

**A CRITICAL ANALYSIS AND STRATEGIC
FRAMEWORK FOR RESEARCH IN SPORT AND
EXERCISE MEDICINE AT THE UNIVERSITY OF THE
FREE STATE**

by

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DECLARATION

I hereby declare that the work submitted here is the result of my own independent investigation. Where help was sought, it was acknowledged. I further declare that this work is submitted for the first time at this university/faculty towards a Philosophiae Doctor degree in Health Professions Education and that it has never been submitted to any other university/faculty for the purpose of obtaining a degree.

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DEDICATION

I dedicate this thesis to my wife, Elizbé, a consummate scholar of life, who affords me the opportunity to live my dreams and who loves and supports me abundantly.

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TABLE OF CONTENTS

CHAPTER 1

ORIENTATION OF THE STUDY

1.1	INTRODUCTION _____	1
1.2	BACKGROUND TO THE RESEARCH PROBLEM _____	3
1.3	PROBLEM STATEMENT AND RESEARCH QUESTIONS _____	5
1.4	OVERALL GOAL, AIM AND OBJECTIVES OF THE STUDY _____	6
1.4.1	Overall goal of the study _____	6
1.4.2	Aim of the study _____	6
1.4.3	Objectives of the study _____	7
1.5	DEMARICATION OF THE FIELD AND THE SCOPE OF THE STUDY _____	7
1.6	SIGNIFICANCE AND VALUE OF THE STUDY _____	8
1.7	RESEARCH DESIGN AND METHODS OF INVESTIGATION _____	8
1.7.1	Design of the study _____	8
1.7.2	Methods of investigation _____	9
1.8	IMPLEMENTATION OF THE FINDINGS _____	11
1.9	ARRANGEMENT OF THE REPORT _____	11
1.10	CONCLUSION _____	12

CHAPTER 2

PERSPECTIVES ON SPORT AND EXERCISE MEDICINE AND FACTORS INFLUENCING RESEARCH

2.1.	INTRODUCTION _____	14
2.2.	THE HISTORY, ROLE AND PLACE OF SPORT AND EXERCISE MEDICINE (SEM) _____	18
2.2.1	The history of SEM _____	18
2.2.2	The role and place of SEM _____	20
2.2.2.1	<i>The role of SEM in disease prevention</i> _____	20
2.2.2.2	<i>The role of High Performance Sports Medicine</i> _____	24
2.2.2.3	<i>The role of prevention and management of sport injuries</i> _____	24
2.2.2.4	<i>Other roles of SEM</i> _____	25

2.3.	THE MULTIDISCIPLINARY CHARACTER OF SEM _____	25
2.4.	RESEARCH IN SPORT AND EXERCISE MEDICINE _____	27
2.5.	A NEW STRATEGIC FOCUS ON RESEARCH _____	29
2.5.1	Research focus at the University of the Free State _____	30
2.5.1.1	<i>Introduction</i> _____	30
2.5.1.2	<i>A new strategic focus on research at the UFS</i> _____	30
2.5.1.3	<i>Promotions and appointments policy at the UFS</i> _____	31
2.5.1.4	<i>Strategic research clusters at the UFS</i> _____	32
2.6	LEADERSHIP AND MANAGEMENT _____	35
2.6.1	Leadership _____	36
2.6.1.1	<i>Strategic leadership</i> _____	37
2.6.1.2	<i>Visionary leadership</i> _____	38
2.6.1.3	<i>Systemic leadership</i> _____	39
2.6.1.4	<i>Creating a motivating climate</i> _____	39
2.6.2	Management _____	41
2.6.2.1	<i>Systemic management</i> _____	42
2.6.2.2	<i>Human resource management</i> _____	43
2.7	STRATEGY _____	44
2.7.1	Basic principles of the strategic process _____	46
2.7.2	The strategic process _____	49
2.7.3	The monitoring of strategic and management processes _____	50
2.8	RESEARCH LEADERSHIP AND MANAGEMENT _____	52
2.8.1	Academic leadership and management _____	52
2.8.1.1	<i>Leadership, management and research in academic medicine</i> _____	52
2.8.1.2	<i>The "triple threat" of clinical workload, research, and teaching</i> _____	55
2.8.2	Research strategy and management _____	56
2.8.2.1	<i>Research strategy</i> _____	56
2.9	THE SCIENTIFIC COMMUNITY _____	59
2.9.1	Characteristics of the research community _____	59
2.9.1.1	<i>Networking</i> _____	59
2.9.1.2	<i>Collaboration and team science</i> _____	59
2.9.1.3	<i>Internet-based scientific networking</i> _____	61
2.9.2	Research culture and scholarship _____	61
2.9.3	Academic freedom and identity _____	64
2.10	RESEARCH ETHICS _____	66

2.11	THE HUMAN ELEMENT IN RESEARCH _____	69
2.11.1	The characteristics of a researcher _____	69
2.11.2	The characteristics of a research leader _____	70
2.11.3	Rewards in research _____	71
2.11.4	Building a research career _____	72
2.11.4.1	<i>Career stages</i> _____	72
2.11.4.2	<i>Considerations in building a research career</i> _____	74
2.12	FUNDING OF UNIVERSITY-BASED RESEARCH _____	75
2.12.1	Funding models for university-based research _____	75
2.12.2	Research funding at the UFS _____	76
2.12.3	Research grant applications _____	77
2.13	RESEARCH ACTIVITIES _____	79
2.13.1	Scientific reputation _____	79
2.14	RESEARCH OUTPUTS _____	81
2.14.1	Research outputs and outcomes _____	81
2.14.2	Impact and significance of research _____	85
2.15	CONCLUSION _____	87

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1	INTRODUCTION _____	88
3.2	THEORETICAL PERSPECTIVES ON THE RESEARCH METHODOLOGY _____	88
3.3	DESCRIPTION OF THE METHODS _____	89
3.3.1	Literature review _____	90
3.3.2	Semi-structured interview _____	91
3.3.2.1	<i>Theoretical aspects</i> _____	91
3.3.2.2	<i>The interview guide for SEM researchers and research managers</i> _____	92
3.3.2.3	<i>Target population</i> _____	95
3.3.2.4	Sample selection _____	95
3.3.2.5	<i>Survey population</i> _____	97
3.3.2.6	<i>Description of sample</i> _____	97
3.3.2.7	<i>The pilot study</i> _____	99
3.3.2.8	<i>Data gathering and analysis</i> _____	99

3.3.3.	The Delphi survey _____	99
3.3.3.1	<i>Theoretical aspects</i> _____	99
3.3.3.2.	<i>The Delphi process and questionnaire in this study</i> _____	102
3.3.3.3	<i>Sample selection</i> _____	102
3.3.3.4	<i>Target population</i> _____	103
3.3.3.5	<i>Survey population</i> _____	104
3.3.3.6	<i>Sample size</i> _____	104
3.3.3.7	<i>Description of the sample</i> _____	105
3.3.3.8	<i>The pilot study</i> _____	107
3.3.3.9	<i>Data gathering</i> _____	107
3.3.3.10	<i>Data analysis</i> _____	108
3.4	ENSURING THE QUALITY OF THE STUDY _____	109
3.4.1.	Trustworthiness _____	109
3.4.2.	Reliability _____	110
3.4.3	Validity _____	110
3.4.4	Generalisation _____	111
3.5	ETHICAL CONSIDERATIONS _____	111
3.5.1	Approval _____	111
3.5.2	Informed consent _____	111
3.5.3	Right to privacy _____	112
3.5.4	Minimising the potential misinterpretation of results _____	112
3.6	CONCLUSION _____	112

CHAPTER 4

RESULTS, DATA ANALYSIS AND FINDINGS OF THE SEMI-STRUCTURED INTERVIEWS

4.1	INTRODUCTION _____	113
4.2	DESCRIPTION OF THE SAMPLE POPULATION FOR INTERVIEWS _____	113
4.3	DATA ANALYSIS AND DESCRIPTION OF THE FINDINGS OF THE SEMI-STRUCTURED INTERVIEWS _____	114

4.3.1	Category 1: The status, role and place of Sport and Exercise Medicine at the University of the Free State _____	114
4.3.1.1	<i>The status of Sport and Exercise Medicine at the University of the Free State _____</i>	114
4.3.1.2	<i>The role and place of research in SEM at the UFS _____</i>	116
4.3.2	Category 2: Role players and stakeholders in SEM research _____	119
4.3.3	Category 3: The Research Strategy of the UFS _____	122
4.3.3.1	<i>Question 3.1: How do you understand the current research strategy of the UFS? _____</i>	123
4.3.3.2	<i>Question 3.2: How, in your opinion, does research in your own department fit in with the current research strategy of the UFS? _____</i>	125
4.3.3.3	<i>Question 3.3: How, in your opinion, does research in SEM fit in with the current research strategy of the UFS? _____</i>	127
4.3.4	Category 4: Challenges in research _____	129
4.3.4.1	<i>Question 4.1: What, in your opinion, are challenges of interdisciplinary research at the UFS? _____</i>	129
4.3.4.2.	<i>Question 4.2: What, in your opinion, are academic challenges for researchers in SEM or in your own discipline? _____</i>	132
4.3.4.3	<i>Question 4.3: What, in your opinion, are challenges for leaders and managers in research? _____</i>	134
4.3.4.4	<i>Question 4.4: What, in your opinion, is needed to master these academic challenges? _____</i>	136
4.3.4.5	<i>Question 4.5: What difficulties may be encountered that could prevent the successful attainment of these solutions? _____</i>	142
4.3.5	Category 5: Skills and status of researchers and research leaders _____	144
4.3.5.1	<i>Question 5.1: What do you think are the disciplinary knowledge and status needed by researchers and research leaders? _____</i>	144
4.3.5.2	<i>Question 5.2: What leadership skills are, in your opinion, required by researchers and leaders or managers of research programmes? _____</i>	145
4.3.5.3	<i>Question 5.3: What managerial skills are in your opinion required by researchers and leaders or managers of a research programme? _____</i>	147
4.3.6	Category 6: Suggested components of a strategic framework in SEM research _____	150

4.3.6.1	<i>Question 6.1: Which aspects or criteria would you suggest to be included in a strategic guide for the development and implementation of a research programme in sport and exercise medicine at the University of the Free State (or your own discipline)?</i>	150
4.3.7	Category 7: Open question	153
4.3.7.1	<i>Question 7.1: Do you have any other comments or suggestions that may be useful in the development of a strategic framework for a multi-disciplinary research programme in SEM at the UFS?</i>	153
4.4	CONCLUSION	154

CHAPTER 5

RESULTS, DATA ANALYSIS AND FINDINGS OF THE DELPHI PROCESS

5.1	INTRODUCTION	156
5.2	DESCRIPTION AND DISCUSSION OF THE DELPHI SURVEY	156
5.2.1	Round One of the Delphi survey	157
5.2.1.1	<i>The measuring instrument</i>	157
5.2.1.2	<i>Analysis of the Round One responses</i>	160
5.2.1.3	<i>Discussion of the findings of Round One of the Delphi survey</i>	161
5.2.2	Round Two of the Delphi survey	161
5.2.2.1	<i>The measuring instrument</i>	161
5.2.2.2	<i>Analysis of the Round Two responses</i>	162
5.2.2.3	<i>Discussion of the findings of Round Two of the Delphi survey</i>	162
5.2.3	Round Three of the Delphi survey	163
5.2.3.1	<i>The measuring instrument</i>	164
5.2.3.2	<i>Analysis of responses</i>	164
5.2.3.3	<i>Discussion of the findings of Round Three of the Delphi survey</i>	165
5.2.4	Summative discussion of the Delphi process	172
5.2.4.1	<i>Consensus</i>	173
5.2.4.2	<i>Stability</i>	188
5.2.4.3	<i>No consensus</i>	188
5.2.4.4	<i>Comments by panellists</i>	188

5.3	INTEGRATED DISCUSSION OF THE RESULTS OF THE DELPHI SURVEY _____	189
5.3.1	Section A: Strategic foundations of a research framework in SEM_____	189
5.3.1.1	<i>Overall strategy in research planning and management</i> _____	189
5.3.1.2	<i>Prioritisation of research in focus areas</i> _____	191
5.3.1.3	<i>Monitoring of the success of a research programme</i> _____	192
5.3.1.4	<i>Additional relevant input from panellists regarding strategy in research planning and management</i> _____	192
5.3.2	Section B: The role, place and character of research in SEM at a university _____	193
5.3.2.1	<i>The educational and academic role of research in SEM</i> _____	193
5.3.2.2	<i>The academic positioning of a research programme in SEM at a university</i> _____	195
5.3.2.3	<i>The multidisciplinary character of SEM</i> _____	196
5.3.2.4	<i>Possible academic role players and stakeholders in a multidisciplinary SEM research programme</i> _____	196
5.3.2.5	<i>The positioning of a multidisciplinary SEM research programme within existing research focus areas at the UFS</i> _____	198
5.3.2.6	<i>Additional relevant input from expert panellists regarding the role, positioning and character of a SEM research programme</i> _____	198
5.3.3	Section C1: Resources that are required by a research programme in SEM _____	199
5.3.3.1	<i>Human resources</i> _____	199
5.3.3.2	<i>Financial resources</i> _____	204
5.3.3.3	<i>Internal institutional resources</i> _____	206
5.3.3.4	<i>External organisational resources</i> _____	206
5.3.4	Section C2: Processes relevant to the successful operation of a multidisciplinary SEM research programme _____	207
5.3.4.1	<i>Strategic processes</i> _____	207
5.3.4.2	<i>Managerial processes</i> _____	210
5.3.4.3	<i>Operational processes</i> _____	211
5.3.5	Section D: Challenges in multidisciplinary research in SEM _____	211
5.3.6	Section E: Outputs (products) of a multidisciplinary SEM research programme _____	213
5.3.6.1	<i>Types of outputs</i> _____	213

5.3.6.2	<i>Levels of focus</i> _____	215
5.3.7	Outcomes (impact) of a multidisciplinary SEM research programme ____	216
5.3.7.1	<i>Types of outcomes</i> _____	216
5.3.7.2	<i>Measurement of outcomes</i> _____	217
5.4	CONCLUSION _____	217

CHAPTER 6

A STRATEGIC FRAMEWORK FOR A RESEARCH PROGRAMME IN SPORT AND EXERCISE MEDICINE AT THE UNIVERSITY OF THE FREE STATE

6.1	INTRODUCTION _____	219
6.2	PREMISES FOR THE DEVELOPMENT OF A STRATEGIC FRAMEWORK FOR RESEARCH IN SPORT AND EXERCISE MEDICINE AT THE UNIVERSITY OF THE FREE STATE _____	221
6.3	PRINCIPLES AND POINTS OF DEPARTURE OF THE STRATEGY _____	223
6.3.1	Principles related to Sport and Exercise Medicine _____	223
6.3.2	Principles related to the University of the Free State _____	224
6.3.3	Principles related to leadership, management and strategic planning____	224
6.3.4	Principles related to research _____	224
6.3.5	Principles related to sustainability _____	225
6.4	ROLE PLAYERS AND RESOURCES WHICH MAY INFLUENCE THE DEVELOPMENT, IMPLEMENTATION AND SUSTAINABILITY OF A SPORT AND EXERCISE MEDICINE RESEARCH PROGRAMME AT THE UFS _____	226
6.4.1	Role players in the programme _____	227
6.4.1.1	<i>Competent academic staff</i> _____	227
6.4.1.2	<i>Competent research support staff</i> _____	228
6.4.1.3	<i>The research leader and manager</i> _____	228

6.4.2	Institutional resources_____	229
6.4.3	External organisational resources_____	230
6.5	INPUTS REQUIRED FOR THE SUCCESSFUL DEVELOPMENT, IMPLEMENTATION AND SUSTAINABLE MANAGEMENT OF A RESEARCH PROGRAMME IN SEM AT THE UFS _____	230
6.5.1	Leadership and management inputs (Figure 6.4) _____	232
6.5.1.1	<i>Strategic management</i> _____	232
6.5.1.2	<i>Academic management</i> _____	233
6.5.1.3	<i>Financial management</i> _____	233
6.5.1.4	<i>Time management</i> _____	234
6.5.1.5	<i>Operational management</i> _____	234
6.5.2	Academic and research inputs (Figure 6.5) _____	235
6.5.3	Programme activities_____	236
6.6	OUTPUTS OF A SEM RESEARCH PROGRAMME AT THE UFS _____	236
6.6.1	Academic outputs _____	237
6.6.1.1	<i>Quantitative outputs</i> _____	237
6.6.1.2	<i>Qualitative outputs</i> _____	237
6.6.2	Human products _____	237
6.6.3	Financial products _____	238
6.6.4	Levels of focus_____	238
6.6.5	Targeted direction of outputs _____	238
6.7	LONG-TERM OUTCOMES, IMPACT AND SIGNIFICANCE OF A SEM RESEARCH PROGRAMME AT THE UFS _____	239
6.7.1	Types of outcomes, impact and significance _____	239
6.7.2	Monitoring of outcomes, impact and significance _____	240
6.8	CHALLENGES AND SOLUTIONS IN THE DEVELOPMENT, IMPLEMETATION AND SUSTAINABLE MANAGEMENT OF A SEM RESEARCH PROGRAMME AT THE UFS _____	240
6.8.1	Challenges_____	240
6.8.1.1	<i>Academic challenges</i> _____	241
6.8.1.2	<i>Managerial challenges</i> _____	241
6.8.2	Solutions _____	241

6.9	A STRATEGIC FRAMEWORK FOR RESEARCH IN SPORT AND EXERCISE MEDICINE AT THE UNIVERSITY OF THE FREE STATE _____	243
6.9.1	Orientation to the strategic framework _____	243
6.10	CONCLUSION _____	244

CHAPTER 7

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS OF THE STUDY

7.1	INTRODUCTION _____	245
7.2	OBSERVATIONS RELATED TO THE STUDY _____	245
7.2.1	Observations regarding the context, aims, and objectives of the study _____	245
7.2.2	Observations regarding the methodology _____	246
7.2.3	Observations regarding the interpretation of certain findings _____	247
7.2.4	General observations _____	247
7.3	LIMITATIONS OF THE STUDY _____	248
7.4	FINAL RECOMMENDATIONS _____	248
7.5	CONCLUSION _____	249

REFERENCES _____	251
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APPENDICES

APPENDIX A1

APPENDIX A2

APPENDIX A3

APPENDIX A4

APPENDIX B1

APPENDIX B2

APPENDIX C1

APPENDIX C2

APPENDIX C3

APPENDIX D1

APPENDIX D2

APPENDIX D3

APPENDIX E1

APPENDIX E2

APPENDIX F1

APPENDIX F2

LIST OF FIGURES

Figure 1.1:	A schematic overview of the study _____	10
Figure 2.1:	Schematic illustration of evidence-based medicine (EBM) _____	15
Figure 2.2:	A theoretical base for development of a strategic framework in SEM at the UFS _____	17
Figure 2.3:	The role of reductionism and holism in SEM and the prevention of disease _____	23
Figure 2.4:	The traditional medical model _____	26
Figure 2.5:	The Sport and Exercise Medicine model _____	27
Figure 2.6:	The “Leader’s Wheel” _____	37
Figure 2.7:	Elements and dynamics of a motivating climate _____	41
Figure 2.8:	The four fundamental management functions constituting the management process _____	42
Figure 2.9:	Classification of managers according to management level and area _____	43
Figure 2.10:	An exploded map of strategic management _____	46
Figure 2.11:	Level Five hierarchy of successful leadership _____	48
Figure 2.12:	The three circles of the Hedgehog concept, illustrating the main determinants of focus areas for success _____	48
Figure 2.13:	The strategy process _____	49

Figure 2.14:	The basic programme logic model _____	51
Figure 2.15:	The researcher in context – levels of influence on selection of research agendas _____	58
Figure 2.16:	The UFS Research Strategy Framework _____	63
Figure 2.17	A representation of the location of meaningful work within the academic context _____	72
Figure 2.18	Stages in a research career _____	73
Figure 3.1	The interview continuum _____	91
Figure 5.1	Example of the selection menu of the Delphi questionnaire _____	157
Figure 6.1	Premises for a strategic framework for research in Sport and Exercise Medicine at the University of the Free State _____	222
Figure 6.2	Points of departure in the development of a strategic framework for SEM research at the UFS _____	225
Figure 6.3	Role players and resources which may influence the development and sustainability of a Sport and Exercise Medicine Research Programme at the UFS _____	226
Figure 6.4	The components of leadership and management inputs required for the successful implementation and sustainable management of a SEM research programme at the UFS _____	231
Figure 6.5	The components academic and research inputs required for the successful implementation and sustainable management of a SEM research programme at the UFS _____	231

Figure 6.6	The three to five year outputs expected from for the successful implementation and sustainable management of a SEM research programme at the UFS _____	236
Figure 6.7	The desired outcomes, impact and significance of a SEM research programme at the UFS _____	239
Figure 6.8	A schematic illustration of the strategic framework for research In Sport and Exercise Medicine at the University of the Free State _____	242

LIST OF TABLES

Table 2.1:	Strategic research clusters at the UFS _____	35
Table 2.2:	Ten rules for building and maintaining a scientific reputation _____	80
Table 3.1:	The categories and questions of the semi-structured interviews _____	94
Table 3.2:	Position, expertise and qualifications of interviewees _____	98
Table 3.3:	Description of the Delphi panel of experts _____	106
Table 4.1:	The Status of Sport and Exercise Medicine at the University of the Free State _____	Appendix A4
Table 4.2:	The role and place of research in SEM at the UFS _____	Appendix A4
Table 4.3:	Essential role players and stakeholders in a Sport and Exercise Medicine Research programme _____	Appendix A4
Table 4.4:	Nominated academic stakeholders in an interdisciplinary SEM research programme _____	122
Table 4.5:	Understanding of the research strategy of the UFS _____	Appendix A4
Table 4.6:	How own departmental research and SEM research fit in with the current research strategy of the UFS _____	Appendix A4
Table 4.7:	Challenges of interdisciplinary research at the UFS _____	Appendix A4
Table 4.8:	Academic and management challenges and solutions for researchers in SEM or in own discipline _____	Appendix A4

Table 4.9:	Potential difficulties and solutions in attainment of the goals _____	Appendix A4
Table 4.10:	Disciplinary knowledge and status of researchers and research leaders _____	Appendix A4
Table 4.11:	Leadership characteristics of researchers and leaders in research programme _____	Appendix A4
Table 4.12:	Management skills of researchers and leaders in research programmes _____	Appendix A4
Table 4.13:	Characteristics of research leaders _____	149
Table 4.14:	Criteria to be included in a strategic guide for development and implementation of a research programme in SEM _____	Appendix A4
Table 4.15:	Other comments or suggestions that may be useful in the development of a strategic framework for a multi-disciplinary research programme in SEM at the UFS _____	Appendix A4
Table 5.1:	Stability statements in Round Three (final round) of the Delphi survey _____	166
Table 5.2:	Statements that reached consensus on "partially agree" and "disagree" _____	173
Table 5.3:	Consensus in the Delphi study _____	175

LIST OF ABBREVIATIONS AND ACRONYMS

ACSM	American College of Sports Medicine
ADO	Anti-doping Organisation
COHSASA	Council of Health Service Accreditation of South Africa
CMSA	Colleges of Medicine of South Africa
COS	Community of Science
CSEM	College of Sport and Exercise Medicine of South Africa
CUT	Central University of Technology, Free State
DALY	Disease-adjusted life years
DIRAP	Directorate Institutional Research and Academic Planning
DoE	South African National Department of Education
DoH	South African National Department of Health
DPhil	Doctor Philosophiae
DRD	Directorate Research Development of the UFS
EAH	Exercise-associated hyponatremia
EBM	Evidence-based medicine
EFSMA	European Federation of Sports Medicine
FDA	Federal Drug Administration of the United States of America
FHS	Faculty of Health Sciences
FIFA	International Football Federation
FIMS	Fédération Internationale de Médecine du Sport
FS	Free State Province, South Africa
GCP	Good Clinical Practice
GRP	Good Research Practice
HoD	Head of Department
HPCSA	Health Professions Council of South Africa
HPE	Health Professions Education
HPSM	High-performance sports medicine
ICRAM	International Campaign to Revitalise Academic Medicine
IGM	Interacting Group Method
IMAST	Integrated Medicine and Sciences Support Team
IOC	International Olympic Committee
IP	Intellectual property
JIF	Journal Impact Factor

MC-IOC	Medical and Scientific Commission, International Olympic Committee
MD	Doctorandus Medicinae
M Fam Med	Magister in Family Medicine
MPhil	Magister Philosophiae
MRC	Medical Research Council of South Africa
NCD	Non-communicable disease
NGT	Nominal Group Technique
NHLS	National Health Laboratory Service
NIH	National Institutes of Health of the United States of America
NRF	National Research Foundation of South Africa
PhD	Doctorandus Philosophiae/Doctor of Philosophy
PLoS	Public Library of Science
PSP	Prestige Scholars Programme
PU for CHE	Potchefstroom University for Higher Christian Education, South Africa
RAE	Research Assessment Exercise
RCI	Research Commercialisation and Innovation office of the UFS
RISA	Research and Innovation Support and Advancement Agency South Africa
SA	South Africa
SAASTA	South African Agency for Science and Technology Advancement
SAQA	South African Qualifications Authority
SASCOC	South African Sports Confederation and Olympic Committee
SASMA	South African Sports Medicine Association
SCI	Science Citation Index
SEM	Sport and Exercise Medicine
SME	Subject Matter Expert
SoM	School of Medicine
UCT	University of Cape Town
UFS	University of the Free State
UK	United Kingdom
UP	University of Pretoria
UV	Universiteit van die Vrystaat
Wits	University of the Witwatersrand

SUMMARY

Key terms: Delphi process; multidisciplinary; research management; research programme; semi-structured interviews; Sport and Exercise Medicine; strategic framework; qualitative and quantitative approach.

This research comprises an in-depth study to construct a strategic framework for research in Sport and Exercise Medicine at the University of the Free State in Bloemfontein, South Africa.

Sport and Exercise Medicine (SEM) is a young academic discipline in South Africa. Internationally, the status, training, research and level of service delivery in SEM are spread out over a broad spectrum, from a well established and highly specialised medical specialty in certain countries, down to relative obscurity with lack of recognition in mainstream medicine and without specialty status in others. Research is the ideal focus area which will advance the status and recognition of SEM in South Africa and elsewhere, as well as increase the evidence base for SEM, both locally and internationally. A need for relevant research in SEM in South Africa has been recognized. The University of the Free State (UFS) has a young SEM programme, which needs to grow and gain local, national and, eventually, international recognition to make a meaningful contribution to the discipline of SEM. Furthermore, the UFS has embarked on a journey to increase its research outputs and status considerably over the next five to ten years. These conditions provide a golden opportunity to establish a research programme of excellence in SEM at the UFS.

Against this background, the problem that was addressed is a lack of co-ordinated, publishable research in the Sport and Exercise Medicine (SEM) disciplines at the UFS, despite many opportunities that are presented. In addition, a relative need for strategic research planning in sport sciences in South Africa and internationally has been recognized. The overall goal of the study was therefore to facilitate high quality, published research in SEM with the view to improve the scientific grounding of the discipline. In order to achieve this goal, the specific aim of the study was to do a critical situation-based analysis of Sport and Exercise Medicine and relevant factors in research and research management, with the view to compile a strategic framework for the development of a research programme in SEM at the UFS.

Both qualitative and quantitative research methods were utilised in the study and used in complementary fashion. The methods comprised a literature review, semi-structured interviews and a Delphi survey to determine the key components of the eventual strategic framework. All respondents in the empirical part of the study gave informed consent to participate. Pre-testing of the interview guide and the Delphi questionnaire were done by means of pilot studies. These processes were followed to ensure scientific validity, reliability and trustworthiness of the study.

The literature review provided relevant insights into aspects of SEM and SEM research; leadership, management and strategic planning; academic research management; principles of research; as well as strategies and policies influencing research at the UFS.

With the literature review as foundation, semi-structured interviews were conducted with current academic role players in SEM at the UFS, as well as with research managers at the UFS, to investigate the practical applications of theory and policy in research at the UFS, to identify challenges in research at the UFS, and to obtain the views of current role players on aspects of a multidisciplinary research framework in SEM at the UFS. Thirteen participants were selected for the semi-structured interviews by means of purposive and sequential sampling methods. The questions in the semi-structured interviews comprised seven categories, namely the status, role and place of SEM at the UFS; stakeholders in SEM research; research strategy; challenges in research; skills, knowledge and status of researchers and research leaders; suggested components of a strategic framework in SEM research; and an open category which invited any further relevant comments. Due to their semi-structured nature, the data obtained from interviews were mostly qualitative, but with quantitative elements.

The results of the semi-structured interviews were categorised, analysed and collated in tables. These results were used in the context of the literature review, to construct a Delphi questionnaire which was used in a Delphi process with a panel of national and international experts in SEM research and in research management. The Delphi technique is a method for the collection of opinion on a particular topic, particularly the opinions of experts on the topic at hand. It was therefore chosen as an appropriate

tool to test the results of interviews with local experts as interpreted according to the literature, on a panel of experts.

The participants in the Delphi process were carefully selected to include national and international experts in SEM education and research, as well as policy-makers, leaders and managers in research. The selected international experts were globally representative. The panel consisted of ten experts. The Delphi questionnaire was constructed in accordance with the semi-structured interviews, but categorised in the sequence of the program logic model of the W.K. Kellogg Foundation, on which the final strategic framework was developed. The categories comprised strategic foundations of a research framework in SEM; the role, place and character of research in SEM at a university; inputs and processes required, challenges expected and outputs envisaged; as well as the expected impact or significance of a research programme in SEM at the UFS and possible ways to measure the progress of the programme. The results of the Delphi survey were analysed and the findings presented and discussed.

The final outcome of the study, a strategic framework for research in SEM at the UFS, was created by triangulation of the critical analysis of SEM research and other relevant themes in the literature review, the results of the semi-structured interviews, and the results of the Delphi survey. In the final product, the premises, principles, points of departure and required resources for the development of a strategic framework for a research programme in SEM at the UFS were presented. Detailed formulations of inputs, processes and outputs of the programme were put forward, to culminate in a sustainable research programme.

In conclusion of the study, final conclusions were drawn, limitations of the study addressed and recommendations made.

The researcher believes that this study will make a unique contribution to the research, further development, and ultimately the status of Sport and Exercise Medicine at the University of the Free State and in South Africa. The challenges identified in the study and the complexities of research development have not gone unnoticed. These challenges will be addressed with passion and determination towards the attainment of the ultimate goal which inspired the study.

OPSOMMING

Sleuteltermes: Delphi-proses; multidisiplinêr; navorsingsbestuur; navorsingsprogram; semi-gestruktureerde onderhoude; sport- en oefeningsgeneeskunde; strategiese raamwerk; kwalitatiewe en kwantitatiewe benadering.

Die navorsing behels 'n diepgaande studie met die doel om 'n strategiese raamwerk vir navorsing in sport- en oefeningsgeneeskunde aan die Universiteit van die Vrystaat in Bloemfontein, Suid-Afrika te konstrueer.

Sport- en oefeningsgeneeskunde (SEM) is 'n jong akademiese dissipline in Suid-Afrika. In die internasionale arena is die status, opleiding, navorsing en vlak van dienslewering oor 'n breë spektrum versprei – van 'n goed gevestigde, hoogs gespesialiseerde spesialiteitsrigting in sekere lande tot relatiewe gebrek aan erkenning as vakgebied in hoofstroom geneeskunde sonder spesialisstatus elders. Navorsing is by uitstek die fokusarea wat die status en erkenning van SEM in Suid-Afrika en elders sal bevorder. Dit sal ook die bewysbasis vir kliniese sport- en oefeningsgeneeskunde op nasionale en internasionale vlak verbreed. Die behoefte aan toepaslike navorsing in SEM is in Suid-Afrika geïdentifiseer. Die Universiteit van die Vrystaat (UV) beskik oor 'n jong SEM-program wat sal moet groei om plaaslike, nasionale en uiteindelik internasionale erkenning te verwerf, ten einde 'n betekenisvolle bydrae te lewer tot die vakgebied. Die UV het voorts 'n doelwit gestel om sy navorsingsuitsette en –status aansienlik oor die volgende vyf tot tien jaar te verbeter. Hierdie omstandighede skep 'n gulde geleentheid vir die vestiging van 'n uitnemende navorsingsprogram in SEM aan die UV.

Teen hierdie agtergrond is die probleem wat in die studie aangeroei is 'n gebrek aan gekoördineerde, publiseerbare navorsing in SEM en verwante dissiplines aan die UV, ten spyte van baie geleenthede daarvoor. Daarmee saam is 'n relatiewe gebrek aan strategiese navorsingsbeplanning in sportwetenskappe in Suid-Afrika geïdentifiseer. Die algehele doelwit van die studie was dus om gepubliseerde navorsing van hoë gehalte in SEM te bevorder, om sodoende die wetenskaplike begroning van die vakgebied te verbeter. Ten einde hierdie doelwit te bereik was die spesifieke doel van die studie om 'n kritiese, omgewingsgebaseerde analise van SEM en relevante faktore in navorsing en

navorsingsbestuur te doen, om uiteindelik 'n strategiese raamwerk vir 'n navorsingsprogram in SEM aan die UV daar te stel.

Kwalitatiewe en kwantitatiewe navorsingsmetodiek is aanvullend in die studie gebruik. Die metodiek het 'n literatuuroorsig, semi-gestruktureerde onderhoude en 'n Delphi-opname behels om die hoofkomponente van die uiteindelige strategiese raamwerk te bepaal. Alle respondente in die empiriese gedeelte van die studie het ingeligte toestemming gegee om deel te neem. Loodsstudies is gedoen om beide die onderhoudsgids en die Delphi-vraelys vooraf te toets, ten einde die wetenskaplike betroubaarheid, grondigheid en beproefdheid van die studie te verseker.

Die literatuuroorsig het relevante inligting en insigte oor aspekte van SEM en SEM navorsing; leierskap, bestuur en strategiese beplanning; akademiese navorsingsbestuur; beginsels van navorsing; sowel as strategieë en beleide wat navorsing aan die UV beïnvloed, voorsien.

Die literatuuroorsig is as basis gebruik om semi-gestruktureerde onderhoude met huidige akademiese rolspelers in SEM, sowel as met navorsingsbestuurders aan die UV te voer. Die onderhoude is gebruik om die praktiese toepassing van teorie en navorsingsbeleide, uitdagings in navorsing, en die sienswyses van huidige rolspelers oor aspekte van interdisiplinêre navorsing in SEM aan die UV te ondersoek. Dertien deelnemers is vir die semi-gestruktureerde onderhoude gekies deur middel van doelmatige en sekwensiële steekproefneming. Die vrae in die semi-gestruktureerde onderhoude het uit sewe kategorieë bestaan, by name die status, rol en plasing van SEM aan die UV; rolspelers in SEM-navorsing; navorsingstrategie; uitdagings in navorsing; kundigheid, vaardighede en status van navorsers en navorsingsleiers; voorgestelde komponente van 'n strategiese raamwerk in SEM aan die UV; sowel as 'n oop kategorie wat 'n uitnodiging gerig het vir enige verdere relevante kommentaar. As gevolg van die semi-gestruktureerde aard van die onderhoude was die data wat verkry is van kwalitatiewe aard, maar met kwantitatiewe elemente.

Die resultate van die semi-gestruktureerde onderhoude is gekategoriseer, geanaliseer en in tabelle opgeteken. Die resultate is voorts in konteks van die literatuurstudie gebruik, om 'n Delphi-vraelys te konstrueer wat gebruik is in 'n Delphi-opname onder 'n paneel van nasionale en internasionale kenners in SEM-navorsing en navorsingsbestuur.

Die Delphi-tegniek is 'n metode om 'n meningsopname oor 'n bepaalde onderwerp te doen en is veral geskik om die menings van kenners op 'n betrokke gebied te bepaal. Die tegniek was dus geskik om die resultate van die onderhoude met plaaslike kenners, soos geïnterpreteer aan die hand van die literatuur, onder 'n paneel van kenners te toets.

Die deelnemers aan die Delphi-opname is noukeurig selekteer om nasionale en internasionale kenners in SEM-opleiding en -navorsing, sowel as beleidmakers, leiers en bestuurders in navorsing in te sluit. Die geselekteerde internasionale deelnemers was globaal verteenwoordigend. Die paneel het uit tien kenners bestaan. Die Delphi-vraelys is soortgelyk as die semi-gestruktureerde onderhoudegekonstrueer, maar gekategoriseer volgens die "program logic model" van die W.K. Kellogg-stigting, waarvolgens die strategiese raamwerk ontwikkel is. Die kategorieë het bestaan uit strategiese vertrekpunte van 'n navorsingsraamwerk in SEM; die rol, plasing en karakter van navorsing in SEM aan 'n universiteit; benodigde insette en prosesse, verwagte uitdagings en voorsiene uitsette; sowel as die verwagte impak of beduidendheid van 'n navorsingsprogram in SEM aan die UV en moontlike metodes om vordering van die program te meet. Die resultate van die Delphi-opname is geanaliseer en die bevindings aangebied en bespreek.

Die finale uitkoms van die studie, 'n strategiese raamwerk vir navorsing in SEM aan die UV, is geskep deur triangulering van die kritiese analise van SEM-navorsing en ander relevante temas in die literatuuroorsig, die resultate van die semi-gestruktureerde onderhoude en die Delphi-opname. In die finale produk is die vertrekpunte, grondbeginsels en vereiste hulpbronne vir die ontwikkeling van 'n navorsingsprogram in SEM aan die UV aangebied. Gedetailleerde formulering van insette, prosesse en uitkomste van die program is voorgelê om uiteindelik uit te kom by 'n volhoubare navorsingsprogram.

Ter samevatting van die studie is die finale gevolgtrekkings aangebied, beperkings van die studie bespreek en aanbevelings gemaak.

Die navorser is van mening dat die studie 'n unieke bydrae sal lewer tot die navorsing, verdere ontwikkeling en uiteindelik die status van sport- en oefeningsgeneeskunde aan die Universiteit van die Vrystaat en in Suid-Afrika. Die uitdagings wat in die studie

geïdentifiseer is en die ingewikkeldheid van navorsingsontwikkeling is van kennis geneem. Hierdie uitdagings sal met passie en doelgerigtheid tegemoet gegaan word ter bereiking van die uiteindelijke doelwit wat die studie geïnspireer het.

A CRITICAL ANALYSIS AND STRATEGIC FRAMEWORK FOR RESEARCH IN SPORT AND EXERCISE MEDICINE AT THE UNIVERSITY OF THE FREE STATE

CHAPTER 1

ORIENTATION TO THE STUDY

1.1 INTRODUCTION

Sport and Exercise Medicine (SEM) is a rapidly growing discipline in health sciences. In order to accelerate this growth, research within SEM is of the utmost importance. Therefore, in this research project, an in-depth study was done by the researcher with a view to analyse the current role, place and status of research in SEM at the University of the Free State (UFS) in Bloemfontein, South Africa; do a literature study; and use the information by doing a critical analysis to develop a strategic framework for research in SEM at the UFS with the assistance of an international panel of experts in SEM research.

Sport and Exercise Medicine in its current form is a young discipline in medicine and finds itself in various stages of incorporation into mainstream medicine in the world (O'Brien & Mahony 2000:237). One of the challenges that is posed to Sport and Exercise Medicine as an academic discipline, is its quick development from the older discipline of sports medicine into a multi-disciplinary field of study, with interest in various other medical disciplines, including orthopaedics, cardiology, internal medicine, exercise sciences, community health and many more. The reason for this apparent overlapping of disciplines lies in the evolution of Sport and Exercise Medicine. The need for more specialised care for the athletic population resulted in generalists and orthopaedic surgeons becoming more interested in the medical care of athletes, which resulted in the first exhibition in sports medicine as early as 1911 in Dresden, Germany, and the first sports medicine conference in 1912 in Oberhof, Germany (Schwellnus 2010). Application of the principles of exercise physiology in enhancement of physical conditioning and athletic performance, soon led to the realisation that exercise can be used to rehabilitate the chronically ill population, especially those with cardiac disease. This application of exercise medicine and exercise science developed into one of the most effective ways to reduce risk in persons with a variety of chronic diseases. It was a natural evolution from exercise rehabilitation of chronic disease to prevention of

disease by means of exercise and healthy lifestyle promotion in the general population (Schwellnus 2010). In fact, according to Pigozzi (2009:1085), prevention of injury and illness at all levels has become one of the most important objectives of sports medicine. This evolutionary process concluded in the current scope of practice of Sport and Exercise Medicine, which is:

- Prevention, diagnosis and treatment of sports injuries,
- Prevention, diagnosis and treatment of medical conditions related to sports participation,
- Prevention and rehabilitation of chronic medical conditions, using exercise and lifestyle intervention as therapeutic tools (Schwellnus 2008:1).

Because of the relatively recent emergence of Sport and Exercise Medicine in its current form as a medical discipline, stable positioning within scientific circles has not yet been reached and stability and positioning are currently in various stages of evolution, both nationally and internationally. However, increasing demand and a clear role for academic sports medicine means that the discipline is ripe for expansion (Macauley 2000:234). Effective expansion of an academic discipline is underpinned by high-quality research.

In providing background for the development of a strategic framework for research in a university department, Nisheva, Gourova, Ruskov, Todorova and Antonova (2008:214) state that the global race for knowledge in the last few decades, and the emergence of a number of interdisciplinary scientific areas, increase the challenges for research and industry organisations. These authors are of the opinion that long-term planning becomes important, especially in small countries with limited financial resources for research, technology development and innovation (RDTI). It is essential for the academic staff of a university to determine:

- Areas of strategic importance and present strengths,
- Where to concentrate more resources and strengthen local capacities,
- Areas to keep a small potential or withdraw,
- How to integrate much better into international research, innovation and higher education activities, and
- How to use the best available practice.

This study can provide a strategic framework and serve as a directive for the development of a structured research programme in SEM at the UFS in order to support the growth of the discipline in South Africa, as only one internationally recognised programme of this kind exists in South Africa. On a broader scale, it may have the potential to be used as a basis for the development of research programmes in SEM or related disciplines elsewhere in Africa, or indeed, the world.

The aim of the first chapter is to orientate the reader to the study. It will describe the current situation; motivate the need for well co-ordinated, high quality, interdisciplinary research in Sport and Exercise Medicine followed by the problem statement – including the research questions, the overall goal, aim and objectives of the study. These are followed by a demarcation of the study and highlighting of the significance and value of the study. Thereafter a brief overview of the research design and methods of investigation is presented. The chapter is concluded by a lay-out of the subsequent chapters and a short, summative conclusion.

1.2 BACKGROUND TO THE RESEARCH PROBLEM

As far as positioning in South Africa is concerned, Sport and Exercise Medicine is not a registered field of speciality. At present (2012), there are four universities that offer Master's Programmes in the subject field. As no official specialist registration for SEM professionals exists, there is no quality control on the side of the medical profession as far as programme content and volume are concerned. This leads to tremendous variation in the content and quality of the various Sport Medicine programmes. Two programmes are offered over a minimum of three years, in the form of blended learning approach with a research component of between 30% and 40%. Two other universities offer a two-year programme with a smaller research component (Heads of Academic Sports Medicine Programmes in South Africa 2008).

As far as the positioning at the UFS is concerned, the Sports Medicine programme is a programme in the Division Sport and Exercise Medicine within the School of Medicine (SoM), with unofficial association with other sport and exercise disciplines and activities on service delivery level, teaching and learning level, and on research level.

As far as international positioning is concerned, the status, training and level of service delivery and research with regard to SEM are spread over a broad spectrum. The Scandinavian countries and Europe are the most advanced regions in the subject field (the former Eastern bloc countries were extremely advanced and had already applied their knowledge and technology to enhance the performance of their athletes some decades ago). In these regions training is highly intensive and specialised. According to Kannus and Parkkari (2000:240), sports medicine training in Finland used to involve full medical specialisation of six years including complete rotations at cardiology and orthopaedics, but has since been reduced to five years of postgraduate training after a medical degree. In the United States of America one can super specialise in sports medicine after specialisation in one of four other medical disciplines - orthopaedics, paediatrics, family medicine or emergency medicine (to become an orthopaedic sports physician, paediatric sports physician, etc.) by obtaining a Fellowship from the American College of Sports Medicine (ACSM: Online). In South Africa SEM is currently based on the Australian model as described by Fricker (2000:240), which involves the acquisition of a Master's degree and practical work for approximately three or four years at an accredited unit – often in the private sector – in order to attain a fellowship and registration as sports physician. In South Africa the Master's degree is offered, but the fellowship and registration of a medical specialty have not realised yet.

The relative inconsistencies in academic programme content and requirements for specialisation within the young subject field create excellent opportunities for an innovative programme. It may take many years before the subject field can achieve speciality status, allowing for quality assurance of programme content. Research is *par excellence* the area in terms of which a SEM programme can grow and build stature in South Africa at present. The need for scientific input in sport in South Africa increases annually (Sports and Recreation South Africa 2008). Relevant research of high quality is in great demand and is conducted at only one centre in South Africa. The situation, therefore, provides a golden opportunity to establish a research unit of excellence in Sport and Exercise Medicine at the University of the Free State.

The UFS heavily underlines research and research development in policy and operational documents (UFS 2003; 2009b; 2010a; 2010b). It claims in its Research Strategy 2009-2013 to be one of the top six research-led universities in South Africa.

The strategy includes becoming a recognised research-intensive university by successful implementation and monitoring of the ambitious strategy (UFS 2009b).

Sport and Exercise Medicine is a young discipline. A strong research component is essential for the status and even the survival of a SEM programme (Schwellnus 2010). Science has to keep up with the ever increasing demands of the sport fraternity for methods of improving performance, management of illness and injury in the athletic population and lifestyle/preventive medicine (Bishop 2008:253).

1.3 PROBLEM STATEMENT AND RESEARCH QUESTIONS

The problem that was addressed is a lack of co-ordinated, publishable research in the Sport and Exercise Medicine (SEM) disciplines at the UFS, despite the opportunities that are presented in Sport and Exercise Medicine.

No recent, or any, study concerning a strategic framework for SEM at the UFS, or elsewhere in South Africa, could be traced. Searches on the website of the National Research Foundation (NRF) and the Nexus Database System (information regarding South African dissertations) did not produce relevant dissertations on SEM with a view to compile a strategic research framework. In searching the broader literature, however, one recent study addressing current sports-related trends in South Africa was found, reporting a trend for individual research to be paramount and focused around niche areas in seven main disciplinary fields, e.g. sports medicine including physiotherapy and biokinetics, sports science, physical activity epidemiology and health or wellness, sport sociology integrated with historical and sport management studies, ergonomics, sport recreation management and leisure studies, the psycho-social aspects of sport, education and training. The study concluded that innovation in this field of study particularly relates to sports medical and sports scientific research of entrepreneurial nature, and recognised the need for collaboration, inter-disciplinary and grounded research within an African paradigm (Burnett 2010:72).

Internationally, examples of related scholarly work include an applied research model for the sports sciences, focussing on the ultimate aim of improving sports performance as published by Bishop (2008:253-263). A new framework for research leading to sports injury prevention was proposed by Finch (2006:3-9). These studies and others

that will be described and referenced in Chapter 2 were helpful in giving an insight into the current status of research in sport sciences in general and in SEM.

In summary, there seemed to be an identified need for strategic research planning in sports sciences in South Africa and internationally. However, no scientific reports on the development of a strategic framework for SEM could be found in the literature.

In order to address the problem stated, the following research questions were addressed:

- 1. How can research in SEM be conceptualised and contextualised in a UFS perspective, as the theoretical framework of the study?*
- 2. What is the role, status and current place of interdisciplinary research in SEM at the UFS, what factors influence this research, and what can be done to improve the quality and quantity thereof?*
- 3. What relevant factors and criteria, based on the perceptions and experiences of national and international experts in SEM research, should be included in a strategic framework for interdisciplinary research in SEM at the UFS?*

These three research questions formed the basis of the research. The findings of the study will serve as a foundation for the development of a research programme in SEM at the UFS.

1.4 OVERALL GOAL, AIM AND OBJECTIVES OF THE STUDY

1.4.1 Overall goal of the study

The overall goal of the study was to execute high quality, publishable research in SEM with the view to improve the scientific grounding of the discipline.

1.4.2 Aim of the study

The aim of the study was to do a critical research based situation analysis of Sport and Exercise Medicine with the view to compile a strategic framework for the development and implementation of a research programme in SEM at the UFS.

1.4.3 Objectives of the study

To achieve the aim the following objectives of the study were pursued:

- Conceptualising and contextualising the lack of strategic guidelines for the development and implementation of research in SEM at the UFS. (This was done via a literature study.)
- This objective addresses research question number 1.
- Identifying the factors that play a role in SEM research. (This was done via semi-structured interviews.)
- This objective addresses research question number 2.
- Determining criteria to develop a strategic research development framework (This was done via a literature study as well as from the results of the interviews), and testing the criteria for the strategic framework by a panel of experts in SEM research. (This was done by means of a Delphi process.)
- This objective addresses research question number 3.
- Finalising the strategic framework for SEM research at the UFS, based on all the relevant literature cited; the findings of the semi-structured interviews with SEM and research specialists at the UFS; and the expert opinions on the content of such a framework; as well as on the expertise and experience of the researcher.
- This objective addresses research questions 1-3 in view of a holistic, scientific product.

1.5 DEMARCATION OF THE FIELD AND THE SCOPE OF THE STUDY

The findings of the study will be utilised to develop a research programme focussed on interdisciplinary research, in SEM at the UFS. The study fits the field of Health Professions Education (HPE). Due to the application of the study in the field of SEM research, the study can be classified as interdisciplinary.

The participants in the semi-structured interviews in this study were researchers in SEM and related disciplines, as well as research experts and managers at the UFS. For the Delphi survey, the participants were individuals who all have specific expertise in research in general and in academic SEM research in South Africa and internationally.

In a personal context, the researcher in this study is a qualified medical doctor with a postgraduate qualification in SEM from a leading South African university. He has 26 years of experience in clinical general medicine and 19 years of experience in clinical Sport and Exercise Medicine. The researcher is the head of the Division Sport and Exercise Medicine at the UFS and is responsible for a Master's programme in SEM, with a large research component. He is also involved in the national development of SEM towards recognition and registration as a medical specialty. These responsibilities, as well as a keen interest in interdisciplinary SEM research, stimulated the researcher to undertake this study.

As far as the timeframe is concerned, the study was conducted between October 2010 and July 2012, with the empirical research phase from April 2011 to April 2012.

1.6 SIGNIFICANCE AND VALUE OF THE STUDY

The value of the research will be the provision of a strategic framework for conducting quality research in SEM, thereby utilising the opportunity for the University of the Free State to fill the void/lack of this type of work necessary for the improvement/furthering of scientific methods in sport, Sport and Exercise Medicine and related sciences in South Africa. If implemented successfully, the findings of the study may make a significant contribution to the status and place of SEM in mainstream medicine in South Africa, and as secondary objective, in Africa and the rest of the world.

1.7 RESEARCH DESIGN AND METHODS OF INVESTIGATION

1.7.1 Design of the study

The methods that were used comprised a literature study which formed the basis of the empirical components – semi-structured interviews and a Delphi process.

The semi-structured interviews were mostly qualitative in nature, but with a quantitative component. The Delphi process on the other hand, was essentially quantitative, with a smaller qualitative component. The open-ended questions in both the semi-structured interviews and the Delphi process, contributed to the qualitative component of the study.

The qualitative and quantitative designs followed in this study are described in more detail in Chapter 3.

1.7.2 Methods of investigation

The literature study included a review of relevant scientific literature on the multi-professional character of SEM, and the role and place of SEM in mainstream medicine in South Africa and elsewhere. As far as literature on research and research systems were concerned, themes that were studied included new strategic focuses on research, systems for research development, research culture, support systems for research, research action plans, policies and guidelines, as well as staff provision and development for research programmes.

The literature study was followed up by a series of semi-structured interviews amongst researchers in SEM at the UFS, as well as research managers in the Faculty of Health Sciences and the University of the Free State, in order to determine the role, status and current positioning of SEM research at the UFS, as well as to determine factors that may play a role in the successful implementation of a research programme in SEM at the UFS. The semi-structured nature of the interviews contributed valuable answers to specific questions, but also created space for open-ended discourse and spontaneous input from interviewees, culminating in a rich yield.

The outcomes of the literature study and the semi-structured interviews were used to compile a Delphi questionnaire, testing possible components of a SEM research programme amongst a panel of national and international experts in SEM research and research managers.

The results from the literature study, the semi-structured interviews, the Delphi process and the experience and expertise of the researcher were used to compile a strategic framework for SEM research at the UFS.

A detailed description of the population, sampling methods, data collection and techniques, data analysis and reporting, as well as ethical considerations is presented in Chapter 3.

A schematic overview of the sequence of the study is given in Figure 1.1.

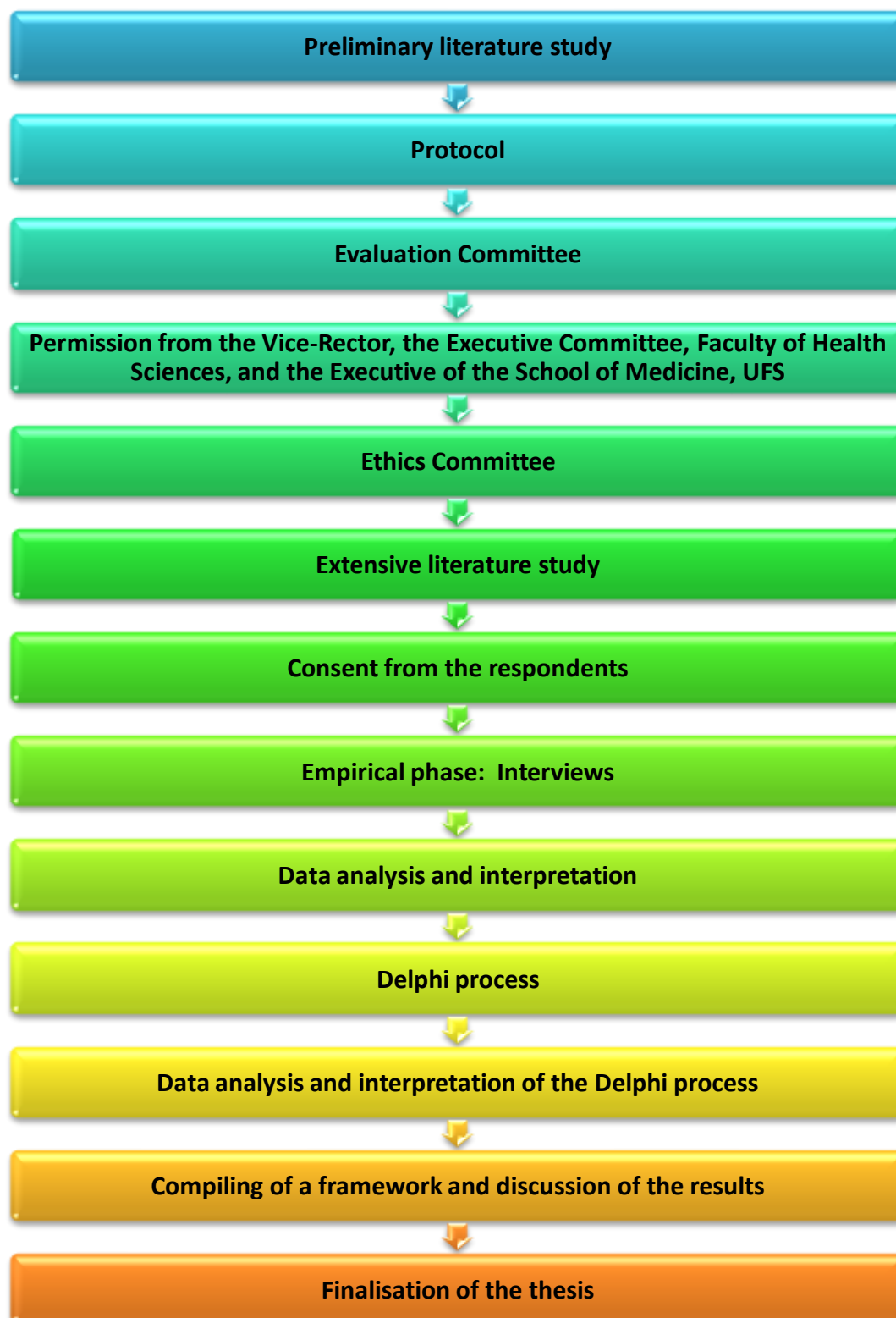


Figure 1.1: A schematic overview of the study
[This schematic overview was prepared by the researcher, Holtzhausen (2012) as part of this PhD research project]

1.8 IMPLEMENTATION OF THE FINDINGS

The report containing the findings of the research will be brought to the attention of the management of the Faculty of Health Sciences of the UFS. The support of faculty management for the development of an interdisciplinary research programme in SEM and related disciplines at the UFS, with the strategic framework as basis, will be requested and recommended. After publication and presentation of the research framework, it is hoped that the study will assist in the development of similar programmes nationally and internationally. It will furthermore be recommended that the framework may be adapted to aid development in other disciplines as well.

The research findings will be submitted to academic journals for publication, as the researcher hopes to make a contribution to the growth and development of SEM in South Africa, Africa and internationally. The research findings will also be presented at conferences.

1.9 ARRANGEMENT OF THE REPORT

To provide more insight into the topic, the methods used to find solutions, as well as the final outcome of the study will be reported on as follows:

In this chapter, Chapter 1, **Orientation to the study**, the background of the study is provided. The research questions, overall goal, aim and objectives are presented. The research design and methods of investigation are briefly discussed. In the chapter, the fields of study are demarcated and the intended significance and value of the study within these fields are offered.

In Chapter 2, **Perspectives on Sport and Exercise Medicine and factors influencing research**, contextualisation and conceptualisation of SEM, as well as aspects of research and research systems are discussed. In the chapter literature on the multi-professional character of SEM, and the role and place of SEM in mainstream medicine in South Africa and elsewhere are presented. Themes presented on research and research systems include new strategic focuses on research, systems for research development, research culture, support systems for research, research action plans,

policies and guidelines, as well as staff provision and development for research programmes. This chapter serves as the theoretical framework for the study.

In Chapter 3, **Research design and methodology**, the research design and methods applied are presented in detail. The methods of data collection and analysis are discussed. The conducting of the semi-structured interviews, as well as the way in which the Delphi questionnaire was constructed and data processed, are presented.

In Chapter 4, **Results, data analysis and findings of the semi-structured interviews**, the results of the semi-structured interviews on SEM research at the UFS are presented and the findings discussed.

In Chapter 5, **Results, data analysis and findings of the Delphi process**, an exposition and discussion of the Delphi process among experts in SEM research and research managers is provided.

In Chapter 6, **A Critical Analysis and Strategic Framework for Research in Sport and Exercise Medicine at the University of the Free State**, the strategic framework as final outcome of the study is presented, contextualised in higher education and in SEM, and discussed in detail.

In Chapter 7, **Conclusions, limitations and recommendations of the study**, a brief overview, core conclusions and recommendations, as well as the limitations of the study are presented to conclude the dissertation.

1.10 CONCLUSION

Chapter 1 provided the background and introduction to the study undertaken to develop a strategic framework for research in Sport and Exercise Medicine at the University of the Free State. As research is such an important component of the growth of SEM, the strategic framework developed in this thesis provides a solid foundation for accelerated growth in SEM.

The next chapter, **Chapter 2**, entitled **Perspectives on Sport and Exercise Medicine and factors influencing research**, will be a review of the relevant literature as outlined in this chapter.

CHAPTER 2

PERSPECTIVES ON SPORT AND EXERCISE MEDICINE AND FACTORS INFLUENCING RESEARCH

This chapter provides an overview of the literature on aspects pertaining to the research study. The literature is presented in three main spheres which are loosely demarcated in the text – Sport and Exercise Medicine; principles of leadership, strategy and management; and considerations in research management and research.

2.1. INTRODUCTION

Sport and Exercise Medicine (SEM) may seem a trendy, market driven health care arena serving to promote the welfare of elite athletes and those who care for them. But a closer look reveals a much older ancestral tree with roots at the very onset of recorded medicine and branches that intertwine with every aspect of today's medical treatment (Leadbetter & Leadbetter 1996:618). As one of the oldest branches of medicine it is interesting to note the disparity in positioning of SEM in different parts of the world, ranging from an important role player in public health and activity related medicine in some parts of the world, to not being recognised as a medical discipline in others and thereby not being allowed to make a meaningful contribution to health care in those countries.

One of the reasons for this ambiguity may lie in the perception, according to Franklyn-Miller, Etherington and McCrory (2011:83), that sports physicians take care of elite athletes who require different types of "cutting edge" therapies than other populations and that unproven therapies are often used in the management of these athletes. In other fields of medicine the use of such unproven therapies would lead to considerable professional criticism and suspicion about the scientific basis of the discipline (Bartecchi 2006:1499). Franklyn-Miller *et al.* (2011:83) argue that the actual use of unproven remedies, as well as the perception by peers of that notion, will limit the development of an evidence base in SEM and will ultimately undermine the credibility of the speciality.

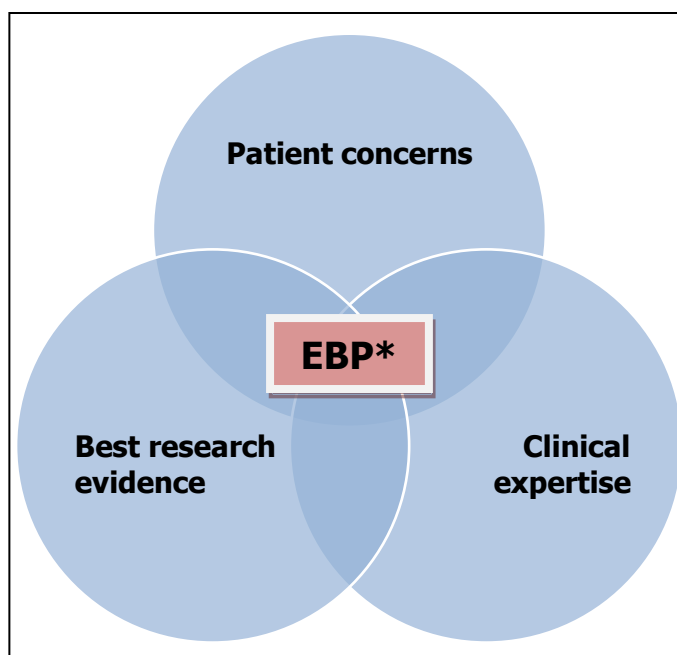


Figure 2.1: Schematic illustration of evidence-based medicine (EBM) - how clinical skills, evidence from research, and patient desire should overlap to provide the “quality decision” for the patient (Brukner & Khan 2012:12)
***EBP = Evidence-based practice**

Evidence-based medicine (EBM) is a vital component of good clinical practice (GCP) and demands that we search for, and develop evidence for benefit and safety of treatment options, after which we select our options according to the best evidence available (Franklyn-Miller *et al.* 2011:83). Brukner and Khan (2012:6) illustrate the model of EBM graphically, as shown in Figure 2.1. In South Africa, SEM in its current form is a young discipline which is still to earn its rightful place in mainstream medicine. In order to assist in providing an evidence base for SEM in South Africa and elsewhere by research, this study will provide a strategic framework for such research.

This chapter provides background from scientific literature, policy-, and other documents to form the basis for the development of the research tools used in the study – in this case an interview guide and a Delphi questionnaire. The chapter investigates the following topics, not in chronological order:

Relevant to SEM:

- The history, role and place of SEM.
- Multi-professional character of SEM.
- Research in SEM.

Relevant to leadership, management and strategic planning:

- Principles of leadership, management and strategy

Relevant to academic and research management:

- Leadership and management in research
- Research strategy
- Leadership and management in academic medicine
- Building a research career
- Funding of university based research

Relevant to principles of research:

- The scientific community, research culture and scholarship
- Research ethics
- The human element in research
- Research activities and career building
- Research outputs

Relevant to the UFS:

- A new strategic focus on research
- Promotion and appointment policy of the UFS
- Research funding at the UFS
- Strategic research clusters at the UFS.

The synthesis of the chapter is presented graphically in Figure 2.2.

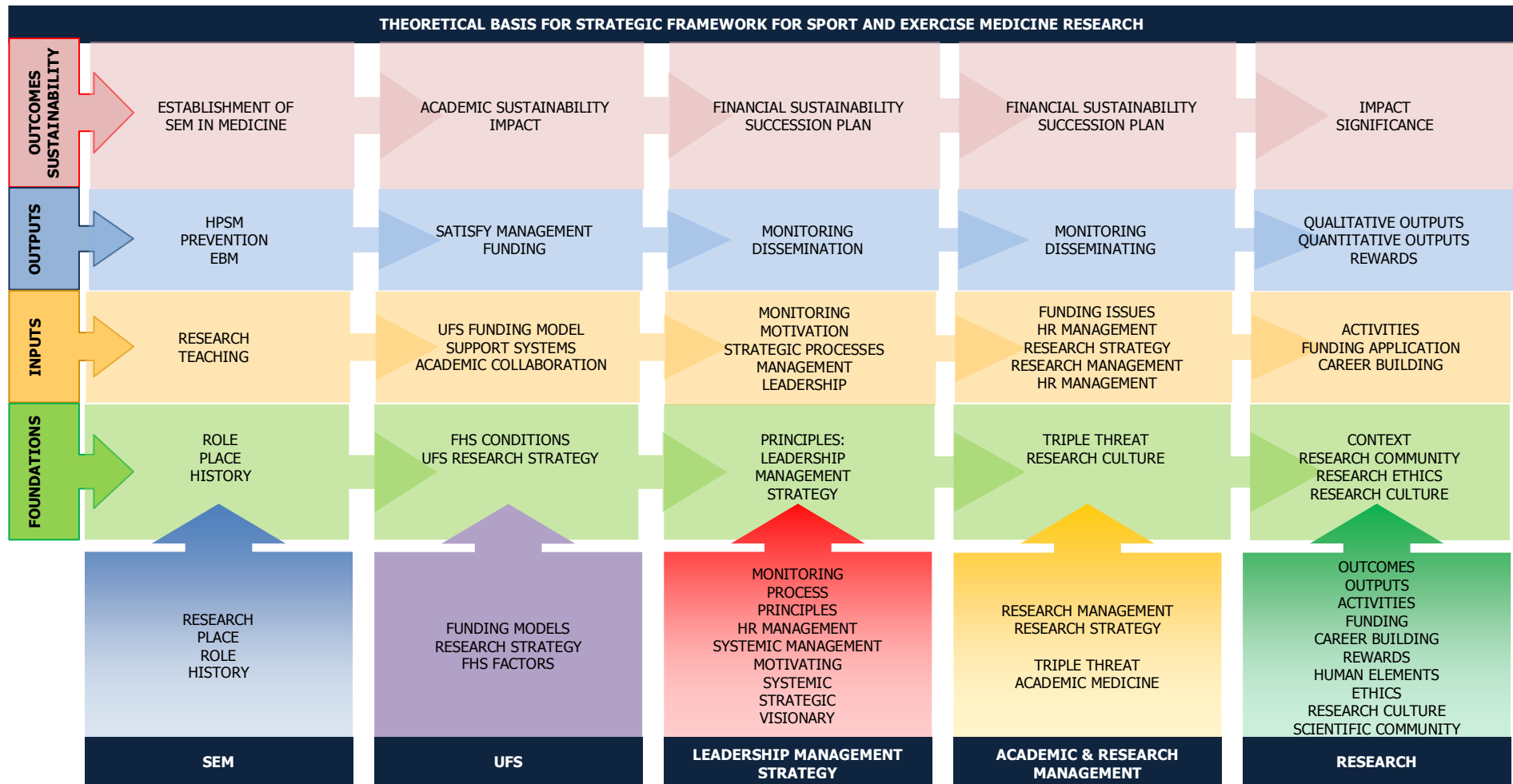


Figure 2.2: A theoretical base for development of a strategic framework in SEM at the UFS. (SEM = Sport and Exercise Medicine; HPSM = High Performance Sports Medicine; EBM = Evidence-based Medicine; FHS = Faculty of Health Sciences; HR = Human Resources) [This schematic representation was compiled by the researcher, Holtzhausen (2012) as part of this PhD project]

2.2. THE HISTORY, ROLE AND PLACE OF SPORT AND EXERCISE MEDICINE (SEM)

In his review of the lineage of sports medicine, Peltier (1987:4) describes the desire of all people to be in good health and physical condition. Through the ages, physical activity or sport has not only been associated with the occurrence of injuries that needed medical attention, but more prominently with promotion and preservation of good health.

2.2.1 The history of SEM

The *Cong Fou* of ancient China is generally recognised as the earliest known writing on therapeutic exercise, which consisted of motions based on animal movements, and prescribed by Buddhist monks for relief of pain and other symptoms. It was also practised in schools in China during the Chou dynasty around 1151 BC (Koh 1981:181). Preceding that, however, in India the importance of exercise for good health was emphasised in writings dating back to 3000 BC, and exercise guidelines were even established in medical texts of the time, such as the *Sustrate Charaka et al.* and *Astang Hridaya Samhi*, prescribing that exercise should not be taken after meals; should be performed daily; should be appropriate for an individual's age, physical condition, and capacity; and should not be done to the point of fatigue as evidenced by the amount of perspiration or mouth dryness (Gettman, Ayres & Pollock 1979:115). These principles are still relevant today. Ancient India's best known contribution to modern day exercise for health is *yoga*, which conditions the mind and body, and is used to combat many ailments, including constipation, arthritis, asthma and obesity (Shankar 1999:2).

In ancient Greece, regular games were organised, including the Olympic Games that were instituted in 1376 BC and held regularly until abolished by Emperor Theodosius in AD 393. Sports clubs played an important role in urban life in ancient Greece. These clubs included rooms for bathing, massage, exercise and gymnasiums. The word "gymnasium" is derived from the Greek word meaning "naked", since athletes trained and competed in the nude. Public lectures were held at gymnasiums, thereby combining education and sport, with concern for diet, hygiene, and exercise to promote a sound mind in a healthy body, or "*mens sana in corpora sano*" (Peltier 1987:4).

Herodicus was a wrestling and boxing instructor in ancient Greece, who is purported to be the first to write on the subject of "remedial exercises". Exercises for medical purposes were often called "therapeutic gymnastics" or "gymnastic medicine" (Berryman 1989:517). As chronicles of ancient history often do, there is controversy over the exact facts, but there is general consensus that Hippocrates, the father of modern medicine, was a student of Herodicus and that central Hippocratic doctrines can be found in Herodicus' work (Georgoulis, Kiapidou, Velogianni, Stergiou & Boland 2007:316). One of these doctrines is central to the philosophy of modern Sport and Exercise Medicine:

"All parts of the body which have a function, if used in moderation and exercised in labours in which each is accustomed, become thereby healthy, well-developed and age more slowly, but if unused and left idle they become liable to disease, defective in growth, and age more quickly".

-Hippocrates (Leutholtz & Ripoll 1999:xi)

With the decline of the Greek civilisation and the rise of the Roman Empire, some portions of Greek medicine were carried over. The Roman physicians also used therapeutic exercise, and introduced strenuous exercise for rehabilitation. One of the most prominent Roman physicians was Galen, who classified exercises into body parts involved, vigorousness, duration, frequency, and the use of apparatus. He was physician to the gladiators, as well as the educator and physician of Commodus, son of Emperor Marcus Aurelius and a prominent athlete of the time (Peltier 1987:5). His historical book, *On Hygiene*, contains many principles of Sport and Exercise Medicine (Green 1951; Shankar 1999:2). It is interesting to note that both Herodicus and Galen have been named the "Father of Sports Medicine" (Georgoulis *et al.* 2007:315; Snook 1978:128). The prominence of Sport and Exercise Medicine in mainstream ancient medicine is beyond question and bears many similarities with what we have in the 21st century – state funded athlete and gladiator schools with supporting trainers, physicians, dieticians and the like, versus modern day sport institutes. The concern over hypokinesia-related illness and obesity is also still topical (Winter 2008:1247).

After the fall of the Roman Empire and during Arabian control of Southern Europe, progress in medicine and rehabilitation stalled due to Arabian laws against dissection. Exercise was abandoned during the middle ages because of Christian beliefs in

preservation of the body. Medicine was also practiced minimally in this period because of the Christian belief in the suffering of man (Shankar 1999:3). The first illustrated book on sports medicine and landmark publication was published in the renaissance in 1569 in Venice by Geronimo Mercuriali, a distinguished professor of medicine at Padua. It was called *Artis gymnastica apud antiquos celeberrimae, nostris temporibus ignoratae*, and is a history of the attitudes of the Greeks and Romans to diet, hygiene, bathing and exercise, and their effects on health and disease (Peltier 1987:5). In more recent history, Pehr Henrik Ling (1776 – 1839) applied exercise programmes for the treatment of diseases and deformities (Karling 1954:335). In the United States, prominent people such as Benjamin Franklin, Thomas Jefferson and Noah Webster all proclaimed the need for physical activity for the improvement of health. The two World Wars brought major breakthroughs in therapeutic exercises for restoration of function in injured soldiers (Adams & McCubbin 1991:31). After World War II, the first School of Specialisation in Sports Medicine was founded in Milan, Italy in 1958. (Ergen, Pigozzi, Bachl & Dickhuth 2006:169).

Further recent history of the development of SEM to its current situation was presented in Chapter 1.

2.2.2 The role and place of SEM

Concerning the role of SEM, Ergen *et al.* (2006:167) state that athletes and active individuals demand expertise and sport-specific knowledge varying from musculo-skeletal problems to environmental stresses, as well as a host of other medical problems involving cardiology, dermatology, endocrinology, and psychology. In addition, moral, legal and health related difficulties such as doping in the professional athlete pose unique and complex challenges to medical doctors.

2.2.2.1 The role of SEM in disease prevention

In an address to the Royal College of Surgeons, Noakes (2010a:998) admitted his early career perception that the future of medicine lay in health promotion and disease prevention as a more cost-effective form of health care, as opposed to the treatment of disease. It has been proven in landmark studies by Morris, Chave and Adam (1973:333) and Paffenbarger, Wing and Hyde (1978:161) that exercise is one of the most powerful tools for the prevention of disease. In support of this, Blair (2009:1)

showed beyond doubt that physical inactivity is one of the most important public health problems of the 21st century – more so than obesity, cigarette smoking, hypertension, hyperlipidaemia or diabetes. Physical inactivity and sedentary lifestyle have been declared a global “non-communicable disease” (NCD) by the World Health Organisation (WHO) (WHO 2005). The WHO predicts that lifestyle-related chronic diseases – mainly cardiovascular disease, diabetes, cancer and chronic respiratory disease – will account for two thirds of all deaths globally in the next 25 years (Mathers & Loncar 2006:e442). In this regard, the “Exercise is Medicine” initiative of the ACSM was launched to educate and assist doctors to prescribe exercise as standard treatment for chronic diseases of lifestyle (Sallis 2009:2).

In South Africa, a rapid increase in modifiable non-communicable diseases such as obesity, hypertension, diabetes and high cholesterol has been recorded in the last decade. More than 70% of South African women and 45% of men over the age of 35 years are either overweight or obese (Bradshaw, Steyn, Levitt & Nojilana 2011:2 of 4). According to Mayosi, Fischer, Lalloo, Sitas, Tollman and Bradshaw (2009:935), non-communicable diseases caused 28% of the total burden of disease measured by disability adjusted life years (DALYs) in 2004. They provide evidence that the South African adult population has high levels of risk factors for NCDs, such as tobacco use, physical inactivity and unhealthy diet that translate into cardiovascular disease.

There is, however, a discrepancy between this knowledge and the practical implementation of preventive approaches to which is now one of the most urgent concerns in healthcare worldwide and threatens to collapse our health systems unless extraordinary changes take place. The need for translational and implementational research, to improve the application of basic research and scientific knowledge to benefit patients and the general population in terms of prevention and treatment of disease has been professed for medicine in general (Lenfant 2003:868; Zerhouni 2005:1621). Matheson, Klügl, Dvorak, Engebretsen, Meeuwisse, Schwellnus, Blair, Van Mechelen, Derman, Börjesson, Bendiksen, and Weiler (2011:1272) argue that the main reason for the disparity between knowing the evidence and acting, is the current international reductionist medical model, which is better suited to treat disease as opposed to prevention on a large scale which, on the other hand is better suited in a more holistic model. The clinical discipline of SEM is well positioned to address this immense challenge.

Reductionist theory states that complex data or phenomena can be explained by reduction to more simply understood, fundamental parts. Holistic theory believes that all the properties of a system cannot be determined or explained by its component parts. In effect, holism states that reality is interacting wholes that are more than the mere sum of their parts. Reductionism and holism are both part of our reality. Reductionism is most closely associated with medical science, whereas holism has been de-emphasised in part because its connotation includes metaphysics, complementary medicine and naturopathy. Reductionism has become the default strategy not only for medical science but also for medical care. The shortcomings of reductionism are apparent in the prevention and treatment of chronic diseases requiring a multidisciplinary, integrated approach. The fundamental tenets of holism and reductionism are so different that prevention has no fertile middle ground within which to develop. It is, in essence, an orphan. Sport and Exercise Medicine should adopt chronic disease prevention and management so that a new clinical home can be established to champion its cause. Healthcare providers in this new space would combine their training and education within disease-based, reductionist approaches for the treatment of acute disease episodes but would draw from the principles of population-based prevention to create new clinical delivery programmes within a new profession. In Figure 2.3, the dotted lines indicate the emergence of a new clinical discipline that acts as both a home and a champion for the prevention and treatment of chronic disease. The short-term goal is to establish this clinical circle of endeavour with links to reductionism and holism. Medium-term goals (bottom left) would be to develop solid lines of collaboration, drawing from the two fields and measuring outcome progress from the new model of preventive healthcare delivery. Long-term goals (bottom right) would be for the fields of reductionism and holism to learn enough from each other that the three circles overlap substantially. It is important to recognise this approach will take time. For now, for this new field of endeavour to come into existence, it needs to be its own entity and revolve around its own centre – the prevention and treatment of chronic disease (Matheson *et al.* 2011:1277). The role of SEM in the management of chronic disease is therefore central and of great importance. The urgent establishment of SEM as preventative discipline is proposed, as shown in Figure 2.3.

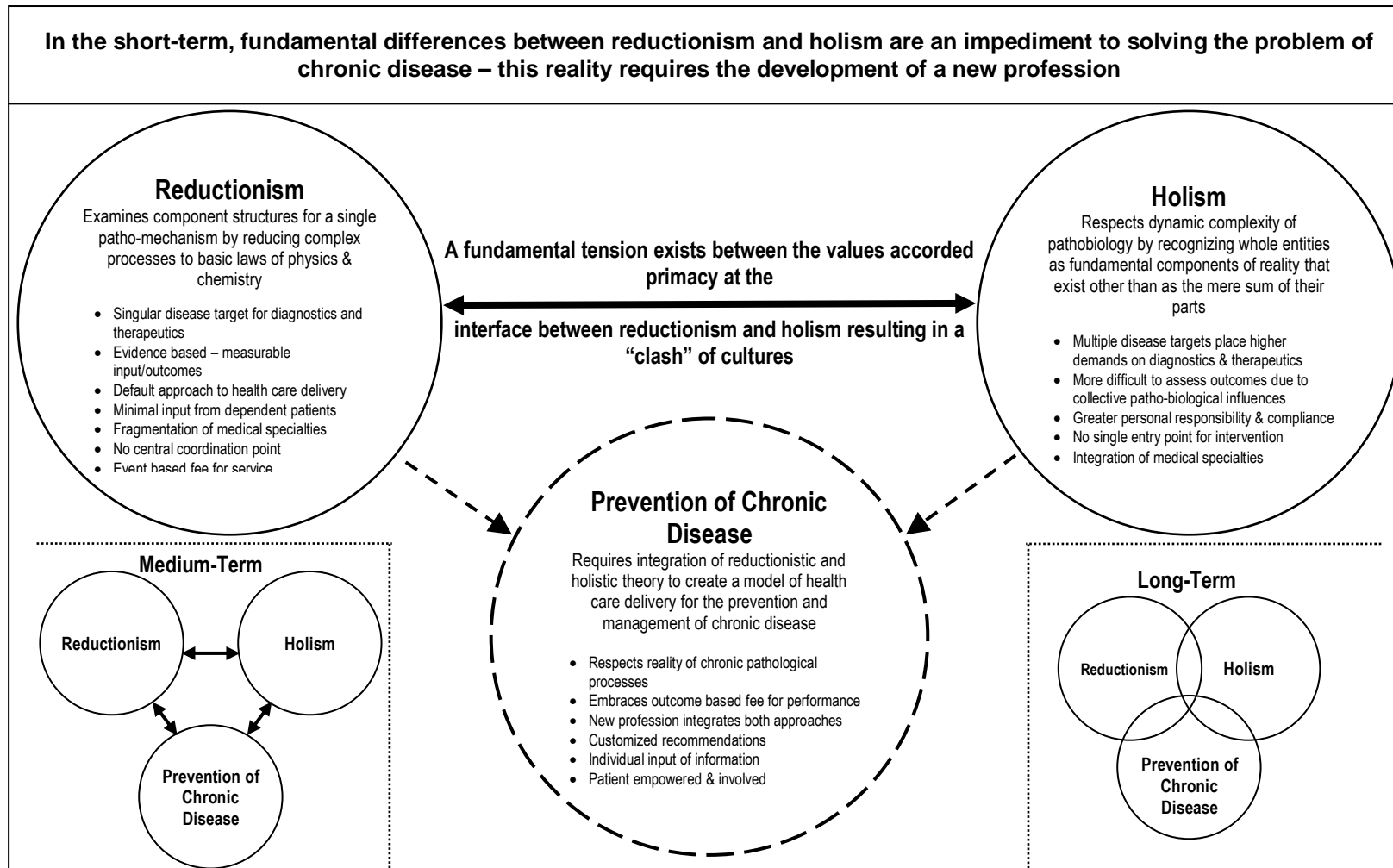


Figure 2.3: The role of reductionism and holism in SEM and the prevention of disease (Matheson *et al.* 2011:1272)

2.2.2.2 *The role of High Performance Sports Medicine*

High performance sports medicine (HPSM), a component of the specialty of SEM, has been described as the provision of an integrated model of medical care of the high-performance athlete, focusing on the maintenance and optimisation of health, well-being and competitive sporting performance under circumstances of high physiological and psychological stress. The principles of care in HPSM is the same as any other field of medicine, but unique in many aspects, including clinical challenges, working models and measures of outcome. An example of such a challenge is the protection of the health of athletes when they undertake training loads that in themselves can cause ill health (Speed & Jaques 2011:81).

2.2.2.3 *The role of prevention and management of sport injuries*

The prevention and management of sport injuries are further key roles of SEM. Concerning injury prevention, much research is still needed as indicated recently at the first Summer Youth Olympic Games in 2010, where lack of knowledge about injury prevention was evident (Steffen & Engebretsen 2010:485). Finch (2011:1053) highlighted the difficulties in implementation of preventive strategies in sport, similar to the prevention of CDL – our scientific knowledge gets lost in translation to practice. As far as injury management, the historical starting point for SEM, is concerned, a broad scope of conditions are treated and rehabilitated, with an often blurred line between treatment and rehabilitation (Brukner & Khan 2012: 164). This statement emphasises the need for a multi-professional approach as described in this chapter.

There has been a remarkable explosion of evidence to support treatments in SEM in the past decade. Brukner and Khan (2012:164) remark that in 2010 alone, new sports medicine treatment evidence was published in leading journals, such as the *New England Journal of Medicine* (Frobell, Roos, Roos, Ranstam & Lohmander 2010:331), *Journal of the American Medical Association (JAMA)* (Emery, Kang, Schrier, Goulet, Hagel, Benson, Nettel-Aguirre, McAllister, Hamilton & Meeuwisse 2010:2265; De Vos, Weir, Van Schie, Bierma-Zeinstra, Verhaar & Tol (2010:144), the *British Medical Journal (BMJ)* (Cooper Kuh & Hardy, 2010:c4467; Bleakley, O'Connor, Tully, Rocke, MacAuley, Bradbury, Keegan & McDonough 2010:c1964), and *The Lancet* (Coombes, Bisset & Vincenzino 2010: 1751).

2.2.2.4 Other roles of SEM

The evolutionary process described here and in Chapter 1 culminated in the current scope of practice of Sport and Exercise Medicine, which is:

- Prevention, diagnosis and treatment of sports injuries
- Prevention, diagnosis and treatment of medical conditions related to sports participation
- Prevention and rehabilitation of chronic medical conditions, using exercise and lifestyle intervention as therapeutic tools (Schwellnus 2008:1).

These broad functions are explored in more detail in paragraph 2.3. The positioning (place) of SEM internationally and in South Africa have been described in Chapter 1, describing the recent development of the discipline as a timely specialty (Batt 2007:85).

2.3. THE MULTIDISCIPLINARY CHARACTER OF SEM

SEM has always been difficult to define because of its wide scope of practice, including curative, rehabilitative and preventive aspects (Ergen *et al.* 2006:167).

The scope of practice of SEM includes:

- Injury prevention, diagnosis, treatment, and rehabilitation
- Management of medical problems
- Exercise prescription in health and chronic disease states
- The needs of exercising in special subpopulations
- The medical care of sporting teams and events
- Medical care in situations of altered physiology, such as altitude or at depth
- Performance enhancement through training, nutrition and psychology
- Ethical issues, such as the problem of drug abuse in sport.

This wide spectrum of practice of SEM lends itself to being practised by a multidisciplinary team of professionals with specialised skills who provide optimal care for the athlete and improve each other's knowledge and skills (Brukner. & Khan 2012:6). The specialty of Sport and Exercise Medicine in the United Kingdom (UK) is described by Batt (2007:85) as embracing the health of physically active people of all ages and abilities. On completion of higher specialist training, doctors are expected to

have broad-based knowledge and competencies reflecting the breadth of practice, from advising on suitable forms of exercise, or managing soft tissue injuries, to team doctoring, to care of active people with disabilities. SEM doctors work in a wide range of settings across primary and secondary care, typically as members of multidisciplinary teams providing therapeutic and preventive services, and acting as advocates of physical activity in the wider population.

The composition of the multidisciplinary SEM team depends on the setting. In an isolated rural community, the team may consist of a family practitioner and/or a physiotherapist alone, or of a multitude of professionals such as a physiotherapist, sports physician, exercise specialist, orthopaedic surgeon, radiologist, podiatrist, massage therapist, dietitian/nutritionist, psychologist, coach and others. For this elaborate system to function optimally, the traditional medical model (Fig 2.4.) with the physician as primary contact and subsequent referral to other professionals is not appropriate.

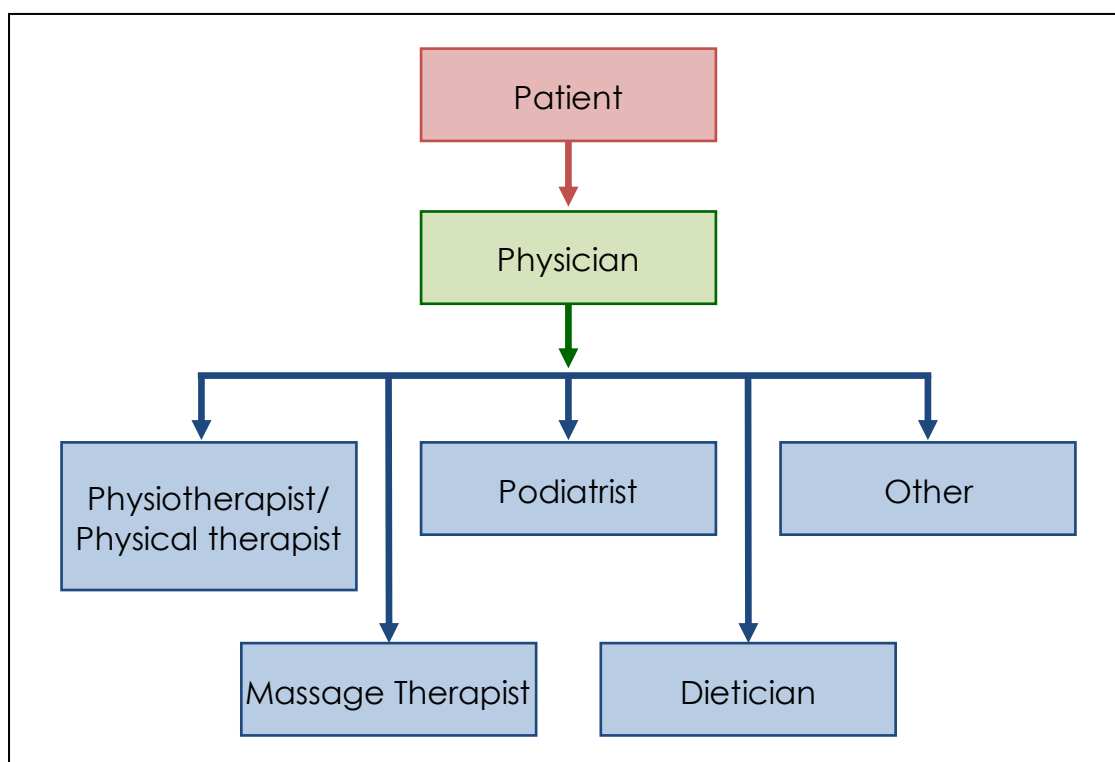


Figure 2.4: The traditional medical model (Brukner & Khan 2012:7)

Brukner and Khan (2012:8) proposed the Sport and Exercise Medicine model where the athlete and the coach are central to a patient-centred model of professionals interacting with each other, each within his/her own scope of practice and/or expertise (Figure 2.5.). This model is specifically aimed at the athletic population, but the general holistic approach thereof can easily be adapted to suit other aspects of SEM.

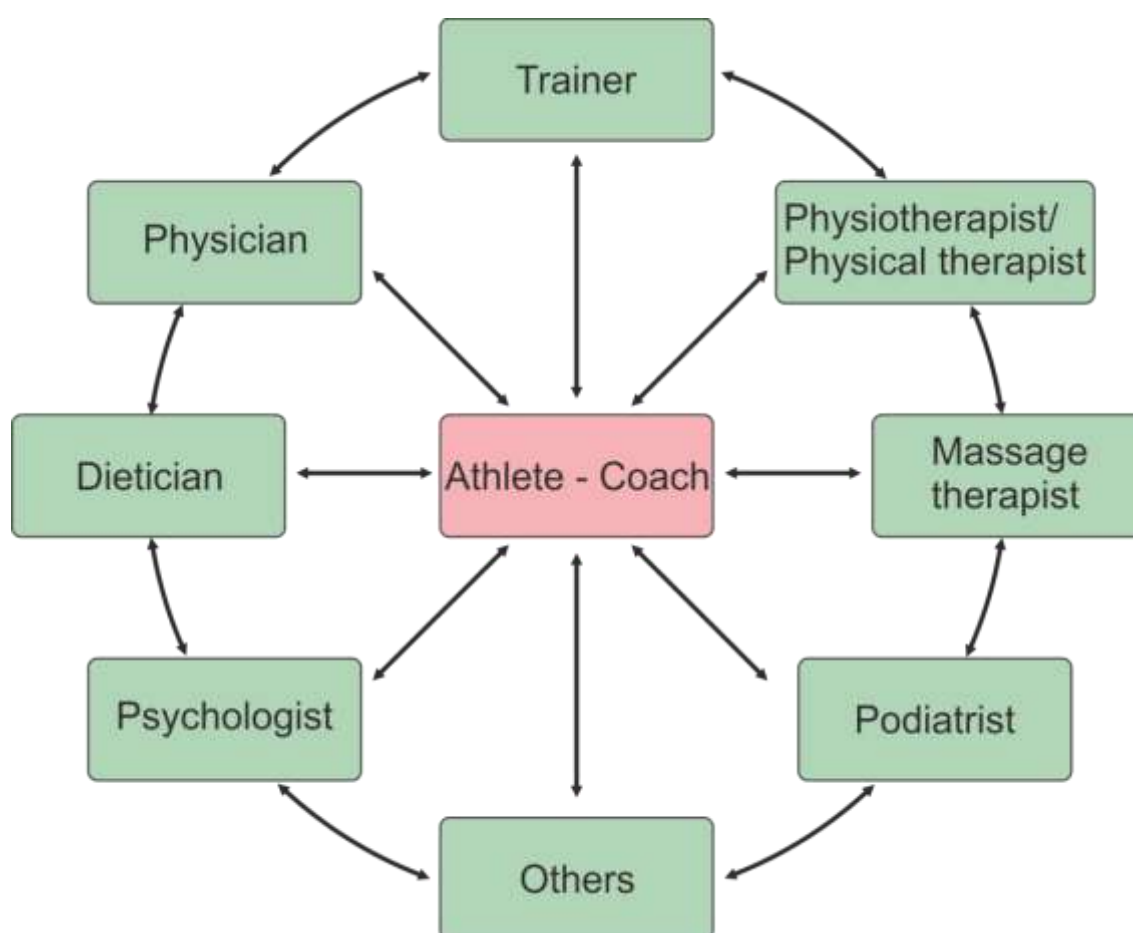


Figure 2.5: The Sport and Exercise Medicine model (Brukner & Khan 2012:8)

2.4. RESEARCH IN SPORT AND EXERCISE MEDICINE

Generating and disseminating knowledge through publication is generally considered to be one of the core activities of an academic (Frantz, Rhoda, Struthers & Phillips2010:17). Since the early 1990s there has been a movement towards the practice of evidence-based medicine, a school of thought which proposes that clinical decisions should be taken on the best possible evidence with a view to making quality

decisions (Brukner& Khan 2012:12; Sackett 1995:1171). According to Sackett, Strauss, Richardson, Rosenberg and Haynes (2000:1) evidence-based practice is the integration of best research evidence with clinical expertise and patient values, as schematically illustrated in Figure 2.1.

The need for the establishment of an evidence base for SEM has been addressed. The argument is taken further by McCrory (2002:1) when he re-emphasises that our specialty (SEM) suffers from a number of credibility issues that are critical. The specialty therefore desperately needs an evidence base upon which we can develop our guidelines and management pathways in order to survive as a discipline. McCrory (2002:1) also noticed a distinct difference between non-medical sports scientists and clinical sports physicians, when he observes that the former take research and an evidence base for granted, and the latter are still relying on much clinical experience and less research. By 2011 this disparity has reduced, as can be seen in the number and improvement in quality of clinical SEM research (Hopkins 2011:16).

The quality and quantity of SEM research can be assessed according to the Journal Impact Factor (JIF) of scientific journals in Sport and Exercise Science and Medicine, as is annually calculated and published in the Sportsmedicine online publication (Hopkins 2007:9; 2011:15). The JIF reflects the average annual rate of citation of a journal's recent articles, and gives a relative measure of the importance of the journal. Even though not a reliable measure for comparison of disciplines, in assessing the JIF the profiles of SEM journals seem to be similar to that in comparable disciplines (Hopkins 2007:9), and also that the average impact factor for SEM journals has increased notably in the five years from 2007 to 2011. The highest ranking medical journal on the list, the *Sports Medicine*, increased its impact factor from 3.5 in 2007 to 5.1 in 2011. Clinical sports medicine journals which showed rapid recent gains in impact factor are *Clinics in Sports Medicine*, which showed an increase of more than 70% to 2.4, The *British Journal of Sports Medicine* (3.5), *Journal of Science and Medicine in Sport* (2.5), and *International Journal of Sports Medicine* (2.4) which all increased their impact factors between 30% and 70% from 2010 to 2011.

Ample evidence now exists for exercise as an important preventive measure for chronic disease (Blair 2009:1; Matheson *et al.* 2011:1272) and for the prevention of injuries (Finch 2011:1253). One of the next research challenges in SEM is implementation

research – research into population-targeted interventions (following demonstrated efficacy). Intervention delivery in real-world settings is a complex science with many ecological, cultural and other variables that need to be addressed with research in order to successfully disseminate and apply our knowledge of prevention of injuries and chronic diseases (Finch 2011:1253).

2.5. A NEW STRATEGIC FOCUS ON RESEARCH

To contextualise a new strategic focus on research, especially in this work which investigates research development within a university context, it is necessary to scrutinise the being and development of universities *per se*. Universities developed over the ages from institutions of higher education, implicating teaching and learning as core function to, after centuries, having added scholarship, research, consultancy, knowledge transfer, public engagement and several other functions as well. Universities developed and keep developing from the original metaphysical institutions that they were, interested in large ideas such as (in sequence) the relationship between man and God, man and the universe, man and the State, and man and Spirit. Subsequent developments culminated in types of universities such as the scientific university, the entrepreneurial university, and lately the corporate university, but also the frustratingly bureaucratic university, all as described by Barnett (2011), in his book "*Being a University*". An important point that Barnett (2011:62) argues, is that "being" a university actually implies "becoming" a university, and that continual development and changing takes place, forging its own becoming. Our lives and universities are played out amid structures of various kinds – social, cultural, international, ideological - but they are not entirely determined: we have options before us. In identifying *positive options*, universities and individuals within universities are able to create *feasible utopias* within a university environment (Barnett 2011:4). The current positive academic climate at the University of the Free State as described in section 2.5.1, seems to be particularly suited to such creation.

2.5.1 Research focus at the University of the Free State

2.5.1.1 Introduction

Over the last 15-20 years the higher education system in South Africa has been shaped by a rapidly changing national and international context. Roles and resourcing of universities by governments have globally been reassessed because of changing needs of a knowledge-based society, competition for greater shares of the global economy and pressures on sources of funding. New technologies, the “marketisation” of the higher education sector, increasing focus on performance and quality assurance has further influenced this reassessment. In the South African context, universities have been challenged to reposition to accommodate the need in Africa to massify, diversify and internationalise (UFS 2009b:1).

2.5.1.2 A new strategic focus on research at the UFS

The University of the Free State (UFS) is widely regarded as one of the top six “research-led” or “research-intensive” universities in South Africa. Internally, however, the research strategy describes the UFS as “research active”, but with an ongoing effort to move to a state of “research intensity” (UFS 2009b:4). As recently as 2010 researchers at the UFS applauded the effort of the University to become research-intensive, but conceded that the critical mass and quality of research at the UFS are not yet of such proportions (Roos 2010). Pro-active initiatives have been implemented since 2000 to facilitate the further evolution of its research strategies to place research at the core of all academic activities at the UFS. This initiative included the introduction of a research turnaround strategy in 2002 with a short-term objective of an immediate increase in accredited and subsidy-bearing publication outputs, and a long-term objective to build additional research capacity, as well as to develop latent research potential (UFS 2010c:1). This drive has since increased exponentially, not least because of the Vice-chancellor and Rector, Prof Jonathan Jansen’s inaugural speech in 2009 when he stated:

*“...let me be clear that the UFS will be unashamedly elitist in its drive to become an African university instantly recognised for excellence in **research**, teaching and engaged scholarship in relation to the communities around us...”* (Jansen 2009).

The research strategy of the UFS for the period 2009-2013 has an overreaching goal to foster a contented, well connected and vibrant critical mass of researchers, especially in strategic priority areas, who lead the University's contribution to national growth, regional advancement and global excellence (UFS 2010d). In this quest the UFS committed itself to disproportionate investment in research. The strategy makes it clear that the commitment of the UFS to contribute increasingly to national and regional development and growth can only be done if the University is also in a position to contribute to global excellence in research. In committing itself to becoming a research-intensive university, the UFS embarked on a journey to create as its main feature the fact that teaching, learning and community service are all shaped by its research base (UFS 2009b:4).

2.5.1.3 *Promotions and appointments policy at the UFS*

A university's values are most clearly described by its promotion and tenure policies, and by the criteria it uses to evaluate faculty members' performance (Weiser 2004:129). An important development, therefore, to enhance the movement of the UFS towards being a research-intensive university was the adoption of a comprehensive institutional policy for the appointment and promotion of its academic staff members for the first time in 2010. The rationale for the policy is the promotion of scholarship, a central concept to the function and character of institutions of higher learning (UFS 2011:4).

Scholarship is defined as creative intellectual work that is validated by peers and communicated, including discovery of new knowledge, development of new technologies, methods, materials, or uses and integration of knowledge leading to new understandings (Weiser 2004:133). Boyer (1990:16) describes the characteristics of scholarship as four separate but overlapping functions of the professoriate – the scholarship of discovery, the scholarship of integration, the scholarship of application, and the scholarship of teaching.

The UFS policy for appointment and promotions uses assessment in three areas of scholarship in line with the core functions of a university, namely:

- scholarship of discovery, where the creation and dissemination of original knowledge is emphasised,
- scholarship of teaching, where qualities of teaching and learning is considered, and
- scholarship of engagement, where the use of knowledge in service of the community is taken into account.

The policy adopts the scholarship of discovery as the most important area of assessment when academic appointment and promotion is considered, and achievement in this area constitutes the majority value in the final assessment of candidates. Stringent requirements have been set, including a National Research Foundation (NRF) rating or equivalent recognition in the scholarly community for appointment or promotion to the professoriate of the UFS (NRF online; UFS 2011:4). Despite this emphasis on research or the scholarship of discovery, O'Meara (2005:483) encourages multiple forms of scholarship to enhance increased institutional effectiveness.

2.5.1.4 *Strategic research clusters at the UFS*

The documentation on the strategic clusters at the UFS was not referenced. The author attempted to verify the base literature used in those documents, but despite that, this section is almost entirely referenced from the internal documents of the UFS. This does not, however, have a negative effect on the research study as the clusters are independent variables in this research and supportive literature, or lack thereof- will not influence the outcome.

Around the turn of the 21st century, the UFS has recognised the need to identify and build its research strengths. As part of this process it has decided to proactively follow a process of identifying priority areas on which to focus its research – later called strategic clusters. It was envisaged that this development will position the UFS to become more nationally and internationally competitive, build its reputation as an excellent research institution, and attract considerably increased resources for research (UFS 2006a:1).

In identifying and developing the strategic clusters, a conceptual framework was assembled as basis. The framework accommodated global and national trends concerning universities, followed by local institutional imperatives, all as it pertains to focusing of efforts (UFS 2006a:1).

The international trends that were recognised before initiating the strategic cluster approach are (UFS 2006a:2):

- The recognition and acceptance by societies and governments that universities' contributions extend far beyond the creation and dissemination of knowledge, but also presenting new expectations, responsibilities and opportunities. In this regard, many universities have recognised the need to identify and build around their research strengths.
- Research does not lend itself to be easily controlled and managed – it is linked to academic freedom, and is unpredictable. In the fast-changing competitive environment of modern higher education, however, there are constraints which require the application of some sort of management framework, setting priorities and influencing the deployment of resources. This stance is explored in more depth in section 2.9.3.
- The trend for universities to specialise and select focus areas to concentrate their research activities in order to stay competitive.
- The success of universities which adopted strategic priority areas, especially in Canada (University of Toronto), England, Scotland, Ireland and Australia.

With reference to national trends, the UFS recognised various government policy documents which implied the need for strategic focus of research efforts. These include the National Policy on Higher Education (RSA 2001:60) and the National Research and Development Strategy (RSA 2002:21), and the National Department of Health Strategic Plan (RSA 2004). The National Research Foundation of South Africa (NRF) also emphasises the promotion of cohorts of researchers in prioritised areas in its Vision 2015 (NRF 2008: 9,14), as well as the identification of institutional research niche areas (NRF in UFS 2006a:3).

Institutional imperatives that were fundamental to the development of strategic research clusters were, firstly, that the quality and profile of a university's research activities play a major role in areas such as its reputation, quality of teaching and its

ability to attract funding. The UFS recognised the need to position itself as an institution that not only supports good research over a wide spectrum, but excels in certain areas of research ("strategic clusters"), which can serve as a basis for strengthening undergraduate teaching, postgraduate training and community service activities.

Secondly, the UFS wished to improve its ranking as sixth in South Africa from a research point of view (and also recognising the uncertain criteria of the ranking process), to position itself as a research-intensive university. In order to achieve this goal, increased research activity, output and focus of resources would be required (UFS 2006a:3)

The criteria in the identification and selection of strategic clusters included (UFS 2006b:2):

- Critical mass: An existing core of academics with a proven track record in the field.
- Leadership capacity.
- Capacity and competence: There must be resources to support the research and training, including qualified staff and infrastructure as well as strategic collaboration and partners.
- Financial resources: There must be a prospect of long-term research funding to ensure sustainability and there should preferably already be committed resources.
- Multi-disciplinarity: The selected field should preferably be multi-disciplinary and promote cross-disciplinary collaborations.
- Distinctive: The field should be distinctive or complementary to activities at other South African universities and/or research organisations.

The strategic clusters that have been identified and therefore selected to be at the forefront of the research drive of the UFS, as well as receiving preferential treatment from the UFS, are presented in Table 2.1.

Table 2.1: Strategic research clusters at the UFS (UFS 2006a:15)

<i>Cluster 1:</i> Enabling technologies/technologies for the future [Suggested constituent focus areas: High throughput biology, nanotechnology [solid state lighting], chemical and allied technologies].
<i>Cluster 2:</i> Food production, quality and safety for Africa [Suggested constituent focus areas: Animal production and protection, plant production and protection, human nutrition, food quality and safety].
<i>Cluster 3:</i> Regional community development and alleviation of poverty [Suggested constituent focus areas: Urban development, rural development: sustainable livelihoods in the QwaQwa region [a rural region where a satellite campus of the University of the Free State is situated], resource management and development [tourism, small business development, local government], healthy communities [communicable diseases, chronic diseases of lifestyle, children with disabilities].
<i>Cluster 4:</i> Social transformation [citizenship and identity, diverse histories, globalisation and governance, human rights and social equity].
<i>Cluster 5:</i> Water resources and ecosystem management [freshwater ecology, environmental change, water resource management, sustainable utilisation of terrestrial ecosystems].
<i>Cluster 6:</i> Towards a competitive chemical industry [new drug manufacturing, petrochemicals, natural product development, polymers].

2.6 LEADERSHIP AND MANAGEMENT

This section describes the concepts as well as selected approaches to leadership and management, which are applicable to the outcomes of this research study. According to Western (2008:35) the terms "management" and "leadership" can be used interchangeably, but both can evoke multiple meanings. Managers can demonstrate leadership and leaders can have managerial skills. The essential difference between the two concepts is eloquently explained by Zaleznik (1992:126). Managerial culture emphasises rationality and control. Energy is directed towards goals, resources, organisation structure, or people. Qualities of managers are persistence, tough-mindedness, hard work, intelligence, analytical ability, tolerance and goodwill. Leaders, on the contrary, work from high-risk positions, and are often temperamentally disposed to seek out risk and danger where a chance of opportunity and reward seems promising. Contemporary leaders seldom use formal authority or means of rewards/punishment in order to accomplish compliance. This attribute of successful leaders is also addressed by Collins (2001:20) where he describes Level Five leadership (cf. 2.7.1).

2.6.1 Leadership

Leadership is often portrayed as something that is a golden chalice, a most sought-after object, yet it seems always just beyond our reach (Western 2008:22). It is not easily defined but, perhaps like beauty, you will know leadership when you see it. To narrow down the subjectivity, leadership can be reviewed in four common themes – it is a process, it involves influence, it occurs in a group context, and it involves goal attainment. A common view of leadership is that it is focused on challenges rather than the person, it is collective and less individualised, and various or less “one size fits all” (Burgoyne & Pedler 2003 in Western 2008:27). The ultimate ideal leadership depends on the need and the context of what the leadership is required for.

Complex modern environments present leaders with the twin challenges of leading for stability and change, and for *what is possible* and *what is thought to be right* (Pisapia 2009:ix). Research environments or universities are systems with high organisational complexity, as defined by the amounts of differentiation that exists within different elements of the organisation, such as structure, authority, locus of control, and attributes of personnel, products, and technologies (Dooley 2002:5013). Wilson and McLaughlin (1984:28) describe the organisational complexity of a medical school as formidable. Many management consultants acknowledge that the academic medical centre is the most complex organisation they have encountered (Wilson & McLaughlin 1984:4). Leadership styles that can accommodate complexities are therefore particularly suited for leadership in research and medical research.

Three types of leadership – *strategic, visionary and systemic leadership* - are subsequently discussed as examples of appropriate options. These options should not be seen as prescriptive or exclusive of other styles for research leaders, as leadership and leadership style are dependent on many variables, including inherent qualities in a person (traits approach); the behaviour of a leader (behavioural approach); and the adaptation of the leader to the context of the system (contingency approach) (Kanji & Moura e Sá 2001:702).

2.6.1.1 *Strategic leadership*

Pisapia (2009:xi) puts forward that *strategic leadership* is particularly well suited to deal with complex environments. Strategic leadership is defined as the ability (as well as the wisdom) to make consequential decisions about outcomes, actions and tactics in ambiguous environments. Strategic leadership marries management with leadership, politics with ethics, and strategic intent with tactics and actions. Strategic leadership is a not the same concept as strategic planning or strategic management. Strategic leadership depends on synthesis, whereas strategic management and planning depend on analysis (Pisapia 2009:7). Strategic leadership is built on six habits, organised in the “Leader’s Wheel (Figure 2.6) by Pisapia (2009:15). These habits are:

- Artistically using a palette of managerial, transformational, political and ethical actions to create a frame breaking or frame sustaining change.
- Agility of the mind; as well as actions.
- Anticipating changes, challenges, and opportunities in internal and external environments.
- Articulating statements of strategic intent through a generative/minimum specifications approach.
- Aligning people and organisations by viewing followers as colleagues and developing the social capital necessary to mobilise them.
- Assuring results and learning by anchoring the learning in committed self-managed teams.

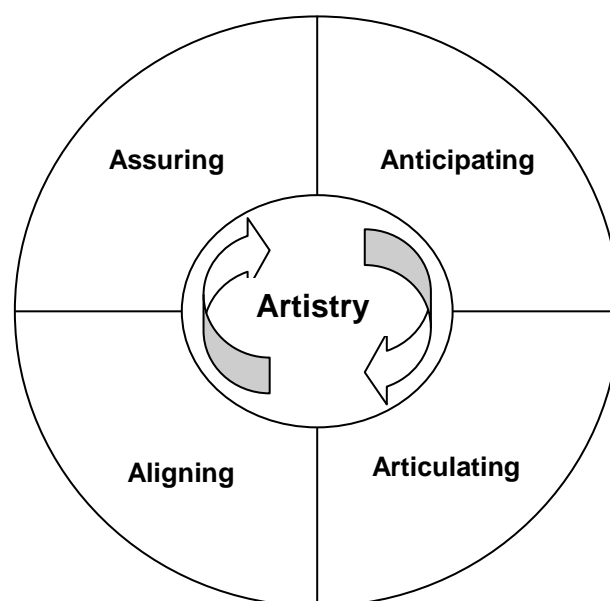


Figure 2.6: The “Leader’s Wheel” (Pisapia 2009:15)

The artistry of the strategic leader has been summarised as follows by Sir Winston Churchill:

“Like a painter, the strategic leader must have an all-encompassing view of the beginning and the end, the whole and its parts as one instantaneous impression held retentively and untiringly in the mind of the leader”

-Sir Winston Churchill (Pisapia 2009:11).

2.6.1.2 Visionary leadership

Another example of a leadership approach suitable for research leaders is visionary leadership, which is particularly suited for adaptation and flexibility in the face of changes beyond the control of the leader or the system – or leadership of change. An important principle of visionary leadership is awareness – monitoring change, making the necessary mid-course corrections, and knowing when to initiate a new vision-forming process. It must be noted that vision in this context is not the last word, but part of a continuing process of orienting an organisation to emerging external realities. Organisational learning – or the identification of trends that will have an impact on the future vision of the organisation over the entire spectrum of people and activities within the organisation – assists in identification and adaptation to change. Organisational learning is a prerequisite for visionary leadership (Nanus 1992:20).

The prudent visionary leader is advised by Nanus (1992:23) to adhere to the following principles:

- Do not do it alone. Invite participation in the process and avoid isolation of the leader.
- Do not be overly idealistic. A vision should ideally be realistic, yet challenging.
- Reduce the possibility of unpleasant surprises. The impact of unfortunate consequences from unpleasant surprises can be reduced in a number of ways. Firstly, a leader can be thorough in forecasting and anticipating a full range of possible future events. Secondly, flexibility can be built into the vision statement itself. Thirdly, trends and developments can be tracked carefully after implementation to gain the greatest amount of possible lead time to react. Lastly, a flexible response capacity can be built into the organisation to be able to absorb surprises with minimal consequences.

- Watch out for organisational inertia. It is natural for organisations to resist change, and it is possible to overcome some of it.
- Do not be too pre-occupied with the bottom line. If the right things are done, the eventual outcome will fall into place.
- Be flexible and patient in implementing the vision.
- Never get complacent. In fact, the best time to begin a direction change is when things are going well, because confidence and resources are plentiful.

2.6.1.3 Systemic leadership

Systemic leadership tends to see each organisational member as a fully responsible autonomous agent with powers of judgement or decision making. At the same time, each person is also uniquely responsible for their performance, and therefore held accountable for it (Kanji & Moura e Sá 2001:704). This approach is similar to that of visionary leadership. It seems that a blend of these approaches would be suitable to accommodate the continually changing research landscape, as well as the desired autonomy of researchers.

2.6.1.4 Creating a motivating climate

It is clear from the previous sections that successful leadership depends much on the ability of a leader to motivate the team that he/she is leading. This section therefore highlights selected relevant aspects regarding the motivation of people, specifically relating to the research setting.

First of all it is important to understand what motivates people. In a higher functioning system such as a research community, the integration of three theories as described by Coetsee (1996:20) is notable. *Reinforcement theory* is based on the assumption that human behaviour is determined by the outcomes or results of such behaviour. The premise of this theory is that people will repeat behaviour which results in positive outcomes. Rewards and recognition can therefore be used as elements in creating a motivating climate. *Cognitive theories* of motivation imply that individual behaviour is a result of a person's own assumptions, premises, expectations, values and other factors. In this theory, motivated behaviour is seen as the result of individual conscious, rational decisions between alternatives. *Job characteristic theory* entails that the characteristics

of a job is key to the motivation for doing it. Monotonous jobs may smother employee's motivation, while challenging jobs may enhance motivation. The need to place the right people in the right positions in a research team as a key success factor is therefore re-emphasised.

People are the most important part of the implementation of a strategy. In harnessing their energy and commitment, it must be seen to that they were included in the planning process (ownership), they must know that success is important, must be motivated to do the right things well (effectiveness), and see real incentives for their work (HBE 2005:110).

Three points of departure to understand motivation of people better have been described by Coetsee (1006:22). Firstly, a manager cannot motivate a group of people directly. A work environment needs to be created in which people are encouraged to be more efficient (do things correctly) and more effective (do the correct things correctly). *Incitement* can instil interest, but is not sustainable, as opposed to true *motivation*. Secondly, a person's level of motivation is determined by the interaction of forces within the person (needs, expectations, ideals, visions, knowledge, experience, self-concept, etc.) and forces in the environment (supervisory style, organisational climate and culture, team spirit, co-operation, rewards and recognition etc.). Thirdly, it must be recognised that people differ and react differently to the same environment.

Four determinants of reaction to an environment are:

- Some people are "self-starters" and others need to be encouraged ("kick-starters"),
- People make decisions concerning the amount of energy they are prepared to spend in return for a particular reward (or punishment),
- People wish to know beforehand what the result of their decision or behaviour will be ("what's in it for me?"), and
- In making a choice between two or more options the person would usually choose the option which he/she expects would lead to the most attractive outcome or reward.

Coetsee (1996:110) proposes a model for the creation of a motivating climate, which includes multiple considerations. Similar to the strategic and managerial processes described in this chapter (cf. 2.6;2.7), it contains aspects of goal setting, operations,

unlocking of potential, performance measures, outcomes and significance; all arranged in a matrix of inputs, transformational elements (operations), and outputs (Figure 2.7).

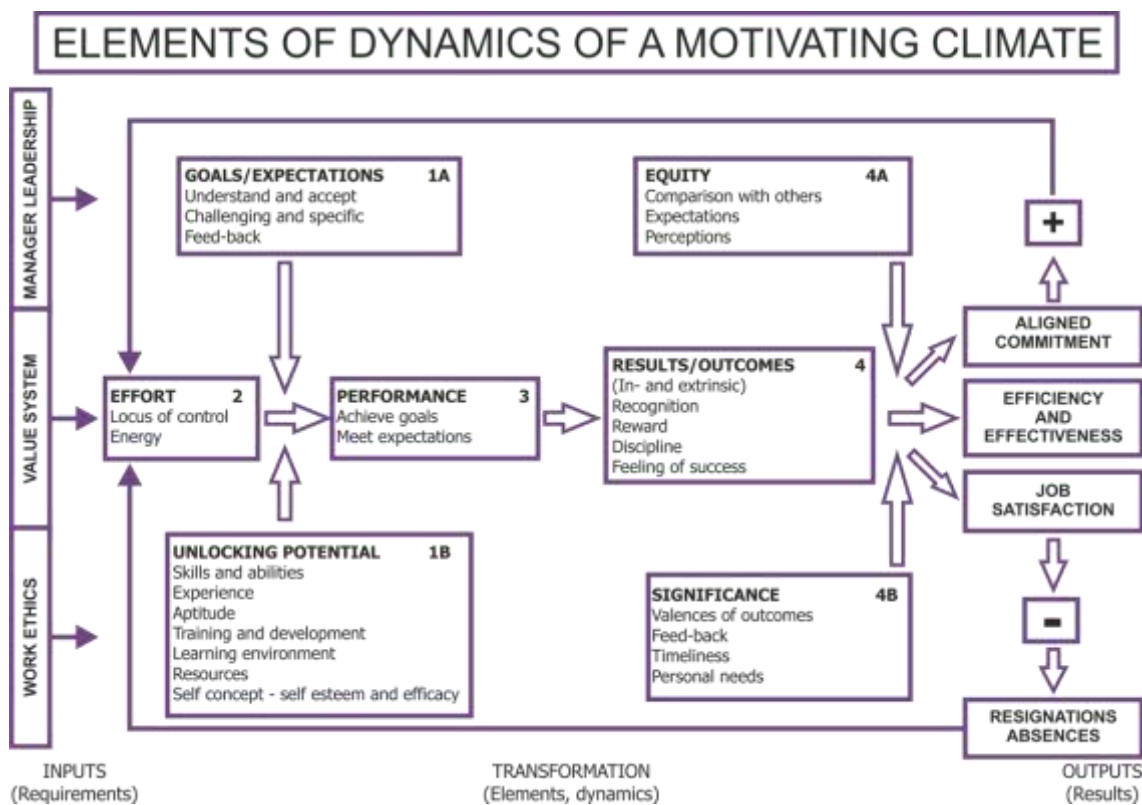


Figure 2.7: Elements and dynamics of a motivating climate (Coetsee 1996:111)

2.6.2 Management

Aspects of management will be discussed in this section under the headings of systemic management and human resource management. These topics are expanded with more relevance to the academic and research communities in sections 2.8 to 2.11. A third important aspect of management, financial management, will be explored in terms of research funding models in section 2.12.

2.6.2.1 *Systemic management*

The basic function of all organisations is to meet the needs of society. These needs differ between populations, but are bound to be complex and changing (Smit & Cronjé 2002:4). All types of organisations, whether it is business, government, churches, sport organisations or universities, have a common desire to reach their goals as efficiently as possible. All organisations bring together society's resources for this purpose. The function of managers is to plan and co-ordinate the use of resources for the efficient attainment of goals. In general, the resources in question are people (human resources), money (capital or financial resources), raw materials (physical resources) and knowledge (information resources). According to Smit and Cronjé (2002:9) the fundamental functions of management are planning, organising, leading and controlling. These are linked up in a logical sequence of actions to form an integrated management process (Figure 2.8).

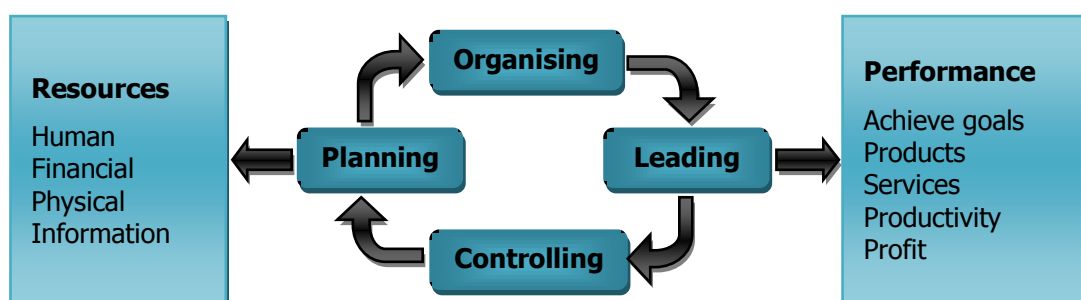


Figure 2.8: The four fundamental management functions constituting the management process (Smit & Cronjé 2002:9)

Managers operate at different levels of organisations. Managers are usually classified according to their level in the organisation (top, middle, or first-line managers), or by the functional or specialist area for which they are responsible. *Top management* is responsible for strategic management of the organisation as a whole, determining its mission, goals and strategies. Top management also influences the organisation's culture. *Middle management* is responsible for the management of specific departments and is primarily concerned with implementing policies, plans and strategies formulated by top management. First line managers, sometimes called supervisors, are responsible for even smaller segments of the organisation. Their primary concern is to apply policies, procedures and rules to achieve a high level of productivity, to provide technical assistance, to motivate subordinates, and to

accomplish day-to-day goals (Smit & Cronjé 2002:12). The areas of management which are applicable for different types of organisations may differ. The fundamental areas of business management, along with the relative functions of levels of management, are graphically depicted in Figure 2.9.

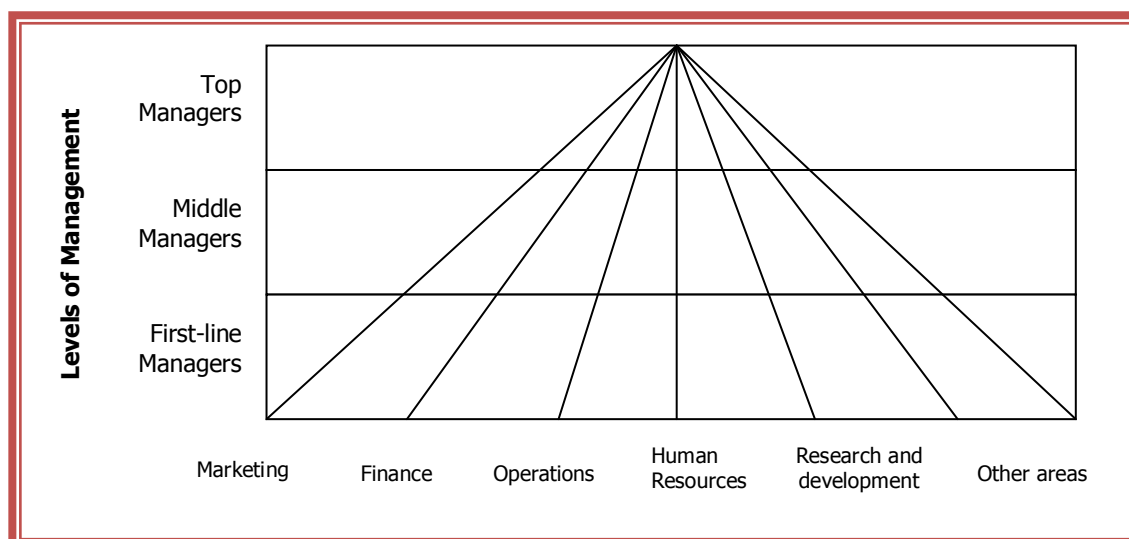


Figure 2.9: Classification of managers according to management level and area (Smit & Cronjé 2002:12)

These management areas will be addressed in the sections on strategy (cf. 2.7), and more specifically as they relate to the research community, in the sections on research management (cf.2.8), human resource management in research (cf.2.11), and research funding (cf. 2.12).

2.6.2.2 *Human resource management*

This section only offers a brief introduction to the selection and strategic placement of human resources.

The Harvard Business School recommends key considerations in the selection of team members, a critical factor in successful management. Top-level involvement is essential, as is the support of managers and employees whom others respect for reasons implied in the following questions (HBE 2005:111):

- Are enough people in relevant positions of power members of the team?
- Do members of the team have relevant expertise?
- Does the team include the required range of perspectives to make intelligent decisions?
- Does the team include people with sufficient credibility so that employees and management alike will treat its decisions seriously?
- Does the team include true leaders?
- Are the team members capable of foregoing their personal interests in favour of the larger goal of the programme?

A prerequisite for establishing the team in this way is to know who has the power to make or break a new strategy, who controls critical resources or expertise, how individuals will react to change – who will gain or lose something? Another important question is if there are groups of people who are likely to mobilise against or in support of a process of change?

According to Kotter (1996:59), three types of people should be avoided as team members. People with big egos don't always understand their own limitations and how those limitations can be complemented by the strengths of others. In the research environment, the realisation of one's own ignorance has been described as an essential virtue (Noltingk 1959:8). "Snakes" are people who secretly poison relationships between team members and should be avoided. Reluctant players, who lack either the time or enthusiasm to provide energy to the team should be avoided. Keeping them off may be difficult because a reluctant player may possess power, expertise or access to resources that are required by the programme.

2.7 STRATEGY

"If you don't know where you are going, you might wind up someplace else".

Yogi Berra

(Online: <http://www.brainyquote.com>)

In its original sense, strategy, (from the Greek word *strategos*) is a military term used to describe the art of the general. It refers to the general's plan for deploying and manoeuvring his forces with the goal of defeating an enemy army. The business sector

embraced the concept in the 1970s, thinking of strategy as a plan for controlling and utilising their human, physical, and financial resources with the goal of promoting and securing their vital interests. More recently strategy has been defined as a plan that aims to give the enterprise a competitive advantage over rivals through differentiation. There is a distinct difference between strategic planning and or business planning. In short, the former is about *doing the right things*, whereas the latter is about *doing things right* (HBE 2005:xi-xiv).

The application of the principles of strategic planning in the research environment has been described in Chapter 1 (cf. 1.1).

There is a multitude of approaches to strategic planning in the literature (Collins 2001; HBE 2005; WKKF 2004; Johnson, Langley, Melin & Whittington 2007). A Google Scholar search for "strategic planning" yielded approximately 1 800 000 references. Different types of organisations have different approaches to strategic processes, decision processes and change processes. Johnson *et al.* (2007:3) disagree with the common view that strategy is a property of organisations. They are of the opinion that strategy is more about things that people do – that it is an activity. For example, differentiation strategies involve people doing things differently and in ways difficult to imitate; strategic processes involve people making strategies. The emphasis on people in strategic processes is supported by Collins (2001:13), who, in an investigation of companies that became exceptionally successful ("good to great") after some strategic changes, unexpectedly found that the successful leaders of those companies all focused on the selection of people first before changing the strategy of the companies.

Strategic planning specifically for research programmes or laboratories has been described for decades as, for example, the description of research strategy by Noltingk (1959:57-68) who outlined the selection of types of research, boundaries of scientific fields, potential customers, value assessment, objectives, and management of research projects. With reference to more recent demands for the strategizing of research in healthcare systems, greater recognition for organisations to collaborate with each other to improve research and the creation of clear pathways to ensure high-quality research has been documented (McNicholl, Coates & Dunne 2008:345).

Strategy will be described in terms of basic principles, leadership and management, the strategic process, and the application of strategic planning in the research environment.

2.7.1 Basic principles of the strategic process

The interactions between human, organisational and institutional factors on one axis, and that between strategy content in process, is illustrated in a strategic management matrix in Figure 2.10.

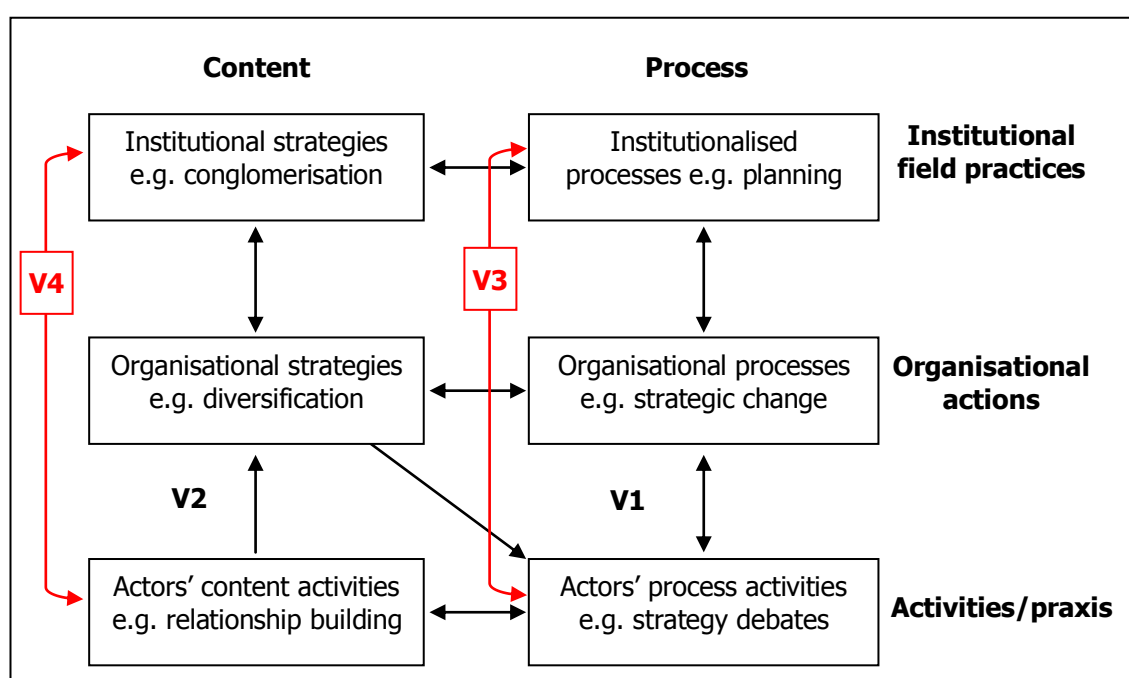


Figure 2.10: An exploded map of strategic management (Johnson *et al.* 2007:18)

In Figure 2.10, V1 depicts the link between people's activities and organisational level processes, in both directions. It illustrates that people's interactions inform and constitute organisational processes. V2 illustrates the link and effect of people's activities on organisational strategies. V3 indicates the interrelationship between institutional strategy management processes and people's activities within organisations, while V4 is an indicator of institutional strategies (Johnson *et al.* 2007:18-26).

In a research study investigating key success factors in strategic planning which dramatically improved the profits of a number of companies, Collins (2001:12) identified eight common denominators. These are:

- Level Five leadership, which emphasises personal humility and professional will as central leadership characteristics, in favour of more highly rated characteristics such as knowledge, teamwork, management and leadership skills. These leadership characteristics were graded by Collins (2001:20) in order of importance (Figure 2.11).
- First who, then what. The common approach in these successful companies was that the leader identified the most appropriate people to assign to the appropriate tasks as first priority.
- Confront the brutal facts (yet never lose faith). Honesty and diligence in appraising the current situation, identification and management of adversity while keeping faith in the eventual success of the project in question. This factor implies that role players need to have passion for the project and belief in the value thereof.
- The “Hedgehog concept” implies focus on the right things, and simplicity. According to this concept focus is determined by an interaction between three factors as illustrated in Figure 2.12. These factors are firstly, what you can be the best in the world at, secondly, what drives the economic engine of the project, and thirdly, what you are deeply passionate about.
- A culture of discipline. With discipline the need for hierarchy and bureaucracy diminishes. A culture of discipline with an ethic of entrepreneurship is conducive to great performance
- Technology accelerators. Technology is used in these successful companies to assist in attaining success or transformation, but not as a primary means thereof.
- The flywheel and the doom loop. The implication of this principle is that success will not happen without relentlessly pushing a giant flywheel in one direction until it gains its own momentum. The doom loop indicates the forces in the opposite direction, having a negative effect on progress.
- Built to last. This reflects a project’s sustainability, built on core values and purpose.

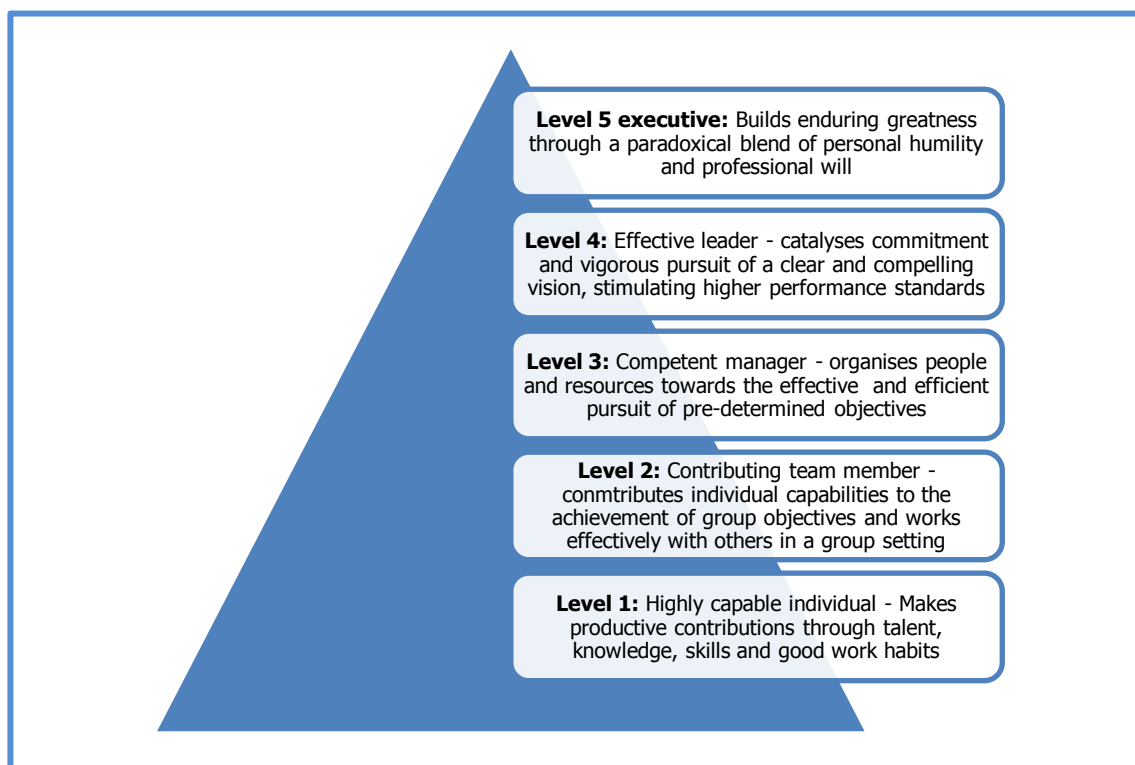


Figure 2.11: Level Five hierarchy of successful leadership (Collins 2001:20)

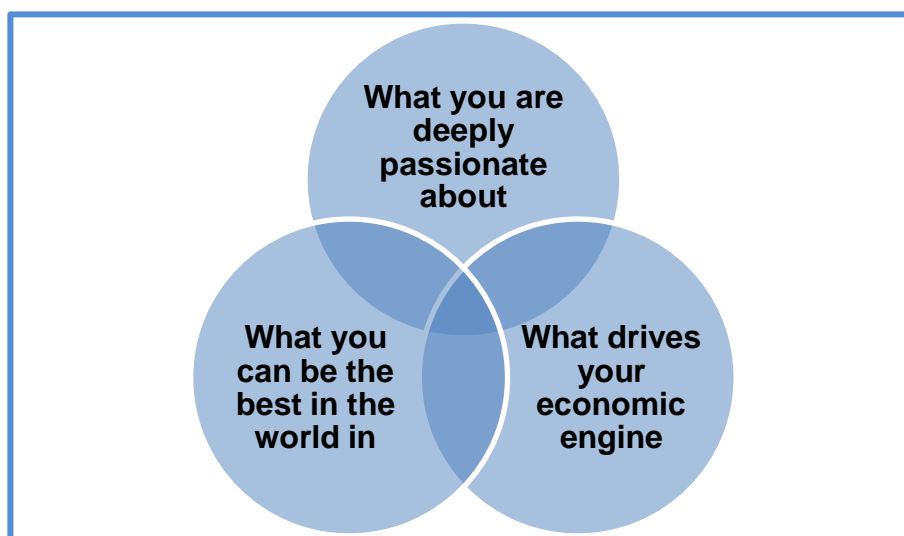


Figure 2.12: The three circles of the Hedgehog concept, illustrating the main determinants of focus areas for success (Collins 2001:96)

2.7.2 The strategic process

The strategic process delineates the process of progressing from where an organisation or system is, to where it wants to be. The detail of the outcomes of the strategic process (where it wants to be) is determined by a process to determine the broad vision, defining mission, and specific goals. The journey is facilitated by a host of management processes, from formulating a strategic plan, but also plans for operational issues such as communications, human resource management, restructuring and budgeting (Bryson 2011:online). Strategy creation and its implementation should be approached as a process, or a set of activities that transform inputs into outputs. The basic structure of such a process is described graphically in Figure 2.13 (HBE 2005:xvii).

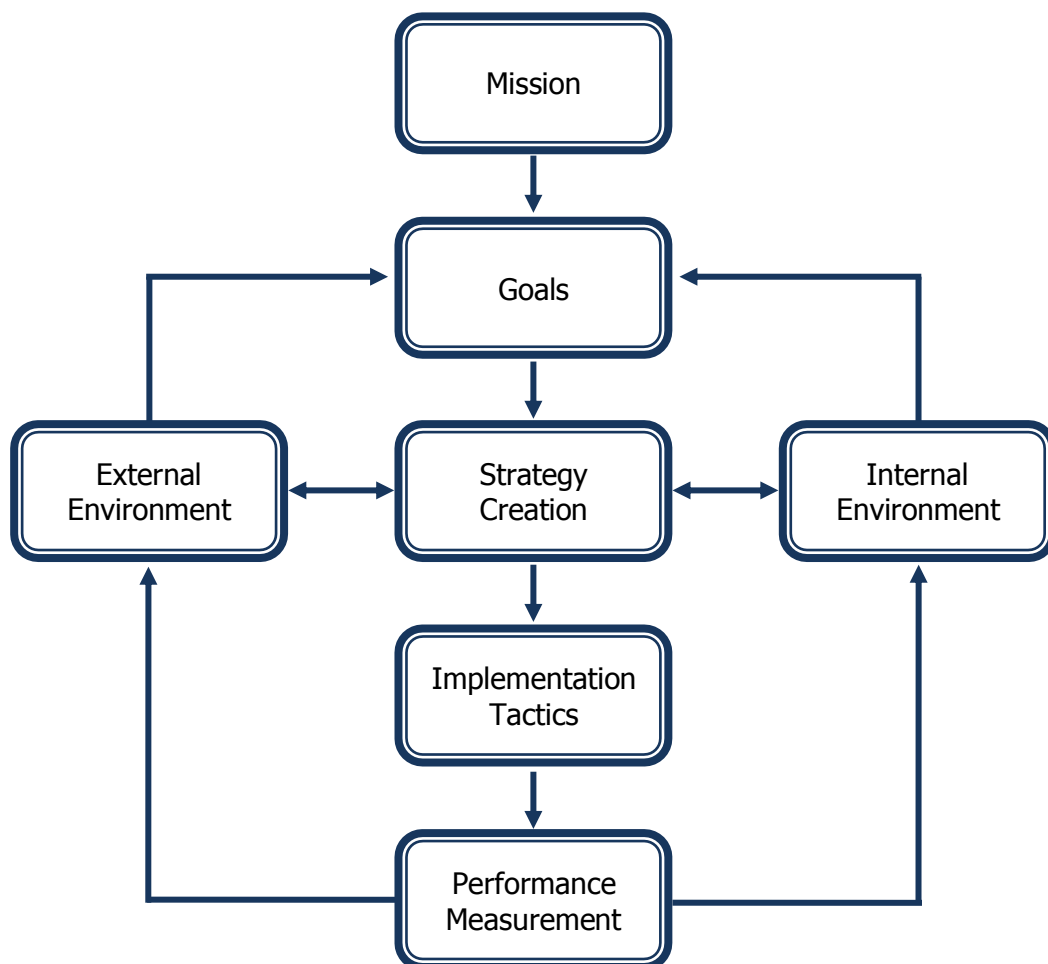


Figure 2.13: The strategy process (HBE 2005:xvii)

Strategy begins with goals, which naturally follow from an organisation's mission. For practical purposes, goals need to be defined in context. It needs to take the external environment (opportunities and threats) as well as the internal climate of the organisation (strengths and weaknesses) into consideration as an iterative process. This analysis has adopted the acronym SWOT: strengths, weaknesses, opportunities, and threats (HBE 2005:2). Goal setting need to be "SMART" to be successful: specific, measurable, achievable, realistic, and time-bound. These goals are then achieved by making action plans with the action steps including "who", "what" and "when" (HBE 2005:84). An important aspect of the strategic process is continuous review of progress, measured by the goals, with appropriate adaptation of the strategy as required (HBE 2005:98). An effective tool for monitoring of progress was developed by the W.K. Kellogg Foundation (WKKF 2004) and is described in this chapter (cf. 2.7.3).

2.7.3 The monitoring of strategic and management processes

One of the principle tasks of strategic management is to ensure that the strategy of the organisation is carried out successfully (Thompson & Strickland 1998:15). Much literature exists on implementation and management of corporate business (Smit & Cronjé 2002:12). Because of the varied nature of non-profit organisations, including universities and research environments, generic strategic and management models are not easily adaptable to suit specific needs, as is the case of this research study.

For the purpose of this research study, the program logic model of the W.K. Kellogg Foundation (WKKF), specifically suited for strategic monitoring of non-profit organisations, was chosen as an appropriate framework for the conducting of the study and as the foundation for the eventual strategic framework for research in SEM at the UFS.

The WKKF program logic model is defined as: *"a picture of how an organisation does its work – the theory, and assumptions underlying the program. A program logic model links outcomes (both short- and long term) with program activities/processes and the theoretical assumptions/principles of the program"* (WKKF 2004:iii).

The premise of the use of the program logic model is that good evaluation reflects clear thinking and responsible program management in an uncomplicated way. It creates an

explicit understanding of the challenges ahead, the resources available, and the timetable. In addition, it keeps a balanced focus on the big picture as well as the component parts. In conceptualising the program according to this model, a manager begins by describing the basic assumptions or foundations, and then adding program components in the order in which they should occur. These are categorised in five components:

- *Factors*: These are resources and/or barriers which will potentially enable or limit the effectiveness of the programme. Enabling, *protective factors or resources* may include funding, existing organisations, potential collaborating partners, existing organisational or interpersonal networks, staff and volunteers, time, facilities, equipment, and supplies. Limiting *risk factors or barriers* might include such things as attitudes, lack of resources, policies, laws, regulations, and geography.
- *Activities*: These are the processes, techniques, tools, events, technology, and actions of the planned programme. These may include *products* such as promotional material or educational curricula, *services* such as education and training, counselling or health screening, and *infrastructure*, including structure, relationships and capacity used to bring about the desired results
- *Outputs*. These are the *direct results* of programme activities, described in terms of the size and scope of the services and products delivered or produced by the programme.
- *Outcomes*. These are specific changes in *attitudes, behaviours, knowledge, skills, status, or level of functioning* expected to result from program activities.
- *Impacts*. These are organisational, community, and/or system level changes expected to result from the programme.

The sequence of the program logic model is presented in Figure 2.14 (WKKF 2004:iii).

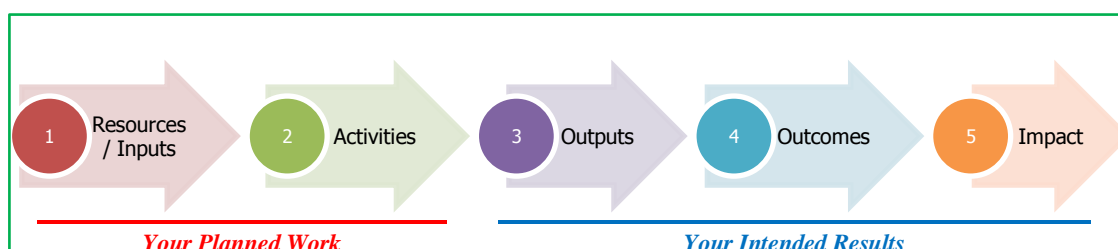


Figure 2.14: The basic program logic model (WKKF 2004:1)

2.8 RESEARCH LEADERSHIP AND MANAGEMENT

The leadership and management of research systems follow certain basic leadership and business principles. As with any other segment or system in society, however, the management of research systems and researchers demands some adaptations to generic management principles in order to fulfil particular requirements. In this section, selected leadership and management factors specific to the healthcare-, university-, and research environments, with examples from relevant policy documents will be addressed.

2.8.1 Academic leadership and management

One prominent function of academic leadership and management is the monitoring of quality and standing of research and science. On a global scale, the ability to judge a nation's scientific standing is vital for governments, businesses and trusts that must decide on scientific priorities and funding (King 2004:311). Similarly, at university level, some form of measurement of academic standing and peer review of scientific contributions of the university is necessary. It is, however, a notoriously difficult process and a problem to define appropriate evaluators and criteria for evaluation (Seglen 1997:498). At faculty and departmental level, the evaluation of performance of academic departments, as well as that of individual researchers is necessary to monitor quality, direction and progress. At this level the measuring instruments are as difficult to define as on a more global level (Agasisti, Catalano, Landoni & Verganti 2012:2; Hirsch 2005:16569). Aspects of desired research outputs, as well as significance and impact of research are explored in section 2.14.

2.8.1.1 *Leadership, management and research in academic medicine*

Academic medical centres are a critical national resource which demands creative, enlightened leadership (Wilson & McLaughlin 1984:3) Globally, academic medicine is under threat at this time. A shortage of clinical academic staff has been identified in the UK. Similarly, a sharp decline in clinical research was identified in the UK as long ago as 2001 (Stewart 2002:323). Much instability in academic medicine around the

world has been identified by the International Campaign to Revitalise Academic Medicine (ICRAM) (Awasthi, Beardmore, Clark, Hadridge, Madani, Marusic, Purcell, Rhoads, Sliwa-Hähnle, Smith, Edejer, Tugwell, Underwood, & Ward 2005:0606). Factors which were identified by ICRAM and relevant to this research are

Workload and scientist factors:

- The great pressures on health services, such that academic medicine is often neglected.
- Tensions between the responsibilities for teaching, research and clinical service and the growing difficulty or impossibility of a single individual to be competent in all three aspects.
- Problems with career progression for academics.
- In many, probably most, countries those doctors who enter careers in research, who ideally would be the “best and brightest” are likely to earn much less than those who can spend at least some time working in private practice.
- Although no clinicians are openly against research, clinicians are often unimpressed with doctors who concentrate on research.

Research factors

- The fact that clinical research has not kept up with the advances in basic scientific discovery.
- The lack of capacity in “translational research” – research that brings innovations directly to patients.
- The substantial gap between best, evidence-based practice and what is actually practised.
- The canyon between academics and practitioners.
- Use of citation indices in research assessment, which overemphasises the value of basic research and underemphasises the importance of applied research that may bring more immediate benefit to patients.
- A lack of mutual respect among different categories of researchers – basic, clinical, public health, primary care, applied, etc.
- Research is often not focused on the biggest health problems (particularly true in a global context).

In South Africa, the challenges of healthcare are great in terms of economic forces, human resources, morale and funding (Kleinert & Horton 2009:759; Muller, Bezuidenhout & Jooste 2006:2). In South Africa, a decline in academic medicine is also evident, in keeping with the global trend (Linegar, Smit, Goldstraw & Van Zyl. 2009:592; Mollentze & Van Zyl 2009:546; Van Niekerk 2009:543). Particular challenges in South Africa are highlighted in this section.

One of the peculiarities of academic medicine management is the relationship between the medical school and the teaching hospital. Medical schools and teaching hospitals are expensive cost centres. In the USA in the 1980s, the combined costs of a medical school and a teaching hospital (when it belongs to the university) amounted to 20 % of the university's total expenditures. Where teaching hospitals were not owned by the university, the expenditure of medical schools alone amounted to 25% of the university budget (Wilson & McLaughlin 1984:79). These figures may be dated and relevant to the USA, but the relatively high cost and subsequent budgetary challenges particular to medical schools, are demonstrated. The importance of good symbiosis between a medical school and the teaching hospitals is emphasised by Jones and Gold (2001:993), arguing that the financial health of many medical schools is tied closely to the fortunes of their teaching hospital partners. In South Africa, teaching hospitals are state owned and managed by the provincial Departments of Health (DoH). The clinical load associated with these hospitals is a real threat to research time and outputs in medical schools in South Africa (Van Niekerk 2009:543).

In addition to the teaching hospitals, another important role player in the governance, operational policy and administrative structure of the medical school, is the university management with its own policies and structures. The unique set of circumstances and financial requirements of medical schools as opposed to other faculties often creates tension between the medical- and other faculties (Wilson & McLaughlin 1984:80).

2.8.1.2 *The "triple threat" of clinical workload, research, and teaching*

Apart from the financial dependence of medical schools on teaching hospitals, or in the South African scenario on the DoH, the focus of the two entities is often different. Teaching hospitals have a responsibility to provide sufficient, high-quality clinical services. These high clinical loads are often absorbed at the cost of teaching and

research (Cohen 1998:133; Jones & Gold 2001:993; Wilson & McLaughlin 1984:79). Universities and medical schools, on the other hand, have responsibilities and focus beyond clinical work, including teaching and research (Awasthi *et al.* 2005:0607). This situation has been coined the “triple threat” and implies that the realities of both research and clinical enterprises make it unlikely that a clinical faculty member can excel in all three missions of teaching, research, and patient care (Jones & Gold 2001:993). Currently there is increased funding and other incentives available from healthcare research funding agencies for research in health care, both internationally and in South Africa (ASSAf 2009:187). One of the dire consequences of the “triple threat”, however, is the relative inability of medical schools’ faculty to take advantage of these opportunities (Jones & Gold 2001:993). In the South African context, the lack of focus on teaching and research and the strong decline in both quality and quantity of clinical research was highlighted by Gevers (2009:760).

Solutions to this threat have been offered in the literature. One contributing solution was put forward by Steinert, Nasmith, McLeod and Conochie (2003:142) who developed a teaching scholars programme for medical educators at McGill University to follow while maintaining their clinical, teaching and research responsibilities. This additional expertise in teaching can assist in introducing time-saving techniques and technologies, in addition to improved quality of teaching. In the USA, the separation of clinical faculty members into two groups, clinicians and researchers, with clinical teaching responsibilities distributed broadly among them is increasingly used as a solution. Research in medical schools in the USA is further promoted by tenure eligibility, or permanent appointment with academic freedom, preserved primarily for researchers (Jones & Gold 2001:993). In the researcher’s experience, the appointment of permanent researchers in medical schools in South Africa is not a common practice. Even though the Academy of Science of South Africa (ASSAf) has introduced a consensus document to revitalise clinical research in South Africa in 2009 (ASSAf 2009), visible changes have not been forthcoming. The need for co-ordinated planning to reinvigorate clinical research in South Africa was emphasised by Gevers (2009:762). As a way forward in this regard, transformation in a broad sense within healthcare systems in South Africa has been proposed by Van Niekerk (2009:543), including the appointment of the right people with appropriate core values into the right positions and following a winning team approach. Key success factors proposed in this regard

are teamwork, in which data, evidence and solid arguments are discussed openly and honestly without criticism, decisions maintained, and collective and individual responsibility accepted for decisions made.

2.8.2 Research strategy and management

In any society or sub-culture in which the primary emphasis is upon ideas – their propagation, dissemination, discussion, evaluation and protection – it can be expected that there will be many differences of opinion (Glatt & Shelly 1970:1). The diversity and complexity of the research environment pose different challenges to managers of research systems than those of other environments. Topics particular to research management are addressed in this section.

2.8.2.1 Research strategy

Selection of research focus areas

Traditionally, universities were centres of independent intellectual enquiry whose purpose was to pursue truth rather than sectional interest. Since the 1960s external socio-political influences increasingly influenced this academic autonomy (Holligan 2011:56). Over the last two decades the higher education system in South Africa has been shaped by a rapidly changing national and international context. Globally, the knowledge-based society, competition for greater shares of the global economy and pressures on funding sources have led governments to reassess the role and resourcing of universities. The current norm is that research is scrutinised by external forces for results, quality assurance and performance. South African universities had to reposition themselves to accommodate the socio-political need for universities in Africa to increase capacity, diversify and internationalise (UFS 2009b:1).

In an analysis of factors influencing research strategy and significance in developmental research, Fabes, Martin, Hanish and Updegraff (2000:212) offered a model for selection of research focus which accommodates both the academic need for new knowledge in a discipline and external demands for knowledge within a larger social context. Even though this model was developed specifically for research in developmental sciences, it seems to be generally applicable to some extent. The model presents four levels of

context which may influence scientists' choice of research topics. All of these may not apply at all times for all researchers.

According to the model by Fabes *et al.* (2000:213) the first contextual level that may influence selection of research focus, is the *person* level. At this level, researchers' personalities, habits and interests that are formed over time through biological, social and environmental factors, guide their choices and appraisals of research topics.

The most immediate level of context that plays a role in the selection of research focus is the *microsystem*. This innermost sphere of influence involves the interactions of personal interests of the scientist with his or her most immediate environments, from early in life and continuing throughout the scientist's career. Early family, school, and neighbourhood influences play a role in the initial decision to become a scientist. Family and personal experiences may also trigger interests. University experiences, such as training in scientific methodology and academic socialisation may provide a certain world view that can direct early research career choices. A researcher's academic department or work setting, professional relationships, and teaching experiences are examples of factors in the microsystem that may influence the selection of research topics (Fabes *et al.* 2000:213).

At the *mesosystem*, forces interact to help shape research focus. This level varies from interest in a colleague's work to changes in focus of professional organisations or departments. A particularly influential mesosystem force is the selection of journal editors and reviewers, as well as grant officers or organisations and reviewers. The selection process directly influences which manuscripts and grants are published or funded (Fabes *et al.* 2000:214).

The third level of context which may influence selection of research focus is the *exosystem*. This system involves linkages between processes taking place between two or more broad settings. These processes indirectly influence the microsystem and the immediate environment of the researcher. The exosystem includes government, community interests, university policies and funding agencies (Fabes *et al.* 2000:214).

The *macrosystem* represents the fourth level of context in selection of research focus and involves cultural attitudes, values, and the media as potentially powerful forces

impacting on research agendas (Fabes *et al.* 2000:214). A schematic depiction of the researcher in context, as developed for developmental researchers, but applied in this study to SEM research, is presented in Figure 2.15.

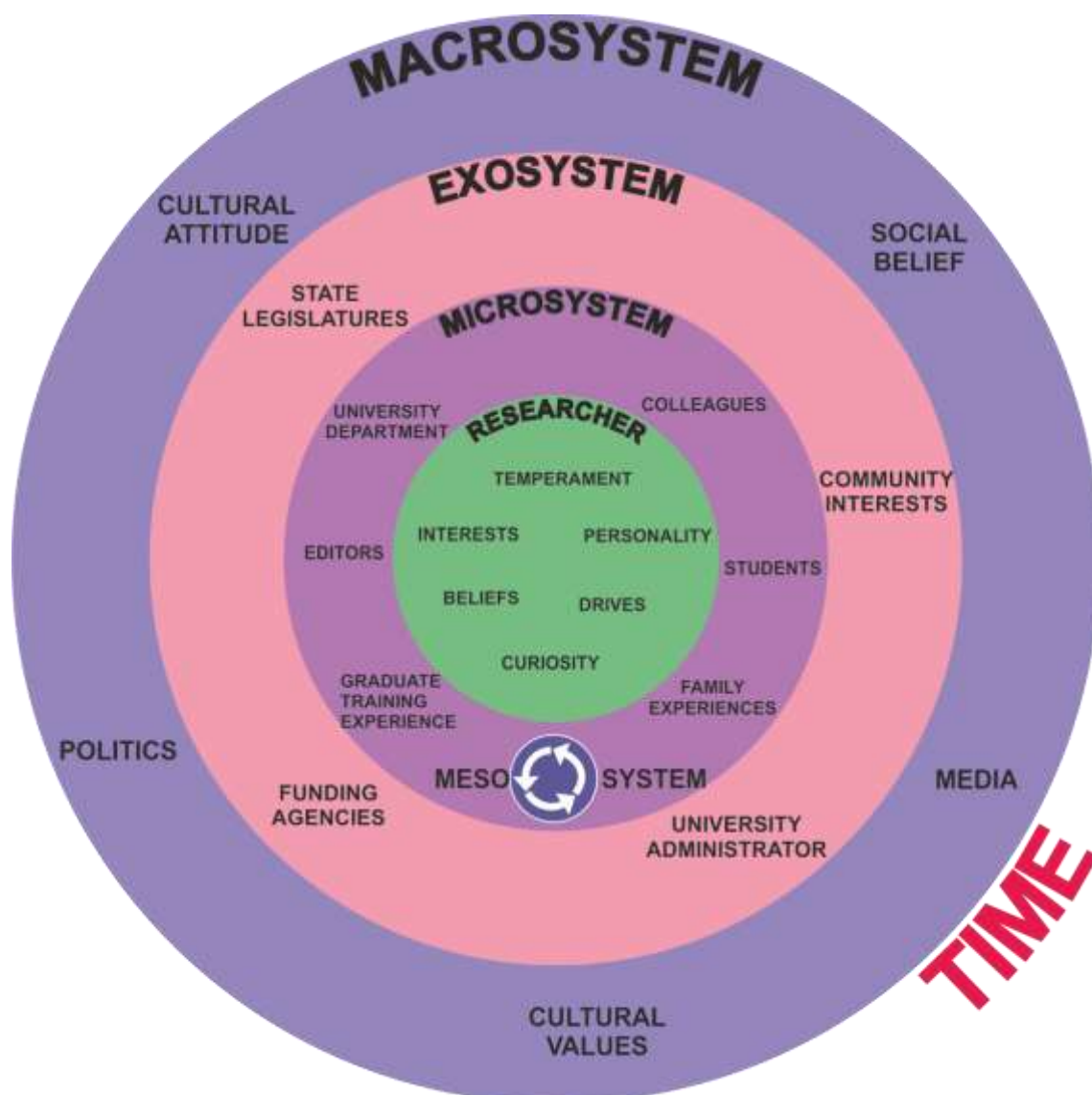


Figure 2.15: The researcher in context – levels of influence on selection of research agendas (Fabes *et al.* 2000:216)

2.9 THE SCIENTIFIC COMMUNITY

In this section, certain characteristics of the research community, research culture, and influences on academic freedom are explored in the literature. In the literature the terms “scientific community” and “research community” are used almost interchangeably and the terms will be used in this section as it was presented by the authors of the literature consulted.

2.9.1 Characteristics of the research community

Ludlow and Kent (2011:73) describe the “scientific community” as scientists linked to one another in a variety of ways that strengthen the practice of science and contribute to career development and personal fulfilment. Science cannot be practised in isolation.

2.9.1.1 *Networking*

Scientists work in communities of specialists that share their work, support one another, form collaborations, ponder over problems and seek constructive criticism. This networking can take various forms, from informal conversations to formal meetings to group participation in internet-based conversations (Ludlow & Kent 2011:73). In this regard, Melin (2000:39) explains that whether or not researchers collaborate, they do belong to a scientific network in some respect. Contacts and communication with peers is one form of interaction that might not lead to co-authored texts, but can provide a vast intellectual exchange which may spark the development of new ideas.

2.9.1.2 *Collaboration and team science*

Networking, as described in 2.9.1.1 is a tool to develop collaborations and enhance their effectiveness (Ludlow & Kent 2011:73). Interdisciplinary collaboration in the sciences was investigated by Qin, Lancaster and Allen (1997:893). They reported a general trend in research collaboration towards interdisciplinary collaboration, especially in biology and medical sciences. A rapidly developing trend is “team science”, involving

multi-centre interdisciplinary collaboration, which is particularly suited for solving large and complex problems (Ludlow & Kent 2011:74; Melin 2000:31).

Melin (2000:38) put forward two potential types of benefits of collaboration – personal and structural. On a personal level it provides a platform for transfer of knowledge and experience from senior to junior researchers (Lee & Bozeman 2005:693), sharing of expertise and personnel, and provides opportunities for new approaches or solutions to problems by obtaining different approaches from different disciplines (Qin *et al.* 1997:893). On a structural level, sharing or exchanging of resources such as data or equipment creates opportunities for research that would otherwise have been impractical to do. Opportunities for funding can be increased by collaboration, especially for young researchers collaborating with leaders in the field (Ludlow & Kent 2011:74; Melin 2000:39).

The most beneficial effect of networking and collaborative research is a potential increase in productivity and quality of scientific outputs (Lee & Bozeman 2005:693). Multi-university collaborations are the most rapidly growing type of authorship structure and they provide the highest impact papers when a top-tier university is included (Jones, Wuchty & Uzzi in Ludlow & Kent 2011:74). A particular opportunity for networking and collaboration for South African researchers and those in other developing countries, is the current outreach of first world research communities, for example the USA, to collaborate and assist in answering research questions specific to disadvantaged and developing countries and communities, where research-led solutions could bring the greatest impact to high rates of early mortality (Glew 2008:227; McKee, Stuckler & Basu 2012:1). Not only can globalisation of clinical trials to include multiple countries address the underrepresentation of developing countries in clinical research, but may also assist in comparing different approaches to managing disease and health issues. This can be particularly valuable where the value of simple and inexpensive interventions, as often used in low-income settings, can be tested. Furthermore, the recruitment of participants may be faster and the cost of research less expensive in developing countries (Lang & Siribaddana 2012:1).

A potential challenge in interdisciplinary collaboration is the lack of understanding of disciplinary terminologies and working norms of other disciplines, that may, amongst

other things, lead to incorrect application or interpretation of data (Qin *et al.* 1997:914). Lee and Bozeman (2005:694) warn that, while some collaborations may greatly enhance productivity, others may inhibit it.

2.9.1.3 *Internet-based scientific networking*

Internet-based scientific networks provide excellent platforms for scientists with similar interests to communicate and obtain information. One such resource is the Community of Science (COS), which provides a knowledge management system for individuals and institutions, as well as an extensive source of information on research funding opportunities (<http://www.cos.com>). The educational and research network for scientists in the UK is "Janet" (<http://www.ja.net>), which also provides links between UK scientists and those elsewhere. Another useful internet-based resource is SciVal (<http://www.info.scival.com>), a support system for research management and funding.

2.9.2 *Research culture and scholarship*

"Research culture" or "scientific culture" is complex phenomena which are difficult to define. In this context Ludlow and Kent (2011:160) wrote that it is not easy to generalise about research. It has many different forms and accommodates many different work patterns. For the purpose of this research, it is described in terms of the guiding principles underpinning the UFS Research Strategy 2009-2013 (UFS 2009b:3), as well as the desired strategic outcomes of the UFS research management and implementation plan 2009-2013 (UFS 2010d:8).

The guiding principles applied at the UFS to nurture a research culture and to culminate in the UFS becoming a research intensive university, are:

- *Strong, visionary University leadership*, with unwavering support for the strategic vision for research, able to take difficult decisions, and developing operational responsibilities;
- *Responsible stewardship* of human, financial and other resources;
- *Ethical conduct* in all research related activities;
- *Accountability* for performance;
- A focus on *relevance, excellence and impact*;

- A culture of *continuous reflection and improvement* in strategies, actions, and systems;
- A culture of *people-centred, flexible and accurate service delivery*;
- *Responsiveness* to market needs and demands for human resources, expertise, and products;
- *Integration, collaboration, and synergy* where appropriate for better performance.

The UFS uses a strategy of development of selected priority themes or strategic clusters, as described in Section 2.5.1.4. The need for the creation of an institutional environment that will allow emerging as well as experienced researchers to thrive, with adequate time for research has been recognised to enable the delivery of exceptional research outputs. Multidisciplinary interaction is promoted to establish a vibrant, interconnected research community at the UFS. To assure sustainability, a next generation of researchers – postgraduate students, postdoctoral fellows and young staff members are prepared on a continuous basis. Senior researchers are motivated and enabled to reach their true potential.

Definitions and approaches to scholarship have been described in section 2.5.1.3

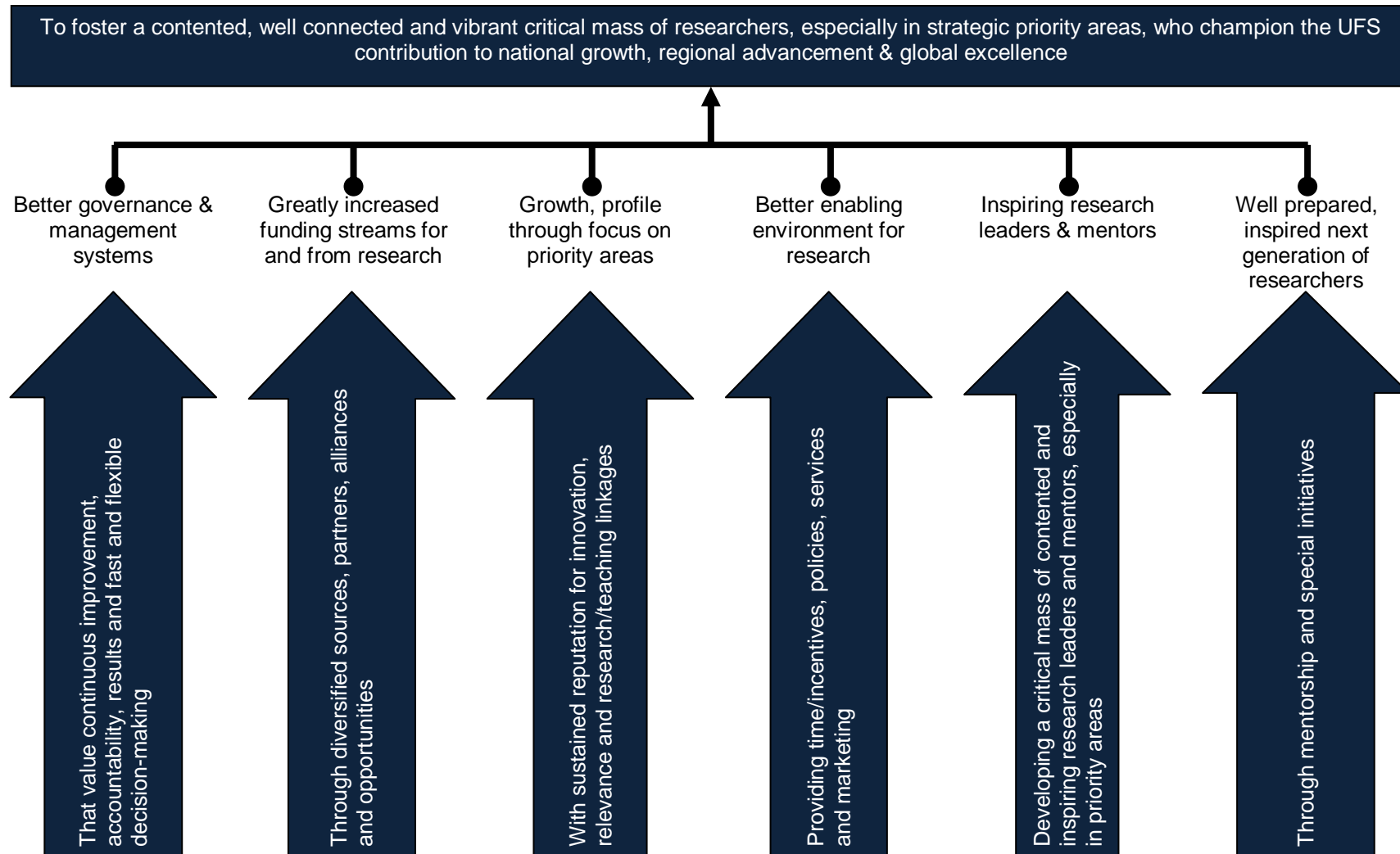


Figure 2.16: The UFS Research Strategy Framework (UFS 2010d:20)

2.9.3 Academic freedom and identity

In the pursuit of scholarship, especially the scholarship of discovery, a certain degree of academic autonomy or freedom is required to allow free and innovative new thinking. The activity of universities has traditionally been conceived in terms of independent intellectual enquiry whose purpose is to pursue truth rather than sectional interest (Holligan 2011:56). In 1886 Nietzsche, as quoted in Roberts (2007:360) distinguished between “philosophers” and “scholars”, where true philosophers were seen as rare individualists, committed above all else to the pursuit of knowledge, ready to take risks and independent in their judgements. Scholars, by contrast, were subservient, insecure conformists, desiring honour and recognition over the quest for knowledge. This definition of scholarship has changed. It seems that in the modern context the philosopher, although with less independence, is accommodated in the scholarly community (cf. 2.5.1.3). Many external forces have changed these previous positions of autonomy and academic freedom. Selected issues on this topic and relevant to this research will be explored in this section.

Socio-political factors in the selection of research focus have a distinct influence on academic freedom, particularly where linked to funding opportunities and performance indicators (Sizer, Spree & Bormans 1992:133). The effects of external influences on research funding and publication in the UK was assessed by the Research Assessment Exercise (RAE). In this exercise a warning was expressed that the undermining of research culture and academic freedom could lead to the “death of the professors” (Lyotard 1984 in Roberts 2007).

The current international research culture is moulded by external funding models and both quality and quantity of output (Ludlow and Kent 2011:vii). Roberts (2007:360) warns that this approach could lead to academics becoming more “herd like” in their activities, only doing what is required for success in the current system. Taking risks, for example, in pursuing lines of research that may not lead to the production of “quality assured outputs”, could become inadvisable or impossible to do. Individual original thinking may be seriously undermined by the system.

In clinical research, the question of conflict of interest between researchers and industry, most prominently the pharmaceutical industry but also others, such as the food and beverage industries, have been heavily debated in the literature (Angell 2000:1516; Bekelman, Li & Gross 2003:454; Bodenheimer 2005:1539; Heffner 2000:1516; Lo, Wolf, Berkeley 2000:1616; Rettig 2000:129; Rogans-Watson 2009:2196). In guarding against lack of objectivity, in 1984 the New England Journal of Medicine became the first major medical journal to require authors to disclose any financial ties with companies that make products which are discussed in the Journal (Angell 2000:1516). Conflict of interest policies of leading medical schools in the US have been found to vary widely, with a low percentage of policies that are stringent enough to prevent financial gain of researchers in companies of which the products are researched. In a recent editorial, the editors of PLoS Medicine argued that disclosure has severe limits as a strategy for mitigating bias, and may even worsen the problem. The reasons for this argument are that disclosure alone merely shifts "secret bias" to "open bias", and that the reader may be blinded by the perception of absolving a person from his or her responsibility to manage the conflict of interest (PLoS 2012:1).

In SEM, one landmark issue demonstrating the power of industry and marketing over science has evolved over the last two decades (Beltrami, Hew-Butler & Noakes 2008:796; Noakes 2007:463; 2011:475). In the 1990s, the American College of Sports Medicine (ACSM) promoted the concept of "drink as much as possible fluids" during exercise to prevent dehydration and improve performance. This stance was embraced by role players in the sports beverage industry and copious intake of sports drinks was heavily marketed. The dangerous condition of exercise-associated hyponatremia (EAH) caused by overhydration as described by Noakes (1992:205), was indirectly promoted by the marketing of the "benefits" of high intake of sports drinks. The potentially dangerous medical condition associated with this practice was disregarded for years, to the point of attempts at discrediting of the scientist. Apart from ignoring academic scientists, the scientific department of one of the large companies involved, was overruled by the company's own marketing department (Noakes 2007:463; 2010b:473). This episode has exposed the power of commercial influence over acceptance of ground-breaking and life-saving research, and is an extreme example of the threat of external forces to science.

2.10 RESEARCH ETHICS

There should be no doubt about the central role of ethics and ethical practice in research, especially in medical research. A number of complex issues, some of which cannot be resolved, deserve consideration in medical research ethics. The first fundamental issue is the difference between medical practice and scientific research. The "irresolvable ethical dilemma" that arises is the obligation of the medical practitioner to treat patients on the basis of scientific knowledge, or evidence base (cf. 2.1; 2.4). The scientific validation of medical knowledge, however, requires the exposure of human subjects to the risk of new therapeutic regimes and is therefore in conflict with the physician's obligation to, above all, do no harm (*primum nil nocere*) (Boomgarden, Louhiala & Wiesing 2003:13). In this regard, the rights of the individual remain paramount, and no scientific advance can outweigh harm done by unethical research (Campbell, Gillett & Jones 2001:218). Immanuel Kant (1724-1804) declared:

Whatever has a value can be replaced by something else which is equivalent; whatever, on the other hand, is above all value, and therefore admits of no equivalent, has a dignity" (Kant in Boomgarden, Louhiala & Wiesing 2003:31).

Other prominent ethical considerations in medical research include informed consent and vulnerability to consent, for instance because of monetary vulnerability or moral vulnerability (Boomgarden, Louhiala & Wiesing 2003:29). Confidentiality versus true anonymity is another contentious ethical issue, especially in dealing with sensitive information about individuals, such as pregnancy, drug abuse or HIV/AIDS (Boomgarden *et al.* 2003:42). Research on vulnerable groups, for instance testing of new medication on persons who do not possess the ability of giving informed consent, as in the case of Alzheimer's disease or psychotic patients raises the question of advancing scientific knowledge in the treatment of such vulnerable groups. A further example is research in emergency situations (Boomgarden *et al.* 2003:69).

Two elements of science, including medical science, are identified by Campbell *et al.* (2001:233). The first is the investigation of important questions. The second is the formulation of new theories and new ways of interpreting data. In the first instance, the accumulation and careful analysis of data is required, for which

medical science is well prepared. In the second instance, medical science is confronted with a complex challenge. According to Campbell *et al.* (2001:233), as we have inherited it, medicine is based on a fairly narrow view of science. It succeeds at explaining the workings of mechanistic devices and to some extent the biological workings of the human body where relationships of cause and effect can be discerned with relative ease. What is difficult to understand, however, is a system with an individual and holistically interconnected set of causes, where the same cause may not always produce the same effect. In these cases, the medical system of thinking may be incapable of detecting patterns evident to other ways of thinking, such as a sociological approach may do. The biomedical approach comes into tension with two sets of forces at work in clinical care – the need for innovation, and the possibility of radically different approaches, as those underpinning alternative healing systems (Campbell *et al.* 2001:234). The limitations of the narrow biomedical approach to medicine as part of medical orthodoxy, and the need for a broader outlook has been described from the point of view of SEM (cf. 2.2.2.1).

Two different dimensions of ethics in research have been distinguished – procedural ethics and “ethics in practice”. *Procedural ethics* involve, amongst other research procedures, obtaining of approval from a research ethics committee that are not necessarily experts on the area or type of research and requires some experience and specific approaches. *Ethics in practice* pertain to day-to-day ethical issues that arise in the execution of research, and which do not necessarily involve the complex ethical issues described previously (Guillemin & Gillam 2004:266). It is also called *micro-ethics* and deals with sensitive situations that arise in the research process, especially when researching people. It can be compared with the doctor-patient relationship in medical practice, which involves establishment of trust and dealing with personal and sensitive issues, and the recognition and dealing with “ethically important moments” (Guilemann and Gillam 2004:265; Komesaroff 1985:68). *Reflexivity* is often used in qualitative research to assist in dealing with “ethics in practice” issues. It involves a continuous process in which researchers scrutinise their own roles and conduct, as well as the possible interpretations and implications of their research (Guilemann & Gillam 2004:274).

In order to guide researchers through the pitfalls of research ethics, good research practices (GRP) are commonly used. In certain domains, there are detailed guidelines, such as for laboratories developing food additives and drugs, as developed by the US Food and Drug Administration (FDA) (FDA 2005). These guidelines do not apply to basic research, for which there are not universally accepted guidelines yet.

Ludlow and Kent (2011:85) propose six general guidelines for good research:

1. Keep track of what was done to prevent errors in recapitulation of the conduct of the research, particularly at the manuscript writing stage;
2. Document authorship decisions and the basis for any changes in authorship during the conduct of the research;
3. Document the role of each of the authors in the research, which many journals now require:
 - a. who was involved in the conceptualisation of the research,
 - b. who designed the procedures and conducted the research,
 - c. who was involved in data analysis, and
 - d. who participated in writing the manuscript?
4. Provide evidence of inventorship in the event of the development of any intellectual property during the conduct of the research;
5. Maintain adequate documentation in the event of a research audit; and
6. In the case of clinical research, maintain adequate documentation of each of the research participants in the event of an audit.

Ethical and procedural issues in clinical research are well standardised. Good Clinical Practice (GCP) refers to international standards that provide quality controls and ethical standards for research involving humans and patients in particular. Consolidated guidelines have been made available by the National Institutes for Health in the USA (NIH 1996: online). The FHS of the UFS has provided ethical guidelines according to which all research in the FHS must be conducted, under the scrutiny of an ethics committee (UFS 2009a).

2.11 THE HUMAN ELEMENT IN RESEARCH

In this section, selected aspects of human resource management and human elements as relevant to the research world are addressed. People are of critical importance in the success of research programmes, as recognised by Noltingk (1959:1), when he observed that one supreme problem in research management is to fill the programme (laboratory) with the right people at the right places. This section contemplates characteristics of a researcher and a research leader, researcher identity, motivation, and rewards. It concludes with considerations in building a research career.

2.11.1 The characteristics of a researcher

According to Ludlow and Kent (2011:11), being a scientist is an exhilarating, although often challenging, career. To be successful, they highlight a number of attributes. Curiosity and love of science are primary characteristics of a researcher. A scientist needs to love the discovery process and learning as a lifelong endeavour. A scientist must be able to focus and have a great deal of self-discipline to work long hours and overcome frequent obstacles. Meticulous attention to detail is required to be successful. A researcher needs flexible thinking, to absorb and rethink unexpected results. He/she must be able to discard a pre-believed hypothesis and deal afresh with new results. Enthusiasm for research and research projects is a primary characteristic (Noltingk 1959:1).

In the research community, scientists must be able to absorb criticism and failure. Criticism should be used to improve manuscripts or grant applications and should not be taken personally. Scientists must accept that not all experiments are successful. Being a successful scientist entails getting to know and being a member of the scientific community - sharing ideas, helping others, doing favours, and returning favours, as described in section 2.9.1.

2.11.2 The characteristics of a research leader

Styles and techniques of leadership and management have been described (cf. 2.6). Certain characteristics of a successful leader in research are described in this section. Three groups of attributes of research leaders - research leadership skills, research organisational skills, and networking skills are explored in this section.

Concerning *leadership skills*, a research leader or principal investigator is required to work with others, to encourage them, give them direction and make the long hours of work rewarding and meaningful. Senior researchers need to assist and encourage juniors to complete their research studies, and assist them to cope with failure. They need to be able to take charge, and have boundless determination and enthusiasm to inspire and motivate others (Ludlow & Kent 2011:12). Human relations in a research programme are a vital parameter influencing the success thereof. An essential success factor in human relations is goodwill from superiors to juniors. Noltingk (1959:39) professes that research hierarchies are often built in a pyramidal structure, wherein harmony between the vertical links is probably the most important single factor to predict success.

Managerial skills required by research leaders include skills in research management, budgeting, chairing committees, and planning. Essential *academic skills* of a research leader include skills in teaching, training students, as well as writing and reviewing grant applications and manuscripts. All these tasks require skills in multitasking, delegating and organising. Having good supportive staff is of paramount importance. A research manager becomes essential as the programme grows bigger (Ludlow & Kent 2011:12).

Networking has been described as a central activity in the research community (cf. 2.9.1). A research leader should participate actively in the research community, to understand the players in the field, to introduce his/her mentees to the community, to identify and recruit students and fellows. It is also important for a research leader to make his/her own work known (Ludlow & Kent 2011:12).

According to Ludlow and Kent (2011:12), personalities, as well as personal and work habits vary considerably and do not necessarily have bearing on success. It is

important for a mentor and mentee to understand and feel comfortable with each other (Ludlow & Kent 2011:5). Character ranks before learning or knowledge in research leadership, but the latter cannot be disregarded altogether (Noltingk 1959:2). In this regard, he emphasises that the most valuable assets that a senior researcher acquires, are broad, rather intangible ones – the experience of how to develop good relations with other scientists and how to assess the significance of a rather indefinite experiment.

A scientific reputation is built on many quantifiable factors (cf. 2.13), but a survey done by a group of Public Library of Sciences (PLOS) editors identified ill-defined characteristics such as fair play, integrity, honesty, and caring as important contributors (Bourne & Barbour 2011:1).

The importance of enthusiasm and motivation in the success of a research programme has been described (cf. 2.11.2), and aspects of the creation of such a climate were described in section 2.6.1.4. The involvement of a critical mass of key role players is essential for success of a research programme (Noltingk 1959:1). Relevant aspects of management of individuals in a team were addressed in section 2.6.2.2.

2.11.3 Rewards in research

A career in research can be rewarding and satisfactory (Ludlow & Kent 2011:160). As described in this chapter, monetary rewards of academics are often incomparably less than in the private sector, as is the case in academic medicine in South Africa (cf. 2.8.1). Stewart (2002:438), a professor of medicine, describes the professional rewards for success in academic medicine as immense. As examples he refers to the fact that clinical academics are relied upon for national and international leadership in medical affairs. Furthermore, academic clinicians have the luxury of a varied workload; still a commitment to clinical practice, but importantly have the ability to control their destiny through excellence in research and education. Meaningful work, as personal reward, has been described as the realisation of one's potential and purpose – the point at which a person's passions, strengths and core values interact synergistically in his/her work (Lieff 2009:1385). Buechner (1993) as quoted by Lieff (2009:1385) defined this point as the place where your own deep

gladness meets the world's deep needs. The location of meaningful work within the academic context is demonstrated graphically in Figure 2.16.



Figure 2.17: A representation of the location of meaningful work within the academic context (Lieff 2009:1385)

Within the academic context of a department, programme, practice, or university, meaningful work occurs at the intersection of a person's passions/interests, strengths, and values. Recognition of occasions when these elements are simultaneously experienced can identify such work, and this knowledge should inform that person's career direction and choices. The academic context must also be scanned for its culture, interests, and strengths. The alignment of the faculty members' notion of meaningful work with the academic environment is critical to the faculty members' professional fulfilment and well-being.

2.11.4 Building a research career

2.11.4.1 Career stages

According to the generally accepted USA model, the different stages of a career in research include initial research training at the doctoral (PhD) level, postdoctoral training, tenure track junior scientist or assistant professor, tenured associate professor or principal investigator at a research institute, and full professor or principal investigator at a research institute. For clinical investigators, however, the phases of a research career can be intertwined with clinical training and clinical

academic practice (Ludlow & Kent 2011:1). The challenges in creating a balance between research, training and clinical work in academic medicine have been described (cf. 2.8.1.2). The model presented here can, therefore, be used as a guideline or example only, and will rarely be applicable in pure form in academic medicine in South Africa. The stages of a typical research career are depicted in Figure 2.18. Tenure refers to permanent appointment of academic staff with secure remuneration as well as a high level of academic autonomy and freedom. This privileged position for a researcher is much sought after, but sadly, such appointments are declining in the face of adverse economic factors (Jones & Gold 2001:993).

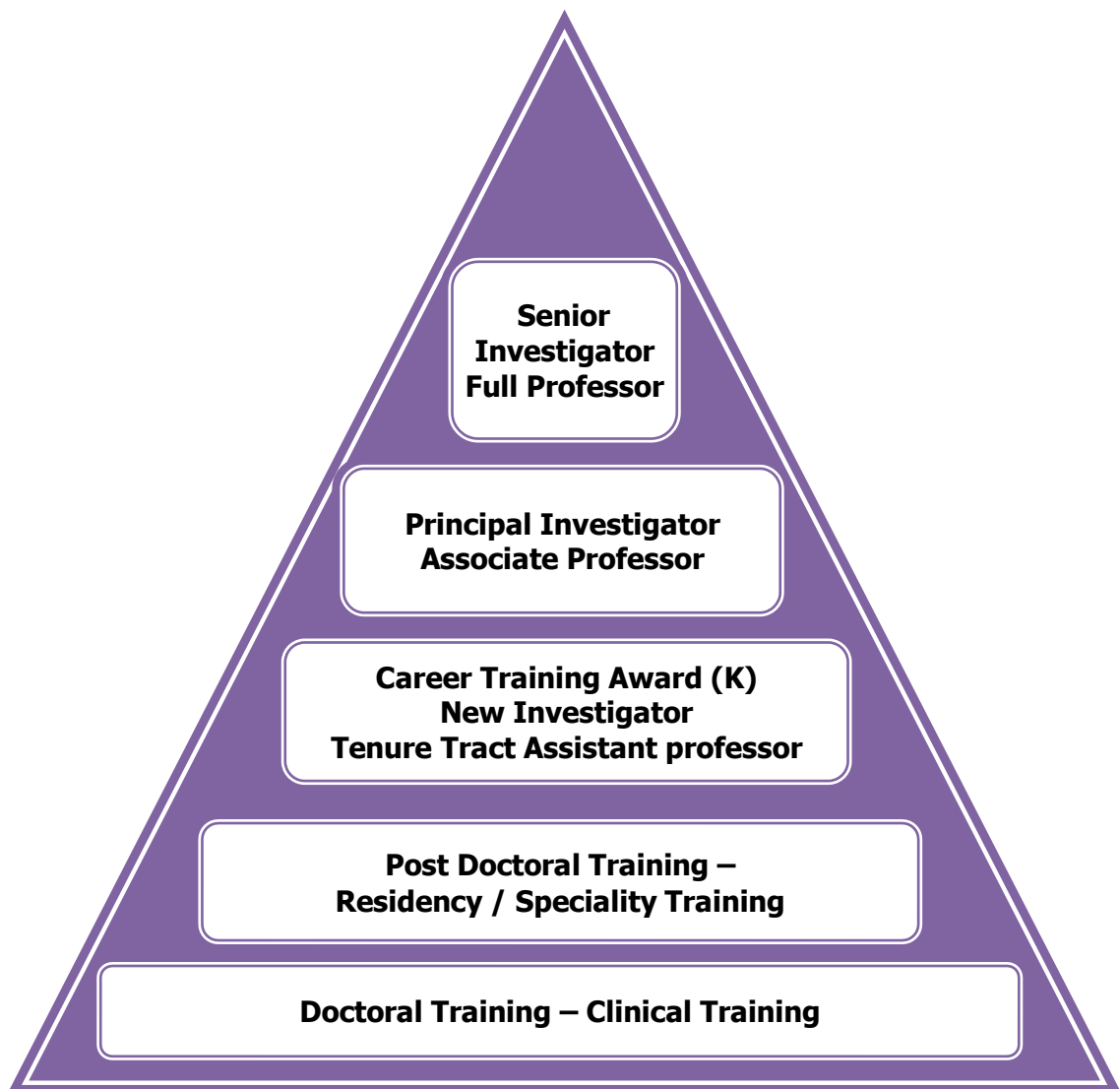


Figure 2.18: Stages in a research career (Ludlow & Kent 2011:2)

2.11.4.2 Considerations in building a research career

The selection of a *doctoral* programme for entry into a research career requires consideration of the factors in the model presented in section 2.8.2.1. In addition to this approach, however, the selection of a mentor is of considerable importance as well (Ludlow & Kent 2001:2). In considering a programme and a mentor, young researchers are advised to take into account the credentials and professional standing (by identification of number of citations), potential access to research funding, mentoring style, and the availability of potential mentors. In the planning of a *post-doctoral fellowship*, careful pre-planning is a key success factor to build on knowledge gained in the PhD. The area of expertise of the postdoctoral mentor is of extreme importance at this stage of a research career. The career step following the postdoctoral fellowship is to become a "*new*" *investigator* in own right. One of the key factors in this phase is to secure funding. In medical schools in the USA, funding is usually provided for the first three years as a start-up package, with the expectation that the salary will be supported primarily by research grants after the initial start-up period. In the mid-career, scientists are expected to collaborate in projects where several different areas of expertise are required. Collaboration offers opportunities for less experienced investigators to develop expertise from a senior scientist. Collaborations also offer a broader base of funding. Care must, however, be taken to demonstrate the ability to work independently in the mid-career, despite collaborative work. The next career phase is the mature, senior investigator, who becomes a leader in his/her chosen field. Senior investigators are often requested to write review articles, serve as editors of journals, be on symposium panels and deliver keynote addresses at conferences. They play an important role in promoting their scientific discipline by advocacy in scientific societies (Ludlow & Kent 2011:9).

Considerations in building an academic career at the University of the Free State (UFS) were presented earlier in this chapter (cf. 2.5.1.3).

2.12 FUNDING OF UNIVERSITY-BASED RESEARCH

2.12.1 Funding models for university-based research

Funding of university research careers with limited interference from external influences is not the international norm at universities any longer, as described in section 2.8.2.1. Even while still deeply embedded in the USA academic system, tenure is also increasingly subjected to assessment of performance and funding possibilities (Jones & Gold 2001:994; Ludlow & Kent 2011:165). The triple threat of clinical work, teaching and research in academic medicine all over the world, and particularly the system in South Africa where medical academics are not rewarded for research (cf. 2.8.1.2), are not conducive to the establishment or growth of research programmes. It may be expected of universities to provide initial funding for new researchers and research programmes as described in section 2.11.4, but the common lack of availability of university funds makes it an unreliable source. It is clear that university-based research programmes are best funded from sources outside the university, or third stream income, an approach also adopted by the UFS (UFS 2010d:8; cf.2.5.1; 2.12.2).

Sources of funding of the most-cited medical research have been investigated. From 1994 to 2003, the most frequently cited articles in the medical literature, 76% had at least one author with a university affiliation, and 57% at least one with a hospital affiliation, making academic medicine the most productive contributors to research in medicine in that period. Government or public funding was used in 60% of these publications, followed by industry, with 36%. In that period, there was a steady increase in the proportion funded by industry (Patsopolous, Analatos & Ioannidis 2006:1061). More recently the role of industry in the funding of medical research has become even more pronounced (Bekelman *et al.* 2003:121). The complexities of researcher-industry partnerships have been described (cf. 2.9.3).

The main governmental research funding agencies in South Africa relevant to SEM research are the National Research Foundation (NRF) and the Medical Research Council (MRC). The NRF is affiliated to the South African National Department of Science and Technology. It is the primary governmental research agency in South Africa and has three main functions – to support research and innovation through

its Research and Innovation Support and Advancement agency (RISA); to encourage an interest in science and technology through its business unit, the South African Agency for Science and Technology Advancement (SAASTA); and to facilitate high-end research through its National Research Facilities (NRF 2008:2). The MRC is a governmental research agency affiliated to the National Department of Health. Its objectives are to promote the improvement of health and quality of life of the population of South Africa through research, development and technology transfer (MRC 2012:3). Both of these agencies have specific strategic focus areas of research where preferential funding is directed on a competitive basis. Both agencies also promote interdisciplinary, collaborative research (MRC 2012:15; NRF 2008:18). An important fact to take note of in planning SEM research in South Africa, is the current focus of the MRC on the growing threat of non-communicable diseases (NCD) and the prevention thereof – a primary focus of SEM (cf. 2.2.2.1; MRC 2012:2).

2.12.2 Research funding at the UFS

In the quest to cultivate a research-intensive environment, or culture (cf. 2.9.2), the UFS recognises the need to secure and increase innovative third stream (not from government subsidy or tuition fees) revenue sources. Likewise, in the international arena extramural funds from government agencies or the private sector are the major contributors of capital on which universities depend to support research (Ludlow & Kent 2011:160).

The UFS Research Management and Implementation plan 2009-2013 makes provision for strategic activities to secure and increase third stream research funding (UFS 2009b:8). These activities include to:

- increase income from contract research,
- increase revenue from licensing,
- grow the UFS patent portfolio,
- create UFS spin-out companies to commercialise UFS knowledge,
- increase industry partnerships,
- identify new commercial partners and cultivate new relationships with key decision makers,

- increase funding from international Higher Education Institutions (HEIs) and international industry,
- redirect third stream income from short courses to the Research Commercialisation and Innovation (RCI) office, and
- direct marketing of adequately protected intellectual property (IP) to potential industry partners.

At University level there are many systems in place to generate third stream income for a research programme in SEM at the UFS. At Faculty of Health Science (FHS) level, the research directorate assists in obtaining research funds from various sources, including the university, government or other external funding agencies as outlined in the FHS Research Manual (UFS 2010b:7).

Apart from the university, MRC and NRF, a multitude of potential funding resources are available on a competitive basis. These can be accessed through websites of agencies such as the Community of Science (COS) (cf.2.9.1.3), or University research support departments (UFS 2010b:36).

2.12.3 Research grant applications

Research funding is mostly awarded on the basis of strict strategic guidelines, quality assurance policies and procedures (Ludlow & Kent 2011:111). In general, five criteria are scrutinised in comprehensive processes to award research funding. The criteria that the National Institutes of Health (NIH) in the USA uses, are *significance* of the research, the investigator's *track record*, the *innovative aspects* of the research, the *feasibility of methods* proposed, and whether the *research environment* is supportive of doing the research (NIH 2012: online). The current era of global economic decline has made it increasingly competitive to obtain peer-reviewed research funds (Inouye & Fiellin 2005:274). Only a fraction of applications are eventually awarded research grants. It is, therefore, essential to take great care in the preparation and presentation of research grant applications. A grant application does not merely entail an administrative process, but is an inherent and important part of the research process. Funding is not a matter of chance or luck, it totally depends on presenting a clear case for the importance of the research, as well as a feasibility plan (Ludlow & Kent 2011:111).

In preparation of writing a research grant application, a researcher needs to consider some background information. For any research project the most suitable type of grant to apply for, as well as the most suitable source of funding need to be considered. After selection of a funding agency to apply to, it is advised to seek guidance from the grants administrator of the particular agency. It is important to obtain and follow all the guidelines for the application meticulously. It is also advisable to find out as much as possible about the potential reviewers for the particular section within the agency. The perspective of the reviewers as experienced, busy researchers with vast scientific background but not necessarily in-depth knowledge about the research topic at hand, should be considered at all times. Reviewers need to understand the significance, specific aims, methodology, and desired outcomes of the research without having to labour over the application (Inouye & Fiellin 2005:275; Miclau, Borrelli, Harvey & MacKenzie 2010:28).

The preparation of research grant applications cannot be rushed. Ludlow and Kent (2011:126) propose a schedule that runs over six months to prepare a grant application, including preparation, writing of drafts, internal and external pre-reviews, accurate budgeting and submission of the application. Applications should be reread and adjusted repeatedly before submission (Miclau *et al.* 2010:27). The content of the application should address the criteria for successful application in a clear and concise manner, concluding with a powerful summary statement (Miclau *et al.* 2010:23).

Most research proposals do not receive funding on the first review and need to be resubmitted to be funded eventually. Each criticism must be addressed before resubmission. Researchers are reminded that they should not give up - without resubmission the project will definitely not be funded (Ludlow & Kent 2011:128). Litthauer (2010) warns that one of the most important aspects in dealing with grants is to use the money after it has been awarded and produce the intended research, or risk having your scientific reputation damaged.

2.13 RESEARCH ACTIVITIES

Researchers and research leaders have a varied working schedule, with many activities apart from the actual conduction of research. In a research career, attention needs to be given to management, planning, grant application writing, actual research and manuscript writing, and publication (Ludlow & Kent 2011:160). Externally, researchers are required to be part of the scientific community, to interact and form part of networks, but also to review manuscripts, grant applications, and other scientific material. Academics are also expected to serve on professional organisations, and fulfil other public duties (Ludlow & Kent 2011:73).

2.13.1 Scientific reputation

Building a scientific reputation at the institution where a researcher is working, as well as among national and international peers, is a lifelong journey. Bourne and Barbour (2011:1) describe a good scientific reputation as a reputation acquired over a lifetime, and which is akin to compound interest – the more you have the more you can acquire. It is also very easy to lose, and once gone, nearly impossible to recover. One important group of elements of a scientific reputation is defined by quantitative data as described in section 2.13.1. In the survey conducted by PLoS editors to define scientific reputation, qualitative elements were identified as described in section 2.11. Even though these elements were not distinctly defined, Bourne and Barbour (2011:1) offer ten rules, similar to a code of conduct, to build and maintain this less tangible component of a scientific reputation. These rules are presented in Table 2.2.

Table 2.2: Ten rules for building and maintaining a scientific reputation (Adapted from Bourne & Barbour 2011:1)

Rule	Notes
Rule 1: <i>Think before you act</i>	Science is full of occasions where you get upset, such as in response to a poor review of your work. Do not respond immediately in a dismissive or impolite way. Respond later with a professional and thoughtful response to the offending party, and not to a broader audience. Always take the high road.
Rule 2: <i>Do not ignore criticism</i>	Failure to respond to criticism is perceived either as acknowledgement of the criticism or as lack of respect for the critic. Neither is good.
Rule 3: <i>Do not ignore people</i>	Take care not to respond to people in a way proportional to your perceived value of them. A good example is the poor treatment of students. Later, these students may have some influence over your career. Give people a sense of worth just by responding to calls, letters, emails. More serious forms of ignoring people can be for example omitting deserving people from authorship. The perception of raising your contribution at the expense of others is detrimental to your reputation.
Rule 4: <i>Diligently check everything you publish and take publishing seriously</i>	Publication in peer-reviewed journals is the most important output of a researcher (cf. 2.14). Whether a junior or senior contributor to a publication, quality and accuracy of data are essential for a growing reputation, and not to damage your reputation. Authorship should be deserved. Do not agree to be a co-author of an unseen paper.
Rule 5: <i>Always declare conflicts of interest</i>	Conflict of interest can be over a broad spectrum, including financial, professional, or personal. A good rule is to imagine how your actions will be perceived by others in terms of your perceived gain from the process. Rather declare possible conflicts of interest than risking negative impact on your reputation.
Rule 6: <i>Do your share for the community</i>	There is an unspoken criticism of scientists who appear to take more than they give back. Be available to review papers, share in the networking process, and be involved in professional organisations and activities.
Rule 7: <i>Do not commit to tasks you cannot complete</i>	It is human nature for high achievers to take on too much, but for the sake of your reputation, learn to say no.
Rule 8: <i>Do not write poor reviews of grants and papers</i>	Be polite, timely, constructive, and considerate. Be honest and not afraid of providing honest feedback, even to the most established authors. Being a trusted reviewer will reflect on your perceived knowledge of the field.
Rule 9: <i>Do not write references for people who do not deserve them</i>	It is difficult to turn down a request for a reference, even if you are not inclined to be their advocate. Such requests should, however, be turned down. The alternatives are either a poor reference which will lead to resentments; or an inflated reference of the virtues of a person, which will eventually damage your reputation.
Rule 10: <i>Never plagiarise or doctor your data</i>	Even though technology makes it relatively easy to manipulate data, images, or text. Even if it is intended in good faith, for example to enhance a digital image to highlight your point, it should never be considered. You are likely to be found out.

The scientific reputation and impact of researchers on a research department was explained by the Departmental Chair of the Department of Chemistry at Stanford University, a most prestigious research establishment. In considering faculty members for tenure, the Department contemplates a number of qualitative characteristics as primary factors. First of all, they must be “good departmental citizens”, working together for the common good of the department. Secondly they must be *good* teachers, and thirdly, they must be *great* researchers. In determining whether candidates are great researchers the Department considers letters of recommendation from national and international peers, in which they are requested to consider if a researcher has, in their views, changed the community’s view or understanding of the nature of the discipline in a positive way, based on the establishment of new knowledge. They typically do not use many quantitative measurements such as publication and citation indexes as primary considerations (Zare 2012:9). This approach gives a useful insight, but is probably not helpful outside of the elite research community.

2.14 RESEARCH OUTPUTS

Research outputs are the products delivered by a researcher or research programme. The importance of university research for socio-economic development has been increasingly acknowledged (Brennan & Techler 2008:259). This factor, in addition to the current difficult financial climate has placed increased emphasis on the direction of focus, evaluation, and quality assurance of research activities of universities and of national research institutions (Agasisti *et al.* 2012:2). In this section, aspects of the measurement of shorter-term research outputs and outcomes, as well as the impact or significance of research contributions are presented from the literature.

2.14.1 Research outputs and outcomes

Publication in peer-reviewed journals is the most common focus in the evaluation of research outputs of research programmes and individual researchers alike. It is the current norm to evaluate both the quantity and quality of publications. Quantity is evaluated by the number of publications in peer reviewed scientific journals, and

quality is often evaluated by the number of citations of an article or author (Agasisti *et al.* 2012:2; Bourne & Barbour 2011:1).

Specific bibliometric indicators of the quantity and quality of researchers or programmes are contentious and consequently much debated (Agasisti *et al.* 2012:1). The "journal impact factor" (JIF) has become the norm to assess the quality of scientific journals (Kurmis 2003:2449). It was developed in the 1960s by Garfield and Scher, and is a number that is calculated every year by counting the number of times that articles in the particular journal are cited by other scholars in the previous two years, as a measure of a journal's scholarly impact on its respective field. (Church 2011:10; Garfield 2006:90). From the JIF, the "Science Citation Index: (SCI) is produced annually (Kurmis 2003:2449). Researchers and research programmes are then evaluated on their contributions to journals with high impact factors and the number of times that their work has been cited by other scholars. In fact, SCI and JIF are often used as primary assessment measures for a researcher's performance in the evaluation process for promotion and funding (Church 2011:10). The "H-factor" is an index proposed by Hirsch in 2005 (Hirsch 2005:16569), which calculates a factor incorporating the number of papers published, in relation to the number of citations for each paper over a specific period of time.

The JIF, and consequently the SCI, have been exposed to much debate and criticism with many arguing that its weaknesses outnumber its strengths, categorising it as an ineffective measuring tool and not appropriate to carry as much weight as it currently does (Church 2011:11; Kurmis 2003:2449; Agasisti *et al.* 2012:2). Strengths of the JIF include its accuracy, immediacy and simplicity. On the other hand, many weaknesses of the JIF have been pointed out. The JIF only takes between 2.5% and 4% of the world's scientific journals into account. It can be influenced by many structural and technical limitations, including the citation of letters, editorials and conference abstracts. Homographs, or the citation of authors with the same name is difficult to account for. The act of persistently citing friends or colleagues has been coined "cronyism", and has a similar effect on JIF and SCI as self-citation. Review articles will also be favoured by the JIF, as 60% of the world's top 25 journals are review journals (Church 2011:12; Kurmis 2003:2449). The JIF is further skewed by the fact that general journals tend to have higher

impact factors than specialist journals, because of a larger audience and subsequent larger potential citation pool. It is argued that slower moving fields of science are not recognised in the JIF, which sets two years as cut-off point. It may take longer to develop research, ethical clearance and depth in certain fields such as clinical research, and the process of publication may be longer because of prolonged publication time (Kurmish 2003:2452). Regarding scientific growth and depth, Agasisti *et al.* (2012:3) caution that the JIF as measure for evaluation and funding may cause a shift in scientists' behaviour towards being more short-term oriented, instead of pursuing more fundamental, long-term, high quality, and riskier activities. Research relevant to smaller communities may also be neglected, as it has been shown that the most frequently cited papers are written in the English language and are applicable to larger, developed populations (Van Dalen & Henkens 2001:455). All these factors may have a negative impact on science in general. Garfield (2006:92), the founder of the JIF, acknowledges the conclusion of Hoeffel (1998:1225) that the JIF is not a perfect tool to measure the quality of articles but that there is nothing better. It has the advantage of already being in existence and remains a good technique for scientific evaluation. Two further interesting notions raised by Hoeffel and which should be considered by scholars are, firstly, the fact that journals with high impact factors are those in which it is most difficult to have an article accepted because of the big demand for publication in such journals. Secondly, many of these journals existed and established their credibility long before the introduction of the JIF. It is exceedingly difficult for newer journals to come in consideration for inclusion in the SCI and JIF, as the established journals are targeted by good, established scientists (Hoeffel 1998:1225; Kurmis 2003:2452).

Recently, publication in open-access, internet-based journals, which makes the full text of scholarly articles freely available on the Internet, has become more popular because of its perceived larger readership and the consequent increased impact of a researcher's work. Despite possible perils around copyright, peer-review and publishing costs, authors are increasingly using this mode of dissemination of research. Early findings are that open-access articles do have more impact in at least certain disciplines (Antelman 2004:372).

The commercialisation of university-based research in the form of patenting, contract research, or other commercial avenues, has increased in the past few decades and has generated intense controversy (Azoulay, Ding & Stuart 2009:637). The potential for funding of research by commercialisation has been recognised and explored (UFS 2009b:8). It has been established that elite scientists and institutions are more likely to be recruited to undertake research for commercial purposes (Zucker, Darby & Brewer 1998:290). The impact of academic patenting on the rate, quality and direction of academic research has been examined in the careers of 3862 academic life researchers (Azoulay *et al.* 2009:637). It was found that academic scientists who patent their work were more productive than otherwise equivalent researchers, mainly because of increased publication in the year preceding the patent application. Publication quality seemed to be equivalent between the two groups. However, it was found that scientific publications paired with patent applications are less likely to be cited. The study also indicated a negative effect of patenting on the collective functioning of a research programme, because future research directions may be blocked or deterred by the intellectual property rights held by outsiders. Furthermore, academic patenting might have an influence on the career trajectories of junior researchers in the programme, to select private sector careers above academic posts. Commercialisation of academic research is also criticised for distorting the choice of research topics and focus areas. On the contrary, scholars of technological change recognise that ideas might simultaneously have high scientific value and important commercial potential (Azoulay *et al.* 2009: 637).

A more detailed evaluation of performance of academic departments was undertaken by Agasisti *et al.* (2012:2), who investigated the efficiency of 69 academic departments in the Lombardy district of Italy for which a detailed data set of inputs and outputs is available. From this evaluation they propose the following variables to be considered in the evaluation of academic departments:

- Inputs: The *physical area* (measured in square metres) devoted to research laboratories; and *high-qualified human resources (staff)*, including academic, technical- and administrative support staff.
- Outputs were categorised in four categories: *Quantity* (number of research outputs per year); *quality* (average number of citations for each article published and H-index); research *funded* through regional and national grants

(Grants 1) and research funded through international grants (Grants 2); and *externally funded research orders*, or applied research directly commissioned by companies and other institutions for immediate transfer of knowledge into the workplace.

At the UFS, as in most South African universities, research outputs and evaluation for promotion and for funding of researchers are measured to a large extent by the NRF-rating (cf. 2.5.1.3). This rating is a comprehensive research career assessment and rating on a national register. It includes the peer-reviewed assessment of a variety of factors, including qualifications, research focus areas and specialisation, involvement in the scientific community by serving on professional boards, reviewing journal articles and other scientific material. Most importantly, however, research outputs in peer-reviewed scientific journals over the previous eight years are assessed, followed by other forms of output such as published conference proceedings, patents, and other significant research outputs. The rating also considers a self-assessment of research outputs and a peer-review of ongoing and planned future research. The review panel includes national and international peers (NRF 2012).

2.14.2 Impact and significance of research

The scientific integrity, validity and statistical significance of research have been established and are beyond debate (cf. 2.1; 2.4). In this section, however, less quantifiable, but equally important considerations regarding the validity, impact and significance of research are explored.

In an article reviewing criteria for evaluation of the significance of developmental research in the twenty-first century, Fabes *et al.* (2000:215) confirm the importance of the three most commonly used forms of research validity – *internal validity* (the ability to draw definite conclusions about the relationship between the independent and dependent variables in a research study); *external validity* (how generally applicable the research findings are to other populations, situations, and settings); and *ecological validity* (the extent to which the environment experienced by the research subjects influence the investigator's interpretation and the outcomes of the research). In addition to these well-established entities, four new categories of

validity, focusing on external impact and dependent on external forces and influences in the selection of research topics have been identified. *Incidence validity* implies the degree to which a particular research study addresses a topic that significantly affects large numbers of people. *Impact validity* is defined as the degree to which a research topic is perceived to have serious and possibly enduring consequences for problems in a population. This type of validity dictates that those problems that cause the most damage are considered to be the most serious and therefore more urgent to address. *Sympathetic validity* reflects the tendency to judge research according to the degree of sympathy it creates in populations, highlighting the importance of affect in external parties as a factor that can influence decisions about research. The last new category of research validity described in the study (Fabes *et al.* 2000:219) is *salience validity*, referring to the influence of heightened public awareness, for instance by the media, on assessing the significance of research topics.

In an address to new researchers admitted to the Vice-chancellor's Prestige Scholars Programme (PSP) at the UFS, the Vice-chancellor, Professor Jonathan Jansen, reflected on five types of broader significance which complement the types of validity described by Fabes *et al.* in this section, and which can (or should) be considered in the planning and evaluating of scholarly research (Jansen 2011:1). *Practical significance* represents the significance of a new technological discovery that comes through applied research. This type of significance correlates with incidence validity and impact validity as described by Fabes *et al.* (2000:215). *Theoretical significance* is defined by Jansen as the discovery of new conceptual understandings or insights into old or familiar problems, advancing our understanding of things. This type of significance is similar to the attribute of the ability to establish new knowledge, as required for tenure in the Department of Chemistry at Stanford University (cf. 2.13.1). The quest for this type of significant research starts with recognising an anomaly, then determining how existing theories make sense of the problem, and then, on the basis of extensive data, attempting to improve or extend existing explanations for the problem. Jansen (2011:14) defines the next type of significance as *emotional significance, or resonance validity*. This type of significance refers to the ability of research to generate feelings or attachments, mobilising people to action, as in the case of climate change or experiences of the poor. It correlates with Fabes' sympathetic validity as described

earlier. In medical research, *clinical significance* refers to the effectiveness of a treatment such that the patient is no longer regarded as ill or dysfunctional. This type of significance can possibly be used in the pursuit of evidence-based medicine (EBM) (cf. 2.4), even in the absence of pure statistical significance. *Personal significance* in research is the pursuit of research on a topic that has bearing on personal experiences or emotions of a researcher, which has the potential to release creative energy and high levels of dedications in the researcher (Jansen 2011:15). This type of significance relates to the first (personal) contextual level of factors influencing the selection of research focus (cf. 2.8.2.1) and the significance of personal rewards in a research career (cf. 2.11.3).

2.15 CONCLUSION

This chapter provided a selective overview of literature on a broad range of aspects relevant to the establishment of a strategic framework for research in SEM at the UFS. It provides a platform for the development of measuring instruments for this research – the semi-structured interviews and the Delphi questionnaire. The next chapter, **Chapter 3**, describes the **Research Design and Methodology** used in this research study.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

This chapter deals with the research design and methodology employed in the execution of the study. Theoretical background of the research methods used will be presented, followed by a detailed rationale and description of each method utilised. The methodology, process and procedures of designing the semi-structured interview data sheets, the Delphi questionnaire in its various stages, as well as the methods of sample selection and data analysis will be described.

The study design included qualitative and quantitative elements that were used both in isolation and in combination, depending on the objective studied at the stage of the research. The semi-structured interviews were mostly qualitative in nature, with quantitative elements, while the Delphi process was mostly quantitative in nature, with qualitative elements. At a conceptual level, the predominantly qualitative nature of the semi-structured interviews was ideal to obtain a good level of understanding of the current standing, challenges and possible solutions facing SEM research at the UFS. The findings of the semi-structured interviews were contextualised in the literature, to provide a solid platform for construction of a Delphi questionnaire. The Delphi process provided an ideal vehicle to test possible components of a strategic framework for SEM research among a panel of experts in a predominantly quantitative fashion, but allowing space for qualitative freedom of expression. By combining the two types of methodology, the components of the resultant strategic framework were comprehensively resourced and tested, enhancing the interpretability and application of the research findings.

3.2 THEORETICAL PERSPECTIVES ON THE RESEARCH METHODOLOGY

In defining the quantitative research paradigm, Babbie and Mouton (2001:49) refer to a number of related themes which include an emphasis on the qualification of construct, that is, assigning numbers to the "perceived qualities of things". In this paradigm, variables play a key role in the description and analysis of human behaviour, while the control for sources of error remains central to the research process.

In defining the qualitative research paradigm, Mouton (1996:149) states that studies which are aimed to provide an in-depth description of a group of people or community studies, are usually qualitative in nature, and that such description is embedded in the life worlds of the actors being studied and produced insider perspectives of the actors and their practices.

A distinction between the quantitative and qualitative paradigm lies in the quest for understanding and for in-depth inquiry. In a quantitative study, the focus is on the control of all the components in the actions and representations of the participants. Variables are controlled and there is an acute focus on how the variables are related. In this setting, respondents or research subjects are usually not free to express data that cannot be captured by predetermined instruments (Henning 2004:3). In a qualitative study on the other hand, the variables are usually not controlled because the freedom and natural development of action and representation need to be captured. In this regard Henning (2004:4) explains that we want to understand, and also explain the argument, by using evidence from the data and from the literature, what the phenomena that we are studying are about. Porter in Cormack (2000:141) states that qualitative research presents data in words and is interpretive as compared to quantitative research which presents its data in numbers and seeks to explain why things happen.

In this study, qualitative methods were used to provide an in-depth knowledge and insight into the field of study, while information gathered were quantified for accurate measurement and interpretation of results.

3.3 DESCRIPTION OF THE METHODS

The methods that were used and which will form the basis of the study, comprised of a literature review, and – as the empirical study – semi-structured interviews and a Delphi process. In this section information on the sampling, data collection, data analysis, ethical consideration, validity, reliability and trustworthiness will be included.

3.3.1 Literature review

The aim of a literature review is to contextualise the problem against related theory and research, as well as to ensure that the researcher is sufficiently knowledgeable about the topic to be able to investigate it in an informed manner (Singleton & Straits 1999:544)

The purpose of the literature review was to provide a background in order to develop a structured interview guide and the context for the research problem; to establish the need for the research; and to indicate that the researcher is knowledgeable about the area (Landman 1988:69). Two main focus areas, namely SEM and research development, were addressed. The themes which were discussed in the literature review focussed on:

- The multi-professional or interdisciplinary character of SEM,
- The role and place of SEM in academic medicine,
- New strategic focuses on research,
- Systems for research development,
- Research culture,
- Support systems for research,
- Research action plans,
- Research policies and guidelines, and
- Staff provision and development.

Various sources of information were consulted, including books and journal articles, as well as relevant publications on the internet. Information on research strategy, culture, policy, support systems, and action plans at the UFS, were obtained from various official internal documents of the UFS. For a full discussion on the literature underpinning the study, please refer to Chapter 2.

3.3.2 Semi-structured interview

3.3.2.1 *Theoretical aspects*

The theoretical aspects and methodological basis for the use of semi-structured interviews are discussed in this section.

Interviews give a researcher the opportunity to meet the subjects of the research. They can provide both the detailed information required, and some fascinating contextual or other information (not all of which one can use) (Wisker 2008:192). There are various types of interviews that form a continuum from the informal and conversational interaction, to a more structured, or semi-structured interview, and the structured interview at the other end of the spectrum, as illustrated in Figure 3.1.

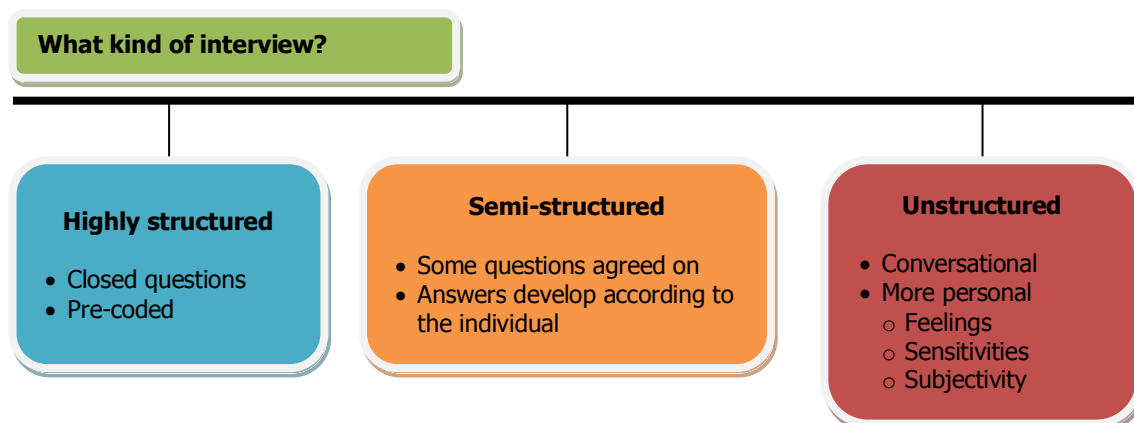


Figure 3.1: The interview continuum (Wisker 2008:194)

According to McMillan and Schumacher (2001:444) the characteristics of a structured interview include that topics are outlined in advance and the researcher decides the sequence and wording in the interview. In a structured interview, the evaluator asks the same questions of numerous individuals in a precise manner, offering each individual the same set of possible responses (*ERIC Digests* 1999: Online). Semi-structured interviews manage to address both the need for comparable responses, or the same questions being asked of each interviewee, and the need for the interview to be developed by the conversation between interviewer and interviewee. Semi-structured, open-ended interviews leave space for some divergence and qualitative input, with the interviewer then returning to the structured interview questions.

Unstructured interviews have been described as naturalistic, narrative or non-directional and are rich in gathering feelings (Wisker 2008:194). Maykut and Morehouse (1994:83) draw a distinction between an *interview guide* and an *interview schedule*. The *interview guide* represents a series of topics or broad interview questions which the researcher is free to explore and probe with the interviewee, seemingly more appropriate for semi-structured and unstructured interviews. The *interview schedule*, on the other hand, consists of a detailed set of questions and probes, seemingly more suited to structured interviews.

3.3.2.2 *The interview guide for SEM researchers and research managers*

Prior to commencement of the interviews, permission and consent were obtained from the participants. A letter of invitation to participate in the research study (cf. Appendix A1) and a form of informed consent to participate in the study were sent to the sample population (cf. Appendix A2).

The specific purpose of the semi-structured interviews was to gather opinions and information from experts in the field of Sports and Exercise Medicine and related sciences, as well as from policy makers, leaders and managers in research at the University of the Free State, concerning current role, status and standing of SEM research at the UFS, as well as the challenges, possibilities, and other factors to take into consideration in the development of a strategic framework for research in SEM at the UFS. Due to their semi-structured nature, the data obtained from interviews were mostly qualitative, but with quantitative elements.

All questions were asked in an open-ended way, requiring the informed, but subjective opinion of each respondent. For this purpose, each question was preceded by the phrase: "In your opinion". Interviews were conducted with the aid of an interview guide (cf. Appendix A3), but opportunity was allowed for participants to comment on associated issues that arose in the interviews. All interviews were sound recorded, but also annotated by the interviewer on an interview datasheet (cf. Appendix A3). The same questions were presented to researchers and teachers in the field of SEM and related sciences, and policy makers, leaders and managers in research at the UFS. However, in interpreting the results of the interviews, distinction was made between the responses of the two groups.

The semi-structured interviews were compiled after studying the relevant literature as described in Chapter 2, in association with the researchers' experience and expertise of research and of SEM, in association with his institutional knowledge of the UFS. The interviews consisted of 18 questions, in seven categories. The interview questions are reported in Table 3.1.

Table 3.1: The categories and questions of the semi-structured interviews

CATEGORY 1: THE STATUS, ROLE AND PLACE OF SEM AT THE UFS	
Status	What, in your opinion, is the status of SEM at the UFS?
Role	What, in your opinion, is the role (why is it necessary) of research in SEM at the UFS?
Place	What, in your opinion, is the place (where does it stand) of research in Sport and Exercise Medicine at the University of the Free State?
CATEGORY 2: STAKEHOLDERS IN SEM RESEARCH	
Role players	In your opinion, which disciplines are essential role players (that can contribute) in a sports- and exercise medicine research programme (e.g. university, external, and interdisciplinary)?
Stakeholders	In your opinion, which disciplines are essential stakeholders (that has an interest and something to gain from) in a sports- and exercise medicine research programme (e.g. university, external, and interdisciplinary)?
CATEGORY 3: RESEARCH STRATEGY	
Research strategy of the UFS	How do you understand the current research strategy of the University of the Free State (Appendix A3a)?
Research in interviewee's department at the UFS	How, in your opinion, does <i>research in your own department</i> fit in with the current research strategy of the University of the Free State?
Research in SEM at the UFS	How, in your opinion, does research in Sport and Exercise Medicine fit in with the current <i>research strategy of the University of the Free State</i> ?
CATEGORY 4: CHALLENGES IN RESEARCH	
Challenges (currently and over the next five years)	What, in your opinion, are challenges of <i>interdisciplinary research</i> at the University of the Free State?
	What, in your opinion, are <i>academic challenges</i> for researchers in Sport and Exercise Medicine disciplines (or your own discipline)?
	What, in your opinion, are challenges for <i>leaders and managers</i> in research?
Solutions	What, in your opinion, is needed to successfully master these <i>academic challenges</i> ?
	What, in your opinion, is needed to successfully master these <i>leadership and management</i> challenges?
	What difficulties might be encountered that could prevent the successful attainment of these challenges?
CATEGORY 5: SKILLS, KNOWLEDGE AND STATUS OF RESEARCHERS AND RESEARCH LEADERS	
Disciplinary knowledge and skills	What do you think are the <i>disciplinary knowledge and status</i> needed by researchers?
Leadership characteristics	What <i>leadership skills</i> are, in your opinion, required by researchers and leaders or managers of research programmes?
Managerial skills	What <i>managerial skills</i> are in your opinion required by researchers and leaders or managers of research programme?
CATEGORY 6: SUGGESTED COMPONENTS OF A STRATEGIC FRAMEWORK IN SEM RESEARCH	
Strategic framework	Which aspects or criteria would you suggest to be included in a strategic guide for the development and implementation of a research programme in Sport and Exercise Medicine at the University of the Free State (or your own discipline)?
CATEGORY 7: OPEN QUESTION	
	Do you have any other comments or suggestions that may be useful in the development of a strategic framework for a multi-disciplinary research programme in SEM at the UFS

3.3.2.3 Target population

A target population entails individuals who all possess specific characteristics (De Vos 1998:14). Yedegis and Weinbach (2002:180) state that when selecting a target population the budgetary constraints, methods of data collection and time allocated to conduct the research should be carefully selected and stated. It is mostly not easy to study the whole population hence only a subset of the population can be studied.

The target population for the semi-structured interviews in this study consisted of two distinct groups. The first group in the target population consisted of all the academically qualified people involved with SEM at the UFS. The group included all academics involved in regular teaching, attending and evaluation of student presentations (over more than one year), and research in the UFS Sports Medicine Programme since its inception in 2006, as well as all academics serving on the Sports Medicine Committee of the School of Medicine, UFS. To ensure comprehensive identification of all possible members of the population, an invitation was sent to all heads of department in the Faculties of Health Sciences of the UFS, to identify any suitably qualified persons in SEM that have not been previously identified by, or involved in the UFS Sports Medicine Programme. The second group of candidates for the semi-structured interviews have been selected as policy makers, leaders and managers in research at the University of the Free State.

3.3.2.4 Sample selection

Qualitative and quantitative research requires different ways of sampling. Sampling can roughly be divided into random and non-random sampling, and is selected according to purpose of the research (Bowling 2002:187). Plano Clark and Cresswell (2008:200) identified four broad categories of sampling used in the social and behavioural sciences, but also applicable in other domains. These are probability sampling, purposive sampling, convenience sampling and mixed-methods sampling. In each of these categories different sampling techniques are recognised.

Probability sampling techniques include as random sampling, stratified sampling, cluster sampling and sampling using multiple probability techniques. Probability sampling lends itself for use in quantitatively orientated studies. It involves selecting relatively

large numbers of units from a population, or subgroups (strata) thereof, in a random manner where the probability of inclusion of every member of the population is determinable (Tashakkori & Teddlie 2003:713). Probability sampling aims to achieve representativeness of an entire population.

Purposive sampling, on the other hand, is primarily used in qualitative studies and may be defined as selecting units based on specific purposes associated with answering a research question. In using this technique, particular settings, persons or events are deliberately selected for the important information they can provide that cannot be obtained elsewhere (Maxwell 1997:87). Purposive sampling techniques are categorised in four categories: Sampling to achieve representativeness or comparability, sampling special or unique cases, sequential sampling and sampling using multiple purposive techniques (Plano Clark & Cresswell 2008:200).

Convenience sampling involves inclusion of units that are easily accessible and willing to participate in the research. Captive samples and volunteer samples are the two types of convenience sampling commonly found. Mixed-method sampling involves the selection of units for a research study using both probability sampling (to increase external validity) and purposive sampling (to increase transferability) (Plano Clark & Cresswell 2008:201). These three sampling methods have not been used for the purpose of sample selection for the semi-structured interviews.

The sampling method for the semi-structured interviews in this study was done according to the purposive technique to achieve representativeness or comparability. This technique is particularly useful when the researcher either wants to select a sample that represents a broader group of cases as closely as possible, or set up comparisons among different types of cases (Plano Clark & Cresswell 2008:201). Both of these indications for use of the technique were applicable to this study. Because of the opportunity for new information to emerge in the open-ended, semi-structured interviews, a certain amount of sequential sampling was also used. Contingent on the depth, direction and recommendations obtained in key interviews, places of saturation and lacunae in information were identified, and subsequent sequential sampling and interviewing conducted.

3.3.2.5 *Survey population*

Sampling is the process of selecting a sufficient number of elements from the population. The reason for sampling instead of collecting data from the whole population is to get a sample that is as representative as possible of the target population. Ideally one would like to study the whole population to give more meaning to ones findings. However, this is not possible; hence we must at most times settle for a sample (Bailey 1987:81). The survey population consists of the eventual participants in the research study and represents the sample.

3.3.2.6 *Description of sample*

The first group of candidates for the semi-structured interviews consisted of all academics involved in regular teaching, attending and evaluation of student presentations (over more than one year), and research in the UFS Sports Medicine Programme, all academics serving on the Sports Medicine Committee of the School of Medicine, UFS, as well as suitably qualified persons nominated by all heads of department in the Faculty of Health Sciences (FHS), UFS. Thirty-three candidates were identified, of which the most suitable candidates were selected by scoring their involvement, interest and qualifications on seven criteria, namely: 1) Membership of the Sports Medicine Committee of the UFS, 2) Lecturing in SEM at the UFS, 3) Involvement research at the UFS, 4) Research supervision in SEM at the UFS, 5) Special interest in SEM, 6) Postgraduate qualifications in SEM, and 7) Other relevant considerations.

The second group of candidates that made up the target population consisted of policy makers, leaders and managers in research at the University of the Free State. This group included academic members of the research committee of the FHS, members of the Research Ethics Committee of the FHS, and academic members of the Directorate Research Development (DRD) of the UFS. Twenty-two candidates were identified, of which the most suitable persons were identified by scoring according to: 1) Number of publications, 2) National and international academic stature, 3) Research management position, 4) Involvement in research supervision, and 5) Other relevant considerations.

The final sample consisted of 13 persons that were interviewed. Twelve of these were selected according to the sampling criteria, and one was invited as a result of sequential sampling. Three of the interviewees represented group one only (role players in SEM at the UFS), four represented group one and two (role players in SEM as well as research managers), and six represented group two (research managers at the UFS), resulting in relatively equal representation from role players in SEM and research managers at the UFS. The position, expertise and qualifications of the interviewees are shown in Table 3.2.

Table 3.2: Position, expertise and qualifications of interviewees

POSITION IN SEM AT THE UFS	FIELD OF EXPERTISE	HIGHEST QUALIFICATION
GROUP 1: ROLE PLAYERS IN SEM AT THE UFS		
Lecturer, consultant and research supervisor in SEM, Member of SEM Committee	Family Medicine	M Fam Med
Lecturer, consultant and research supervisor in SEM Member of SEM Committee	Exercise and Sport Science	D Phil
Lecturer, consultant and research supervisor in SEM	Sport and Exercise Medicine Family Medicine	M Phil (Sports Medicine) M Fam Med
GROUP 1 AND 2: ROLE PLAYERS IN SEM AND RESEARCH MANAGERS AT THE UFS		
Member: Sports Medicine Committee Member: FHS Ethics Committee	Human Nutrition Epidemiology of exercise and nutrition in the population	PhD
Lecturer and research supervisor in SEM Chairperson: FHS Research Committee Member: FHS Ethics Committee	Biostatistics	PhD
Consultant in SEM Member: SoM Research Committee	Family Medicine	M Fam Med
SEM Programme consultant Member: SEM Committee Member: SEM Selection Panel	Health Sciences Education	PhD
GROUP 2: RESEARCH MANAGERS AT THE UFS		
Dean: Faculty of Health Sciences Former Chairperson: SEM Committee	Health Sciences Education Research Management	PhD
Member: FHS Ethics Committee	Research management	PhD
Member: FHS Ethics Committee	Nursing Research management	PhD
Chairperson: FHS Ethics Committee	Community Health Research Management	PhD
Former Chairperson: FHS Research Committee	Obstetrics and Gynaecology Research management	DM
Researcher: Directorate Institutional Research	Research management	PhD

3.3.2.7 *The pilot study*

A pilot study was conducted by submitting the interview guide and interviewing two academics (one medically qualified person; one educationist) in order to determine aspects such as the clarity and distinctness of the questions, how much time is needed to complete the interview and to ensure that the questions are not biased. After the pilot study the interview guide was amended accordingly.

3.3.2.8 *Data gathering and analysis*

Consent to participate in the study was obtained from all interviewees by signed informed consent. Interview guides were delivered by hand and sent out electronically a week before the interview. Semi-structured interviews were scheduled by appointment and done in person. All interviews were recorded digitally, coded and analysed by the researcher.

3.3.3. *The Delphi survey*

3.3.3.1 Theoretical aspects

The Delphi technique is a method for the collection of opinion on a particular topic, particularly the opinions of experts on the topic (De Villiers, De Villiers & Kent 2005:639; Kennedy 2004:505). It is based on the premise that "pooled intelligence" enhances individual judgement and culminates in an enhanced collective opinion of experts (Linstone & Turoff 1979:3; Murry & Hammons 1995:426). The method was devised in the early 1950s as a tool for determining priorities, specifically in policy making at the RAND Corporation after World War Two (Woudenberg 1991:132). It was pioneered in the open literature by Dalkey and Helmer, who used the method to test expert opinion to forecast future events and their probable effects on society using questionnaires with controlled-opinion feedback (Dalkey & Helmer 1963:458). Subsequently the method has been used for diverse management planning and decision making processes in the technology, education, and healthcare fields (Loo 2002:762). According to Smit and De J Cronje (2002:163), the Delphi technique can be used to finalise decisions which need to be made by experts, and is therefore suitable

to test expert opinion in order to arrive at management conclusions, as is the aim of this study.

There is uncertainty in the literature about the origin of the name of the Delphi technique. According to Clayton (1997:337) and Murry & Hammons (1995:426), the Delphi Technique was named after the oracle on the island of Delphi in Greece, which was believed to accurately predict the future. However, Van Zyl (2004:251) mentions that the Delphi technique received its name from Delphi, a place that was famous before the time of Christ as a seat of the most important temple of the Greek god, Apollo. Kennedy (2004:505) sheds light on the subject by explaining that the Delphi method was indeed named in deference to the legend of the Greek Delphi oracle, stemming from an early poem of Homer to Apollo. The oracle had a network of informants and was considered to be one of the most truthful – with data derived from many sources. It is said that kings and other rulers would come to Delphi to consult with Apollo (Van Zyl 2004:251).

The Delphi technique rests on the two assumptions that, in the first place, group decisions are more valid than those made by a single person (particularly if those persons are experts in the fields of study) and, in the second place, that face-to-face interaction might be influenced by domineering members or by group bias (Murry & Hammons 1995:426). Since the decision-making is rarely left to a single person, the success, credibility and validity of the process is increased (Clayton 1997:373). According to Critcher and Gladstone (1998:432), the Delphi technique allows a wide range of experts from different backgrounds to participate equally in the communication process. These experts may furthermore be geographically widely separated.

The main characteristics of the Delphi technique are (Nel 2007:81)

- anonymity;
- expert input (Clayton 1997:377);
- physical separation;
- iteration, as the process takes place through a number of rounds during which a new questionnaire – containing the feedback from the previous round – is compiled (Woudenberg 1991:133);

- statistical analysis of the responses, which allows each participant to see where his/her opinion lies when compared to the rest of the group (Clayton 1997:385); and
- controlled feedback, which entails that the participants' responses after each round are analysed and each respondent receives feedback during the next round.

Feedback is completely anonymous and it is a democratic process, as each panellist has the opportunity to change and/or amend his/her previous opinion (Goodman 1987:730). In addition, the Delphi technique not only provides quantitative information about the subject of study, but also qualitative information, because definitions and solutions to problems – related to the topic under discussion – are provided by the participants. In this context Critcher and Gladstone's (1998:433) aptly stated that "Delphi straddles the divide between qualitative and quantitative methodologies".

The Delphi process was divided in the following six phases by Linstone and Turoff (1979:7):

1. Formulation of ideas,
2. Exposing the options,
3. Determining initial positions on the issues,
4. Exploring and obtaining the reasons for disagreement,
5. Evaluating the underlying reasons and
6. The re-evaluation of options.

In selection of the Delphi technique as vehicle for this part of the research, advantages and disadvantages of the technique were examined. Other group decision-making methods have established track records and are used with success. Examples are the nominal group technique (NGT) and the interacting group method (IGM), which both have the disadvantages of interaction and possible influencing of panel members, possible communication challenges and the practical implication of having to be in the same physical location. These methods also do not allow for the use of successive rounds to build upon earlier results and to maintain focus in the study (Needham & De Loe 1990:133; Loo 2002:763-4). Kennedy (2004:505) expresses the interesting view that strengths of a method may be viewed as limitations by some, depending on the person's worldview of credible knowledge. One example is that the anonymity as one of the recognised advantages of the Delphi method may contribute to lack of

responsibility and accountability for responses (Goodman 1987:732). Furthermore, even though the consensus approach and its inherent tendency towards agreement of the Delphi method has been widely accepted as an advantage, it had been noted that the very striving towards consensus may lead to a watered down version of the best opinion (Sackman 1975:57), or that it may generate bland statements that represent the lowest common denominator (Rennie 1981:666). The possible lack of objectivity in the selection of a panel of experts has also been criticised as directly related to the power of the outcome of the research. The validity of the research is therefore dependent on the justification and representativeness of the expert panellists (Goodman 1987:731).

3.3.3.2. *The Delphi process and questionnaire in this study*

The Delphi technique was used in this study for the following reasons (Cricher & Gladstone 1998:432; Linstone & Turoff 1979:4; Murry & Hammons 1995:426):

- It was a fast and cost-effective method of gathering expert opinions;
- difficulties and problems with a face-to-face discussion were overcome through the physical separation of the Delphi process;
- the study allowed a range of experts from various backgrounds to participate equally in the process;
- both quantitative and qualitative data were gathered; and
- as the research is aimed at designing a strategy, the Delphi process lent itself to an exploration of the topic wherein participants can carefully consider their responses in their own time.

3.3.3.3 *Sample selection*

The selection of a suitable panel of experts is central to the validity of Delphi studies (Goodman 1987:731). Great care was therefore taken in the selection criteria for the Delphi process in this research.

Even though some Delphi studies have been criticised for their lack of random samples (Williams & Webb 1994:182), the Delphi technique does not require for expert panels to be representative samples (Powell 2003:378). According to Powell (2003:378), representativeness is seemingly assessed on the qualities of the expert panel rather

than its numbers. In order to appropriately select experts, the characteristics of a suitable Delphi expert were identified in the literature. Defining experts can be problematic and somewhat arbitrary (Goodman 1987:732). According to Keeney, Hasson and McKenna. (2001:196), the definition of an expert covers a wide range from "informed individual" to "a specialist in the field", to "someone who has knowledge on a specific subject". The mere fact that individuals have knowledge on a particular topic does not necessarily mean that they are appropriate experts. A solution is offered by Kennedy (2004:505) who states that the key is to describe the panellists fully so that judgments about their ability and credibility may be made by the reader.

One of the critical characteristics of experts that will contribute to the success of a Delphi process is willingness to participate (Powell 2003:379). According to Linstone and Turoff (1975:235) diversity of viewpoints that span respectable controversy will help to generate interest and involvement. Further claims to better performance and highly acceptable solutions by diverse or heterogonous groups have been made in the literature (Murphy, Black, Lamping, McKee, Sanderson, Ashkam & Marteau. 1998:2; Powell, 2005:379). Exploring this viewpoint further, Goodman (1987:731-2) proposes that participants must be experts who reflect current knowledge and perceptions, yet are relatively impartial to the findings. Murphy *et al.* (1998:3) warns that there is a danger of bias when selecting on the basis of acquaintance – a particularly relevant factor to acknowledge in SEM in South Africa, where there are a limited numbers of experts which are mostly acquainted.

3.3.3.4 Target population

The target population consisted of international and national experts in the fields of SEM education and research, as well as policy-makers, leaders and managers in research. In this survey experts were defined according to academic qualifications, specialisation in SEM, expertise in research, national academic standing, international academic standing, and academic involvement such as supervising and examining postgraduate students.

3.3.3.5 Survey population

The survey population were selected according to the criteria set for the target population, in three distinct categories for purposes of diversity in the expert panel. The first category consisted of international experts in SEM research. This category was further refined by approaching experts who are distinguished members of the academic community, and holding official positions on bodies such as the scientific or educational committees of the International Sports Medicine Federation (FIMS), or in the International Olympic Committee. To make this category even more internationally representative, experts fulfilling the above criteria were recruited from different continents, resulting in international expert representation from North America, Latin America, Europe, Asia and Australasia. African representation was obtained from the second category, which consisted of South African experts in SEM research. Experts from three of the four SEM academic programmes in South Africa were included. The fourth programme is that of the University of the Free State, for which the research was conducted and could therefore not be included in a panel of external experts. The third category of experts was leaders and policy makers in research in South Africa. In this regard, academic experts fulfilling the initial criteria and holding senior positions within the Medical Research Council of South Africa (MRC) and the National Research Foundation of South Africa (NRF) were invited to be members of the panel of experts.

Exclusion criteria after qualification were lack of availability, not consenting to participate, and being a possible examiner of the PhD thesis. Examiners were known to the promoters, and selected on similar criteria as the Delphi panel, in order to have the study scrutinised by international leaders in the field. To allow them to examine the thesis objectively, the names of possible examiners were removed from the list of Delphi experts eligible for invitation to participate.

The expertise of the candidates who were selected according to the above criteria was tested in a points scoring matrix which awarded points for qualifications, expertise in SEM or sport science, expertise in research, national and international standing (publications, keynote presentations, research rating, national and international appointments, and academic standing (examiner or supervisor of postgraduate students)). Sixteen experts were selected and invited to participate in the study. Three declined the invitation and one did not respond to the invitation. The final survey

population therefore consisted of ten invited experts who had given informed consent and participated for the duration of the Delphi process.

3.3.3.6 *Sample size*

There is no definitive sample size advocated for Delphi studies. It is clear that the panel size depend on a multitude of factors. Rules of thumb offered by Loo (2002:765) suggest that 15-30 carefully selected subject matter experts (SMEs) could be used for heterogeneous populations and as few as five to ten for homogenous populations. The complexity of the problem, range of expertise required to address it, the purpose of the study and the availability of suitable SMEs are further factors to take into account in determining the size of the Delphi panel of experts.

The sample in this study consisted of ten expert members selected according to the criteria presented in sections 3.3.3.3 to 3.3.3.5.

3.3.3.7 *Description of the sample*

The expertise of the Delphi panel members in the three categories are shown in Table 3.3.

Table 3.3: Description of the Delphi panel of experts

CATEGORY 1: INTERNATIONAL EXPERTS IN SEM			
	POSITION	INTERNATIONAL SEM REPRESENTATION/STANDING (selected references)	GEOGRAPHIC REPRESENTATION
1.	Professor of Physical Medicine and Rehabilitation and Physiology, School of Medicine and Dean, Faculty of Medicine, University of Puerto Rico, San Juan, Puerto Rico.	Past President, FIMS. Principal investigator for the Puerto Rico Clinical and Translational Research Consortium.	Latin America
2.	Chair, Sport and Exercise Medicine Fellowship, University of Toronto, Canada.	Chair, Educational Committee, FIMS	North America
3.	Professor and first Dean, School of Physiotherapy, University of Otago, Dunedin, New Zealand.	Internationally acclaimed researcher in sports concussion management	Australasia
4.	Professor of Sports Medicine and Chair, Oslo Sports Trauma Research Centre and the Department of Sports Medicine, University of Sport and Physical Education, Oslo, Norway	Member of the IOC Medical Commission (MC-IOC) – Medical and Scientific Group	Europe/ Scandinavia
5.	Professor, Department of Sports and Exercise Physiology, and Dean, Centre for Sports Science and University Sports, University of Vienna, Vienna, Austria.	Past Vice-president and chair of the scientific committee, FIMS. Member of the MC-IOC and Head of the Working Group “Molecular basis of connective tissue and muscle injuries in sport”. Vice-President, European Federation of Sports Medicine (EFSMA).	Europe
6.	Chair, Department Rehabilitative and Preventative Sports Medicine, Med. Clinic, University of Freiberg, Germany.	Member, Scientific Board of the European College of Sports Science. Vice-President, European College of Sports Science, Member, MC-IOC.	Europe
CATEGORY 2: NATIONAL EXPERTS IN SEM			
7.	Professor of Sports Medicine and Exercise Science, School of Medicine, University of Cape Town, Cape Town	Co-Director, IOC Research Centre, Sports Science Institute of South Africa and UCT. Member, Scientific Committee of FIMS	South Africa
8.	Head, Department of Sports Medicine and Exercise Science, University of the Witwatersrand, Johannesburg	Member, Educational Committee of FIMS. Director, FIFA Medical Centre of Excellence, University of the Witwatersrand, Johannesburg.	South Africa
9.	Head, Division Sports Medicine, University of Pretoria, Pretoria	Past member, Education Committee of FIMS	South Africa
CATEGORY 3: NATIONAL RESEARCH LEADERS AND POLICY MAKERS			
10.	President and vice-president: research, South African Medical Research Council (MRC)		South Africa

3.3.3.8 *The pilot study*

The pre-testing of the Delphi questionnaire was done by means of a pilot study. This was undertaken to test the questionnaire to ensure the reliability, validity and trustworthiness of the study. For the pilot study an expert in Health Professions Education (HPE), and a medically qualified person who is also a distinguished researcher in HPE were utilised to ensure that the questions are clear, the statements correctly numbered and the responses that are elicited, appropriate for analysis.

3.3.3.9 *Data gathering*

Invitations to participate in the Delphi process by means of an explanatory letter of invitation (cf. Appendix B1), accompanied by written consent forms (Appendix B2) were sent to potential participants by email. After signed informed consent was obtained, experts were included in the Delphi panel of experts. Letters to explain the purpose and instructions of the Delphi process (cf. Appendix C1, D1 and E1), questionnaires (cf. Appendix C2, D2 and E2) and feedback on the previous rounds (cf. Appendix C3, D3 and F2) were distributed anonymously to the panel of experts until sufficient consensus or stability was reached. The questionnaires consisted seven categories of statements on which panellists could select the options "fully agree", "partially agree" or "disagree". Each statement was accompanied by an option to give comments or qualify the selection. Open-ended questions invited panellists to make further comments or suggestions regarding the topic in each category. The accompanying letter explained the purpose of the Delphi process, the format and instructions to complete the questionnaire. Approximately six weeks were given to complete each round. Feedback on the results of each round was given to panellists to peruse before completing the next round. The process and documents are described in detail in paragraph 5.2.1.

According to Dajani, Sincoff and Talley (1979:83) consensus is assumed to have been achieved when a certain percentage of responses fall within a prescribed range for the value being estimated. This range differs throughout the literature, from 100% to 51%, depending on the type of research. In some studies the interpretation of consensus were left to the reader (Powell 2003:379). The Delphi method has been criticised in terms of reliability of measures (Woudenberg 1991:145), for reasons such as that responses to the same question can differ substantially if given to different

panels, and that the consensus in later rounds may rather be due to some pressure to conform than genuine converging consensus of opinions (Loo 2002:767). To clarify this notion, Keeney *et al.* (2001) argue that the existence of consensus from a Delphi process does not mean that the correct answer has been found, or that it can be used to replace rigorous scientific reviews of published reports or for original research. To further qualify the interpretation of Delphi responses, Woudenberg (1991:145) explains that although consensus can be important, it can never be the primary goal of a Delphi survey. One of the main strengths of the Delphi method is that it offers a democratic and structured approach that harnesses the collective wisdom of participants. To enhance the richness of data, therefore, open-ended questions and invitation to qualify responses with narrative data is important (Powell 2003:381).

Having presented the criticism and viewpoints on interpretation of Delphi data, the aim of the Delphi process still is to reach a level of consensus among the expert panel members on a specific statement. For this study it was set on obtaining an 80% consensus, as propagated by Larson and Wissman (2000:46), but bearing the importance of contextual interpretation in mind utilising narrative data.

Stability is described as the natural tendency for opinions of experts to centralise (Linstone & Turoff 1979:277). Stability was therefore declared when movement of the opinion of the group as a whole has ceased to change between experts on each statement. It took three rounds to obtain adequate consensus or stability in this study. As with consensus, stability was declared when 80% of participants did not change their selection in more than one round, and interpretation done with consideration of the narrative data obtained, as suggested by Powell (2003:381).

3.3.3.10 Data analysis

Data analysis of the Delphi process was done by the researcher. Responses of each round were entered into a spreadsheet for calculation of consensus or stability, and development of the questionnaire for the next round. All comments from expert panel members were recorded. Each successive round contained a questionnaire with all statements on which consensus were not reached, as well as feedback that included all comments by expert panel members. Final analysis was done by interpreting the data in context of the literature survey and semi-structured interviews.

Qualitative data analysis comprises the processes of organising data into categories and identifying patterns in categories (Katzenellenbogen, Joubert & Karim 1999:180). This is called content analysis (Mathers *et al.* 1998:17). The processes do not usually follow a linear pattern, but tend to occur in several cyclical, overlapping phases where the researcher moves back and forth between different levels (Leedy 1997:165).

3.4 ENSURING THE QUALITY OF THE STUDY

3.4.1. Trustworthiness

Maykut and Morehouse (1994:64) explain the term “trustworthiness” as referring to the “believability” of a researcher’s findings. Guba, as quoted in De Vos *et al.* (2002:351-352), identifies trustworthiness as having four aspects, namely credibility, transferability, dependability and confirmability. According to Seale (1999:466), to ensure reliability in qualitative research, the examination of trustworthiness is crucial. Babbie and Mouton (2001:277-278) believe that, since a quantitative study cannot be considered valid unless it is reliable, a qualitative study cannot be called transferable unless it is credible and it cannot be deemed credible unless it is dependable.

The trustworthiness of this study was evidenced through the reliability and the validity of the qualitative research method – in this case, the interviews, as well as the credibility of the Delphi instrument, the Delphi method of research, as well as the Delphi panel. Trustworthiness of the study was assured by checking the interview transcriptions as well as the selection of subject experts and specialists for the Delphi panel according to set criteria. Furthermore, trustworthiness of the Delphi process was assured by providing the Delphi panel with individual and collective written feedback of the results after each and every round of the Delphi study.

According to Hammond and Gear (1986:309), reliability of data is a culmination of validity and repeatability, which is similar to the definition of trustworthiness of Maykut and Morehouse (1994:64), as used in the previous paragraphs. However, all efforts will be made to ensure maximal reliability, validity and trustworthiness, irrespective of the definition of each.

3.4.2. Reliability

“Reliability” is defined as the extent to which a measurement instrument yields consistent, stable, and uniform results over repeated observations or measurements under the same conditions each time (Goodwin 1995:96).

The reliability in this research was established by means of well-constructed questions for the interviews, carefully piloted and reviewed by experts in this area of research. In addition, reliability of the study was assured by inclusive, carefully selected samples, both in the interviews and in the Delphi process.

3.4.3 Validity

Leedy and Ormond (2002:31) define “validity” as the extent to which the instrument measures what it is supposed to measure. According to Bowling (2002:150), an instrument would then be assigned validity after it has been satisfactorily tested repeatedly in the population for which it was designed. This type of validity is known as internal validity, as compared to external validity, which refers to which extent the research findings are generalisable to the wider population of interest (Bowling 2002:150).

Factors influencing the validity of the findings of a Delphi process have been addressed in section 3.3.3. The Delphi technique’s claim to validity, in its ability to examine and accurately reflect the subject under study, relies to a large extent on the quality and representativeness of the panel of experts. Validity can be assumed if the panellists in the study can be shown to be representative of the group or area of knowledge that is studied (Goodman 1987:731). For this reason a rigorous process, as described in section 3.3.3 was followed to ensure the quality and representability of the Delphi panel of experts. Furthermore, the validity of Delphi research findings depends much on the accountability and serious participation of the expert panellists (Goodman 1987:732; Kennedy 2004:505). It was attempted to hold the interest of the panellists in this study with regular feedback and an indication of the value of the findings. However, the academic and ethical integrity of this distinguished panel of experts should be beyond reproach. Lastly, validity was enhanced by supportive expertise of the research supervisors and the biostatistician.

3.4.4 Generalisation

Kennedy (2004:505) argues that the Delphi technique, as singular exploratory research method have certain limitations in applicability or external validity, as the research exercise is performed outside the context of real life. Two additional strategies have been proposed to clarify and refine the findings of a Delphi process and to enhance its external validity and potential for findings to be generalised. The first strategy was to use two samples to examine similar research questions from different perspectives, and the second was to use thematic analysis of the results and cluster them into a dimensional framework (Kennedy 2004:506). This study applied both these strategies, and took the first strategy a step further by using the first set of results (semi-structured interviews) to assist in formulating the questionnaire for the Delphi process. The international representation, stature and anonymity of the Delphi panel of experts further enhance the external validity of this research.

3.5 ETHICAL CONSIDERATIONS

3.5.1. Approval

Approval to execute the research was obtained from the Vice-Rector (Academic Planning); the Dean of the Faculty of Health Sciences, UFS (via the Executive Committee of the Faculty of Health Sciences, as the Dean is the promoter for this study), and the Executive Management of the School of Medicine, UFS. Consent was obtained from the Dean of the Faculty of Humanities to interview a number of members of that Faculty. Approval was also obtained from the Ethics Committee of the Faculty of Health Sciences, UFS (Ethics Committee approval number ETOVS 191/10).

3.5.2. Informed consent

All the participants in the semi-structured interviews and the Delphi process gave written consent to take part. The participants were given a short description of the purpose and process of the study, as well as the expected requirements and duration of participation. Participation was therefore voluntary and informed.

3.5.3 Right to privacy

Participants were guaranteed that all information will remain confidential and anonymous. The very process of selection of a Delphi panel of experts implies that the researcher will know the identities of the panellists. The interviewees in the semi-structured interviews are also selected and known to the researcher. McKenna (1994:1224) suggests in the case of the Delphi process to use the term “quasi-anonymity” where respondents are known to the researcher and even to one another. In this research, however, the respondents were not known to each other. The researcher’s and promoters’ names and contact details were available to the participants. Participants also have access to the published results of the study.

3.5.4 Minimising the potential misinterpretation of results

Minimising of misinterpretation of results was attempted by producing a clear, comprehensive research report. Findings are disseminated in a responsible fashion by the publication of findings and recommendations in peer-reviewed, scientific literature and presentations at reputable academic conferences, meetings and workshops. The target audiences of these publications and meetings generally have sufficient academic background to interpret the findings of this study prudently. The name and contact details of the researcher accompany all publications of this work, in the event of uncertainty of interpretation of results and findings.

3.6 CONCLUSION

Chapter 3 provided an overview of the research design and methodology utilised in the study, as well as the processes and procedures followed.

In the next chapter, **Chapter 4**, entitled **Results, data analysis and findings of the semi-structured interviews**, the results and data collecting method of the semi-structured interviews will be reported and discussed.

CHAPTER 4

RESULTS, DATA ANALYSIS AND FINDINGS OF THE SEMI-STRUCTURED INTERVIEWS

4.1 INTRODUCTION

The purpose of this chapter is to present and contextualise the results from semi-structured interviews with experts in the field of Sports and Exercise Medicine (SEM) and related sciences, as well as with policy makers, leaders and managers in research at the University of the Free State (UFS).

The flow of the research allowed for a literature study to investigate the background and current standing of SEM, management and leadership principles, as well as theoretical and policy underpinnings of research in general and at the UFS. To augment these underpinnings, the semi structured interviews intended to investigate the practical applications of theory and policy in research at the UFS, challenges in research at the UFS, and the views of current role players on aspects of a multi-disciplinary research framework in SEM at the UFS. Subsequently the results from both the literature review and the semi-structured interviews were used to develop a Delphi questionnaire to test strategic foundations, possible inputs, outputs and outcomes of a multi-disciplinary research programme in SEM at the UFS among international and national experts in research management and SEM research (cf. Chapter 5).

The specific purpose of the semi-structured interviews was therefore to gather opinions and information concerning the current role, status and standing of SEM research at the UFS, as well as the challenges, possibilities, and other factors to take into consideration in the development of a strategic framework for research in SEM at the UFS. Due to their semi-structured nature, the data obtained from interviews were mostly qualitative, but with quantitative elements.

4.2 DESCRIPTION OF THE SAMPLE POPULATION FOR INTERVIEWS

The composition of the sample of interviewees is presented in terms of numbers, roles and field of expertise (cf. 3.3.2.6). The final sample consisted of 13 persons which were interviewed. Twelve of these were selected according to purposive sampling

criteria, and one was invited as a result of sequential sampling. The interviewees can be divided into three groups: Group one represents role players in SEM at the UFS, group two represents research managers at the UFS, and a further group consisted of individuals with features of both groups (cf. 3.3.2.6). The position, field of expertise and qualifications of interviewees are shown in Table 3.1.

4.3 DATA ANALYSIS AND DESCRIPTION OF THE FINDINGS OF THE SEMI-STRUCTURED INTERVIEWS

The interview guide was developed in seven categories, of which six were semi-structured, and one was an open category (cf. Table 3.2.). The results will be presented accordingly. The interviews were digitally recorded and subsequently summarised in tables. Because of the high volume of findings in the interviews, the majority of the tables are presented in Appendix A4, and described in this chapter.

4.3.1 Category 1: The status, role and place of Sport and Exercise Medicine at the University of the Free State

This category investigated the perceived status of SEM, and the role and place of research in SEM at the UFS, in order to conceptualise the current platform for the development of an interdisciplinary research programme in SEM.

4.3.1.1 *The status of Sport and Exercise Medicine at the University of the Free State*

Interviewees' perceptions of the academic status of SEM at the UFS were tested. Thirty statements and recommendations were recorded in this regard, of which eighteen statements were positive, and nine implied a measure of negativity. One recommendation regarding academic growth was made, and two recommendations regarding improvement of the status of SEM at the UFS. In general, the interviewees with better contact and interaction with the Division SEM regarded the status as either positive, or that better recognition was deserved. Research managers not having regular contact with SEM, were inclined to regard the status of SEM as poor. The statements were summarised in Table 4.1 (cf. Appendix A4).

Regarding the **current status** of SEM at the UFS, positive findings that were recorded, included that SEM has a niche at the UFS and is regarded as an integral part of the UFS. The status was regarded as good or excellent, and that the status has improved in the previous year. The activities of the Division SEM were visible at the UFS. Negative comments regarding the current status of SEM indicated a lack of knowledge of SEM activities among academics at the UFS. In summary, the negative perceptions were that the status is low because of lack of knowledge of SEM activities, that the status is inadequate and should be improved, and that SEM deserves better recognition at the UFS. Uncertainty about the boundaries of the discipline and the multi-disciplinary character of SEM were expressed. It is clear that there is ambivalence regarding the academic status of SEM at the UFS, which is understandable because of the relative youth of the Division and the current uncertain status of SEM in health care in South Africa as described (cf. 1.2).

Regarding the **growth** of SEM at the UFS, the growth phase in which the Division SEM found itself at the time of the research, was acknowledged. It was further recorded that SEM has support from the UFS for growth and that it can play an important role in the FHS. On the negative side, it was recorded that the current funding model and personnel structure do not support the FHS pledge of support to the Division SEM. The challenge to balance a clinical support service as clinical component of an academic division, with teaching, learning and research, was highlighted. This situation is in accordance with academic departments in medical schools on a global scale (cf. 2.8.1.2).

SEM **research** at the UFS was regarded as of high quality. It was favourably compared with research in other departments in the FHS. The research was described as appropriate, useful and practical. It was mentioned that the national and international research output and contribution can improve. However, a good national contribution in **clinical** SEM was reported. These responses regarding disappointing output of SEM research at the UFS reflect the inability to create a sustainable structure that supports more optimal output and impact of research. This finding supports the core purpose of this research - to establish a strategic framework in which SEM research can flourish at the UFS. It was interesting to note that none of the interviewees made reference to the criteria for measurement of research outputs before commenting on both the

perceived quality and quantity of research outputs from the Division SEM, as described in the literature (cf. 2.14).

Interviewees also reported on the status of SEM as academic discipline. It was described as a young, developing (“up and coming”) discipline. The **importance** of SEM was emphasised by the recorded high status of sport in society and the consequent need for proper sport injury prevention and management systems. SEM was further described as a cutting edge academic discipline. The multi-professional character of SEM was recognised. The prominent international role of SEM in the prevention of non-communicable disease as described in section 2.2.2.1 was not recognised by the interviewees.

Regarding recommendations to improve the status of SEM at the UFS, it was emphasised that SEM should function as an autonomic academic department in order to develop optimally. The annual FHS research forum was recommended for use to gain recognition within the FHS. From this recommendation it was presumed that the interviewees deemed recognition among academics within the UFS as a first objective, before building a scientific reputation in the broader scientific community, as described in sections 2.13 and 2.14, and as required for building an academic career at the UFS (cf. 2.5.1.3).

4.3.1.2 *The role and place of research in SEM at the UFS*

The role of SEM research at the UFS

Twenty-three factors were documented regarding the role of SEM at the UFS. The responses regarding the role of research in SEM at the UFS, have been categorised in the significance of SEM research in general, the educational and academic, and financial roles of SEM research at the UFS. The responses on the role and place of SEM were summarised in Table 4.2 (cf. Appendix A4).

As far as the **significance** of SEM research is concerned, it was recorded that sport plays important roles in society, community wellness and politics. Development of new knowledge in SEM can therefore make meaningful contributions to society. It will also contribute to the development of sport, and can address the needs of the sport

industry. Because of the role of SEM research to optimise human performance, cutting edge research is required which can ultimately be applied to improve the health of the general public and to be a leader in medical research. The importance of research in the **growth of the discipline** has also been emphasised. These responses are underpinned by the emphasis in the literature on evidence-based medicine (EBM) (cf. 2.1), requiring sound research in clinical disciplines, including SEM (cf. 2.4).

As far as the **educational and academic** role of research in SEM at the UFS is concerned, it was regarded as a critical part of the academic SEM programme. SEM research was regarded as an integral part of education, to form basic grounding for undergraduate and postgraduate learning. Research was also regarded as of cardinal importance and the defining component of the Division SEM. It provides the evidence base for the discipline to establish best practices and improve service delivery in SEM. SEM research has been identified as a centre of research excellence in the FHS. Good research has the power and potential to draw excellent scholars to the UFS. The emphasis by interviewees of research as the basis for teaching and learning is in accordance with the international literature and the vision of the UFS (cf. 2.5).

The role of SEM research in **financial** development was emphasised. Research in SEM plays a role in creating an income stream from research grants, publications and government subsidy to sustain further development of the discipline and the Division. This response from the interviews is also in keeping with international research funding trends and the research strategy of the UFS (cf. 2.12). A further financial aspect from the interviews was SEM research creates marketing possibilities for the UFS.

It was postulated that the role of SEM research at the UFS will depend on the emphasis that the UFS places on research. The UFS has recently embarked on a course towards becoming a research-intensive university creating a potentially ideal academic climate for the implementation of a strategic framework for SEM research (cf. 2.5).

The positioning of SEM research at the UFS

Twenty-eight factors regarding the place of SEM research at the UFS were documented. These were categorised in academic placement, research focus areas, staff placement, as well as networking and collaboration.

According to the interviewees, the **academic placement** of SEM research should be a prominent place in the School of Medicine (SoM). It requires the full support of the FHS. A multi-professional/interdisciplinary character of the SEM research programme was emphasised, the placement and direction of which can be determined by the Head of Department (HoD). It should function as an independent unit. These responses generally reflected confidence in SEM research at the UFS by the interviewees, who will be important role players in the eventual implementation of the strategic framework. The interdisciplinary approach taken by the interviewees reflects the global multidisciplinary character of SEM (cf. 2.3).

Even though it was not the essence of the question, a wide array of potential research **focus areas** were recorded, including primary care, exercise medicine, wellness, preventative care and prevention of sports injuries. The placement of SEM research was further defined by possible directives including sports medicine research for smaller communities, to promote sport at the UFS, to use the existing opportunities for SEM at the UFS, to address the research needs of the broader research community and to do research with a diagnostic role. One interviewee suggested development of a focus on scientific support for underemphasised sport, such as martial arts, gymnastics and soccer. The application of exercise physiology in applied SEM to optimise human health and performance was also put forward as a niche area. A current perceived lack of focus in SEM research at the UFS was documented. The selection of focus areas for research seemed to be a challenge throughout this research. Many confounding factors influence this selection, as supported in the literature (cf. 2.8.2.1) and confirmed in the Delphi survey (cf. 5.3). The correct management of this aspect of the strategic framework will be critical for the success thereof.

Regarding the importance of research for **staff** of the Division SEM, interviewees suggested that 25% of academic time of staff should be spent on own research, excluding research supervision. Suggested minimum requirements for publication include one international publication per staff member per year, or some form of minimum requirement for scientific publications. A PhD for all academic staff in SEM was suggested. All academic SEM staff should supervise Masters and PhD studies. It was further suggested that research make up at least one third of the credits of the academic Masters programme in SEM. These suggestions are highly subjective and

bound to particular sets of circumstances and experiences, but it seems to be desirable amongst the interviewees to set expectations for staff research. The complexities in determining research time have been described (cf. 2.8.1).

As far as **networking and collaboration** is concerned, SEM was identified as a “generalist” discipline that need to collaborate with “specialist” disciplines in research, emphasising interdisciplinary research. It should form an integral part of the FHS research on health promotion and wellbeing, as well as treatment and prevention of exercise associated illness and injuries. Collaboration with other universities was recommended. A “constant client” that requires SEM research is needed to develop and sustain the production of Masters and PhD studies. It was recommended that patient databases are developed for the study of specific populations. The recognition of the importance of networking and collaboration by the interviewees is essential for the success of academic SEM (cf. 2.2.2; 2.3; 2.9).

4.3.2 Category 2: Role players and stakeholders in SEM research

The first part of this category explored the perceived essential role players (that can contribute) in a SEM research programme. These can be people, university support departments or external bodies that are perceived to be important in the operation of a SEM research programme. The second part of the category explored the possible essential stakeholders (that have an interest and something to gain from, or can share ownership) in such a programme. These could be university academic disciplines or external bodies. The responses in this category were summarised in Table 4.3 (cf. Appendix A4).

Role players that were identified in the interviews were categorised in internal (university) and external (outside the university) role players. Internal role players were subdivided into role players within the Faculty of Health Sciences and role players elsewhere at the university. External role players on the other hand, were categorised in external academic role players and external supportive role players.

Internal supportive role players within university structures that were identified included the following UFS academic support structures: The Directorate Research Development (DRD), the Directorate for Institutional Research and Academic Planning

(DIRAP) and the Postgraduate School. The non-academic support structures of the UFS that were identified as role players are Human Resources, the International Office, Student Administration, the Finance Department, the Sport Department (Kovsiesport), the Marketing and Fundraising Department and the UFS Alumni Association. Role players within FHS structures that were identified as role players are the School of Medicine (SoM) Executive, the Biostatistics Department, medical writers, and internal funders. The interviews were conducted just before the FHS Research Directorate was launched, which, in retrospect, would have been identified as a key role player.

External academic role players regarding **policy** matters that were identified are the Health Professions Council of South Africa (HPCSA) and other professional boards, academic associations such as the South Africa Sports Medicine Association (SASMA), the South African National Department of Health (DoH), the Colleges of Medicine of South Africa (CMSA), in particular the College of Sport and Exercise Medicine (CSEM). External role players regarding **funding** opportunities that were identified are the National Research Foundation of South Africa (NRF), the Medical Research Council of South Africa (MRC). Mention was also made of other possible funding agencies such as private foundations, but no specific foundations were identified. Pure **academic** external role players were identified as other academic SEM units in South Africa, particularly the Exercise Science and Sports Medicine Research Unit at the University of Cape Town (UCT). It was suggested that, in the light of the small number of SEM academic units in South Africa, a generic South African SEM Research Forum can be pursued. International research collaborators were also mentioned generically, but no specific units were identified.

External supportive role players included possible clients, beneficiaries or funders of a SEM research programme. The **sport community** is represented in this group by the sports industry in general; organised sport in South Africa (The South African Sports Confederation and Olympic Committee (SASCOC) and South African sport federations), the fitness industry and the sports supplement industry. The **medical community** in this category is represented by the pharmaceutical industry and the Council of Health Services Accreditation of South Africa (COHSASA). **Government supportive organisations** include the Department of Sport and Recreation, Department of Health and the Department of Education. The identification of such a vast collection of possible role players in SEM research reflects the modern day trend that external

influences have a definitive effect on research autonomy, focus and outcomes as described in the literature (cf. 2.9.3).

Possible stakeholders or potential **interdisciplinary research partners/collaborators** in a SEM research programme which were identified by the interviewees consist of 21 academic departments/disciplines/groupings within the Faculty of Health Sciences, two from other faculties, and a generic suggestion that stakeholders outside the FHS should be included in a list of possible stakeholders. One interviewee suggested that stakeholders should be identified by the project at hand. Two interviewees reiterated the importance of interdisciplinary research collaborations. Two research managers are of the opinion that a SEM research programme should be housed within the FHS and that the Faculty Board of the FHS should consequently take final ownership or responsibility for such a programme. A list of identified stakeholders according to number of nominations by interviewees is presented in Table 4.4.

It is interesting to note that traditionally close collaborators in SEM, such as cardiology and internal medicine (cf. 2.2.2) received low numbers of nominations. The researcher is of the opinion that the nominations were made randomly and subjectively with local conditions and persons, rather than the discipline of SEM in mind. It reflects the relative lack of knowledge and insight about the discipline of SEM that exists among local experts. As with the selection of research focus areas, many circumstantial factors can influence the selection of stakeholders in SEM research, such as current research focus, available expertise and equipment. Care should therefore be taken to rather refer to "probable" stakeholders, and not to exclude other possibilities. The list was tested in the Delphi process among a panel of international experts in SEM research and presented in Chapter 5.

Table 4.4: Nominated academic stakeholders in an interdisciplinary SEM research programme

NUMBER OF NOMINATIONS	ACADEMIC DISCIPLINE	PLACEMENT
8	Physiotherapy	FHS: School of Allied Health Professions
7	Exercise and Sport Science/Biokinetics	Faculty of Humanities
6	Nutrition and Dietetics	FHS: School of Allied Health Professions
4	Family Medicine	FHS: SoM
4	Orthopaedics	FHS: SoM
4	Pharmacology	FHS: SoM
3	Occupational therapy	FHS: School of Allied Health Professions
3	Physiology	FHS: SoM
3	Psychology	Faculty of Humanities
3	Sport and Exercise Medicine	FHS: SoM
2	Anatomy	FHS: SoM
2	Diagnostic radiology	FHS: SoM
2	Internal medicine	FHS: SoM
1	Biochemistry	FHS: SoM
1	Cardiology	FHS: SoM
1	Haematology	FHS: SoM
1	Laboratories (biochemistry, haematology)	National Health Laboratory Service (NHLS)
1	Nursing	FHS: School of Nursing
1	Ophthalmology	FHS: SoM
1	Paediatrics	FHS: SoM
1	Wellness grouping in FHS (Community Health, Occupational Health, Work Wellness)	FHS

4.3.3 Category 3: The Research Strategy of the UFS

The research strategy of the UFS has been described in Chapter 2 (cf. 2.5). The first question in this category intended to test the interviewees understanding of the new research strategy (2009-2013) of the UFS (UFS 2009b). The second question explored to what extent the strategy was applicable or applied in the interviewees own academic department. The third question attempted to raise opinion on the alignment of SEM research at the UFS with the research strategy of the UFS, where interviewees felt they had sufficient insight in SEM research at the UFS.

4.3.3.1 Question 3.1: How do you understand the current research strategy of the UFS?

The understanding of the interviewees of this strategy is presented under the subheadings of character of the strategy, its application, and recommendations to enhance the application and sustainability of the strategy. Thirty-five factors were recorded in this regard as listed in Table 4.5 (cf. Appendix A4).

Character of the UFS research strategy

The UFS was described by the interviewees as a research active university, with a strategy to become a research intensive (or research-led) university, in keeping with the research strategy (cf. 2.5.1). Its strategy to become one of the top three research universities in South Africa by 2013 has been described as ambitious, but positive and admirable. Research was described as being of the utmost importance for any university, and the ambitious research strategy of the UFS should therefore be supported. The policy is recognised to be the nurturing of an academic culture with focus on basic and applied research, and community service that focus on local development and making a global contribution.

Institutional research support at the UFS is organised in six strategic research clusters, to enhance interdisciplinary interaction and lateral thinking. The strategic clusters were described in Chapter 2 (cf. 2.5.1.4). **Positive comments** regarding the cluster system recorded in the interviews are that the clusters indeed facilitate grouping of experts together, thus becoming a melting pot for development and growth of ideas. It was further stated that it plays a role in maintaining the research momentum of the University and cluster by maintaining a balance between high and low yield periods for individuals or smaller groups within a cluster. The **negative comments** recorded regarding the clusters are that the system does not accommodate health sciences sufficiently, that funding of the clusters are inadequate and that academics at the UFS are not aware of the academic possibilities and opportunities that the clusters offer. One interviewee recommended that the clusters should accommodate transformation in a broad sense, community studies and education as focus areas. The clusters were selected historically from identified potential needs for research and availability of funding, as well as from existing research tracks at the UFS at the time of

implementation of the strategic cluster system (cf. 2.5.1.4). This initiative culminated in the clusters to prosper, but currently the clusters seem to be exclusive islands of excellence and do not allow access for other disciplines or new groupings to the preferential treatment privy to them.

Application of the UFS research strategy

As far as the application of the strategy in the broad university community is concerned, it was recorded that a strong research culture only exists in “pockets” at the UFS. It was further perceived that the research contribution of the FHS is weaker than in most other faculties.

Criticism has been voiced against the research strategy. It was postulated that the University does not support the successful application of its own strategy, by not making provision for sufficient resources and time to apply to research and thereby not nurturing a research culture. The strategy was further criticised by pointing out the perceived disparity between the Chancellor of the UFS promoting local issues as primary focus areas for research, and the Vice Chancellor and Rector who on the contrary promotes international publication on internationally relevant focus areas, which is also supported in the UFS promotion criteria where a high premium is placed on international publication. The process of developing the research strategy and policy was criticised as not being inclusive of the broad academic opinion at the UFS, and therefore lacking the ability to be applied successfully on a University-wide scale.

Recommendations regarding the UFS research strategy

A number of recommendations were made that may assist in the successful application of the UFS research strategy. It was recommended by one institutional researcher that the application of the research strategy should focus on the five focus areas of the strategy – creating an enabling environment, establishing a funding forum for research, use the strategic clusters for research development, identify and develop research leaders and mentors, and developing the next generation of researchers. It was also recommended that the research strategy should support creativity, new thinking and scientific growth. Practical recommendations were to follow the examples of successful research departments at the University, and to pool experienced researchers with

young ones to ensure sustainability of research focus areas, a recognised success factor in research sustainability according to the literature (cf. 2.11.4.2). In order to ensure sustainability of good research at the UFS, the importance of support systems to identify and secure research funding was reiterated. The marketing value of good research for the University was acknowledged.

In this section of the interviews, it became clear that there is support for the ambitious research strategy of the UFS from academics in SEM and research managers at the UFS. However, there seems to be either a lack of understanding of the strategy or actual flaws in its application, resulting in rather rash criticism of the implementation of the strategy. Conversely, useful recommendations were made in this regard.

4.3.3.2 Question 3.2: *How, in your opinion, does research in your own department fit in with the current research strategy of the UFS?*

Fifteen factors were recorded in response to this question, of which three were positive and nine negative. Three recommendations were made regarding the promotion of departmental research. The responses to this question were summarised in Table 4.6 (cf. Appendix A4).

Positive factors

Only one interviewee was satisfied that their departmental research programme was well established and in line with the UFS research strategy. That department also boasts an established research culture which makes it easy and enjoyable to do research within the department. As far as research in the School of Medicine (SoM) is concerned, it was recorded that more research will be forthcoming when M Med students start producing compulsory research projects from 2012. This reflects on the decision that all doctors specialising in medical disciplines need to complete a research project as part of their specialist training, which was not the case in the recent past. This development will produce more research at Masters level, but may pose a further challenge to the "triple threat" of clinical workload, research, and teaching in medical schools (cf. 2.8.1.2).

Negative factors

The negative factors that were recorded regarding departmental research reflect challenges and barriers to departmental research, and subsequent inability to comply with the UFS research strategy. It was clearly stated that most departments within the FHS are not research intensive.

As far as **research factors** are concerned, it was recorded that the current UFS strategy to promote international publication is not conducive to answering to pressing local and national health issues, which are more relevant for a local university in a rural setting to address in research. The unique character of the FHS with a different management structure to other faculties requires different goal setting and poses different challenges. Three important factors were recorded in this regard.

Firstly and most prominently cited, was that the SoM is service orientated because of heavy clinical workloads within the Free State Department of Health (DoH), preventing the School to be or become research intensive. To clarify, medical specialists in the FHS are on a shared service agreement with the DoH, where, in addition to teaching and research as academics, they carry the responsibility of providing specialist medical services in the main referral hospitals in the overburdened public health sector in the central region of South Africa. Clinical work therefore often gets preference over research because of the urgency of the type of work (cf. 2.8.1).

Secondly, promotion criteria in the DoH, in which a large percentage of FHS academics are co-appointed, are not dependent on research and pose a disincentive for research, as described in section 2.8.1.

Thirdly, academics in the DoH are allowed limited private practice which is financially much more lucrative than research incentives. Concern was expressed that UFS policy makers may not understand these unique challenges that require unique solutions to intensify research in the FHS. In this regard, perceived poor communication between the UFS and FHS, or disinterest of UFS management in these challenges was recorded.

Recommendations

Recommendations to promote departmental research outputs were to keep affiliated lecturers motivated to produce at least one publication per year, to incorporate research components in structured postgraduate programmes, and to use available departmental patient data to convert into research reports.

The responses to this question highlighted the predominant inability of departments in the FHS to be research intensive because of very specific, relevant reasons and the need to find unique solutions before the UFS research strategy can be applied successfully in the Faculty. These responses put the criticism on the UFS research strategy as recorded in the previous question, into perspective.

4.3.3.3 Question 3.3: *How, in your opinion, does research in SEM fit in with the current research strategy of the UFS?*

Nine interviewees responded to this question, while three declined to answer on grounds of not having sufficient knowledge of SEM research at the UFS to air an opinion. Twenty-two factors were recorded, which are presented in terms of the place and character of SEM research at the UFS, factors regarding UFS/FHS research strategy and recommendations related to the question. These were summarised in Table 4.6 (cf. Appendix A4).

Place and character

As far as the **place** of SEM research at the UFS is concerned, it was reported as an official niche area within the Health and Wellness grouping of the sustainable development research cluster of the UFS. Regarding its alignment with the UFS research strategy, it was stated that SEM research is well aligned with the UFS research strategy, that it makes a valuable contribution in this regard and that unique opportunities exist for SEM research within the UFS research strategy. SEM was characterised an ideal platform on which to develop interdisciplinary research. As far as the **general character** of SEM research is concerned, it was recorded once more that SEM research is essential for the sustainability and relevance of the Division SEM. It was again stated in this section that support from the FHS for SEM research is required

for broader recognition in the cluster system. Concerning the character of the **academic content** of SEM research, possible broad niche study areas that were recorded are staff wellness, community wellness, sport specific research and sports nutrition. The latter was prompted by the strong research culture within the Department of Dietetics and Human Nutrition, where opportunities for interdisciplinary research exist. An interesting factor with great potential was that SEM research on elite athletes can possibly be applied to health care in broader communities. It is important to note that these responses reflect a distinct local perspective when compared with the scope of practice of SEM in the literature (cf. 2.2; 2.3). This observation emphasises the influence of contextual factors in the selection of research focus and collaborations (cf. 2.8.2.1).

A positive attitude towards SEM at the UFS was portrayed in the responses to this question, and reiterated the perceived potential for growth of SEM research at the UFS. The researcher read these comments and those on earlier questions related to the status and positioning of SEM at the UFS with caution, as the possibility of bias exists. Interviewees may have overtly accentuated the positive aspects of the questions, given the researcher's involvement as head of the Division SEM at the UFS.

Research strategy

In terms of broad strategy, the relative obscurity of SEM as an independent specialist discipline in medicine in South Africa is seen as a challenge to gain proper recognition at the UFS. It is a small, young group within a big faculty, making it difficult to create an impact. Factors recorded in this section regarding the UFS and FHS research strategy, are that the FHS has long established research niche areas, and that the appropriate strategic placement of SEM research in niche areas can attract funding opportunities. Such strategic alignment for funding and other benefits is supported in the literature (cf. 2.11.4; 2.12).

Recommendations

Five general recommendations for alignment of SEM research with the UFS research strategy were made in this section. Firstly, it was recommended that SEM research should fit in with the vision, mission and goals, as well as within the research policy and

plan of the UFS and FHS. Secondly it was recommended that all functions of the Division SEM are shaped around its research. Thirdly it was recommended that the current supportive and stimulating institutional research environment is embraced and utilised to develop towards research excellence. Fourthly, it was recommended that SEM research should be prioritised, and lastly that SEM research should address the needs of the broad sports industry.

In comparing the alignment of interviewees own departmental research and SEM research with the UFS research strategy, the clear perception is that SEM research is regarded as well and positively aligned, while the alignment of own departmental research is predominantly regarded as challenging and even negative. Possible explanations for this disparity are, firstly, that the Division SEM is not funded by the DoH and is therefore not restricted by the challenges of many other departments in this regard, as described in section 2.8.1. Secondly, the Division is relatively young and had a strong research component built into its academic programme from the outset.

4.3.4 Category 4: Challenges in research

Because of the nationally and internationally recognised multidisciplinary character of SEM, the first set of challenges that the semi-structured interviews explored was the perceived challenges of interdisciplinary research at the UFS. Subsequently, management and leadership challenges, as well as academic challenges in research were explored, followed by an exploration of possible solutions to the challenges that were identified.

4.3.4.1 *Question 4.1: What, in your opinion, are challenges of interdisciplinary research at the UFS?*

Thirty-two factors were identified as challenges to interdisciplinary research at the UFS. These are presented as challenges in vision, leadership and management, resources, academic challenges, and challenges of establishing a new academic discipline, as listed in Table 4.7 (cf. Appendix A4).

Vision

Despite the interdisciplinary nature of the strategic research clusters that was introduced at the UFS, the support of interdisciplinary research by UFS management was perceived as a challenge by interviewees. This anomaly can only be explained in the context of the other challenges in research in the FHS, as well as the absence of a cluster that can accommodate the full spectrum of health care, wellness and disease. In addition, it was recorded once more that no good examples of interdisciplinary research exists at the UFS, indicating ignorance of the cluster system or failure of the clusters. The relative inability of the cluster system to accommodate the FHS and SEM research is probably to blame for this statement. The need for **visionary leadership** was identified to convince potential stakeholders in interdisciplinary research of the potentiating effect of recognising the bigger "us", and to create a mind shift away from material departmental gains but rather to see the potential larger academic contribution that interdisciplinary research holds, with subsequent bigger departmental gains. The vision of recognising the difference between research outputs (current drive) and impact (larger vision) must be established. This point of view reflects the very nature of scholarship, a research culture and the broader scientific community, and may indicate a perceived lack of such thinking in the FHS (cf. 2.9). Regarding **academic vision**, a relative lack of creativity and visionary thinking was likewise identified among primary researchers at the UFS. Furthermore, different backgrounds and paradigms of different disciplines were identified as challenging to blend and to find a "common language". The latter finding is supported in the literature as a potential challenge to interdisciplinary research (cf. 2.9.1.2).

Leadership and management

It was suggested that an interdisciplinary SEM research unit should be managed independent of any existing academic department. The visionary challenges recognised in the previous paragraph, need to be managed for successful interdisciplinary research. Fair distribution of academic credits and other gains must be ensured, in order for an academic department to benefit from interdisciplinary work. A further leadership challenge that was identified is the establishment of a management hierarchy that provides inclusivity in decision making, but not undermine the process. The strategic placement and management of interdisciplinary niche areas were also

identified as potential challenges. The creation of win-win situations in interdisciplinary research seems to be the key factor according to the interviews. Trust and good communication have been identified as prerequisites for successful interdisciplinary research.

The determining factor for independence of an interdisciplinary research unit as suggested in the interviews, will be financial independence due to third stream funding of research. This is not feasible in a young unit where the scientific reputation and stature to command successful research grant applications still have to be gained (cf. 2.12). The possibility should, however, be kept in mind as a possible long-term solution. The leadership and management recommendations in the responses to this question are in keeping with the literature (cf. 2.9; 2.11).

Resources

To secure funding for human resources, growth, and support systems was identified in the interviews as the main challenge regarding resources for interdisciplinary research. In the case of SEM, this requires convincing of established research groupings or other potential funders to invest seed money in the establishment of a young, interdisciplinary grouping that has not had the opportunity to establish itself as a successful research group yet. This practice is supported in the literature (cf. 2.12.1). A further challenge identified with regards to financial resources is the fair distribution of income. Allocation of time for departmental versus interdisciplinary research has been recorded as a challenge.

Academic challenges

A number of the academic challenges in interdisciplinary research which were recorded are extensions of leadership and management challenges presented in the previous paragraphs. Both **effective interdisciplinary management** and **effective interdisciplinary academic co-ordination** are required. The perceived challenges in finding strategic common ground between disciplines with different ways of thinking extends to research challenges such as accommodating different approaches to research methodology (cf. 2.9.1.2). Standard setting and effective quality assurance of research contributions from all stakeholders have also been identified as academic

challenges of interdisciplinary research. One interviewee recommended eleven potential research focus areas to concentrate on. These areas are listed in Table 4.7 (cf. Appendix A4). This raises the challenge of **academic focus**, which seems to form a thread throughout the research. One of the well-known principles of research is to focus on one or more specific areas of expertise and grow in expertise. Careful selection of focus areas to accommodate existing expertise, to develop and/or attract expertise seems to be a significant challenge that has not been identified by the interviewees. The literature shows that the selection of research focus areas is a multidimensional process with many internal and external factors influencing the outcome (cf. 2.5.1; 2.8, 2.9, 2.11, 2.12). This important factor in a strategic research framework was explored further in the Delphi process (cf. Chapter 5).

New academic discipline

The establishment of a new academic discipline and research field at a university is a **challenge** in itself, as is the case with SEM at the UFS. The interdisciplinary nature of this new discipline poses even more challenges in a faculty where interdisciplinary research is uncommon. In that regard, dissemination of information about the new discipline and the benefits of interdisciplinary research were recorded in the interviews as challenges. Further to the previously recognised distance between the group of interviewees in this study and the interdisciplinary research clusters of the UFS, it has been recorded that challenges in establishing interdisciplinary research include the limited experience in interdisciplinary research at the UFS and the lack of mechanisms to facilitate interdisciplinary research. On the **positive** side, it was recorded that interdisciplinary research will be stimulating, will broaden thinking and knowledge at the UFS and will be beneficial to the general academic atmosphere at the UFS, all in accordance with the UFS research strategy (cf. 2.5.1.2).

4.3.4.2. Question 4.2: *What, in your opinion, are academic challenges for researchers in SEM or in your own discipline?*

This question raised approximately 50 challenges, as listed in Table 4.8 (cf. Appendix A4). Some of the challenges overlap slightly when used in different contexts, making it difficult to quantify exactly. Interviewees did not always come forward with challenges only, but started discussing solutions, strategy and other factors. The semi-structured

nature of the interviews allowed for this type of open-ended responses, which yielded valuable information. The outcomes of these questions have been categorised, even if not strictly so. It became clear that it is sometimes difficult to distinguish between academic, strategic, managerial and operational issues in research, as all these factors are inextricably linked to culminate in a unique set of circumstances, uniquely conducive to a certain type and level of research. These complexities, as explored in the literature review (cf. Chapter 2), are reflected in the responses to this question.

Academic challenges that were identified were categorised in external (outside the UFS) and internal challenges (inside the UFS).

External academic challenges

The first academic challenge that was recorded was **benchmarking** - specifically the challenge to be nationally and internationally competitive. In a new research programme such as SEM at the UFS, establishment of academic credibility and recognition with international and national peers is a critical challenge. In order to benchmark and plan appropriately, it is necessary to know the strengths and limitations of national and international peers, which has been recorded as an academic challenge. A particular challenge in benchmarking is **competing** with peers with ample resources, such as the international sports federations. A further external academic challenge was how to select and set up appropriate external **collaborations**.

Internal academic challenges

The first group of internal academic challenges has to do with **research focus**. As before, careful selection of research focus areas to best suit the particular circumstances of the research unit in question was identified as a critical challenge. It needs to be creative and at the forefront of new knowledge. A particular challenge is the selection or allocation of research topics to specific Masters' students, either according to student preference or to suit the research focus areas of the unit. A further challenge in selection of research focus areas in applied medical sciences is the ethical and legal complexities of clinical trials.

As far as academic challenges in **strategy and growth** are concerned, a number of leadership challenges included the establishment of a research culture, lack of strong research leadership in the FHS, and to create insight into SEM among academics in the FHS. *Academic managerial challenges* for the current Division SEM were the simultaneous development of a teaching and learning programme and the development of a research programme while having limited resources available. A further challenge in this regard is to determine the direction of growth – what programmes or research lines to develop and what to terminate. *Challenges regarding growth* and implementation were successful implementation of the suggested strategy and to be productive. Key factors in this regard are to find good research ideas and to identify research partners within the UFS. The expected high input and low output in the first three years after establishment of a research programme, with anomalous expectations of early high output from management structures was identified as a challenge in a new research unit.

In interpreting the responses to this question, the researcher became aware of the relative risk of entertaining a broad range of research topics in the beginning of the programme, leaning heavily towards individual student preference and availability of resources such as study populations. This approach may well delay the development of in-depth research focus in terms of time, but offers good exposure for the development of broad baseline expertise in the Division SEM and create exploratory opportunities in the eventual selection of focus areas.

4.3.4.3 Question 4.3: What, in your opinion, are challenges for leaders and managers in research?

The responses in this category had a predominantly internal focus, raising managerial challenges in academic departmental- and at broader UFS level. Twenty-seven challenges were raised. These challenges were categorised in institutional and Department of Health challenges, human and financial resources, and time. The recorded academic and management challenges and solutions for research are listed in Table 4.8 (Cf. Appendix A4).

Institutional challenges

Four challenges at institutional level were raised. It was stated that university managers have other, more immediate challenges than research that occupy their minds and time, such as budgetary and personnel issues. The lack of an institutional research culture was again raised. In terms of research support systems, it was stated that the UFS has poor research support systems and limited or no research funds or fundraising systems to assist research managers. It needs to be understood that the UFS has recently identified these insufficiencies and is in the processing of addressing the matter (cf. 2.5.1).

Provincial Department of Health challenges

Two challenges were raised regarding the fact that most clinical academics in the FHS are on shared FS DoH payroll (cf. 2.8.1). Firstly, promotions and work descriptions within the DoH does not include or promote research, and is only focused on clinical service delivery. Secondly, poor working conditions within the Department of Health, where staff is overburdened with heavy clinical workloads, often with limited resources, discourages research. The researcher is also of the opinion that it is more lucrative for specialists to engage in limited private practice in spare time than to do research. These challenges were offered on more than one occasion by a number of interviewees, and need to be explored in depth in the development of a research strategy within these circumstances, especially when considering the relative shortage of medical expertise in Bloemfontein, where the UFS is situated.

Resource challenges

A prominent managerial challenge that was raised by most interviewees is the lack of availability of financial resources for research. Specific needs for funding are to support the SEM programme, to fund research in the initial bridging phase between the establishment of the programme and the generation of own income, and funding to be able to assimilate expertise in the programme. Challenges in raising funds that were recorded, were to be first to access information on new funding opportunities in an efficient manner, and to create the need for researchers or staff to apply for research funding. It is customary in certain research settings for the institution to fund the initial

phase of new research programmes until research grants can be obtained and financial independence is reached (cf. 2.12).

As far as **human resource management** is concerned, challenges regarding academic staff/faculty and students were raised. Regarding **faculty**, the identification of specialists or experts and to attract them to the programme, was regarded as a particular challenge. The attraction of full time researchers was identified as a further challenge in this regard. The aforementioned will culminate in an increase in research capacity. With interdisciplinary research in mind, the establishment of productive research teams was identified as a challenge. Regarding **students**, challenges were the identification and attraction of good students and the fact that Masters students in clinical disciplines are not often interested in research when it is not essential for obtaining a degree. Furthermore, an important challenge that was identified is the **management of change** in the expectations of postgraduate students to include application for own funding and project management as part of their duties as researchers. A general challenge in human resource management that was identified is the broad management of people and personalities to be able to function optimally, as explored in the literature review (cf. 2.6.1.4; 2.6.2.2; 2.11).

The UFS has a parallel medium teaching policy, implying that all lectures at the university must be presented in both English and Afrikaans. This was presented as a reason for the relative lack of time to dedicate to research at the UFS was raised by three interviewees. The perceived **lack of time for research** is addressed later in the chapter (cf. 4.3.4.4).

Regarding physical resources, **lack of resources and apparatus** due to the relatively low priority of research in the DoH and consequently in the FHS was raised.

4.3.4.4 Question 4.4: *What, in your opinion, is needed to master these academic challenges?*

The solutions offered by interviewees were categorised according to the challenges posed in the interviews and tabled in the right hand column of Table 4.8, opposite the respective challenges (cf. Appendix A4). Unlike the challenges, there were only internal

solutions offered, reflecting on the research leader and team's own responsibility to make things work.

Research focus solutions

Possible solutions addressing the challenge of research focus were offered in the interviews. The first was to develop an intelligent research management strategy to accommodate focus, and for the leader to be entrepreneurial in identification of new opportunities which can encompass large scale funding and partnerships. Additionally, in the selection of research focus areas, it was suggested that a balance is found between local, national and international research interests in order to comply with university policy, needs and opportunities. Conversely, it was also recorded that it is most appropriate to address local needs within the discipline in selecting research focus areas, irrespective of policy or lack of international interest and publication. From the literature it is clear that specific focus areas should be pursued to specialise in. The selection of those areas, however, involves the culmination of a complex process of dependent and independent variables, as described in Sections 2.8.2.1; 2.12.2; 2.12.3 and 2.13.

Academic strategy and growth solutions

Solutions offered in the interviews regarding **academic strategy and growth** included leadership and management solutions. As far as leadership is concerned, one focus needs to be on the establishment of scholarly thinking and creation of a research culture within the realm of SEM and related disciplines. The programme manager should set an example as an academic leader to inspire young academics and strive for excellence in research. As far as growth of a research programme is concerned, it was recommended that an intelligent research management strategy should be developed, with leadership that includes leadership, management, and entrepreneurship in research. Extensive multidisciplinary or interdepartmental co-operation should be nurtured. One recommendation in this regard was that an interdisciplinary SEM research system should be devised that is inviting to researchers to use. The emphasis on inspirational leadership as a key characteristic of research leaders is supported in the literature (cf.2.11.2).

Most interviewees emphasised the importance of good strategic planning of a research programme. Specific recommendations in this regard were to compose a research development plan and to identify new opportunities in the research funding environment and potential partnerships to direct the strategy. Recommendations regarding the content of the strategic plan included clear and explicit goals on a year to year basis, and regular reflection and monitoring of progress and achievements. Regarding the strategic planning process, one interviewee recommended the use of an external facilitator. Relevant aspects of strategic planning are described from the literature in Section 2.7.

Specific recommendations from interviewees to enhance growth of an excellent research programme were:

- To bring in speakers from foundations; corporations; government agencies that offer competitive scholarships; research funding opportunities and visiting professorships at leading universities around the world,
- Follow examples of successful research departments,
- Establish full research Masters and PhD programmes,
- Implement intensive research training programmes such as research design workshops, public seminars and academic writing sessions,
- Design regularly scheduled seminars; make it worthwhile - bring in top researchers speaking on cutting edge research issues,
- Convert all research into publications, and
- Include generic soft skills training/course work in research programmes; e.g. funding application skills, project management skills, financial management skills and public speaking.

The researcher is of the opinion that these and other recommendations, such as conference attendances and presentations, and publication of research will enhance growth and excellence of a research programme by nurturing a culture of scholarship. The general ambience of these recommendations is in keeping with principles of creating a research culture, of research leadership (cf. 2.9.2; 2.11).

Management solutions

Management solutions that were offered by interviewees included solutions on external and internal aspects of management. **Externally**, it was recommended to build strong relationships with the sport industry, clients and collaborators. It was recommended to listen to clients and incorporate their views or wishes in strategic planning processes. The importance of networking and collaborations in research is supported in the literature (cf. 2.9). Collaboration with industry should be done cautiously to retain academic independence (cf. 2.9.3). Recommended management principles to follow **internally** were strict control, to set processes and adhere to them, to do realistic goal setting, and promote high quality of work. It was recommended that researchers should be empowered to produce high quality work by assisting them in reducing workloads in other areas, such as teaching. Good communication with students and staff was recommended as a key management principle. All of these recommendations are supported in the literature (cf. 2.9).

Institutional solutions

Eleven management solutions that were offered by interviewees were aimed at the level of university management. These were categorised in strategic and human resource management solutions. Regarding strategic processes, it was recommended to university and faculty management that policy makers should consult with academics regarding the university research policy. Regarding research management it was recommended that a dedicated research management structure is developed, including research fundraising structures and that strong research leadership is established in the FHS. Since the interviews, the university established a Postgraduate School and the FHS established a Research Directorate for exactly these purposes. All the above should culminate in the nurturing of a research culture in the FHS and in academic departments. At the level of SEM research, it was recommended to FHS management that university management should be convinced to support the programme. The research strategy of the UFS (cf. 2.5.1) makes provision for these recommendations. There seems to be a certain measure of disparity between the strategy and the understanding thereof by academics at the UFS.

Regarding multi-professional co-operation, it was recommended that structures are developed to emphasise and promote this, to find ways to optimise the work of multidisciplinary groups and to limit duplication of work. The researcher is of the opinion that this recommendation refers to generic subjects such as research methodology which are sometimes duplicated in different departments.

As far as recommendations for human resource management to FHS and university management are concerned, it was recommended that institutional recognition and respect for current researchers should be nurtured. Regarding workloads, it was recommended that the relative staff shortage in the SoM, the heavy teaching and clinical loads are addressed. However, no specific recommendations in this regard were forthcoming. The problem has been identified at medical schools over the world as described in section 2.8.1, and is not unique to the UFS.

These recommendations on institutional management drew attention to the fact that many challenges and solutions may lie on institutional or other levels outside of the mandate of the SEM research manager to address. The implication is that such challenges will have to be identified early and accommodated in the research strategy.

Provincial Department of Health solutions

The shared service agreement of employees of the FHS and the DoH and the challenges it brings for research was described earlier (cf. 4.3.3.2). As a solution it was recommended by interviewees that the lack of opportunities and incentives for research for DoH employees can be addressed by utilising university staff and funding structures to focus on research, as the university has very limited input in the strategic focus of the DoH and is unlikely to stimulate further research within overburdened DoH structures.

Resource solutions

Financial resource challenges can mainly be addressed by creating a third stream income for the research programme. Third stream income refers to funds raised from other sources than university fees and government subsidy, and includes research grants, contract research and sponsorships. Specific recommendations in this regard

were for the research manager to know all possible sources of funding and research grants, to encourage and support staff to apply for major research grants, to follow up on grant applications, and to make use of the university fundraising structures. It was recommended that the research manager maintain a balance between academic work and the corporate world to facilitate possible funding from the latter. These recommendations are supported by the UFS research strategy and in the literature (cf. 2.12).

Regarding **human resource solutions**, 13 recommendations were recorded, categorised in three categories. The first category made recommendations regarding the assimilation of expertise. It was recommended that appropriate existing and new academic expertise is assimilated within the research programme. The only recommendation on how to achieve this was to assimilate a limited pool of suitable postgraduate students and academics, and to retain the best and most promising of these.

The second category focused on human resource management skills. These recommendations were to:

- interview all staff and determine their research profiles, problems and personal goals,
- breed success and acknowledge/reward success,
- celebrate every staff achievement in research, circulate good news, create reward systems and to build a culture of acknowledgements of big and small achievements, and
- make achievement of PhDs a priority.

The third category focused on recommendations for persons with specific skills to be appointed in the programme. These were a fundraising officer, a research co-ordinator or driver, non-medical researchers, a scientific writer and a biostatistician. It was also recommended to identify research supervisors in other academic departments to promote interdisciplinary research.

Interestingly, no solutions were offered to three of the four main human resource challenges for research in the FHS, namely the double lecture load, opportunities to engage in lucrative part-time private practice, high clinical load, and lack of promotional

or other incentives to engage in research. As a possible solution to the latter, it has been suggested to utilise university staff and resources outside of the DoH as dedicated researchers. This, of course, is accompanied by a financial responsibility to the university.

The relative validity of the double lecture load as a stumbling block for research deserves further scrutiny before a judgement is made. Firstly, it must be noted that the parallel medium policy really only involves undergraduate teaching, as postgraduate education relies more on discussion groups which are not duplicated, and self-study or other means of continuous learning. The total postgraduate lecture load in the current SEM Masters programme amounts to a mere 120 – 160 hours per year.

On the contrary, granting academics eight hours of private clinical practice per week, for arguments sake for 45 weeks per year, adds up to 360 hours per year, which, if only partially spent on research, can make a meaningful difference to research time and outputs. The concept of allowing academics to engage in private practice in the face of overburdened clinical loads and a dearth of research is questioned by the researcher. It is, however, recognised that the reason for introducing this allowance is to retain academic specialists and expertise in the face of a large disparity in earnings between the private and public (or academic) health sectors in South Africa.

As far as **physical resource solutions** are concerned, it was recommended to make use of new technology such as the latest data analysis software, and to ensure that students and staff are exposed to the latest technologies for research.

4.3.4.5 *Question 4.5: What difficulties may be encountered that could prevent the successful attainment of these solutions?*

This question intended to anticipate difficulties in solving the identified challenges in the previous sections. Expected difficulties in the establishment of a research programme that may prevail after problems were identified and addressed, as well as possible solutions offered by the interviewees are shown in Table 4.9 (cf. Appendix A4).

Difficulties

To a large extent the interviewees reiterated challenges that have been frustrating their previous efforts and experience that are difficult to overcome. This section therefore summarises the most critical challenges that need to be overcome to establish an interdisciplinary research programme in SEM at the UFS. Twenty-three of these difficulties were recorded, and were categorised in three main categories – strategic, management and resource difficulties.

Strategic difficulties that were raised were firstly failure to see the big picture or lack of vision of possible participants. Secondly, lack of representation in a broad sense – professionally, departmentally and socio-politically – was identified as a difficulty. Thirdly, lack of shared focus was identified, and lastly, the failure to reach the tipping point in the establishment of a research culture.

Managerial difficulties that were identified that may interfere with the successful establishment of the research programme were mainly the difficulty and possible inability to establish interdisciplinary partnerships because of reasons such as professional guarding and envy, and priority to own and departmental agendas. Other managerial difficulties to be expected were the manager being uninformed about research support and funding opportunities, lack of sufficient institutional academic support, and the previously identified lack of knowledge and understanding in the FHS of the SEM research programme. A last possible managerial difficulty that was raised was the possible inability to attract appropriate postgraduate students.

As far as expected difficulties in **human resources** are concerned, the previously identified high workload and staff shortage were reiterated. The lack of appointment of dedicated researchers in the FHS and the consequent inability to attract suitable researchers has been identified as a difficulty. The current high volume of part time students raised the difficulty of lack of commitment and focus in such students, as well as the limitations on research funding possibilities for part-time researchers. This holds particularly true for the current status of SEM research at the UFS, where most postgraduate students are clinicians completing a Masters degree part-time, which restricts research possibilities considerably.

Difficulties regarding **financial resources** that are to be expected according to the interviewees are lack of money on the one hand, and the threat of obtaining too much money on the other hand. The difficulty of retaining the support of senate and university and the apparent inability to raise funds for research assistance, especially early in the development of the research programme, were identified as expected difficulties.

Six interviewees (50%) identified lack of time to dedicate to research as a difficulty to be expected in developing the SEM research programme. As far as infrastructure is concerned, potential lack of physical space and research facilities were identified as possible difficulties to overcome.

Solutions

Broad recommendations regarding overcoming of the identified difficulties were offered by three interviewees. **Strategic solutions** were good leadership, good communication and shared ownership of the programme and its strategy and goals. As far as **management** is concerned, the importance of managerial processes to be in place was emphasised.

4.3.5 Category 5: Skills and status of researchers and research leaders

This category explored the opinions of the interviewees on the profile of a successful research leader and researchers in an interdisciplinary SEM research programme. The section explored disciplinary knowledge and status, leadership and management characteristics of a research manager.

4.3.5.1 Question 5.1: What do you think are the disciplinary knowledge and status needed by researchers and research leaders?

Sixteen factors were identified by the interviewees, which can loosely be categorised in disciplinary knowledge, research knowledge, skills, experience and status. Even though most interviewees replied on the characteristics of a research leader, some also reflected on researchers within a programme. These are tabled in Table 4.10 (cf.

Appendix A4). Certain key characteristics of a research leader were described in the literature, and correlate well with the responses in the interviews (cf. 2.11.2).

Disciplinary knowledge has been identified by eight interviewees (65%) as a critical factor for a research leader and researcher. For the leader, disciplinary insight, interdisciplinary knowledge and special expertise in certain focus areas were identified as further disciplinary knowledge requirements. Concerning *knowledge of research*, knowledge of research methodology including quantitative, qualitative and mixed methodology, knowledge of research ethics, supervision and funding opportunities were identified as requirements for a research leader. The ability to translate and apply principles of research into the research leader's own discipline has also been identified as a research requirement. Perceived essential **skills** that were identified were writing skills in the research leader's own discipline, and knowledge and experience of the industry – the sport industry and associated industries in this case. As far as **experience** is concerned, it was recorded that the research leader requires previous and current experience research at ground level, as well as a broad platform of previous exposure and experience of research in the discipline. Concerning the **status** of researchers, it was noted that any doctor with proper knowledge of research methodology is capable of doing research because of undergraduate exposure to research. As far as the status of the research leader is concerned, the person requires respect and high status from peers in the discipline, as well as being a published expert.

4.3.5.2 Question 5.2: What leadership skills are, in your opinion, required by researchers and leaders or managers of research programmes?

Leadership skills that were recorded were categorised into five categories, i.e. inspirational characteristics, managerial skills, vision/insight and general leadership characteristics. These categories were listed in Table 4.11 in order of importance, or how many interviewees made recordings in each category (cf. Appendix A4).

Inspirational characteristics

The most important characteristics for a research leader according to interviewed SEM academics and research managers at the UFS can be classified as inspirational

characteristics, with all interviewees recording at least one such a characteristic. The most prominent characteristic recorded was for the leader to be motivational or inspiring, followed by having passion for the discipline and having "idol" status in the discipline, being able to lead from the front. The research leader must also have the natural ability to lead a team, be a "champion" for the discipline and instil trust in him- or herself as a leader. This sentiment is supported in the literature (cf. 2.11.2).

Managerial skills

Twelve managerial skills required by a research leader were recorded by eight interviewees. The most prominent of these were communication skills including listening and sound boarding skills, followed by skills to work with different levels of knowledge and experience, delegating skills, and not being too critical. Following the same trend, coordinating skills, organisational skills, interpersonal skills and strong leadership skills were recorded. One interviewee was of the opinion that a research leader should adopt an autocratic leadership style in the UFS environment. It was further noted that the research leader must have time to spend with students and their research, be a participating leader and have good research supervision skills.

Vision/insight

Visionary characteristics were recorded by four interviewees. Two interviewees recorded the ability to be visionary and "see the bigger picture". Wisdom and good judgment, as well as the vision to determine the appropriate dynamics of the research group were recorded. Despite the semi-structured nature of the interviews which allows for much freedom of opinion of interviewees, general responses tended towards operational and managerial characteristics. Given the importance of visionary leadership described in the literature (cf.2.6.1.2; 2.11.2), the researcher expected more responses towards vision and insight from the interviewees. The importance of visionary leadership was emphasised by yielding 100% consensus from the Delphi panel of experts in the Round One of the Delphi process, and is supported in the literature (cf. 2.6.1.2; 2.11.2).

General leadership characteristics

General leadership skills were recorded by only one interviewee. These are the ability to show leadership in everyday life, the ability to take responsibility in success as well as in failure, integrity, sensitivity, and bravery.

It was interesting to note that soft leadership skills such as being inspirational seem to carry more weight in this group of academics than harder skills or even visionary abilities, as supported in the literature (2.10.2). Examples of leadership characteristics are presented in Table 4.13.

4.3.5.3 Question 5.3: What managerial skills are in your opinion required by researchers and leaders or managers of a research programme?

There is a degree of overlap between the managerial skills recorded in this section and those noted in the section on leadership, because the researcher noted the replies to each question where it was offered. The overlapping skills are collated in the design of the research strategy (cf. Chapter 6). Forty management skills were noted, loosely categorised in five categories –, financial, general, project and people management skills - as well as specific research management skills and experience. These categories were listed in Table 4.12 in order of number of interviewees making contributions to each category (cf. Appendix A4).

Financial management skills

Financial management skills were regarded by eight interviewees as important managerial skills for a research leader and manager. Concerning **strategic financial management**, the ability to do long term strategic financial planning and fair distribution of resources were highlighted. **Fundraising skills** were also singled out, including knowledge of internal and external funding sources and fundraising policies. **Budgeting skills** that were recorded are knowledge of budgeting policies and procedures, as well as skills in preparing a budget.

General management skills

Five respondents reported general management skills necessary for a research leader. **Planning skills** that were noted were goal setting, comprehensive planning, the ability to work according to a vision and mission, identification of boundaries and limitations and the ability to lead planning sessions. **Operational management skills** that were specified are process management skills, effective measurement of progress, appropriate utilisation of resources, administrative skills, technical skills and organisational skills. **Leadership skills** were noted as a requirement, with specific leadership skills of control and management experience specified.

Project management skills

Project management skills were noted by four interviewees as an important characteristic of research leaders. Specific skills in this regard that were noted were the ability to coordinate different processes within an academic department, and the skill to implement a plan successfully.

People management skills

Interestingly, only four interviewees reported people management skills in the category of management skills, whereas communication skills were regarded as a prominent leadership characteristic in the previous section. This occurrence may reflect on the process of the interviews at different stages, and does not really reflect relative unimportance of people management skills. Specific people management skills that were noted were conflict and problem management skills, stress management skills, personnel selection skills and interpersonal relationship skills. The ability to do professional development of faculty and staff, as well as the ability to maintain the morale of faculty and staff were also recorded as necessary management skills.

Specific research management skills

Three interviewees made specific comments on managerial abilities in the university research environment. One respondent summarised the ideal research leader as "a person with exceptional disciplinary knowledge and experience, together with good

leadership qualities and management skills (people skills, financial skills)". Another synopsis was "a person who is able to plan, implement, monitor, evaluate and adapt a research framework". A third interviewee noted the need for knowledge of institutional challenges by a research leader. A research leader should also be able to promote high quality research in the relevant school or programme, as well as in the entire FHS.

In a document received from the Division of Health Sciences Education, Faculty of Health Sciences, University of the Free State, a comprehensive synopsis of required characteristics of a research leader on different levels is presented (Unknown source. *s.a.*). The document is presented in Table 4.13.

Table 4.13: Characteristics of research leaders (Unknown source. *s.a.*)

Addendum 7.1&7.2 [Head of research] [P1]
<ul style="list-style-type: none"> • To function in a leadership position the Head has to: <ul style="list-style-type: none"> ○ Understand the research context and environment ○ Have knowledge on leadership styles ○ Know the differences between leadership and management ○ Possess knowledge on leadership theory • The Head has to have certain personal qualities such as: <ul style="list-style-type: none"> ○ Integrity ○ High ethical standards • The Head has to be able to lead change by: <ul style="list-style-type: none"> ○ Knowing the concepts and principles of change management ○ Understanding strategic planning [objectives and target-setting] • The Head has to be able to create and develop effective teams by: <ul style="list-style-type: none"> ○ Having knowledge on team roles and functions ○ Understanding group dynamics ○ Having skills for team creation and development • The Head has to be able to lead people by: <ul style="list-style-type: none"> ○ Empowering people ○ Successful staff development • The Head has to have good communication skills in order to: <ul style="list-style-type: none"> ○ Manage meetings effectively ○ Motivate others • The Head has to have the ability to make decision and take risks by: <ul style="list-style-type: none"> ○ Understanding and solving problems ○ Taking decisions ○ Creating solutions • The Head has to manage time and priorities in order to: <ul style="list-style-type: none"> ○ Prioritise and balance activities ○ Manage own time effectively • The Head has to have the ability of self-awareness in order to: <ul style="list-style-type: none"> ○ Understand own strengths; weaknesses; motivations and stresses • The Head of Research has to demonstrate the following leadership competencies: <ul style="list-style-type: none"> ○ Provide clarity about strategic direction ○ Focus on delivery ○ Develop people ○ Build relationships ○ Ensure commitment

4.3.6 Category 6: Suggested components of a strategic framework in SEM research

Only one open question was posed to the interviewees in this category. The responses were categorised in an adapted form of the W.K Kellogg Foundation (WKKF) Logic Model Development Guide, which intends to link outcomes (both short- and long term) with program activities and processes and the theoretical assumptions or principles of the programme (WKKF 2004:III). The responses were summarised in Table 4.14 (cf. Appendix A4).

4.3.6.1 *Question 6.1: Which aspects or criteria would you suggest to be included in a strategic guide for the development and implementation of a research programme in Sport and Exercise Medicine at the University of the Free State (or your own discipline)?*

Strategy and management

Regarding **strategy**, three respondents recommended the establishment of a clear vision and mission, as well as short- medium- and long term goals, in keeping with the Logic Model (WKKF 2004:III). There should be consensus among role players on these goals. Forward thinking and ethical principles should be applied in the strategic process. As far as research strategy is concerned, a departmental research culture should be nurtured, amongst other things by allowing sufficient time for research within the Department. Further recommendations regarding research culture are discussed as outcomes of the planning process below.

Focus can be attained by the establishment of research focus areas, amongst other considerations to avoid duplication or overlap of research in other departments or centres. In the identification of these focus areas, the research strategy of the UFS and the policies of the HPCSA should be considered. The focus must be relevant to the needs of the discipline or specific populations and answer questions that are necessary to answer. The focus areas must culminate in an integrated, interdisciplinary research programme with a common goal. Regarding the content of the focus areas, it was

recommended that there should be differentiated between sport- and public health themes.

Concerning **operational management** of the programme, clear policies and procedures were recommended. A clear departmental policy should be in place, with inclusive management structures such as an interdisciplinary research committee, with regular research meetings. Protocols and procedures should be in detail. Examples of these are presented in the outcomes section below. It was recommended that requirements of statutory and other guiding bodies, such as the South African Qualifications Authority (SAQA), the National Department of Education (DoE), and ethics committees are accommodated in standard procedures. Insurance requirements should also be adhered to.

Inputs

Inputs into the strategic framework and processes are mainly centred on resources and resource allocation. As far as **human resource strategy** is concerned, criteria for inclusion of people into the team should be defined. Entrance into the programme can be enhanced by research opportunities for non-medically qualified researchers and post-graduate students. Undergraduate exposure to the discipline should be enhanced, with a plan to create a flow of undergraduate students into a postgraduate programme. Inactive researchers or non-productive staff should be identified and issues addressed. Certain research support services such as research methodology experts and biostatisticians can be outsourced.

It was recommended that possible sources of **financial support** for research are explored and identified. A fundraising strategy should be in place. As far as **organisational resources** are concerned, it was recommended that the policies of the UFS, FHS and School of Medicine are consulted in the development of an own departmental research policy. Effective networking was recommended as a strategy for use of **external or community resources**. In this regard, it was recommended to pursue the establishment of a national research co-ordinating committee for SEM.

Outputs

Outputs of the strategic framework that were recommended in the interviews were categorised in direct outputs and indicators of success. The direct outputs are mainly operational procedures and guidelines to direct processes within the research programme. It is understood from the interviews that the development of action plans from strategic objectives is recommended, which must ultimately culminate in clear guidelines and procedures. Examples of the procedures that should be standardised were clear programme regulations, registration and budgeting procedures, time scheduling, and clear guidelines on writing of research protocols, research methodology, good clinical practice, and publication. Incentives for publication of research should be offered in a structured manner.

Indicators of success should be put in place by careful goal setting and regular quality control measures.

Outcomes

Outcomes that were recommended to be included as yardsticks in a strategic framework for an interdisciplinary research programme are diverse. Nurturing or improvement of the **intellectual climate** in the programme was mentioned. Examples of how to accomplish this were hosting of distinguished professors, support of conference attendances, promotion and rewarding of research, support of research with time allowances, and attracting and hosting post-doctoral research fellows.

Improvement of **staff qualifications** were also recommended, to the extent of aiming for all staff to obtain PhD or equivalent qualifications. Succession planning was also recommended, by early identification and nurturing of a new generation of researchers.

One respondent focused the attention to the importance that the FHS places on setting targets as norms for **research productivity**. A policy should therefore be put in place that accommodates the FHS criteria for appointment, confirmation and promotion in quantifiable outputs, without sacrificing on quality. Examples of quantifiable outputs are increased academic credits and publications.

An important output of a research programme is the **dissemination of knowledge**, firstly through publications in peer reviewed scientific journals, but also through public forums.

While the focus of the strategic framework is on research, it was recommended that a balance is kept between teaching and research in the Department.

Impact

While goal setting should include short term (1 year), medium term (3-5 years), and long term planning and goal setting, the impact of a new programme will only become evident after 7-10 years (WKKF 2004:2), and will be difficult to specify in the planning phase. None of the interviewees offered suggestions in this regard.

4.3.7 Category 7: Open question

This category was included to invite open discussion on research strategy and development. Only one question was posed in this category.

4.3.7.1 Question 7.1: Do you have any other comments or suggestions that may be useful in the development of a strategic framework for a multi-disciplinary research programme in SEM at the UFS?

The responses to this question produced some overlap and emphasis on previously discussed material, but also succeeded in obtaining some valuable, subjective personal beliefs or attitudes of some interviewees. The responses were categorised in significance of the work, positioning of the research programme, process-related observations, and content of the strategic framework or programme. A substantial portion of responses in this section relates to new programme development issues at the UFS. The responses were summarised in Table 4.15 (cf. Appendix A4).

Concerning **significance** of the exercise to develop a strategic framework for SEM research, it was regarded as important or sensible by two interviewees. Regarding **strategic positioning** of the programme, the consideration was raised whether to develop the programme within an existing department or on a multidisciplinary

platform. However, when interpreting the UFS Research Strategy (UFS 2009b) and the Research Manual of the Faculty of Health Sciences, UFS (UFS 2010b); it is evident that the platform should be developed within current academic structures based on departmental academic activities at the UFS. It was further recommended in this regard that the programme should be aligned with the current academic clusters of the UFS, or that a separate cluster should be developed. It was recorded that the development of a framework creates an opportunity to align the Department of Exercise and Sport Science with the Division SEM at the UFS. In terms of **process**, a final comment was that quality should not be negotiable. The use of the W.K. Kellogg Foundation Model for Development was recommended as a guideline according to structure the research framework (WKKF 2004). This recommendation has been implemented with success in the research.

One interviewee provided an example of considerations in the development of a new programme with research objectives at the UFS, taking into consideration the policies and mission of the UFS and FHS (UFS 2009b; 2010b). The example provides a synopsis of considerations addressed in this chapter and is presented in Table 4.15, under the section "*New programme development at the UFS*" (cf. Appendix A4). In this regard it was also reiterated that criteria for appointment, confirmation and promotion must be in line with the latest UFS Academic Promotions Policy (UFS 2010a; cf. 2.5.1.3), which places emphasis on research outputs. To be further aligned with this policy, a policy within the programme regarding NRF ratings for researchers should be built into the strategic framework. Finally, it was mentioned that research in the Faculty of Health Sciences is currently mainly carried out by individual researchers, with limited opportunities for collaboration. Examples of possible groupings were listed in Table 4.15 (cf. Appendix A4).

4.4 CONCLUSION

This chapter provided the results and interpretation of the semi-structured interviews conducted on academics in SEM and research managers at the UFS. The first part of the interviews provided the basis for a critical analysis of the current status quo of activities and research at the UFS, specifically in SEM.

Trends observed during the interviews were optimism for SEM research within an interdisciplinary context at the UFS, support for the new emphasis on research at the UFS, but with strong reservations on the implementation thereof, accompanied by strong circumstantial defence for the self-confessed lack of research outputs in various disciplines related to SEM at the UFS. The scope of practice of SEM as described in the literature (cf. 2.2.2; 2.3), correlates poorly with the understanding thereof by the interviewees. A further observation in some interviews was a perceived strong focus on own departmental issues rather than a broader vision for academic progress. From these observations the researcher deduces, as conceded in a number of interviews, the relative lack of a research culture in the FHS. A much stronger focus is placed on clinical service delivery and teaching. This is an important factor to consider in the establishment of a research programme at the UFS. The researcher became aware of a multitude of organisational and management challenges that need to be accommodated in a strategic framework for research in SEM at the UFS. Apart from the issues specifically mentioned in this paragraph, the recommendations of academics involved in SEM and research managers at the UFS correlate well with the literature on leadership and research leadership, and research as described in Chapter 2.

The results of this chapter, together with the literature review in Chapter 2, were subsequently used to create a questionnaire for use in a Delphi process among national and international experts in SEM research and research management. The purpose of the Delphi process was to test the local approach to the design of a strategic research framework against international and national expert opinion. The results of the Delphi process are presented in the next chapter, **Chapter 5: Results, data analysis and findings of the Delphi process.**

CHAPTER 5

RESULTS, DATA ANALYSIS AND FINDINGS OF THE DELPHI PROCESS

5.1 INTRODUCTION

The previous chapter, Chapter 4, described and discussed the process and results of the semi-structured interviews conducted with experts in the field of Sports and Exercise Medicine (SEM) and related sciences, as well as with policy makers, leaders and managers in research at the University of the Free State (UFS). The results of the interviews, together with the literature study, provided the platform for construction of the Delphi questionnaire that was used in a Delphi process with a panel of national and international experts in SEM research and research management. The Delphi technique was described in Chapter 3 (cf. 3.3.3). The results of the Delphi process are described and discussed in this chapter according to the sequential rounds thereof. The Delphi process in this survey, was adapted according to the development of the process as described throughout the chapter. Most notably, certain sections were eventually analysed mainly on narrative comments from panellists, as poor consensus was evident, but valuable comments were made. This diversion from the norm is in accordance with the work of Bedford as described in Sackman (1975:23), who has solicited, classified and analysed all panellist comments in his Delphi study. His analysis of open-ended verbal responses led him to defect from "traditional Delphi with its heavy emphasis on statistical feedback" towards a structured adversary procedure, "stressing the importance of assumptions, qualifications, interpretation of general trends, and criticism of co-panellists remarks". This approach seemed to be appropriate for the management of much of the data obtained in this Delphi survey.

5.2 DESCRIPTION AND DISCUSSION OF THE DELPHI SURVEY

The Delphi survey was completed over three rounds. Each round is discussed separately. A description of the measuring instrument is provided, followed by analysis of the responses and a summative discussion of the outcome of the survey.

5.2.1 Round One of the Delphi survey

This section describes the construct and content of the measuring instrument, the process followed, analysis and a summary of the findings of Round One.

5.2.1.1 *The measuring instrument*

A descriptive and instructional letter (cf. Appendix C1) accompanied the first round of the Delphi survey. The procedure and intent of the Delphi process was also explained. It was explained that each statement had to be evaluated with regard to its relevance on a selection of three options. The options were defined as follows:

SL1* = Fully agree [Must definitely be considered in the designing of a research framework]

SL2* = Partially agree [Can be considered in the designing of a research framework]

SL3* = Disagree [Irrelevant for consideration in the designing of a research framework]

(*SL = Selection)

The selection (SL) for each statement could be made by clicking on "select one option" and selecting an option from the drop-down menu on the electronic questionnaire or e-form, as illustrated with the example in Figure 5.1.


<ul style="list-style-type: none"> A university-based research programme should not be restricted by pre-determined research focus areas of the <i>university</i> 	Select one option 	TYPE COMMENTS HERE
<ul style="list-style-type: none"> A university-based research programme should not be restricted by pre-determined research focus areas of the <i>university</i> 	Fully agree Partially agree Disagree	TYPE COMMENTS HERE

Figure 5.1 Example of the selection menu of the Delphi questionnaire (cf. Appendix C2)

Provision was made for the Delphi panellists to give comments or qualify each selection. A total of 352 statements and 27 open-ended questions were included in the questionnaire.

The content of the Delphi questionnaire (cf. Appendix C2) is discussed as it was used in Round One, as constructed with the W.K.Kellogg's Program Logic Model and Harvard Business Essentials Strategy as foundations (WKKF, 2004; HBE 2005).

Section A of the questionnaire was entitled **Strategic foundations of a research framework in Sport and Exercise Medicine**. It comprised four subsections, which contained statements (n=53) on which a selection could be made by panellists and/or comments offered. Subsection One (A1) dealt with an overall strategy in research planning and management (n=17), examining the guiding principles, key success factors, research programme policy, and support of a research programme in general, but applicable to SEM. Subsection Two (A2) addressed prioritisation of research in focus areas (n=30), investigating determinants of research focus areas, and variables that may influence the selection of focus areas and individual research projects. Subsection Three (A3) investigated possible ways of monitoring the success of a research programme (n=4), and subsection Four (A4) invited panellists to provide additional relevant input on the topics under investigation (n=2).

Section B of the questionnaire was entitled **Role, place and character of research in Sport and Exercise Medicine at a university**. This section also included possible positioning of a SEM research programme within the research cluster system of the University of the Free State (UFS). The section was subdivided in five subsections and consisted of 41 statements. Subsection One (B1) investigated the educational and academic role of research in SEM (n=14), specifically the educational role, the developmental role of research for SEM, the role of SEM in society, as well as the role of sport in society. Subsection Two (B2) investigated the academic positioning of a research programme in SEM at a university (n=15), focusing on the placement of such a programme, possible relevant external partners, as well as possible relevant fields and types of study. Subsection Three (B3) described the existing strategic interdisciplinary research clusters (or focus areas) at the UFS, in an attempt to identify common ground for SEM research to associate with any of these preferentially treated research clusters (n=7) (cf. Appendix C2). Subsection Four (B4) dealt with the multi-

disciplinary character of SEM (n=3), and subsection Five (B5) invited panellists to provide additional relevant contributions (n=2).

Section C of the questionnaire was entitled **Inputs that are required by a research programme in Sport and Exercise Medicine**, and attempted to determine relevant resources and processes necessary to establish and maintain a successful SEM research programme (n=191). The section was subdivided in two subsections.

Subsection C1 dealt with resources (n=132) and was further divided in divisions investigating human resources (n=66), financial resources (n=10), internal institutional resources (n=14), external organisational resources (n=18), and possible academic role players or stakeholders (n=24). Concerning human resources, staff composition and qualifications, characteristics of researchers and research leaders, as well as core skills were explored. Possible sources of funding were considered in the financial resources division, while possible non-academic support structures at a university were explored as possible useful resources. The external organisational resources that were considered included funding agencies, academic and professional associations, government structures, sport federations and the community. A comprehensive list of possible academic role players in a multi-disciplinary SEM research programme was compiled during the semi-structured interviews and presented to the Delphi expert panel for consideration in this division.

Subsection C2 scrutinised processes relevant to the successful operation of a multi-professional SEM research programme in three divisions (n=59). The first division considered strategic processes and activities (n=31). The second division considered managerial processes including human resource, academic, financial, and time management (n=16). The third division explored possible appropriate operational processes (n=12).

Section D of the questionnaire was entitled **Challenges in multi-disciplinary research in Sport and Exercise Medicine**. Three subsections were used (n=31). Subsection One (D1) explored academic challenges in multi-disciplinary SEM research (n=19), while subsection Two (D2) explored management challenges (n=10), and subsection Three (D3) invited panellists to offer comments relevant to the section (n=2).

Section E of the questionnaire was entitled **Outputs [products] of a multi-disciplinary Sport and Exercise research programme**, and divided into three subsections (n=48). Subsection One (E1) examined types of outputs from a SEM research programme, such as academic products, human outcomes, and financial outcomes (n=31). Subsection Two (E2) examined possible levels and direction of focus of a SEM research programme (n=17), while subsection Three (E3) invited relevant open commentary (n=2).

Section F of the questionnaire was entitled **Outcomes [impact] of a multi-disciplinary Sport and Exercise Medicine research programme**, divided in three subsections (n=17). Subsection One (F1) examined different types of outcomes or impact areas – academic, internal and external, as well as the possible significance of the programme (n=11). Subsection Two (F2) briefly explored ways of measurement of outcomes of a SEM research programme (n=4), and subsection Three (F3) invited relevant open comment (n=2). The outcomes in section E differ from the outputs in Section F in the sense that the former imply shorter term (1-3 year) quantifiable products, while the latter refers to the longer term impact of the programme on systems and people surrounding it.

Section G of the questionnaire was entitled **Expert panellists final comments**, inviting comments on the content and process of the survey, but especially to offer additional aspects that panellists consider important to be included in the planning of a strategic framework for SEM research (n=1).

5.2.1.2 Analysis of the Round One responses

The responses from this round were analysed manually by calculating the frequency of selections for each statement, as well as tabulating and interpreting the comments offered by panellists. Consensus on a statement was declared if 80% of the panellists chose the same response on a statement (cf.3.3.3.9). In cases where panellists chose not to respond to a particular statement, the percentage consensus was calculated on 80% of the number of respondents to that statement. All statements on which consensus was reached in Round One were excluded from the next rounds, as was the process for all rounds.

5.2.1.3 *Discussion of the findings of Round One of the Delphi survey*

All 10 members of the panel responded to the Delphi questionnaire in Round One (100% response rate). In this round, consensus was reached on 159 statements, or 45%. A total of 196 comments were received in Round One, which gave an insight into their frames of reference and experience. All comments from panellists were documented for further consideration. In the feedback to the panellists, the researcher gave seven explanations of statements for consideration in Round Two. On recommendation of a comment, one statement was added to the Round Two questionnaire. Following analysis of the Round One questionnaire, feedback on the round in the form of a copy of the analysed questionnaire, with statements where consensus have been reached shaded and comments included, were sent to the panellists (cf. Appendix C3).

5.2.2 *Round Two of the Delphi survey*

In this section the measuring instrument, analysis and discussion of findings of Round Two are provided.

5.2.2.1 *The measuring instrument*

An accompanying letter (cf. Appendix D1) and the Round Two questionnaire (cf. Appendix D2) were sent to the panellists as soon as the results from Round One were analysed. In the letter, panellists were requested to peruse the feedback on Round One before completing the Round Two questionnaire. They were invited to either reconsider or stand by their selections made in Round One, and to make comments or suggestions. The Round Two questionnaire consisted of all statements in Round One on which consensus had not been reached, as well as space for comments on specific statements and open comments. One statement was added to the Round Two questionnaire after analysis of comments received in Round One. Comments received in Round One were not included in the questionnaire.

5.2.2.2 *Analysis of the Round Two responses*

The responses from panellists in Round Two were again analysed by calculating the frequency of responses for each statement on the three option selection scale and documenting all comments.

5.2.2.3 *Discussion of the findings of Round Two of the Delphi survey*

The response rate of participants for Round Two was 100%. Consensus in this round was reached on 29 statements, bringing the total consensus to 53%. The findings, including comments received and explanations offered in Round Two are reported in Appendix D3. Consensus statements were shaded. A total of 144 comments were received from panellists in this round. Eleven explanations or questions were raised by the researcher for panellists to consider before the next round. The results of Round Two were conveyed to the panellists (cf. Appendix D3).

Low numbers of consensus in specific sections, accompanied by a high number of comments received from panellists qualifying their decisions, was interpreted by the researcher as areas where consensus is difficult to reach despite continued efforts to do so by the panellists. This finding was taken into consideration in the planning of the remainder of the Delphi process as described in paragraph 5.2.3.1. It was interpreted that questions and statements in these sections were difficult to address because of the limiting format of the questionnaire (only selecting agree, partially agree or disagree). The international panellists seemed to need more knowledge or insight into conditions at the UFS and in South Africa to be able to make informed selections. Furthermore, many confounding factors influencing selection on these topics required either more information, discussion or more comprehensive qualification in this diverse panel of experts. It was therefore decided that further efforts at centralisation will bear little fruit and reaching further consensus in these sections was improbable. These sections were interpreted according to narrative responses, comments and suggestions made by panellists, as well as from relevant literature. Support for this aberration in Delphi methodology is presented in Chapter 3 (cf. 3.3.3.9).

A total of 114 statements in seven subsections and six open questions were identified in this category, where only 24% of statements reached consensus over two rounds. These were:

- A2 Prioritisation of research in focus areas,
- B3 The positioning of a multi-disciplinary Sport and Exercise Medicine research programme within existing research focus areas at the University of the Free State,
- C1.3 Internal institutional resources required for the successful operation of a Sport and Exercise Medicine research programme,
- C1.4 External organisational resources required for the successful operation of a Sport and Exercise Medicine research programme,
- C1.5 Academic role players and stakeholders in a multi-disciplinary Sport and Exercise Medicine research programme,
- D1 Academic challenges in multi-disciplinary Sport and Exercise Medicine research, and
- D2 Management challenges in multi-disciplinary Sport and Exercise Medicine research.

The results of these sections are discussed in the interpretation of the results of the Delphi survey (cf. 5.3).

5.2.3 Round Three of the Delphi survey

The third round of the Delphi survey was managed in the same way as the previous rounds. A letter explaining the purpose and instructions for Round Three (cf. Appendix E1) and the questionnaire for Round Three (cf. Appendix E2) were sent to the panellists after analysis of the results of Round Two.

This section provides a discussion of the design of the measuring instrument with emphasis on the differences between this round and previous rounds, results and a discussion of the findings of Round Three. After completion of Round Three, sufficient consensus, stability and comments on statements were received to declare Round Three as the final round of the Delphi survey (cf. 3.3.3.9).

5.2.3.1 *The measuring instrument*

Part One of Round Three consisted of the remaining statements where consensus had not been reached. Panellists were invited to reconsider or persist with their selections in Round Two, and to offer comments on statements or open comments. Comments offered in previous rounds were included in the questionnaire for this round, to give the panellists insight into different perspectives of one another, as well as to prompt debate.

The sections where low consensus was identified (cf. 5.2.2.3) were put into a separate category in the Round Three questionnaire (Part Two), where no selections needed to be made, but only final comments were requested if appropriate. The lack of consensus or stability in these sections was analysed from the comments and relevant literature.

5.2.3.2 *Analysis of responses*

The responses from Round Three were analysed manually by again determining the frequency of responses for each selection (fully agree, partially agree or disagree) for each statement, and documenting the comments. In addition, the comments in Part Two of the questionnaire were examined qualitatively to come to conclusions on these subsections that were excluded from selection. Stability in Part Two was called "early stability" because stability can only be declared after more than two rounds of a Delphi process to allow for iteration and centralisation of opinion (Woudenberg 1991:133). (cf. Appendix F1).

Regarding declaration of stability in statements where 80% consensus could not be reached, Linstone and Turoff (1979:278) acknowledge that selection of a reasonable cut-off point poses some problems, because of the lack of an underlying statistical theory to do so. The interest lies in the opinion of the group, rather than the individual. Therefore stability in the final frequency of selections per statement for the entire panel is of importance, while a certain amount of oscillatory movement and change within the group is inevitable. Many methods have been proposed to declare stability in a Delphi survey (Linstone & Turoff 1979:277-8). For the purposes of this study, stability was declared when eight of the ten panellists did not change their decisions between rounds

after Round Two, namely Round Two and Round Three. Considerations in criteria for stability was discussed in Chapter 3 (cf. 3.3.3.9).

5.2.3.3 *Discussion of the findings of Round Three of the Delphi survey*

All 10 members of the Delphi panel responded to Round Three either by returning a completed questionnaire (n=3), or by indicating that they did not wish to change their selections and comments made in Round Two (n=7), resulting in a 100% response rate from participants.

In Part One of Round Three, seven further statements reached consensus, resulting in a final consensus of 168, or 71%. Stability was reached in 64 statements, or 27% overall stability where consensus could not be reached. No consensus was reached in only 6 statements (2%). Forty-nine comments were made in this part. A much reduced yield of consensus in Round Two and Three compared to Round One was noted. This occurrence is in accordance with Sackman (1975:51) who noted that convergence of medians is greatest with initial feedback of group opinion and is effectively achieved in three or four rounds. In this regard, Martino in Sackman (1975:51) suggested that conducting further rounds than Round Two may even be unnecessary. In using only one round, of course, the entire character of the Delphi process will be altered, totally eliminating the characteristic of iteration and the potential for centralisation of opinion and was not considered in this study.

Part Two of Round Three yielded only four more comments.

The consolidated results of the Delphi Survey are reported in Appendix F1. Table 5.1 provides details on the statements on which stability was reached in Round Three, with percentages of panellists selecting a particular option indicated in the right hand column. The first figure indicates the percentage that opted for "Fully agree" (SL1), the middle figure for "partially agree" (SL2) and the third figure for "disagree"(SL3). In cases where not all panellists elected to respond to a particular statement, consensus and stability were calculated at 80% of the number of respondents to the particular statement.

Table 5.1 Stability statements in Round Three (final round) of the Delphi survey

CONSOLIDATED FINDINGS FROM THE DELPHI SURVEY: STABILITY			
<p>This document shows the results of the Delphi process, indicating on which statements stability were reached.</p> <p>© No part of this questionnaire may be reproduced, stored in a retrieval system, copied or transmitted in any form without the written consent of the author.</p>			
SECTION A: STRATEGIC FOUNDATIONS OF A RESEARCH FRAMEWORK IN SPORT AND EXERCISE MEDICINE			
<p>This section deals with the foundational reference points of a generic research programme, but is also applicable to a research programme in Sport and Exercise Medicine (SEM).</p> <p>Selections were between the following options:</p> <p>SL1* = Fully agree [Must be considered in the designing of a research framework]</p> <p>SL2* = Partially agree [Can be considered in the designing of a research framework]</p> <p>SL3* = Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>(*SL = selection)</p> <p>Consensus was reached when 80% of the Delphi expert panel agreed on either of the statements. Stability was reached when, after three rounds, less than 20% of the panel changed their options and consensus was not reached. The ratios in the right hand column reflect the percentage ratios of SL1:SL2:SL3.</p>			
	STATEMENTS	SELECTION	OUTCOME
A1	OVERALL STRATEGY IN RESEARCH PLANNING AND MANAGEMENT		
	In designing and managing a research programme, the following statements are relevant:		
b.	The success of a research programme can be enhanced by		
	pre-determination of the direction of research in the programme		Stability 50:40:10
	strong leadership		Stability 60:30:10
	strong mentorship		Stability 60:40:0
c.	The policy of a research programme should:		
	support transfer of knowledge to benefit the university		Stability 30:40:30
	support transfer of knowledge to benefit the community		Stability 50:50:0
d.	The role of research in SEM at a university department is dependent on the balance between teaching and research of the university		
			Stability 40:40:20
e.	A SEM research programme at a university should be supported by:		
	University management		Stability 60:40:0

Table 5.1 Stability statements in Round Three (final round) of the Delphi survey(continued)

A3	MONITORING OF THE SUCCESS OF A RESEARCH PROGRAMME		
	The following statements relate to monitoring and evaluation of the success of a research programme		
a.	A research programme should regularly be		
	<i>Monitored</i> according to <i>qualitative</i> key performance indicators [subjective outcomes of success]		Stability 78:11:11
SECTION B: THE ROLE, PLACE AND CHARACTER OF RESEARCH IN SPORT AND EXERCISE MEDICINE [SEM] AT A UNIVERSITY			
	<p>This section deals with the role, place and character of a research programme in Sport and Exercise Medicine at a university.</p> <p>Selections were between the following options:</p> <p>SL1*= Fully agree [Must be considered in the designing of a research framework]</p> <p>SL2*= Partially agree [Can be considered in the designing of a research framework]</p> <p>SL3*= Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>(*SL = selection)</p> <p>Consensus was reached when 80% of the Delphi expert panel agreed on either of the statements. Stability was reached when, after three rounds, less than 20% of the panel changed their options and consensus was not reached. The ratios in the right hand column reflect the percentage ratios of SL1:SL2:SL3.</p>		
	STATEMENTS	SELECT	COMMENTS
B1	THE EDUCATIONAL AND ACADEMIC ROLE OF RESEARCH IN SPORT AND EXERCISE MEDICINE		
a.	Research in SEM plays an important <i>educational</i> role in:		
	Basic grounding for undergraduate teaching		Stability 50:50:0
b.	Research in SEM plays an important role in the <i>development of SEM</i> as an academic discipline regarding:		
	The development of sport		Stability 40:60:0
c.	Regarding the role of SEM research in society:		
	Sport and Exercise Medicine research can lead the way in mainstream medicine research		Stability 30:60:10
	Research on elite athletes can often be applied to broader communities		Stability 30:60:10
d.	Sport plays an important role in:		
	Politics		Stability 45:33:22

Table 5.1 Stability statements in Round Three (final round) of the Delphi survey (continued)

B2	THE ACADEMIC PLACE (POSITIONING) OF A RESEARCH PROGRAMME IN SPORT AND EXERCISE MEDICINE AT A UNIVERSITY	
b.	The following groupings are relevant partners in a SEM research programme:	
	Sport federations	Stability 40:60:0
d.	SEM is a particularly suitable discipline for:	
	pure scientific research	Stability 20:80:20
B3	THE POSITIONING OF A MULTI-DISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME WITHIN EXISTING RESEARCH FOCUS AREAS AT THE UNIVERSITY OF THE FREE STATE	
	<p>This section deals with the existing strategic interdisciplinary research clusters [focus areas] at the University of the Free State. These clusters have been selected predominantly on the basis of regional need and existing expertise and research. The clusters are intended to enhance the strategic research focus of the university, as well as interdisciplinary/collaborative research. They get preferential university funding and support before research that are not included in a cluster. It is therefore beneficial for any research programme to find common ground within one of the clusters.</p> <p>Selections were between the following options:</p> <p>SL1* = Fully agree [Must be considered in the designing of a research framework]</p> <p>SL2* = Partially agree [Can be considered in the designing of a research framework]</p> <p>SL3* = Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>(*SL = selection)</p> <p>Consensus was reached when 80% of the Delphi expert panel agreed on either of the statements. Stability was reached when, after three rounds, less than 20% of the panel changed their options and consensus was not reached. The ratios in the right hand column reflect the percentage ratios of SL1:SL2:SL3.</p>	
B4	THE MULTI-DISCIPLINARY CHARACTER OF SPORT AND EXERCISE MEDICINE	
a.	The following statements are true regarding SEM:	
	An interdisciplinary SEM research programme should be managed independent of academic departments	Stability 22:11:67

Table 5.1 Stability statements in Round Three (final round) of the Delphi survey (continued)

SECTION C: INPUTS THAT ARE REQUIRED BY A RESEARCH PROGRAMME IN SPORT AND EXERCISE MEDICINE			
	<p>This section deals with different inputs required for the successful operation of a multi-disciplinary research programme, and the activities within such a programme.</p> <p>Selections were between the following options:</p> <p>SL1* = Fully agree [Must be considered in the designing of a research framework]</p> <p>SL2* = Partially agree [Can be considered in the designing of a research framework]</p> <p>SL3* = Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>(*SL = selection)</p> <p>Consensus was reached when 80% of the Delphi expert panel agreed on either of the statements. Stability was reached when, after three rounds, less than 20% of the panel changed their options and consensus was not reached. The ratios in the right hand column reflect the percentage ratios of SL1:SL2:SL3.</p>		
	STATEMENTS	SELECT	COMMENTS
C1	RESOURCES		
C1.1	HUMAN RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:		
b.	The following statements are true regarding the academic staff in a SEM research programme:		
	All academic staff in SEM must obtain PhD degrees		Stability 30:40:30
	All academic SEM staff must supervise PhD students research		Stability 40:40:20
	Researchers in a research programme should be assimilated by retaining the best postgraduate students		Stability 30:70:0
	At least 25% of time of academic staff in a SEM department must be devoted to research supervision		Stability 50:30:20
c.	Critical characteristics required to be a <i>successful researcher</i> in SEM include:		
	Experience on ground level		Stability 50:50:0
	Knowledge of the industry		Stability 60:20:20
	Previous exposure to the discipline		Stability 70:30:0
	Knowledge of funding opportunities		Stability 40:60:0
	Have status [respect] among peers in the discipline		Stability 56:44:0
d.	The following <i>leadership characteristics</i> are required by leaders in research programmes:		
	Not too critical		Stability 20:30:50
	Leadership in daily life		Stability 40:60:0
	Bravery		Stability 20:70:10

Table 5.1 Stability statements in Round Three (final round) of the Delphi survey (continued)

e.	The following <i>management skills</i> are required by research programme managers:		
	Stress management skills		Stability 50:30:20
	Fundraising skills		Stability 70:30:0
	Technical skills		Stability 40:60:0
C1.2	FINANCIAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:		
a.	A SEM research programme should be funded by:		
	Commercialisation of research		Stability 10:50:40
	Commercialisation of clinical services		Stability 20:50:30
	The university in which it is housed		Stability 70:30:0
	Government subsidy		Stability 40:60:0
	Research funding agencies, such as the National Research Foundation or Medical Research Council of South Africa		Stability 70:30:0
	Partnerships between the research programme and private corporations		Stability 50:50:0
c.	There is a risk of losing academic autonomy of a research programme due to interference from funders		Stability 20:50:30
C2	PROCESSES RELEVANT TO THE SUCCESSFUL OPERATION OF A MULTI-DISCIPLINARY SEM RESEARCH PROGRAMME		
C2.1	STRATEGIC PROCESSES		
c.	The following are key strategic <i>activities</i> to ensure success of a multi-disciplinary SEM research programme:		
	<ul style="list-style-type: none"> Increase the number of PhDs of staff in the programme 		Stability 70:30:0
	<ul style="list-style-type: none"> Monitoring of activities of other research units 		Stability 70:30:0
	<ul style="list-style-type: none"> Management models 		Stability 44:44:12
C2.2	MANAGERIAL PROCESSES		
a.	Regarding <i>human resource [people] management</i> , the following aspects are relevant in a multi-disciplinary SEM research programme:		
	<ul style="list-style-type: none"> The establishment of a multi-disciplinary scientific committee 		Stability 60:30:10
c.	Regarding <i>financial management</i> of research, the following aspects are important managerial functions:		
	<ul style="list-style-type: none"> Following a set budgeting procedure for research projects 		Stability 60:40:0
	<ul style="list-style-type: none"> Fundraising must be a specialised function within the research programme 		Stability 50:40:10

Table 5.1 Stability statements in Round Three (final round) of the Delphi survey (continued)

C2.3 OPERATIONAL PROCESSES		
a.	<i>Operational processes</i> of a multi-disciplinary SEM research programme should include the following	
	• Formal agreements on procedures with researchers	Stability 70:30:0
	• Formal agreements on expected outcomes with researchers	Stability 70:30:0
	• Guidelines for publication	Stability 70:30:0
	• Creation of patient databases	Stability 50:50:0
SECTION E: OUTPUTS [PRODUCTS] OF A MULTI-DISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME		
	This section deals with types, levels and targets of outputs of a multi-disciplinary SEM research programme.	
E1 TYPES OF OUTPUTS FROM A MULTI-DISCIPLINARY RESEARCH PROGRAMME		
a.	The following are essential academic products of a multi-disciplinary SEM research programme:	
	Non-scientific informational publications	Stability 30:50:20
	Registered patents	Stability 40:20:40
	Chapters in books	Stability 70:30:0
	Scholarly books	Stability 60:40:0
	• Textbooks and published guidelines	Stability 60:40:0
	• Short learning courses	Stability 40:50:10
b.	The following are desired human outcomes of a multi-disciplinary SEM research programme:	
	• Appointment of staff members on national governmental scientific bodies	Stability 70:30:0
c.	The following objectives deal with desired financial outcomes within a multi-disciplinary SEM research programme at a university. Select your level of agreement with each objective:	
	• Commercialisation of research by contract research	Stability 20:60:20
	• Commercialisation of research by registering patents	Stability 30:50:20
E2 LEVELS OF FOCUS OF A MULTI-DISCIPLINARY SEM RESEARCH PROGRAMME		
a.	The following are important levels at which research outputs should be focused:	
	• Community [regional]	Stability 70:30:0
	• Specific industries	Stability 43:14:43
b.	The following are important persons and bodies at which research outputs should be focused [who should be pleased with the outcome?]:	
	• Government departments [sport, education, health etc]	Stability 40:50:10
	• The public	Stability 70:20:10
	• The healthcare industry	Stability 40:60:0

Table 5.1 Stability statements in Round Three (final round) of the Delphi survey (continued)

SECTION F: OUTCOMES [IMPACT] OF A MULTI-DISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME			
	This section deals with longer term outcomes [impact] and significance of a multi-disciplinary SEM research programme.		
F1	TYPES OF OUTCOMES FROM A MULTI-DISCIPLINARY RESEARCH PROGRAMME		
c.	The following are significant <i>external effects</i> [changes] that may indicate outcomes [significance] of the research programme:		
	• Implementation of research findings in communities		Stability 50:50:0
	• Changes in the community		Stability 40:50:10
F2	MEASUREMENT OF OUTCOMES FROM A MULTI-DISCIPLINARY RESEARCH PROGRAMME		
b.	The outcomes of a research programme should be monitored, but not necessarily planned and quantified		Stability 22:22:56

5.2.4 Summative discussion of the Delphi process

After Round One consensus was reached on 45% of the 352 statements. In Round Two, the consensus increased to 54%. After Round Two, 114 statements were removed from the Delphi process and only offered for comments due to the obvious difficulty in making appropriate selections. Final consensus was reached in 71% of the final 238 statements. Stability was declared on 27% of statements, and no consensus could be reached on the remaining 2%.

5.2.4.1 Consensus

The statements on which consensus were reached on the first option, "fully agree" will be used in the construction of a strategic framework for SEM research. These are indicated with consensus SL1 in Table 5.3. Seven statements reached consensus on the option "partially agree" (SL2). These were considered in light of relevant comments and literature before use in the strategic framework. Two statements reached consensus on "disagree" (SL3), and will be discussed accordingly in the strategic framework.

Table 5.2: Statements that reached consensus on "Partially Agree" and "Disagree"

CONSOLIDATED FINDINGS FROM THE DELPHI SURVEY: CONSENSUS ON "PARTIALLY AGREE" AND "DISAGREE"			
<p>This document shows the results of the Delphi process, indicating on which statements consensus were reached on "Partially Agree" (SL2) and "Disagree" (SL3). The ratios in the right hand column reflect the percentage ratios of SL1:SL2:SL3.</p> <p>© No part of this questionnaire may be reproduced, stored in a retrieval system, copied or transmitted in any form without the written consent of the author.</p>			
SECTION A: THE FOLLOWING STATEMENTS REACHED CONSENSUS ON SELECTION 2, "PARTIALLY AGREE"			
b.	The success of a research programme can be enhanced by		
	An established research culture	Partially Agree	<p>Consensus SL2 10:90:0 Comments: 08 New research cultures often are innovative 10 A "new" culture may be necessary 14 the development of this seems to be the point of this exercise</p>
b.	The following are important determinants in the selection of research <i>focus areas</i> :		
	Availability of equipment	Partially Agree	<p>Consensus SL2 10:80:10 Comments: 08 Should not be a deterrent to a research framework as many solutions are possible for equipment share, lease , purchase. 10 Not all equipment needs can be anticipated and the research should be driven by ideas and questions, not by equipment. 14 ideas/productivity should be in advance of equipment</p>

Table 5.2: Statements that reached consensus on “Partially Agree” and “Disagree” (continued)

Regarding collaboration with existing interdisciplinary research clusters at the UFS:			
c.	<i>Cluster 3:</i> Regional community development and alleviation of poverty [Suggested constituent focus areas: Urban development, rural development: sustainable livelihoods in the QwaQwa region [a rural region where a satellite campus of the University of the Free State is situated], resource management and development [tourism, small business development, local government], healthy communities [communicable diseases, chronic diseases of lifestyle, children with disabilities]	Partially Agree	Consensus SL2 10:80:10 Comments: 08 Role of exercise in healthy communities 10 Chronic diseases
a.	The following organisations outside of the university are relevant role players in the successful operation of a SEM research programme:		
	Government departments of other countries in Africa or internationally	Partially Agree	Consensus SL2 10:80:10
	MANAGERIAL PROCESSES		
d.	It is important for a research programme to work according to strict <i>time schedules</i>	Partially Agree	Consensus SL2 20:80:0 Comments: 10 Some flexibility is needed considering the nature of the results and the need to adjust course 14 research is a business
b.	The following are important persons and bodies at which research outputs should be focused [who should be pleased with the outcome?]:		
	Organised sport	Partially Agree	Consensus SL2 10:80:10
	The fitness industry	Partially Agree	Consensus SL2 20:80:0
SECTION B: THE FOLLOWING STATEMENTS REACHED CONSENSUS ON SELECTION 3, “DISAGREE”			
e.	<i>Cluster 5:</i> Water resources and ecosystem management [freshwater ecology, environmental change, water resource management, sustainable utilisation of terrestrial ecosystems]	Disagree	Consensus SL3 0:10:90
d.	The following <i>leadership characteristics</i> are required by leaders in research programmes:		
	Autocratic leadership skills	Disagree	Consensus SL3 0:20:80

Three of these statements were among those subsections where selection was difficult, and were removed from selection in Round Three. Four statements elicited comments that were used to contextualise and interpret the selections. Only one statement that reached consensus on “partially agree” was not qualified to a degree with comments. This may be due to the retrospective vagueness of the question.

All statements where consensus have been reached are listed in Table 5.3, indicating the percentages allocated to each option, again with the percentage for “fully agree” (SL1) first, followed by that for “partially agree” (SL2) and, on the right hand end, the percentage for “disagree” (SL3).

Table 5.3: Consensus in the Delphi study

CONSOLIDATED FINDINGS FROM THE DELPHI SURVEY: CONSENSUS			
This document shows the results of the Delphi process, indicating on which statements consensus were reached.			
© No part of this questionnaire may be reproduced, stored in a retrieval system, copied or transmitted in any form without the written consent of the author.			
SECTION A: STRATEGIC FOUNDATIONS OF A RESEARCH FRAMEWORK IN SPORT AND EXERCISE MEDICINE			
This section deals with the foundational reference points of a generic research programme, but is also applicable to a research programme in Sport and Exercise Medicine (SEM).			
Selections were between the following options:			
SL1* = Fully agree [Must be considered in the designing of a research framework]			
SL2* = Partially agree [Can be considered in the designing of a research framework]			
SL3* = Disagree [Irrelevant for consideration in the designing of a research framework]			
(*SL = selection)			
Consensus was reached when 80% of the Delphi expert panel agreed on either of the statements. Stability was reached when, after three rounds, less than 20% of the panel changed their options and consensus was not reached. The ratios in the right hand column reflect the percentage ratios of SL1:SL2:SL3.			
	STATEMENTS	SELECTION	OUTCOME
A1	OVERALL STRATEGY IN RESEARCH PLANNING AND MANAGEMENT		
	In designing and managing a research programme, the following statements are relevant:		
a.	Research should be guided by:		
	a research strategy	Agree	Consensus SL1 90:10:0
	an implementation plan	Agree	Consensus SL1 80:20:0

Table 5.3: Consensus in the Delphi study (continued)

b.	The success of a research programme can be enhanced by		
	An enabling environment such as a university with a strong research culture	Agree	Consensus SL1 80:20:0
	An established research culture	Partially Agree	Consensus SL2 10:90:0
	Development of the next generation of researchers	Agree	Consensus SL1 80:20:0
c.	The policy of a research programme should:		
	stimulate creativity	Agree	Consensus SL1 90:10:0
	stimulate new thinking	Agree	Consensus SL1 100:0:0
e.	A SEM research programme at a university should be supported by:		
	Faculty management	Agree	Consensus SL1 80:20:0
	Academics in relevant disciplines at the university	Agree	Consensus SL1 80:20:0
A2	PRIORITISATION OF RESEARCH IN FOCUS AREAS		
	The following statements relate to the development of focus areas in a research programme. Statements where No consensus were reached in Round One and Two, were only distributed for comments in Round Three, as the expert panel found it difficult to make a selection, either because of lack of knowledge or insight of local (UFS) or South African circumstances, or because the development of research focus areas depend on many variables and is highly situation bound.		
b.	The following are important determinants in the selection of research <i>focus areas</i> :		
	Expertise of individual researchers	Agree	Consensus SL1 80:20:0
	Gaps in current research	Agree	Consensus SL1 80:20:0
	Availability of equipment	Partially Agree	Consensus SL2 10:80:10
c.	In addition to selection of research focus areas, the following are important determinants in the selection of <i>individual research projects</i> within a research programme		
	Expertise of individual researchers	Agree	Consensus SL1 80:20:0
	Availability of equipment	Partially Agree	Consensus SL2 20:80:0
A3	MONITORING OF THE SUCCESS OF A RESEARCH PROGRAMME		
	The following statements relate to monitoring and evaluation of the success of a research programme		
a.	A research programme should regularly be		
	<i>Monitored</i> according to <i>quantitative</i> key performance indicators [specific, measurable outcomes of success]	Agree	Consensus SL1 90:10:0
	<i>Evaluated</i> according to <i>quantitative</i> key performance indicators [specific, measurable outcomes of success]	Agree	Consensus SL1 80:10:10

Table 5.3: Consensus in the Delphi study (continued)

	<i>Evaluated according to qualitative key performance indicators [subjective outcomes of success]</i>	Agree	Consensus SL1 89:11:0
SECTION B: THE ROLE, PLACE AND CHARACTER OF RESEARCH IN SPORT AND EXERCISE MEDICINE [SEM] AT A UNIVERSITY			
	<p>This section deals with the role, place and character of a research programme in Sport and Exercise Medicine at a university.</p> <p>Selections were between the following options:</p> <p>S1= SL1 = Fully agree [Must be considered in the designing of a research framework]</p> <p>SL2= SL2 = Partially agree [Can be considered in the designing of a research framework]</p> <p>SL3= SL3 = Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>(SL = selection)</p> <p>Consensus was reached when 80% of the Delphi expert panel agreed on either of the statements. Stability was reached when, after three rounds, less than 20% of the panel changed their options and consensus was not reached. The ratios in the right hand column reflect the percentage ratios of SL1:SL2:SL3.</p>		
	STATEMENTS	SELECT	COMMENTS
B1	THE EDUCATIONAL AND ACADEMIC ROLE OF RESEARCH IN SPORT AND EXERCISE MEDICINE		
a.	Research in SEM plays an important <i>educational</i> role in:		
	Basic grounding for postgraduate teaching	Agree	Consensus SL1 90:10:0
	Defining SEM as academic discipline at the university in which it is housed	Agree	Consensus SL1 90:10:0
	A postgraduate Sport and Exercise Medicine programme	Agree	Consensus SL1 100:0:0
b.	Research in SEM plays an important role in the <i>development of SEM</i> as an academic discipline regarding:		
	The development of the discipline of Sport and Exercise Medicine	Agree	Consensus SL1 90:10:0
	Establishing best practice in clinical Sport and Exercise Medicine	Agree	Consensus SL1 80:20:0
c.	Regarding the role of SEM research in society:		
	The development of new knowledge in Sport and Exercise Medicine can make a meaningful contribution to public health care	Agree	Consensus SL1 90:10:0
	SEM research plays an important role in addressing the scientific needs of the athletic population	Agree	Consensus SL1 80:20:0

Table 5.3: Consensus in the Delphi study (continued)

d.	Sport plays an important role in:		
	Society	Agree	Consensus SL1 80:20:0
	Community wellness	Agree	Consensus SL1 100:0:0
B2	THE ACADEMIC PLACE (POSITIONING) OF A RESEARCH PROGRAMME IN SPORT AND EXERCISE MEDICINE AT A UNIVERSITY		
a.	Regarding the place of a SEM research programme in a university:		
	A SEM research programme is best positioned in a Faculty of Health Sciences	Agree	Consensus SL1 80:20:0
	Research should be an essential part of a structured Masters programme in SEM	Agree	Consensus SL1 100:0:0
	A SEM department should engage in collaborative research partnerships with other disciplines within the institution	Agree	Consensus SL1 80:20:0
b.	The following groupings are relevant partners in a SEM research programme:		
	Other academic health care institutions	Agree	Consensus SL1 90:10:0
	Primary health care institutions	Agree	Consensus SL1 80:20:0
c.	The following fields of study are relevant in an interdisciplinary SEM research programme:		
	Health promotion	Agree	Consensus SL1 100:0:0
	Public wellness	Agree	Consensus SL1 90:10:0
	Prevention of chronic disease	Agree	Consensus SL1 100:0:0
	Prevention of exercise related illness	Agree	Consensus SL1 100:0:0
	Management of exercise related illness	Agree	Consensus SL1 90:0:0
	Prevention of exercise related injuries	Agree	Consensus SL1 90:10:0
	Management of exercise related injuries	Agree	Consensus SL1 90:10:0
d.	SEM is a particularly suitable discipline for:		
	applied research	Agree	Consensus SL1 90:10:0

Table 5.3: Consensus in the Delphi study (continued)

B3	THE POSITIONING OF A MULTI-DISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME WITHIN EXISTING RESEARCH FOCUS AREAS AT THE UNIVERSITY OF THE FREE STATE		
	<p>This section deals with the existing strategic interdisciplinary research clusters [focus areas] at the University of the Free State. These clusters have been selected predominantly on the basis of regional need and existing expertise and research. The clusters are intended to enhance the strategic research focus of the university, as well as interdisciplinary/collaborative research. They get preferential university funding and support before research that are not included in a cluster. It is therefore beneficial for any research programme to find common ground within one of the clusters.</p> <p>Selections were between the following options:</p> <p>S1= SL1 = Fully agree [Must be considered in the designing of a research framework]</p> <p>SL2= SL2 = Partially agree [Can be considered in the designing of a research framework]</p> <p>SL3= SL3 = Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>(SL = selection)</p> <p>Consensus was reached when 80% of the Delphi expert panel agreed on either of the statements. Stability was reached when, after three rounds, less than 20% of the panel changed their options and consensus was not reached. The ratios in the right hand column reflect the percentage ratios of SL1:SL2:SL3.</p>		
c.	<p><i>Cluster 3:</i> Regional community development and alleviation of poverty [Suggested constituent focus areas: Urban development, rural development: sustainable livelihoods in the QwaQwa region [a rural region where a satellite campus of the University of the Free State is situated], resource management and development [tourism, small business development, local government], healthy communities [communicable diseases, chronic diseases of lifestyle, children with disabilities]</p>	Partially Agree	Consensus SL2 10:80:10
e.	<p><i>Cluster 5:</i> Water resources and ecosystem management [freshwater ecology, environmental change, water resource management, sustainable utilisation of terrestrial ecosystems]</p>	Disagree	Consensus SL3 0:10:90

Table 5.3: Consensus in the Delphi study (continued)

B4	THE MULTI-DISCIPLINARY CHARACTER OF SPORT AND EXERCISE MEDICINE		
a.	The following statements are true regarding SEM:		
	SEM is a multi-disciplinary field of study	Agree	Consensus SL1 100:0:0
	A SEM research programme should have a multi-disciplinary character	Agree	Consensus SL1 90:10:0
SECTION C: INPUTS THAT ARE REQUIRED BY A RESEARCH PROGRAMME IN SPORT AND EXERCISE MEDICINE			
	<p>This section deals with different inputs required for the successful operation of a multi-disciplinary research programme, and the activities within such a programme.</p> <p>Selections were between the following options:</p> <p>SL1* = SL1 = Fully agree [Must be considered in the designing of a research framework]</p> <p>SL2* = Partially agree [Can be considered in the designing of a research framework]</p> <p>SL3* = SL3 = Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>(*SL = selection)</p> <p>Consensus was reached when 80% of the Delphi expert panel agreed on either of the statements. Stability was reached when, after three rounds, less than 20% of the panel changed their options and consensus was not reached. The ratios in the right hand column reflect the percentage ratios of SL1:SL2:SL3.</p>		
	STATEMENTS	SELECT	COMMENTS
C1	RESOURCES		
C1.1	HUMAN RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:		
a.	The following staff components are important for the successful operation of a SEM research programme:		
	Competent academic staff	Agree	Consensus SL1 100:0:0
	Competent departmental support staff	Agree	Consensus SL1 90:10:0
	Faculty research support staff	Agree	Consensus SL1 80:20:0
	University research support staff	Agree	Consensus SL1 100:0:0
	Post-magister degree fellows	Agree	Consensus SL1 80:20:0
	Post-doctoral fellows	Agree	Consensus SL1 90:10:0
b.	The following statements are true regarding the academic staff in a SEM research programme:		
	All academic SEM staff must supervise Masters students research	Agree	Consensus SL1 80:20:0
	Continuous staff development is relevant to the success of a SEM research programme	Agree	Consensus SL1 100:0:0

Table 5.3: Consensus in the Delphi study (continued)

	The staff profile of a successful SEM research programme should reflect a balance between experienced and young researchers	Agree	Consensus SL1 90:10:0
	There must be minimum requirements for national publications for all staff members in a department of SEM	Agree	Consensus SL1 90:10:0
	There must be minimum requirements for international publications for all staff members in a department of SEM	Agree	Consensus SL1 80:20:0
c.	Critical characteristics required to be a <i>successful researcher</i> in SEM include:		
	Disciplinary knowledge	Agree	Consensus SL1 100:0:0
	Disciplinary insight	Agree	Consensus SL1 100:0:0
	Writing skills	Agree	Consensus SL1 80:20:0
	Knowledge of research methodology	Agree	Consensus SL1 90:10:0
	Expertise in certain focus areas	Agree	Consensus SL1 80:20:0
	Knowledge of research supervision	Agree	Consensus SL1 80:20:0
	Knowledge of research ethics	Agree	Consensus SL1 100:0:0
	The ability to apply general research principles into SEM research	Agree	Consensus SL1 100:0:0
	Experience in publication of research	Agree	Consensus SL1 80:10:10
d.	The following <i>leadership characteristics</i> are required by leaders in research programmes:		
	Motivational leadership	Agree	Consensus SL1 100:0:0
	Passion for the discipline	Agree	Consensus SL1 90:10:0
	Stature in the discipline	Agree	Consensus SL1 90:10:0
	Ability to see the bigger picture [vision]	Agree	Consensus SL1 100:0:0
	Inspirational leadership	Agree	Consensus SL1 90:0:10
	Skills to work with different levels of knowledge and experience	Agree	Consensus SL1 90:0:0
	Delegating skills	Agree	Consensus SL1 80:20:0
	Listening skills	Agree	Consensus SL1 90:0:0
	Co-ordinating [organisational] skills	Agree	Consensus SL1 80:10:0
	Autocratic leadership skills	Disagree	Consensus SL3 0:20:80
	Interpersonal skills	Agree	Consensus SL1 100:0:0
	Communication skills	Agree	Consensus SL1 100:0:0
	Ability to take responsibility in success	Agree	Consensus SL1 90:10:0
	Ability to take responsibility in failure	Agree	Consensus SL1 100:0:0
	Integrity	Agree	Consensus SL1 100:0:0
	Sensitivity	Agree	Consensus SL1 80:10:10

Table 5.3: Consensus in the Delphi study (continued)

	Trust	Agree	Consensus SL1 90:10:0
	Honesty	Agree	Consensus SL1 100:0:0
	Wisdom [good judgement]	Agree	Consensus SL1 100:0:0
e.	The following <i>management skills</i> are required by research programme managers:		
	Financial management skills	Agree	Consensus SL1 80:20:0
	Project management skills	Agree	Consensus SL1 100:0:0
	People management skills	Agree	Consensus SL1 100:0:0
	Process management skills	Agree	Consensus SL1 100:0:0
	Goal setting skills	Agree	Consensus SL1 90:10:0
	Planning skills	Agree	Consensus SL1 100:0:0
	Conflict management skills	Agree	Consensus SL1 80:20:0
	Administrative skills	Agree	Consensus SL1 80:20:0
	Interpersonal relationship skills	Agree	Consensus SL1 80:20:0
	Skill to implement a plan	Agree	Consensus SL1 90:10:0
C1.2	FINANCIAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:		
b.	A newly established research programme should receive initial start-up funding (seed capital) from the university in which it is housed	Agree	Consensus SL1 90:10:0
C1.3	INTERNAL INSTITUTIONAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:		
	This section deals with the <i>internal (institutional) resources of the university</i> relevant to the successful operation of a SEM research programme. The following statements are true in this regard:		
a.	The following institutional resources at a university are relevant role players in a SEM research programme:		
	The institutional research directorate	Agree	Consensus SL1 100:0:0
	The post-graduate school	Agree	Consensus SL1 80:20:0
	The Faculty of Health Sciences executive	Agree	Consensus SL1 90:10:0
	Research grant application experts	Agree	Consensus SL1 80:20:0
C1.4	EXTERNAL ORGANISATIONAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:		
	This section deals with the <i>external resources</i> relevant to the successful operation of a multi-disciplinary SEM research programme.		
a.	The following organisations outside of the university are relevant role players in the successful operation of a SEM research programme:		
	Research funding agencies [National Research Foundation of South Africa; Medical Research Council of South Africa]	Agree	Consensus SL1 90:10:0
	Research foundations	Agree	Consensus SL1 90:10:0
	Government departments of other countries in Africa or internationally	Partially Agree	Consensus SL2 10:80:10

Table 5.3: Consensus in the Delphi study (continued)

C1.5	ACADEMIC ROLEPLAYERS AND STAKEHOLDERS IN A MULTI-DISCIPLINARY SPORT AND EXERCISE MEDICINE RESEARCH PROGRAMME		
	This section attempts to identify the most relevant potential academic role players in a multi-disciplinary SEM research programme:		
a.	The following academic disciplines are relevant role players in a multi-disciplinary SEM research programme		
	Sport and Exercise science/Biokinetics	Agree	Consensus SL1 100:0:0
	Human nutrition and dietetics	Agree	Consensus SL1 80:20:0
	Physiology	Agree	Consensus SL1 80:20:0
	Orthopaedics	Agree	Consensus SL1 90:10:0
	Sport and Exercise Medicine	Agree	Consensus SL1 100:0:0
C2	PROCESSES RELEVANT TO THE SUCCESSFUL OPERATION OF A MULTI-DISCIPLINARY SEM RESEARCH PROGRAMME		
C2.1	STRATEGIC PROCESSES		
a.	The following are relevant components of a <i>strategic plan</i> for a multi-disciplinary SEM research programme:		
	A vision statement	Agree	Consensus SL1 90:10:0
	A mission statement	Agree	Consensus SL1 100:0:0
	Clear objectives	Agree	Consensus SL1 100:0:0
	Criteria for identification of team members	Agree	Consensus SL1 80:20:0
	An implementation plan	Agree	Consensus SL1 90:10:0
	A quality assurance plan	Agree	Consensus SL1 90:10:0
	A performance measurement plan	Agree	Consensus SL1 80:10:10
	An intellectual property plan	Agree	Consensus SL1 90:0:10
	Consensus among role players on the strategy and goals of the research programme	Agree	Consensus SL1 80:20:0
	A policy document to guide the research programme	Agree	Consensus SL1 100:0:0
	A financial sustainability plan	Agree	Consensus SL1 80:20:0
	Ethical guidelines	Agree	Consensus SL1 100:0:0
b.	The following are relevant reference points for strategic <i>goal setting</i> for a multi-disciplinary SEM research programme:		
	Establishment of research teams	Agree	Consensus SL1 80:20:0
	Utilisation of new technologies	Agree	Consensus SL1 80:20:0
	Establishment of strategic research focus areas	Agree	Consensus SL1 100:0:0
c.	The following are key strategic <i>activities</i> to ensure success of a multi-disciplinary SEM research programme:		
	Nurture a new generation of researchers	Agree	Consensus SL1 80:20:0
	Attract post-doctoral fellows	Agree	Consensus SL1 100:0:0
	Encourage publication of research	Agree	Consensus SL1 100:0:0
	Host international leaders in SEM in the programme	Agree	Consensus SL1 80:20:0

Table 5.3: Consensus in the Delphi study (continued)

	Encourage dissemination of research through public forums	Agree	Consensus SL1 80:10:10
	Support conference attendance	Agree	Consensus SL1 80:20:0
	Research focus areas	Agree	Consensus SL1 100:0:0
	Funding models	Agree	Consensus SL1 80:20:0
	Research outputs	Agree	Consensus SL1 80:20:0
C2.2 MANAGERIAL PROCESSES			
a.	Regarding <i>human resource [people] management</i> , the following aspects are relevant in a multi-disciplinary SEM research programme:		
	Building trust among all role players	Agree	Consensus SL1 100:0:0
	Nurture teamwork	Agree	Consensus SL1 90:10:0
	Nurture a shared vision among team members	Agree	Consensus SL1 90:10:0
	Focus on professional development [career planning] of all members of the team	Agree	Consensus SL1 80:20:0
	Nurture creativity of team members	Agree	Consensus SL1 100:0:0
	Align professional fulfilment with personal fulfilment of team members	Agree	Consensus SL1 80:20:0
b.	Regarding <i>academic management</i> of research the following aspects are important managerial functions:		
	Incentives to researchers for publication	Agree	Consensus SL1 80:20:0
	Pre-arrangement of distribution of credits for interdisciplinary research	Agree	Consensus SL1 80:0:10
	Focus on results [research outputs]	Agree	Consensus SL1 80:10:10
c.	Regarding <i>financial management</i> of research, the following aspects are important managerial functions:		
	Strict financial management principles must apply to all research projects	Agree	Consensus SL1 90:10:0
d.	It is important for a research programme to work according to strict <i>time schedules</i>	Partially Agree	Consensus SL2 20:80:0
C2.3 OPERATIONAL PROCESSES			
a.	<i>Operational processes</i> of a multi-disciplinary SEM research programme should include the following		
	Clear operational procedures	Agree	Consensus SL1 80:10:10
	Clear programme regulations	Agree	Consensus SL1 80:10:10
	Guidelines for writing protocols	Agree	Consensus SL1 80:20:0
	Good clinical practice guidelines in research	Agree	Consensus SL1 80:20:0
	Regular research planning meetings	Agree	Consensus SL1 90:10:0
	Regular research feedback meetings	Agree	Consensus SL1 80:20:0

Table 5.3: Consensus in the Delphi study (continued)

SECTION D: CHALLENGES IN MULTI-DISCIPLINARY RESEARCH IN SPORT AND EXERCISE MEDICINE			
D1	ACADEMIC CHALLENGES IN MULTI-DISCIPLINARY SEM RESEARCH		
a.	The following are relevant <i>academic</i> challenges in the establishment and management of a multi-disciplinary SEM research programme:		
	To establish SEM as a multi-disciplinary research discipline in medicine	Agree	Consensus SL1 90:10:0
	To obtain support from university management for interdisciplinary SEM research	Agree	Consensus SL1 90:10:0
	Fair distribution of research credits	Agree	Consensus SL1 80:20:0
	To become internationally recognised by peers	Agree	Consensus SL1 100:0:0
	Optimal placement of research focus areas in an interdisciplinary grouping is an important consideration in interdisciplinary research	Agree	Consensus SL1 90:10:0
D2	MANAGEMENT CHALLENGES IN MULTI-DISCIPLINARY SEM RESEARCH		
a.	The following are <i>management</i> challenges in the successful operation of a multidisciplinary SEM research programme		
	Maintenance of effective interdisciplinary co-ordination	Agree	Consensus SL1 80:20:0
	Interdisciplinary funding of resources	Agree	Consensus SL1 80:20:0
	To obtain initial funding for a new research programme	Agree	Consensus SL1 80:20:0
SECTION E: OUTPUTS [PRODUCTS] OF A MULTI-DISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME			
	This section deals with types, levels and targets of outputs of a multi-disciplinary SEM research programme.		
E1	TYPES OF OUTPUTS FROM A MULTI-DISCIPLINARY RESEARCH PROGRAMME		
a.	The following are essential academic products of a multi-disciplinary SEM research programme:		
	National peer-reviewed scientific publications	Agree	Consensus SL1 90:0:10
	International peer-reviewed scientific publications	Agree	Consensus SL1 100:0:0
	Citation of publications	Agree	Consensus SL1 100:0:0
	Citation with high impact factor of publications	Agree	Consensus SL1 100:0:0
	Masters degrees	Agree	Consensus SL1 90:0:10
	PhD degrees	Agree	Consensus SL1 80:10:10
	National conference presentations	Agree	Consensus SL1 90:10:0
	International conference presentations	Agree	Consensus SL1 90:10:0
	Increased academic stature among peers	Agree	Consensus SL1 80:20:0

Table 5.3: Consensus in the Delphi study (continued)

	Invitations for collaboration from research units of high standing	Agree	Consensus SL1 90:10:0
	A network of research partners [collaborators]	Agree	Consensus SL1 90:10:0
b.	The following are desired human outcomes of a multi-disciplinary SEM research programme:		
	Promotion of staff within the university	Agree	Consensus SL1 100:0:0
	Appointment of staff members on university research structures	Agree	Consensus SL1 90:10:0
	Appointment of staff members on national research structures	Agree	Consensus SL1 90:10:0
	Appointment of staff members on international research structures	Agree	Consensus SL1 90:0:10
	Appointment of staff members on international scientific forums	Agree	Consensus SL1 90:10:0
	Increased levels of academic expertise within the programme	Agree	Consensus SL1 100:0:0
c.	The following objectives deal with desired financial outcomes within a multi-disciplinary SEM research programme at a university. Select your level of agreement with each objective:		
	Financial self-sustainability	Agree	Consensus SL1 80:20:0
	Growth of the programme by obtaining increasing amounts of research funding	Agree	Consensus SL1 90:0:0
E2	LEVELS OF FOCUS OF A MULTI-DISCIPLINARY SEM RESEARCH PROGRAMME		
a.	The following are important levels at which research outputs should be focused:		
	National	Agree	Consensus SL1 80:20:0
	International	Agree	Consensus SL1 80:20:0
	Specific publications	Agree	Consensus SL1 80:10:10
b.	The following are important persons and bodies at which research outputs should be focused [who should be pleased with the outcome?]:		
	University faculty	Agree	Consensus SL1 80:20:0
	University management	Agree	Consensus SL1 80:20:0
	National peers	Agree	Consensus SL1 90:10:0
	International peers	Agree	Consensus SL1 90:10:0
	Funding agencies [MRC, NRF]	Agree	Consensus SL1 90:10:0
	Organised sport	Partially Agree	Consensus SL2 10:80:10
	The fitness industry	Partially Agree	Consensus SL2 20:80:0

Table 5.3: Consensus in the Delphi study (continued)

SECTION F: OUTCOMES [IMPACT] OF A MULTI-DISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME			
	This section deals with longer term outcomes [impact] and significance of a multi-disciplinary SEM research programme.		
F1	TYPES OF OUTCOMES FROM A MULTI-DISCIPLINARY RESEARCH PROGRAMME		
a.	The following are significant <i>academic outcomes</i> of a multi-disciplinary SEM research programme:		
	Increased quantity of academic manuscripts	Agree	Consensus SL1 80:20:0
	Increased quality of academic manuscripts	Agree	Consensus SL1 100:0:0
	Increased funding of the research programme	Agree	Consensus SL1 100:0:0
b.	The following are significant <i>internal effects</i> [changes] that may indicate outcomes of the research programme:		
	Changes in number of researchers in the programme	Agree	Consensus SL1 80:20:0
	Changes in behaviour of researchers	Agree	Consensus SL1 90:10:0
	Changes in stature of researchers	Agree	Consensus SL1 80:20:0
	Changes in stature of the research programme	Agree	Consensus SL1 90:10:0
c.	The following are significant <i>external effects</i> [changes] that may indicate outcomes [significance] of the research programme:		
	Changes in the university [e.g. attitude, placement of the programme]	Agree	Consensus SL1 80:20:0
	Changes in the profile of Sport and Exercise Medicine	Agree	Consensus SL1 80:10:10
F2	MEASUREMENT OF OUTCOMES FROM A MULTI-DISCIPLINARY RESEARCH PROGRAMME		
a.	In order to measure progress [success], specific outcomes of a research programme should be:		
	pre-planned [short, medium and long term goals]	Agree	Consensus SL1 80:20:0
	quantified	Agree	Consensus SL1 80:20:0
	monitored	Agree	Consensus SL1 80:20:0

5.2.4.2 *Stability*

The 64 statements where stability, but no consensus was reached were interpreted according to the type of statement, as well as accompanying comments from panellists. The stability statements and scores were presented in Table 5.1.

5.2.4.3 *No consensus*

The six statements where no consensus or stability could be reached were:

- Regarding characteristics of successful researchers in a SEM research programme:
 - Experience on ground level
 - Previous exposure to the discipline
- Regarding strategic processes for the success of a SEM research programme:
 - A national SEM research co-ordinating body will make a positive contribution to SEM research in South Africa
- Regarding desired outputs from a SEM research programme:
 - Non-peer reviewed scientific publications
 - Profitability
 - Commercialisation of research by selling new knowledge

All six of these statements were qualified by comments from panellists, which will be useful in the strategic framework.

5.2.4.4 *Comments by panellists*

The Delphi process stimulated rich comments from panellists, especially from the international participants, totalling 393 comments over three rounds. Of these, 196 were made in Round One, 144 in Round Two, and 53 in Round Three. Open-ended questions yielded 85 comments and suggestions, while 308 comments were made related to specific statements. These comments and suggestions provided a unique insight into the perspectives of the expert panellists and added great depth to the

survey and eventual strategic framework. All comments over the three rounds are listed in Appendix F2.

5.3 INTEGRATED DISCUSSION OF THE RESULTS OF THE DELPHI SURVEY

This section provides a detailed discussion and interpretation of the results of the Delphi process as it will be used in formulating a strategic framework for research in SEM at the UFS. It should be borne in mind that the statements were mainly assembled from responses from local experts in SEM and research management at the UFS. Lack of consensus and qualification of decisions in the Delphi survey highlights certain important differences in approach between local interviewees and the Delphi panel of experts, to the issues at hand. This was especially evident in responses from the international panellists. The comments, stability and consensus are shown collectively in Appendix F2 for interpretation. The numbers preceding each comment is the specific number assigned to each panellist. Numbers one to five are South African experts, number six is a South African research manager, and numbers seven to 14 are the numbers of international experts in SEM research.

5.3.1 Section A: Strategic foundations of a research framework in SEM

This section deals with the strategic foundations of a research framework in SEM, investigating overall strategy in research planning and management, prioritisation of research in focus areas, monitoring of the success of a research programme, and open comments regarding strategy in research planning and management (cf. Appendix F2: Section A)

5.3.1.1 *Overall strategy in research planning and management (cf. Appendix F2:A1)*

Consensus was reached on the statements that research should be guided by a **research strategy and an implementation plan**. It was commented that the strategy should be flexible to respond to changes in the external environment.

Regarding strategies to **enhance the success of a research programme**, consensus was reached on three of six statements. These statements are: An enabling environment such as a university with a strong research culture, working in an established research culture and the development of a next generation of researchers. Regarding research culture, it was commented that new research cultures often are innovative and may even be necessary. These comments are aligned with the current new research drive at the UFS as presented in the UFS Research Strategy 2009-2013 (UFS 2009b; cf. 2.5.1).

Stability, but no consensus was reached on the issue of **pre-determination of the direction of a research programme** because of the need for flexibility and adaptability in the management of research. Consensus could not be reached on **strong leadership and mentorship** to enhance the success of a research programme. According to the comments, strong leadership is more necessary in operational matters on issues such as procurement of infrastructure and funding, but researchers should be allowed relative freedom to pursue their own interests (cf. 2.9.3). The lack of consensus in these matters can be explained by the complexities of the establishment of research focus as discussed in Chapter Two (cf. 2.8.2.1). Leadership models that lend themselves to successful research leadership have been explored in the literature in some detail (cf. 2.6).

Regarding the **policy** of a research programme, consensus was reached on stimulation of creativity and new thinking. Stability but no consensus was reached on such a policy to support transfer of knowledge to benefit the university or community. According to comments in this regard, transfer of knowledge can be agreed to if it supports evidence for patient outcomes. A clarification for not consenting to transfer of knowledge in a research policy was that not all beneficial research will be transferable.

No consensus, but stability could be reached on the statement that the role of research at a university department is dependent on the **balance between teaching and research** at a university. The general opinion of the panel of experts was that dedicated research programmes should not be influenced by teaching, and that research requires dedicated time. The difficulties in finding this balance in medical schools were explored in the literature (cf. 2.8.1).

Consensus was reached on the statements that a SEM research programme at a university should be supported by faculty management and by academics in relevant academic disciplines, to culminate in innovative collaborations which can thrive within an optimal research environment. Even though no consensus could be reached on the need for support from university management, strong comments in favour of this were made. The lack of consensus seems to stem from the fact that university management support without the support of the FHS management or peers will not suffice.

5.3.1.2 *Prioritisation of research in focus areas (cf. Appendix F2:A2)*

The survey of this topic in the Delphi process showed little centralisation of opinion and poor consensus, but with useful comments and suggestions. It was consequently removed from the Delphi questionnaire to omit further efforts at reaching consensus, but offered for further comments in Round Three (cf. 5.2.2.3).

It is clear that **prioritisation of research in focus areas** depend on many circumstantial variables, as supported in the literature (cf. 2.8.2.1). However, consensus was reached that the expertise of individual researchers and gaps in current research are important determinants in the selection of research focus areas. The expertise of an individual researcher was qualified as not necessarily a limiting factor, but that expertise can be developed to meet market demands. This notion was supported by Litthauer (2011), when he shared his experience in acquiring the necessary expertise in a relatively short time to become internationally involved in a particularly important line of research. Consensus was also reached that the availability of equipment is an important determinant in the selection of research focus areas, but it was qualified that lack of availability should not be a deterrent to lines of research, that solutions such as sharing, leasing or purchasing of equipment should be pursued. It was stated that research should be driven by ideas, questions and productivity rather than equipment.

Regarding the **pre-determination of research focus areas**, important factors were identified to consider from qualifying comments from panellists. In support of pre-determination of focus areas, six comments reflected on the probable easier availability of funding and resources when focus areas are pre-determined. Against the pre-determination of research focus areas, were the possible inhibition of forward and

innovative thinking, as well as the possible lack of flexibility to introduce new ideas. New research opportunities should be allowed to be explored. The specific focus of certain types of research in SEM cannot be strictly pre-determined. One example is research in doping or anti-doping which needs to follow an exploratory and evolutionary path in the quest to get abreast of new doping offences. Openness for new research areas should be maintained. Other considerations mentioned were a balance between corporate interests and that of individual researchers, identification of “knowledge needs” as a form of market demand, and the need to be attuned to international trends in SEM research, but to still explore new ideas. Many variables which eventually determines research focus were described in the literature (cf. 2.8.2.1; 2.9.3).

5.3.1.3 *Monitoring of the success of a research programme (cf. Appendix F2:A3)*

Consensus was reached that a research programme should be evaluated according to both quantitative (specific, measurable outcomes of success) and qualitative (subjective outcomes of success). No consensus could, however, be reached on the need for monitoring of these parameters. Current trends in measurement of research outputs and outcomes were explored in Section 2.14, indicating that both quantitative as well as qualitative aspects of research are relevant indices for the monitoring and measurement of research programmes.

5.3.1.4 *Additional relevant input from panellists regarding strategy in research planning and management (cf. Appendix F2:A4)*

Three themes presented themselves in the open comments. The first is that of the importance of the development and nurturing of strong research collaborations. The second theme is the availability of funding as an important driver of selection of research focus areas. Thirdly, alignment of research focus areas with regional, national or international needs, which are often aligned with funding possibilities, were mentioned.

The importance of ethical considerations in planning research was mentioned. The importance and complexities of research ethics, specifically in clinical research, were

outlined from the literature in Section 2.10. An advisory or steering committee was advocated to ensure full representation of needs in the research programme.

Finally, the research manager was advised to bear in mind what he/she wants to be known and recognised for when selecting focus areas.

An accurate summation of the responses obtained from this section, was: "There needs to be a coherence of all these aspects. For example, the funding for specific equipment would be relevant for research in the area of someone who has expertise and an interest – but if they left, what then? Would it be possible to continue the research; and does that area of research fit in with the unit and the university (cf. Appendix F2)? This statement highlights the very reason for conducting this research as presented in Chapter One (cf. 1.3).

5.3.2 Section B: The role, place and character of research in SEM at a university

This section deals with the educational and academic role of research in SEM, the academic positioning of a SEM research programme and the multidisciplinary character of SEM. Subsequently, the positioning of a multidisciplinary SEM research programme within the existing research clusters (focus areas) at the UFS is addressed and finally, open comments and suggestions received on these topics are discussed.

5.3.2.1 *The educational and academic role of research in SEM (cf. Appendix F2:B1)*

Regarding an **educational role**, consensus was reached that SEM research plays a role in postgraduate teaching and that it should be an integral part of a postgraduate SEM programme, to demonstrate that SEM is an evidence-based discipline. This finding correlates with the research strategy of the UFS, which states that teaching, learning and community service should be shaped by the research base of the University (cf. UFS 2009b:4; 2.5.1.2). Consensus was further reached that research is important in defining SEM as an academic discipline, and in obtaining recognition in the university where it is housed. The character of SEM is by definition multidisciplinary amongst medical specialties and inter-professional in its application (cf. Appendix F2; 2.3)). It

was argued by one international panellist that SEM may therefore be grounded in other disciplines as opposed to being defined as its own discipline. The response to the importance of SEM research in undergraduate teaching was more ambiguous with stability reached on 50% of panellists agreeing and 50% partly agreeing. It was qualified by commenting that even though research should provide the foundation for teaching, undergraduate teaching usually relies on established evidence from earlier research.

Regarding the **development of SEM as an academic discipline**, it was agreed that research does play an important role in the development of the discipline and in establishing best practice in SEM. This notion was demonstrated in the literature (cf. 2.4).

No consensus could be reached on the statement that SEM plays a role in the development of sport as such, but none of the panellists disagreed with the statement.

On the subject of **the role of SEM research in society**, consensus was reached that the development of new knowledge in SEM can make a meaningful contribution to public health care. It was also consented that SEM research plays an important role in addressing the scientific needs of athletes. Both the public health and sport components of SEM therefore seems to have roles to fulfil in society. In similar vein, consensus was reached that **sport plays an important role in community wellness and in society** in general, qualified that exercise in general plays an even more important role than sport in itself. This vital role of SEM was demonstrated in the literature, and the importance of implementation of research findings in SEM highlighted (cf. 2.2.2.1; 2.2.2.3). No consensus could be reached on the statements that SEM research could lead the way in mainstream medicine research, as proposed by Schwellnus (2010), citing SEM research that have recently been adopted by other disciplines, including exercise for health and chronic diseases of lifestyle, novel therapies in the management of soft tissue injuries and others. Despite previous advances in medicine because of research on elite athletes, there were reservations and no consensus about the statement that research on these athletes can be applied to broader communities. The lesson here is that the statement was most likely too direct for these research experts to agree on, as they rightly commented that certain

lessons learned before on athletes may be useful in other populations, but that research is specific to the population it is conducted on and intended for.

The statement that sport plays an important role in politics, was not consented on, and even criticised as irrelevant to SEM research. It was agreed to by one panellist in a negative way. The potentially powerful role of sport in politics, as in society, was described by Noakes and Vlismas (2011:18-20) in the confidence building of Australia to define them as a nation as opposed to a British appendage by international success in cricket, as later, South African cricket and rugby prowess assisted in building national pride and confidence. The huge political effect of the international sports boycott against South Africa and its apartheid policy is a prime example of the role of politics in sport. The possible influence of political powers in the determination of research in SEM, should therefore be borne in mind. In this regard, the tendency of external powers, including politics, influencing the autonomy of research has been described in the literature (cf. 2.8.2.1).

5.3.2.2 *The academic positioning of a research programme in SEM at a university (cf. Appendix F2:B2)*

Concerning the **placement of a SEM research programme** in a university, consensus was reached that it is best positioned in a Faculty of Health Sciences (FHS). This decision was qualified by commenting that it may differ between institutions – if SEM is seen as an equal contributor and allowed to flourish without being overshadowed in a FHS, that will be the best position. If that status cannot be attained, it may be more appropriate elsewhere, for example in a Faculty of Health and Physical Education (Ergen *et al.* 2006:167).

Consensus was reached that **relevant partners in a SEM research programme** include other academic health care institutions and primary health care institutions. Sport federations were not regarded by the panel as a relevant partner, certainly not as a focus.

There was consensus on all the relevant fields of study in a SEM research programme as defined in the literature (cf. 2.2.2), broadly delineating the potential scope of SEM research to:

- health promotion,
- public wellness,
- prevention of chronic diseases,
- management of exercise related illness,
- prevention of exercise related injuries, and
- management of exercise related injuries.

As to the type of research to be done in SEM, applied research is clearly the focus. The panel did not reach consensus on the inclusion of pure, or basic scientific research, but commented that there is a role for this type of research to fulfil. Some degree of interaction is possible and desirable. One international panellist commented on their SEM research unit covering a spectrum from applied to basic scientific research, highlighting once more the influence of the context in which a research programme functions on the character thereof, as outlined in Chapter Two (cf. 2.8.2.1; 2.9.3).

5.3.2.3 *The multidisciplinary character of SEM (cf. Appendix F2:B4)*

Consensus was reached that **SEM is a multidisciplinary field of study**, and that a SEM research programme should have a multidisciplinary character, as supported by the literature, (cf.2.3). No consensus could be obtained, however, that in accommodating this characteristic, a multidisciplinary SEM research programme should be managed independent of single academic departments. Such a model, according to one panellist, is equivalent to the creation of yet another department. Another panellist cautioned that SEM is a “stand-alone” discipline and will not flourish if buried in an irrelevant department. The influence of contextual factors such as the institutional culture, structures, politics and funding models were mentioned as additional factors that will determine the optimal positioning of a multidisciplinary SEM research programme (cf.2.8;2.9).

5.3.2.4 *Possible academic role players and stakeholders in a multidisciplinary SEM research programme (cf. Appendix F2:C1.5)*

It became clear from the responses to this section in the Delphi questionnaire as well as the responses on pre-determination of research focus areas (cf. 5.3.1.2), that the determination of focus areas and the selection of collaborators, are complex issues, as

shown in the literature (cf.2.8; 2.9). In an attempt to identify the most relevant potential academic role players to collaborate in a SEM research programme, a low percentage of consensus was reached in the first two rounds. The panellists could select from a list compiled in the interviews with local academics in SEM and experts in SEM. The suggestions for relevant role players were ostensibly made from a local perspective.

Consensus on relevant potential academic role players in a SEM research programme was reached on exercise and sport science (biokinetics), human nutrition and dietetics, physiology, orthopaedics, and SEM. The list of suggestions in order of their relative perceived importance is presented in Appendix A4, and further suggestions from Delphi panellists are presented in Appendix F2.

The selection of interdisciplinary collaborators in SEM and in other disciplines is apparently dependent on many internal and external factors. Internally, factors such as the current expertise and focus, as well as the availability of resources play an important role to become appealing to potential collaborators. External factors seem to be a complex blend of perceived expertise and compatibility of people and research, timing, trust, funding opportunities, the creation of opportunities by university structures, and others. Clearly this requires an evolutionary process that is not easily pre-determined. It therefore stands to reason that the local perspectives on possible research partners are not universally applicable, and not even accurate from a local perspective. The complex nature of research focus has been explored (cf.2.8; 2.9).

Comments received from panellists echo this complexity. One panellist commented that the list of possible interdisciplinary research partners depends on the focus of research of the unit and of individuals. He continued to comment that "the logic of my answers is based on generalisation, for example biochemistry and anatomy for most areas of SEM research, therefore agree. Something like paediatrics may be so in some cases, therefore partially agree". This approach was reiterated by other panellists, mentioning research directions and synergy as determinants.

An interesting observation is that disciplines with much overlap and historical collaboration with SEM such as internal medicine, cardiology, community health, and even physiotherapy, did not reach consensus by the panel. This underlines the fluidity

of the process of creating collaborations. The merits of selection of strategic research clusters (focus areas) at the UFS are dealt with in Section 5.3.2.5.

5.3.2.5 *The positioning of a multidisciplinary SEM research programme within existing research focus areas at the UFS (cf. Appendix F2:B3)*

This section deals with local circumstances at the UFS and is therefore addressed out of sequence to the Delphi questionnaire, to slot in after the global role, place and positioning of SEM research has been discussed.

The preferentially treated research focus areas at the UFS, called strategic clusters, have been selected taking into consideration international, national and local imperatives focused on the need for a focused approach (UFS 2006a:2-3). The establishment of these strategic clusters at the UFS has been described in Chapter 2 (cf. 2.5.1.4). Among the criteria for the establishment of a cluster was a critical mass of established researchers in the field. The preferential treatment of these groups did indeed have a positive influence on research outputs (UFS 2006b:1), but may have inhibited the development of new interdisciplinary research focus areas at the UFS.

It was clear from the responses obtained in Rounds One and Two that SEM research, as expected, will not fit into any of these clusters, even though consensus on non-agreement between SEM and the clusters could not be reached. A number of possible aspects of mutual research interest have been identified. The decision to approach any of the existing clusters for collaboration is deemed dependent on the local SEM research focus areas and other conditions, and obviously not appropriate for a panel of external experts to offer informed opinions.

5.3.2.6 *Additional relevant input from expert panellists regarding the role, positioning and character of a SEM research programme*

Additional comments in this section focused firstly on the wide range of possible directions and subsequent possible optimal placements of SEM research. Secondly, it was reiterated that forcing of SEM research into pre-developed clusters or other forms of pre-determined focus areas will impede the development and growth of research.

This notion is supported in internal documentation of the UFS (UFS 2006a:2), as well as in other literature (cf. 2.9.3). Thirdly, comments focused on the importance of the relative autonomy of SEM research for the sake of research prowess as much as for the need to establish the discipline strongly in the field of medicine. The opportunity for SEM research to enhance evidence-based rehabilitation was highlighted, since in the perception of a panellist much funding is spent by governments on unproven healthcare programmes. The literature in support of developing an evidence-base for SEM is unequivocal (cf. 2.1;2.4).

5.3.3 Section C1: Resources that are required by a research programme in SEM

This section investigates the responses of the expert Delphi panellists on the spectrum of resources that should be utilised for the successful management of a SEM research programme. Human, financial, and organisational resources are discussed.

5.3.3.1 *Human resources (cf. Appendix F2:C1.1)*

The following human resource factors relevant to a successful SEM research programme are discussed: Staff components, academic staff management factors, characteristics of successful researchers, characteristics of research leaders, and additional information offered by panellists.

Staff components

Consensus was reached by panellists on all components suggested by local interviewees. Essential staff components in a SEM research program therefore include:

- Competent academic staff,
- Competent departmental support staff,
- Faculty research support staff,
- University research support staff,
- Post-magister degree fellows, and
- Post-doctoral fellows.

Competency of staff is the culmination of proper selection, leadership, management and motivation, as explored in Chapter Two (cf. 2.6). Even though the selected positions will be presented as primary choices is a strategic framework for SEM research, other important positions deserve consideration. The required competencies and characteristics of research staff are explored in the next subsections. Some of the many variables in staff competencies and research career building were presented in Sections 2.6.1.4, 2.6.2.2 and 2.11, in which context this section should be interpreted.

Academic staff qualifications and activities

The only consensus that could be reached relating to the qualifications of academic staff in a SEM research programme is that the staff profile should reflect a balance of young and experienced researchers. To qualify, consensus was also reached that continuous staff development is relevant to the success of an SEM research programme. Interestingly, it was not agreed that all academic staff must obtain PhD degrees. This lack of consensus was qualified by a number of statements mentioning that clinicians or research assistants would not be required to obtain PhD's, and that equal amounts of PhD, MD and Masters qualifications is a successful formula in one international centre. One international expert advised that it should be considered to only recruit staff with PhD qualifications. Furthermore, qualifications should meet the research objectives and experience should be taken into consideration in addition to qualifications.

As far as core activities of researchers in a SEM research programme are concerned, the panel reached consensus that there must be minimum requirements for national and international publications for all academic staff in the programme. Appropriate national publications should be identified for publication, and that national publication should be seen as a rolling plan to progress to international publications. A further minimum requirement offered by the panel is the requirement of scholarship as described in the literature (cf.2.9.2; 2.14), and that minimum requirements should include international publication, but should not be limited to that. Further requirements are discussed in the sections on desired outputs and impact of a SEM research programme (cf.5.6; 5.7).

In an attempt to define certain other core activities of researchers in a SEM research programme, it was put to the panel that all academic SEM staff should supervise PhD and Masters' students, and that at least 25% of time should be spent on research. Consensus was reached only on the statement that all researchers should supervise Masters' students. With regards to the supervision of PhD students, it was qualified that supervisors should have PhD qualifications themselves, as expected. There was support for co-supervision with roles for a PhD supervisor and a clinician in SEM research. It was pointed out that excellent faculty researchers need not necessarily supervise students at all. In appointing PhD supervisors, "prima donna" researchers should be avoided, according to one comment from an international panellist. Panellists found the pinning down of staff to spend at least 25% of their time on research difficult to decide on, as such a figure can only be determined for particular situations. The researcher was made aware of sliding scale models from 10 to 25%. To underline the situational consideration in this matter, it was commented that research time could be more depending on funding, opportunities and productivity of individual researchers, as is the trend in the literature, especially pertaining to research in medical schools (cf. 2.8.1).

A major drive to create academic capacity at the UFS for the past two decades, is to develop and retain the best students for the university (UFS 2010d:16,19). It follows naturally that this practice was put forward by local interviewees in the development of a SEM research programme. Consensus could not be reached by the panellists, but it was acknowledged as one of many strategies in this regard. Panellists recommended recruitment of students from other institutions to maintain growth and increase vitality. From a career building point of view, the literature indicates a number of considerations for young researchers in the selection of a research mentor and programme (cf.2.11.6). This may imply regular changes of staff as normal practice in a research programme.

Critical characteristics of a successful researcher

The characteristics of researchers and research leaders were explored in the literature (cf.2.11). Interestingly, these give preference to love for learning and enquiry before disciplinary knowledge as reported in the interviews and the Delphi process. This subsection tested certain characteristics which local interviewees deemed critical in good researchers with the Delphi panel, as described in Chapter 4 (Appendix A4). This

list may not be exhaustive, but these characteristics will be considered as important in the strategic framework. Consensus was reached on the following:

Concerning characteristics within the discipline:

- Disciplinary knowledge,
- disciplinary insight, and
- expertise in certain focus areas.

In this category, it was not consented that a researcher should have respect among his/her peers. It was commented that peer respect stems from a researcher's publication record rather than personal attributes. Consensus was not reached on the need for experience at ground level, but it was commented that a productive researcher, almost by implication will have worked his way up from ground level.

Concerning characteristics related to research, consensus was reached on the following:

- Knowledge of research methodology,
- knowledge of research supervision
- knowledge of research ethics, and
- the ability to apply general research principles into SEM research.

Concerning characteristics related to research output, consensus was reached on:

- Writing skills, and
- experience in the publication of research.

The importance of publication of research was demonstrated in Section 2.14.

It was not deemed essential for a SEM researcher to have previous exposure to the discipline, as experts in other disciplines may bring new knowledge and skills to a research unit. Knowledge of funding opportunities was not agreed on as essential, presumably because that knowledge can be obtained from support structures at a university.

Leadership characteristics required by research leaders

Leadership characteristics on which consensus were reached, are presented under research leadership and personal characteristics. The list is very inclusive, which in itself accentuates the multifaceted nature of research leadership. To put this list of characteristics into perspective, it needs to be mentioned that the selections were to agree, partially agree or disagree with individual characteristics, not implying therefore that all these characteristics need to be present in all good research leaders.

Leadership should be inspirational and motivational, with a passion for the discipline, vision or the ability to see the bigger picture, and to have good judgement, or wisdom. The importance of inspirational and motivational leadership in research was supported in the literature (cf.2.11.2). Leadership should include the ability to take responsibility in success and failure. A research leader should have stature in the academic discipline, as described in the literature (cf. 2.13.1). The importance of external communication and advocacy on behalf of the research team, as well as insight into institutional politics were highlighted. These roles in the scientific community were supported in the literature (cf.2.9). Leadership in daily life does not necessarily translate to leadership in research. These characteristics are supported in the literature (cf. 2.11).

Personal characteristics of good research leaders that consensus were reached on, are integrity, sensitivity, trust, and honesty. Bravery, in the sense of risk taking, was not agreed upon.

Management skills required by research leaders

As in the previous section, these management skills are listed as consensus have been reached, but do not imply that all skills should be present in one person, but rather present a list of skills that will stand a research leader in good stead. Management skills on a personal level include the skill to work with different levels of knowledge and experience, listening skills, delegating skills, communication skills and interpersonal skills.

On an organisational level, management skills that are required for research leadership are *planning skills* including goal setting, *project and process management skills*, including skills to implement a plan, *financial management skills*, *administrative skills*, and *people management skills*, including conflict management skills. The panel also advised on the importance of *teamwork* and *team leadership*, because of the importance of team synergy in research settings. A research manager should pay attention to detail. These skills were among those management strategies described in Chapter 2 (cf. 2.6).

5.3.3.2 Financial resources (cf. Appendix F2:C1.2)

Throughout the research, the critical importance of sustainable funding models for research programmes is noted. The attempt in this research study to pinpoint successful strategies for the funding of research has been frustrating in its inability to do so. The only statement on which consensus could be reached in this regard, is that a newly established research programme should receive initial start-up funding from the university in which it is housed, as supported in the literature (cf.2.11.6.2). It was commented that the university may be a funder, but that the research needs to be competitive for continued funding from that source. This comment correlates with funding model for research in general and at the UFS (cf. 2.12). A further comment related to university funding of research is that "proper funding (not partial or under-funding) of clinical academic posts should be a priority". This notion leans more toward the system of tenure as described in Chapter Two (cf. 2.12.1).

A number of other potential sources of income have been put forward as statements for consideration of the Delphi panel, but did not find consensus amongst the panellists. Considering the varied comments received on these statements it can be concluded that funding of research programmes vary and is dependent on many factors. Internal factors such as focus, level of research, stature of the programme, expertise and institutional funding policies; and external factors such as research needs and focus of funding agencies, the economic climate, government policy and others, all play a role in the determination of funding of a research programme.

Specific comments with regards to funding provide insight into this complex matter. These are subsequently described:

- Commercialisation of research may be relevant, but should not be the primary determining factor in the selection of research focus. Some commercial sources of funding may be acceptable. Commercialisation of research is supported in the UFS research strategy (2009-2013) (cf. 2.12.2; 2.14.1). Revenue from clinical services may be used to support research and learning opportunities. Clinical services also provide access to patient populations.
- As far as government funding is concerned, there was dissent among panellists. One point of departure was that government subsidy not only is an obligation of government, but also good policy. On the other hand it was put forward that funding should not be from government only. The solution probably lies in the comment that government funding of a research programme depends on the particular funding model of that programme. The imminent shift in focus of health care to prevention of disease, as described in Section 2.2.2.1 may create possibilities for government funding of SEM research in the prevention of disease.
- Government aligned research funding agencies such as the NRF and MRC are probable sources of funding. The panellists commented that it should be on a competitive basis, taking quality of research into consideration. This source of funding, as described in Section 2.12, is appropriate for funding of SEM at the UFS.
- Partnerships with the private sector may be considered for funding if it is managed well. As with other funders, it should be negotiated and contracted that academic autonomy and independence are retained by the researchers. The possible perils of research partnering with commercial entities have been described (cf. 2.10.3; 2.10.4).
- A final possible source of funding is collaborations with colleagues that have access to sustainable funding.

In conclusion regarding financial resources, it is critical to do the initial planning of a research programme with long term sustainability and growth in mind. Initial funding, for example for the first five years, should be guaranteed. Panellists support the concept of a variety of funding streams for a research programme, for reasons such as

easier retention of autonomy and in consideration of the current global financial crisis. External competitive funding takes time to acquire and will not happen early in the lifespan of a research programme. The quality of research outputs and subsequent track record will attract funding opportunities (cf.2.12).

5.3.3.3 *Internal institutional resources*

The quest to identify internal institutional support structures relevant to the successful management and operation of an SEM research programme, yielded low consensus, probably because of the need for more information on conditions at the UFS before informed selections could be made. This section has therefore been restructured within the Delphi questionnaire after Round Two, and only offered for further comments in Round Three (cf.5.2.2.3).

Consensus was reached on four components within a university that are potential relevant role players in a SEM research programme. Interestingly, all of these involve academic expertise. None of the support services or sport and wellness related bodies suggested to the panellists appealed to the panel, probably also because of contextual variables having an influence on the selection of the latter.

The four institutional resources that were regarded as relevant to the successful management and operation of the research programme and which will be adopted into the strategic framework, are *the research directorate of the university, the postgraduate school, the Executive of the FHS, and research grant application experts*. The inclusion of the latter is a particularly interesting finding, as the UFS does not provide any expertise other than administrative support for the writing of research grant applications. One other potential source of support mentioned by an international expert is *a well-informed university president's office*. In the South African context, this statement will probably refer to the vice-chancellor's or rector's office.

5.3.3.4 *External organisational resources*

This section also produced poor centralisation and consensus over two rounds of the Delphi survey, and was consequently restructured in Round Three. Panellists were invited to make further comments on this section, as described in section 5.2.2.3. Of

the 16 sectors or organisations offered to the Delphi panel, consensus was reached on only two, namely national research funding agencies (NRF and MRC), and other research foundations in general.

The panel was tested on the relevance of a wide variety of governmental, professional, healthcare and sports bodies, as well as private industries and the community (cf. Appendix C2:C1.4). Perspectives were offered by the panellists on a number of these bodies, providing some insight into the inability to reach consensus. Professional associations such as SASMA, FIMS and the IOC were described as part of the network that provides vehicles for knowledge transfer, but do not provide significant funding. The private sector, including the private healthcare, pharmaceutical, nutritional supplement and fitness industries were not supported, unless research potential and funding opportunities exist and can be utilised without interference in academic freedom and autonomy. This seems to be an almost impossible scenario, with the potential for much unethical practices (cf. 2.9.3; 2.9.4). A warning was given that it is often very difficult to work with National Olympic committees. Finally it was conceded that alignment with underemphasised sport codes may create unique or opportunistic research prospects.

5.3.4 Section C2: Processes relevant to the successful operation of a multidisciplinary SEM research programme

This section investigates strategic, managerial and operational processes relevant to the successful operation of a multidisciplinary SEM research programme.

5.3.4.1 *Strategic processes*

In this subsection, components of a strategic plan, relevant reference points for goal setting, and key strategic activities necessary for the success of a multidisciplinary SEM research programme are discussed according to the results of the Delphi survey. Finally, open comments in this regard are presented.

Relevant background on leadership, management and strategy (cf. 2.6, 2.7), as well as aspects of academic leadership and leadership in academic medicine (cf. 2.8.1), and research leadership (2.11.2; 2.12.2) were provided from the literature.

Components of a strategic plan

The components of a generic strategic plan for a multidisciplinary SEM research programme are listed below, followed by commentary from the panellists. Consensus was reached on the following components:

- A vision statement
- A mission statement
- Clear objectives
- Criteria for identification of team members
- An implementation plan
- A quality assurance plan
- A performance measurement plan
- An intellectual property plan
- A policy document to guide the research programme
- A financial sustainability plan
- Ethical guidelines
- Consensus among role players on the strategy and goals of the research programme.

It was remarked that quality assurance of research projects should be part of the ethics process and approval.

The complexity of finances and funding of research was emphasised again by a comment from an international panellist, who wrote: "The word 'financial plan' might be too long term and difficult to predict. There has to be some financial stability for the infrastructure and then each grant has to have a viable budget. The financial plan should be a framework that is flexible with change". This notion corresponds with the literature on research funding (cf.2.12).

The statement that consensus should be reached among researchers on the strategy and goals of the research programme inspired some astute comments. The first was an expression of the need for global consensus within a research programme, as dissidents or individualists may undermine activities in the institution. This statement was moderated by a comment that consensus would be optimal, but that general

agreement is more realistic to achieve. Regarding consent on research matters it was put forward that some measure of dissent can lead to more creative and collaborative efforts from the programme, thus not requiring full consensus. Team dynamics as success factor in management and research management were emphasised throughout Chapter 2.

Reference points for strategic activities

To ensure the success of a SEM research programme, consensus was reached on statements in three general strategic categories.

Regarding *strategic management issues*, consensus was reached on the establishment of strategic research focus areas, research teams and funding models. Benchmarking with other comparable units was recommended. Inclusivity and a team approach in strategic processes was implied by suggestions from panellists for building of strong links with key university academic departments, representation of key partners in the planning process, and the establishment of a strong and experienced advisory committee, including academic, business, and community representation. The development of a strong SEM team attitude with strong support for development and academic growth was proposed.

Development can be addressed by nurturing a next generation of researchers, attracting post-doctoral fellows, hosting international leaders in SEM in the programme, and support conference attendances if a member of staff is either contributing to the conference or targeting the conference for a specific reason. The utilisation of new technologies was also supported. A recommendation was made to celebrate all, even small successes. Focus on *research outputs* included encouragement of the publication of research as highest priority, as well as the dissemination of research knowledge through public forums.

Consensus was not reached on the suggestion that a national SEM research co-ordinating body will make a positive contribution to SEM research in South Africa. In the comments the need to understand the politics in SEM in SA is required before an informed selection can be made in this regard. If established it should be driven by productivity. A South African panellist commented that there will always be competition

for limited resources among units, thus limiting the role of a national co-ordinating body.

5.3.4.2 *Managerial processes*

This section investigates components of human resource-, academic-, and financial management that can be included in a strategic framework for SEM research.

Regarding *human resource (people) management*, there is consensus on nurturing trust, team work, a shared vision and creativity among members of the research team. Professional development of all members should be a focus, and professional fulfilment of team members should be aligned with personal fulfilment – an important concept in a tough career promotion environment according to one comment.

Regarding the *academic management* of research, consensus was reached on the pre-arrangement of academic credits for interdisciplinary research, to concentrate on outputs and in this regard to incentivise researchers for publication of their work.

In investigating *financial management* of research, once more consensus could not be reached on budgeting and fundraising procedures. Consensus was, however, reached on the need for the application of strict financial management principles for all research projects.

Throughout the research, sufficient allocation of time was a critical matter for interviewees and Delphi panellists alike. Effective time management of researchers was emphasised. Consensus was reached on the importance for a research programme to work according to strict *time schedules*, but caution was raised that some flexibility in time scheduling is necessary considering the nature of research results and the possible need to adjust course. Time management was considered important, but with the knowledge that schedules often go astray and that planning should be adjusted accordingly.

A useful comment regarding the complexity of research management was that research managers must have experience in doing so, and that successful managers in clinical

and other spheres need professional training before embarking on research management.

5.3.4.3 *Operational processes*

Operational processes on which consensus were reached to include in a strategic framework for SEM research are:

- Clear operational procedures
- Clear programme regulations
- Guidelines for writing protocols
- Guidelines for good clinical practice
- Regular research planning meetings
- Regular research feedback meetings.

Formal agreements with researchers on procedures and expected outcomes of research did not reach consensus, and qualified by the expression of the need for innovation. Procedures should not be enforced to the point of paralysis of innovation and productivity. Nevertheless, frequent and formal evaluation of outcomes and performance was recommended.

5.3.5 Section D: Challenges in multidisciplinary research in SEM

This section explores academic, managerial and other possible challenges in multidisciplinary SEM research – many of which are applicable to research in general, as identified by local SEM experts and research managers in the interviews. This section was identified along with others, where low consensus, and explanatory comments from panellists pointed out subjectivity and a need for more information before informed selections could be made. This section has therefore been removed from the Delphi questionnaire after Round Two, and only offered for further comments in Round Three (cf.5.2.2.3). The pattern that emerged in this section was that consensus was reached on global research challenges, but especially on important issues for the successful establishment and management of a SEM research programme. Challenges where local attitudes and conditions could play a role, did not progress to consensus.

Consensus was reached on five *academic challenges*. The first of these, was to establish SEM as a multidisciplinary research discipline in medicine. Interestingly, no agreement could be reached on the statement that SEM is a small, young discipline that finds it difficult to make an impact in a broader, interdisciplinary medical context. In fact, the statement was refuted by commenting that this was true many years ago, and that the field has grown significantly in the last 20 to 30 years as the importance of physical activity as a public health intervention has been recognised. This comment came from a panellist from a European country where SEM is well established, emphasising the disparities in status of SEM around the globe as described (cf.1.2).

Consensus was reached on the challenge of obtaining the support of the university management for interdisciplinary SEM research. This is in keeping with the earlier agreement that support from university management is a vital factor for success. The third challenge on which consensus was reached, is the fair distribution of research credits, which is not limited to SEM research. The next challenge that reached consensus are the challenge to become internationally recognised by peers – more likely a career quest than a mere research challenge. Finally, the challenge of optimal placement of research focus areas in an interdisciplinary grouping was recognised as an important consideration.

Other potential challenges that were stated in the Delphi questionnaire, are more subjective, and solutions cannot be generalised (Appendix F2:31). No consensus was reached on any of these.

Concerning possible *managerial challenges* in SEM research, consensus was reached on two funding issues – the challenge to obtain initial funding for a new research programme, and interdisciplinary funding of resources. Consensus was further reached on maintenance of effective interdisciplinary co-ordination as a managerial challenge.

The full list of challenges compiled in the interviews, as well as a description of possible solutions were described in detail in Chapter 4 (cf. 4.3.4).

5.3.6 Section E: Outputs (products) of a multidisciplinary SEM research programme

This section deliberates the Delphi panel's consensus on desired outputs of a SEM research programme in the shorter term (3 to 5 years). Some of these outputs are fully quantifiable, and others less so. These outputs should not be confused with long term outcomes of the research programme, which are dealt with in section 5.3.7. The outputs are discussed in terms of types of desired outputs and desired levels of focus of the research programme, and should be interpreted according to the relevant literature (cf. 2.14).

5.3.6.1 *Types of outputs*

The outputs were categorised in academic products, human effects, financial results, levels of focus, and targeted role players at which the success of the outcomes should be directed.

Academic products

As far as publications are concerned, consensus was reached on the following essential outputs (not in order of importance):

- National peer-reviewed publications
- International peer-reviewed publications
- Publication in high impact factor publications
- Citation of publications.

Consensus was reached on national and international conference presentations as essential research outputs. This activity, however, does not carry much weight in the NRF rating system, which forms the basis for promotion at the UFS (cf. 2.5.1.3; UFS 2011:4).

As far as academic outputs are concerned, consensus was reached that both Masters and PhD degrees are essential academic outputs for a SEM research programme.

Regarding early outcomes of the research programme, consensus was reached that increased academic stature among peers, invitations for collaboration from research units of high standing, and a establishment of a network of research collaborators are essential academic products.

No consensus could be reached on certain important expectations of the UFS, such as the registration of patents, chapters in books, scholarly books and others, such as emphasised in the UFS Academic Appointment and Promotions Policy (UFS 2011:4).

Of all the academic outcomes, the primary objective, according to comments from the Delphi panellists, is to publish research in journals with high impact factors. All other objectives are secondary to this goal. This outcome correlates with the literature and will be adopted as a key objective in the strategic framework (cf. 2.14.1). Even though no consensus was reached on the production of non-scientific publications or non-peer reviewed scientific publications, it was qualified that these are often helpful to disseminate knowledge in the community, but should not be engaged in at the peril of peer-reviewed publications. The character of SEM makes it important to disseminate knowledge in non-scientific publications for the benefit of the community.

Human effects

Desired human outcomes for researchers in a SEM programme on which consensus was reached, are promotion within the university, appointment of staff on university research structures, appointment of staff on national and international research structures and scientific forums, as well as increased levels of expertise within the programme. The importance of personal and professional rewards for researchers has been described (cf. 2.11.5).

Financial results

The only financial results on which consensus was reached, were the attainment of financial self-sustainability and growth of the programme by obtaining increasing amounts of research funding. No consensus could be reached on statements involving commercialisation and profitability, even though it was qualified in comments that commercialisation by, for instance, contract research may be pursued, but should not

be the ultimate goal. Profitability, if it happens, was qualified to be accompanied by accountability.

5.3.6.2 *Levels of focus*

Consensus was reached on national and international levels at which research outputs should be focused. Consensus was reached on the suggestion of targeting of specific publications by means of directing the research to suit specific publications. This was qualified by a comment that if such a strategy is followed, it should be to target journals with high impact factors. No consensus could be reached on focus on specific industries, or, interestingly, on the community. The UFS Research Strategy makes provision for regional and national leadership in research, as well as for global excellence (cf. 2.5.1.2).

Targeted direction of outputs

This subsection describes important persons or entities at which research outputs should be focused, or those who should be satisfied with the outcome for the benefit of the programme.

Regarding internal entities to attempt to satisfy, consensus was reached on university faculty and management. It was mentioned that these entities will be concerned with the quality outputs, and consequently be satisfied with quality outputs as defined in Section 5.3.6.1, as well as in the literature (cf. 2.14.1; 2.14.2). Regarding external entities, consensus was reached on national and international peers, as well as funding agencies and organised sport.

Excluded from consensus for entities to target with research outputs are government departments, the healthcare industry and the public.

It was commented that it is difficult to please all constituents, and that the important goal must be "to do good science", implying that the focus should internal and not necessarily at external bodies or entities.

In summary, the main outputs to aspire to are publications in high impact factor publications. In achieving that goal, most other output needs will be satisfied.

5.3.7 Outcomes (impact) of a multidisciplinary SEM research programme

This section explores longer term outcomes, impact and significance of a multidisciplinary SEM research programme. Types of outcomes are discussed, as well as possible ways of measurement thereof.

5.3.7.1 Types of outcomes

In this section, an attempt is made to define different types of outcomes of a research programme, categorised in academic outcomes, internal effects and external effects.

In keeping with results in the previous section, *academic outcomes* on which consensus was reached, were increased quality and quantity of academic manuscripts, as well as increased funding of the research programme.

Concerning *internal effects* of products of the research programme on the programme itself, consensus was reached on changes in the number of researchers, behaviour and stature of researchers, as well as changes in the stature of the programme as indicators of programme outcomes.

With regards to *external effects* of the programme that may indicate outcomes, including the impact and significance of the programme, consensus was reached on changes in the attitude of the university, and changes in the profile of SEM. No consensus was reached on monitoring of implementation of research findings in communities, or changes in community behaviour, presumably because these are difficult to measure in a causal manner, and possibly too far removed from the research programme itself.

The many faces of internal significance (cf. 2.11.3) and external significance (cf. 2.14.2) of research were described in Chapter Two, and should be considered in interpreting these results.

5.3.7.2 *Measurement of outcomes*

This section explored possible ways of measurement of success. Consensus was reached that pre-planned short-, medium-, and long term goals should be measured and quantified. Continuous monitoring of progress should be done. Strong comments argued that quality is more important than quantity, and that there is a need to develop qualitative assessment tools for this purpose. A warning was offered that too much monitoring can lead to a process focus instead of the desired output focus. Similarly, it was remarked that scientific work needs a certain degree of freedom and cannot be planned in detail. There should be room for trial and error. This was supported by the comments that researchers sometimes have to follow uncertain or abstruse ways, and that many good scientific ideas are a product of chance. We were also reminded that a certain amount of "luck and opportunity" are involved in the successful outcome of research.

In summary, goal setting, monitoring and measurement are supported by the panel, but in a more subtle way than in hard corporate terms, and with flexibility for academic freedom, trial and error.

5.4 CONCLUSION

The results, analysis, and findings of the Delphi process were described in Chapter 5. A participant response rate by participants of 100% was maintained throughout the survey.

Of the original 352 statements, consensus was reached on 168, of which four were reached on partially agree, and two on disagree. After elimination of certain statements consensus was reached in 71% of the remaining 238 statements. Stability, where 80% or more panellists persisted with their selections in Round Three but consensus was not reached, was declared in 64 cases (27%).

The construct of the Delphi questionnaire, where selections were made between "fully agree", partially agree" or "disagree", lent itself for qualification of selections by commenting on the reasons for doing so. The interpretation of selections needed to be done with comments from panellists and other contextual factors in mind, as the

selection scale did not allow for more accurate weighting of selections as described by Linstone and Turoff (1979:274). Similarly, it became clear that the measuring instrument was not adequate to evaluate statements in certain subsections, which had to be removed and interpreted according to context, comments and relevant literature. A considerable disparity in points of reference of local experts from whose interviews the Delphi questionnaire was developed, and the national but especially the international expert panellists was noticed, which further complicated prudent responses in the Delphi survey. This in itself is an important finding of the study and was kept in mind in the development of the strategic framework.

According to Linstone and Turoff (1979:3), the Delphi process is more of an art than a science, allowing for adaptation to address specific research questions, as also discussed in Chapter 3 (cf. 3.3.3.9 and 3.3.3.10). This sentiment is reiterated by Reid in McKenna (1994:1224) that the Delphi technique caters for particular types of research questions for which a more scientific instrument would not be suitable, which is particularly true for this study. Eventually the Delphi survey culminated in valuable quantitative results, which were enriched by qualitative interpretation of parts of the survey. The qualitative, narrative responses from the panel provided particularly valuable insights, as the panel consisted of a select group of South African and world leaders in SEM research.

Conclusions drawn from the Delphi survey, semi-structured interviews and literature review were used for the development of a strategic framework as the final outcome of the study. This is described in the following chapter, **Chapter 6**, entitled **A strategic framework for a research programme in Sport and Exercise Medicine at the University of the Free State**.

CHAPTER 6

A STRATEGIC FRAMEWORK FOR A RESEARCH PROGRAMME IN SPORT AND EXERCISE MEDICINE AT THE UNIVERSITY OF THE FREE STATE

6.1 INTRODUCTION

Sport and Exercise Medicine (SEM) in its current form is a young discipline in medicine and finds itself in various stages of incorporation into mainstream medicine in the world (O'Brien & Mahony 2000:238). In South Africa, SEM is attempting to gain access into mainstream medicine within health care systems in both the public and private sectors (Schwellnus 2010). Only after acceptance and integration of SEM in these systems will it be able to make a meaningful contribution to health care in South Africa. Because of the broad scope of practice and focus on prevention of diseases and injuries, will it not only fill a void in health care in South Africa, but also internationally (cf. 2.2.2; Matheson *et al.* 2011:1272;). This study argued that one of the key factors to gaining peer recognition in any academic field is to prove its worth by producing relevant research of high quality. In the case of SEM, this culminates in broadening the evidence base for the discipline (cf. 2.4), as well as to break down the barriers that prevent multidisciplinary research in SEM and related sciences (cf. 2.3).

This study makes a formal attempt to address the lack of structures within which interdisciplinary research in SEM and related sciences can flourish at the UFS and elsewhere, by developing a strategic framework for SEM research at the UFS. Doing so will make a contribution towards the growth of SEM at the UFS as well as that of SEM as an academic discipline in South Africa. In time, it will hopefully contribute to SEM on an internationally reputable level. The methodology employed in developing this framework included a literature study (cf. Chapter 2), a series of semi-structured interviews (cf. Chapter 4) and a Delphi survey (cf. Chapter 5) in order to provide, in a structured and systematically researched manner, the foundations, criteria and content of a strategic framework.

Chapter 1 gave an introduction and orientation to the study. A brief background to the study was offered, the research problem presented and the foundational research questions put forward. The overall goals, aim of the study and objectives were then defined. Subsequently the scope of the study was delineated and its potential value

and significance in the field of SEM described. Finally, the research design and methods were introduced.

In Chapter 2, five pillars for the theoretical basis for a strategic framework for research in SEM were explored. The first pillar consisted of factors related to the discipline of SEM, including the history, role, place and multi-professional nature thereof. The second pillar contained factors related to the UFS – its research strategy and strategic focus areas, research funding models and support systems, as well as its promotion and appointment policy for academics. The third pillar was built on principles of leadership, management and strategic planning as it relates to research. The fourth pillar consisted of principles and issues related to academic and research management. The fifth pillar related to relevant foundations and principles of research, such as research culture and ethics, the scientific community, funding models, research career building and other human elements, as well as desired outputs and outcomes of research programmes (cf. Figure 2.2).

Chapter 3 provided theoretical perspectives on the research methodology before describing the research design and methods. The development and utilisation of the semi-structured interview and the Delphi method as data collection tools were presented in detail.

In Chapter 4, the study population, sampling method and description of the sample and the interview guide for the semi-structured interviews were described before presenting the results thereof.

Chapter 5 described the measuring instrument for the Delphi survey as developed from the literature and data obtained from the semi-structured interviews. The survey was used to test the local perspectives which were obtained in the interviews and the interpretation thereof from relevant literature, on a panel of international and national experts in SEM research and in research management. The results were subsequently presented and discussed.

The present chapter, Chapter 6, will discuss the development of a strategic framework for research in SEM. The chapter is introduced with the premises and points of departure of the framework. Subsequently the role players involved in the framework

will be explored, followed by a discussion of the elements of the framework and their interaction with one another. The elements of the framework will be addressed in detail and contextualised by triangulation of the critical analysis of the relevant literature and the semi-structured interviews, with the findings of the Delphi survey.

6.2 PREMISES FOR THE DEVELOPMENT OF A STRATEGIC FRAMEWORK FOR RESEARCH IN SPORT AND EXERCISE MEDICINE AT THE UNIVERSITY OF THE FREE STATE

Research needs to be justified by the relevancy of its outcomes. It is therefore necessary to iterate the foundational premises on which this research is built, as illustrated in Figure 6.1. Five foundational premises have been recognised during the course of the study. These are depicted in a linked circle, as they are of equal importance and interdependent on one another.

The first premise for conducting this study is **relevance**. The need and subsequent relevance of the work was systematically addressed by presenting the development and current positioning of SEM at the UFS, nationally and globally by means of a systematic presentation of relevant literature and other sources of reputable information (cf. 2.2-2.5). The relevance became even clearer with the progress of the study, identifying amongst other findings definite differences in approaches to research management between academics at the UFS and in South Africa on the one hand, and successful international experts in SEM research on the other (cf. 5.3). These differences in approach were highlighted in all three research areas of this study. Firstly, the literature indicated the disparity of advanced development of SEM in certain other countries when compared to South Africa, prompting the execution of this study (cf. Chapter 1). Secondly, the data obtained from the semi-structured interviews on experts at the UFS were used to develop the Delphi questionnaire. Consensus was reached on only 168 of the original 352 questions in the questionnaire, mainly because of disparity between the responses from South African panellists and international panellists, indicating difference in approach to aspects of SEM research and research management (cf.5.3).This disparity has, to the best knowledge of the researcher, not been scientifically addressed before. The final strategic framework was therefore developed with consideration of local, national and international opinions and integrated to be relevant in the South African and UFS context.

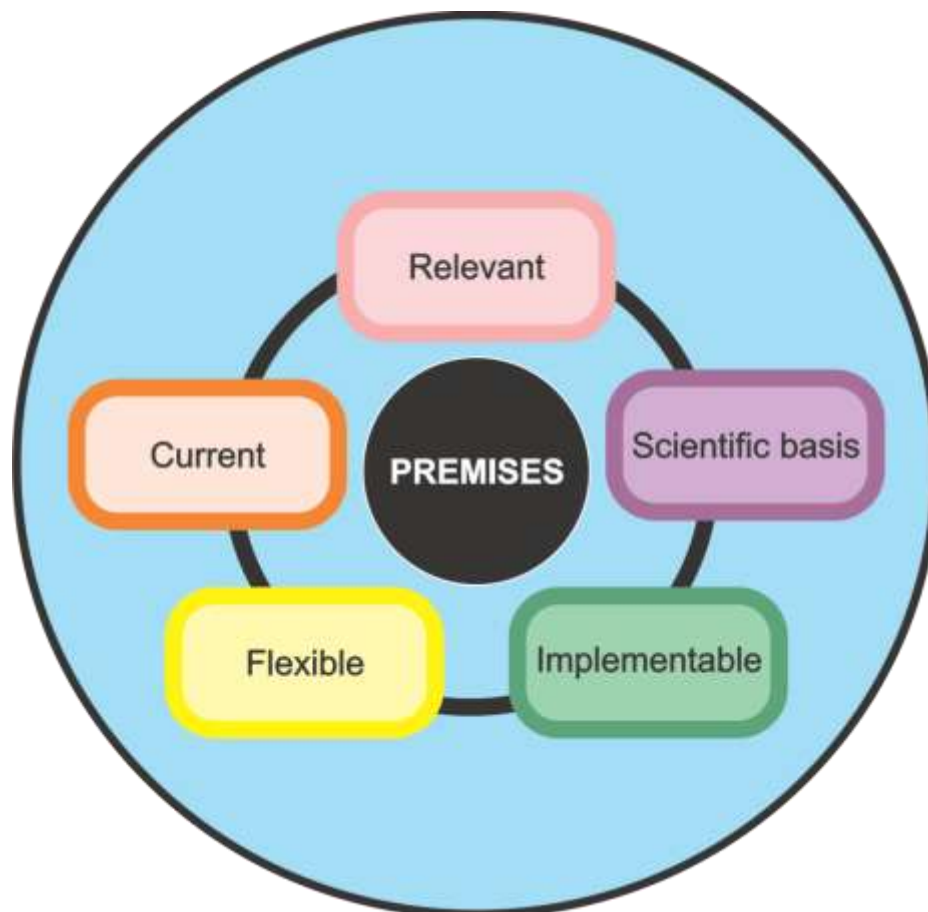


Figure 6.1: Premises for a strategic framework for research in Sport and Exercise Medicine at the University of the Free State
 [This diagrammatic presentation was compiled by the researcher, Holtzhausen (2012) as part of this PhD research project]

The second premise on which the strategic framework is built is that it will be **scientifically based** on the results of sound research. It is apt to contemplate the differences between quantitative research (which is most relevant to clinical research in disciplines such as SEM), and qualitative research of which the methodology is vastly different and less familiar to natural scientists, including health scientists. In this study, a justifiably scientific approach was pursued by utilising elements of both quantitative and qualitative methodologies, as presented in Chapter 3. Reliable and valid data were obtained by means of semi-structured interviews and a Delphi survey, both among relevant populations. These results were interpreted against the background of local, national and international literature to culminate in a scientifically based product.

The third premise entails that the strategic framework should be **implementable** within the boundaries of the vision, policies and structures of the UFS (cf. 2.5.1).

Although the framework is developed for implementation at the UFS, the fourth premise of the research is that the framework should be **adaptable** for implementation as a whole, or for use of segments thereof in other settings. Minor revisions should be feasible to suit different contexts elsewhere in South Africa or internationally. This premise was addressed by referring to a broad base of international literature in Chapter 2, as well as to include international experts from five continents in the Delphi survey (cf. Table 3.2).

Finally, in addressing research in a young and rapidly developing academic discipline, the strategic framework offered for research in SEM should be **current**. The currency of the framework refers to its ability to accommodate a relatively new and fast growing discipline (cf. 2.2; 2.3).

6.3 PRINCIPLES AND POINTS OF DEPARTURE OF THE STRATEGY

Utilising the strategic framework for the development and management of research in SEM at the UFS, requires that the following principles and points of departure are acknowledged as obtained from the literature review (cf. Chapter 2), semi-structured interviews (cf. Chapter 4) and the Delphi survey (cf. Chapter 5):

6.3.1 Principles related to Sport and Exercise Medicine

- Consider the current role, standing, development and demarcation of the field of study of SEM in South Africa and internationally.
- The relevant fields of study in the domain of interdisciplinary SEM research are (cf. 5.3.2.2):
 - Health promotion,
 - Public wellness,
 - Prevention of chronic disease,
 - Prevention of exercise-related illness,
 - Management of exercise-related illness,
 - Prevention of exercise-related injuries, and
 - Management of exercise-related injuries.
- Consider the multidisciplinary character of SEM and SEM research (cf. 2.3).

- Adopt a holistic approach to health care, as opposed to a reductionist medical model (cf. 2.2.2; 2.3).
- Provide research relevant to the needs of SEM, including the further development of an evidence base, and in recognising the importance of implementational research (cf. 2.3). SEM research consists mainly of applied research, as opposed to pure scientific research (cf.5.3.2.2).

6.3.2 Principles related to the University of the Free State

- The strategy must be aligned with the policies and strategies of the UFS , including the research strategy, promotion and appointment strategy, and funding models (cf. 2.5.1; 2.12.2).
- The strategy must be aligned with the available resources and support systems at the UFS (cf. 2.5.1).
- The strategy must consider the opportunities and threats for research within the Faculty of Health Sciences, UFS (cf. 4.3.4).

6.3.3 Principles related to leadership, management and strategic planning

- The strategy must be based on sound principles of leadership, management and strategic planning (cf. 2.6; 2.7; 2.8; 4.3.5.2; 5.3.4).
- The strategy must provide a theoretical strategic base for the development of SEM research at the UFS (cf. 4.3.1).
- The strategy must be uncomplicated (cf. 2.7.3).

6.3.4 Principles related to research

- The strategy must consider the local, national and international research culture, ethics and practices, as described in Chapter 2.
- The strategy must recognise the challenges and limitations particular to research in faculties of health sciences (cf. 2.8.1; 4.3.4).

6.3.5 Principles related to sustainability

- The strategy must focus on relevant quantitative and qualitative research outputs, outcomes and impact (significance) of research (cf. 2.14; 5.3.6).
- The strategy must provide a platform for academic and financial sustainability for the programme (cf. 5.3.6; 5.3.7).

The foundational principles and points of departure according to which the strategic framework was developed, are illustrated in Figure 6.2. As with the premises, the principles and points of departure are schematically illustrated in a linked circle, to emphasise the equality and interdependence of the components.

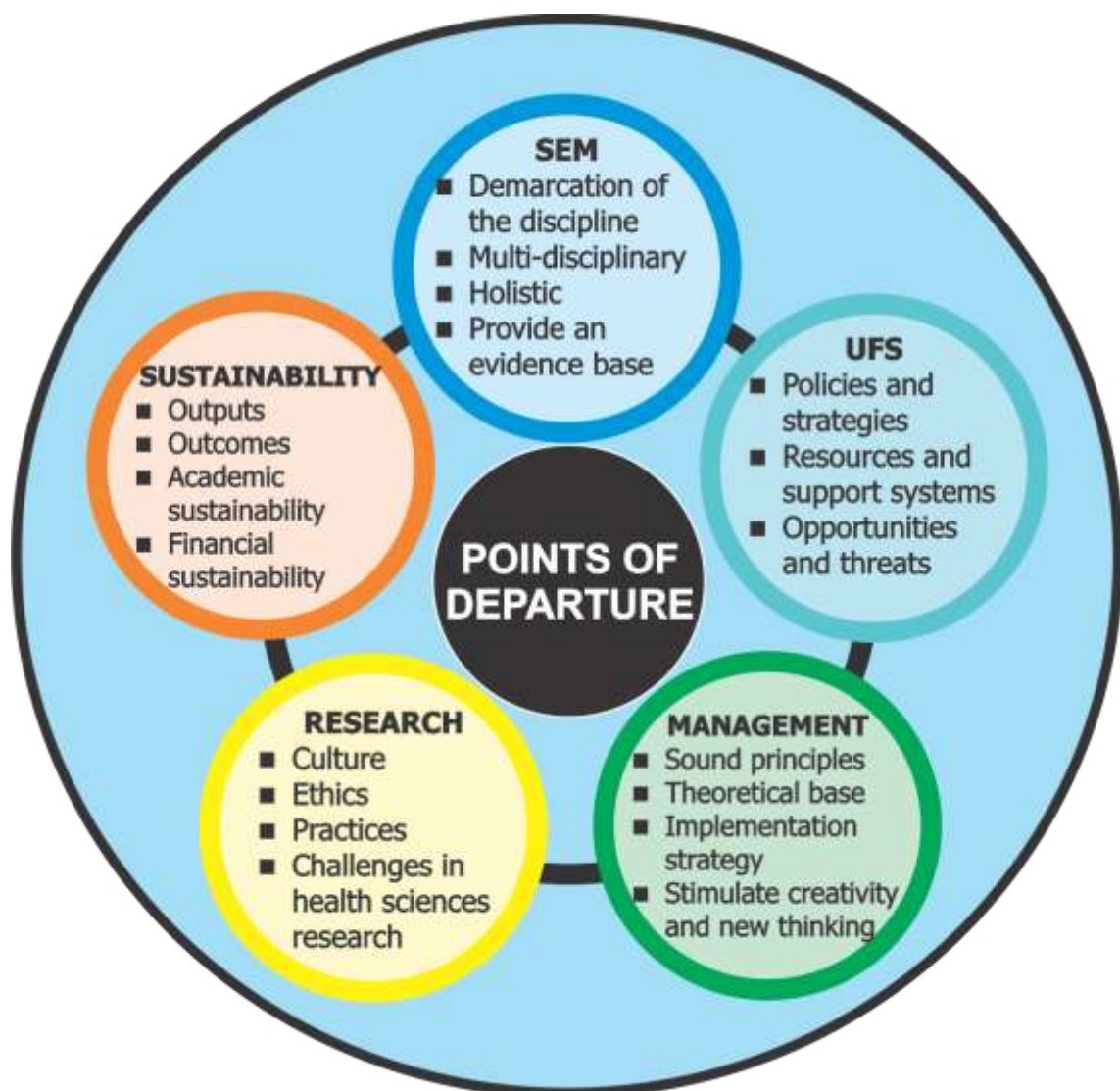


Figure 6.2: Points of departure in the development of a strategic framework for SEM research at the UFS
 [This diagrammatic presentation was compiled by the researcher, Holtzhausen (2012) as part of this PhD research project]

6.4 ROLE PLAYERS AND RESOURCES WHICH MAY INFLUENCE THE DEVELOPMENT, IMPLEMENTATION AND SUSTAINABILITY OF A SPORT AND EXERCISE MEDICINE RESEARCH PROGRAMME AT THE UFS

Possible role players and stakeholders in a SEM research programme at the UFS were identified in the literature (cf. 2.2; 2.3; 2.11.4) and semi-structured interviews (cf. 4.3.2), and tested on a panel of experts in the Delphi survey (cf. 5.3.2; 5.3.3.1). It is put forward that these individuals, institutions or subgroups, with cognisance of their characteristics, needs, functions, interactions, and way of functioning as described be recognised and utilised for successful implementation and management of the programme. The role players are presented and graphically illustrated in three subgroups of internal (within the programme) human resources (purple), institutional resources (university, but outside the research programme, green), and external resources (blue) according to strategic management principles (cf. 2.7.1) (Figure 6.3).

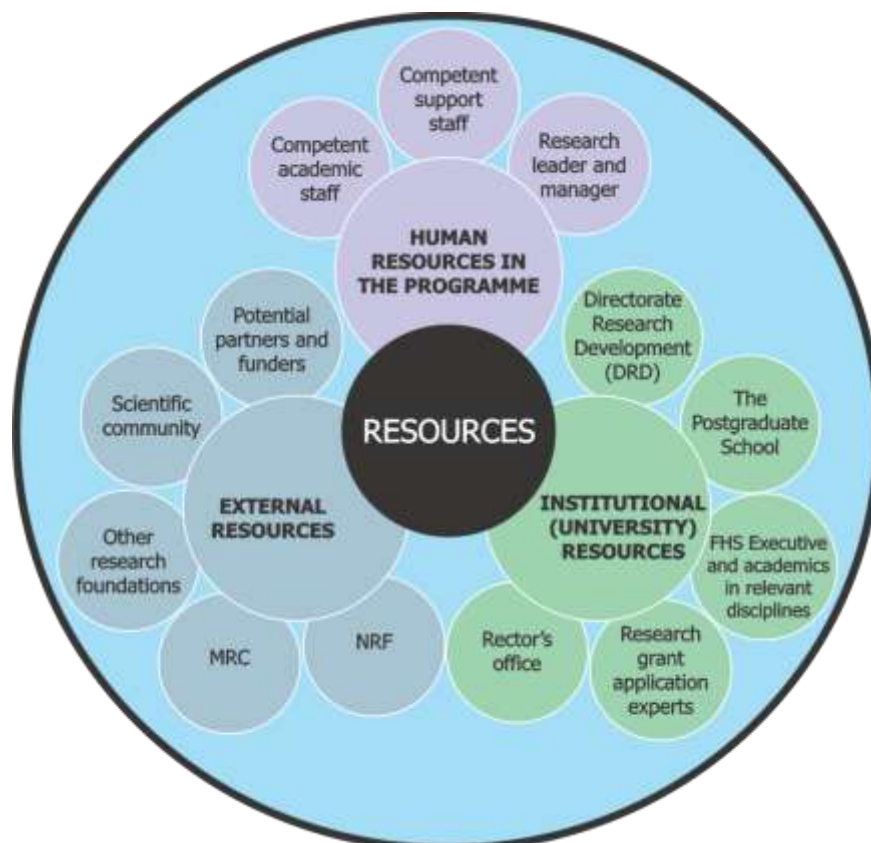


Figure 6.3: Role players and resources which may influence the development and sustainability of a Sport and Exercise Medicine Research Programme at the UFS

[This diagrammatic presentation was compiled by the researcher, Holtzhausen (2012) as part of this PhD research project]

6.4.1 Role players in the programme

6.4.1.1 *Competent academic staff*

A competent academic staff component should reflect the following characteristics:

- Regarding composition of the academic staff team -
 - Appropriately qualified team members to meet the research objectives, at Masters, MD or PhD levels (cf. 5.3.3.1),
 - A balance of young and experienced researchers (cf. 2.11.4; 5.3.3.1),
 - Include post-magister fellows and post-doctoral fellows (cf. 5.3.3.1), and
 - Recruited by retention of the best students and recruitment of students from other institutions (cf. 5.3.3.1).
- Regarding team dynamics –
 - Share the vision of the programme (cf. 2.6.1; 2.11; 5.3.4.2),
 - Engage in debate and reach agreement on issues, if not consensus (cf. 5.3.4.1), and
 - Be creative (cf. 5.3.7.2).
- Regarding characteristics of team members (cf. 2.11; 4.3.5; 5.3.3.1) -
 - Pursue continuous staff development,
 - Reflect scholarship,
 - Reflect mentorship,
 - Play a positive role in the team dynamics of the programme,
 - Have a love for learning and enquiry,
 - Have disciplinary knowledge,
 - Display disciplinary insight,
 - Have expertise in certain focus areas,
 - Have knowledge of research methodology,
 - Have knowledge of research supervision,
 - Have knowledge of research ethics,
 - Have writing skills,
 - Have experience in the publication of research,
 - Have respect among peers that stems from a good publication record, and
 - Display professional fulfilment aligned with personal fulfilment.

6.4.1.2 *Competent research support staff*

Competent research support staff should (cf. 2.6; 2.7; 5.3.4.2):

- support the research activities of the programme,
- have some knowledge of the science pursued in the programme,
- share the vision of the programme,
- be motivated,
- be efficient and effective,
- undergo continuous staff development, and
- have job satisfaction.

6.4.1.3 *The research leader and manager*

The study identified the complexity of research management (cf. 2.8; 4.3.4; 5.3). It is recommended that research managers undergo professional training and develop a measure of experience in research management before managing his/her own research programme (cf. 5.3.4.2).

Leaders and managers in the research programme should reflect some of the following leadership characteristics (cf. 2.11.2; 4.4.3.5.2; 5.3.3.1):

- Inspirational and motivational,
- Have a passion for the discipline,
- Display vision, or the ability to see the bigger picture,
- Have good judgement or wisdom,
- Have the ability to take responsibility in success and failure,
- Have stature amongst peers,
- Be an advocate of the programme and the discipline,
- Have insight in institutional activities, policies, and politics, and
- On a personal level, display integrity, sensitivity, trust, and honesty.

The following management skills are recommended for effective management of the programme (these need not all necessarily be present in the same person) (cf.5.3.3.1):

- On personal level:
 - Skill to work with different levels of knowledge and experience,
 - Listening skills,
 - Delegating skills,
 - Communication skills, and
 - Interpersonal skills.
- On organisational level:
 - Planning skills,
 - Project and process management skills,
 - Financial management skills,
 - Administrative skills,
 - Delegating skills,
 - People management skills,
 - Team synergy management skills, and
 - The ability to pay attention to detail.

6.4.2 Institutional resources

Institutional human resources that are required for the development and successful management of a SEM research programme, are (cf. 5.3.3.3):

- The Directorate of Research Development of the UFS
- The Postgraduate School of the UFS,
- The Executive of the Faculty of Health Sciences of the UFS,
- Academics in relevant disciplines at the UFS,
- Research grant application experts, and
- A well-informed rector's office or university management.

6.4.3 External organisational resources

These resources are organisations or groupings outside the university that can be of value in the development and successful management of the research programme (cf. 5.3.3.4):

- The National Research Foundation of South Africa (NRF),
- The Medical Research Council of South Africa (MRC),
- Other research foundations,
- The national and international scientific community in general, including professional associations,
- Other academic health care institutions,
- Primary health care institutions,
- Potential research partners and funders, specific to research needs and focus at any given time, which will not create potential conflict of interest or threaten research autonomy.

6.5 INPUTS REQUIRED FOR THE SUCCESSFUL DEVELOPMENT, IMPLEMENTATION, AND SUSTAINABLE MANAGEMENT OF A RESEARCH PROGRAMME IN SEM AT THE UFS

This section proposes inputs on leadership and managerial level, academic and research level, and programme activity level which will contribute to the success of a SEM research programme at the UFS. The main recommendations represent the application of principles in these domains, as this study intends to provide a strategic framework, and not a detailed model, implementation- or management plan. The leadership and management inputs are illustrated in Figure 6.4, and the academic and research inputs in Figure 6.5, both according to the categories identified in the study.

The programme activities are central to the final strategic framework and are depicted in the final schematic illustration of the framework (Figure 6.8 D).

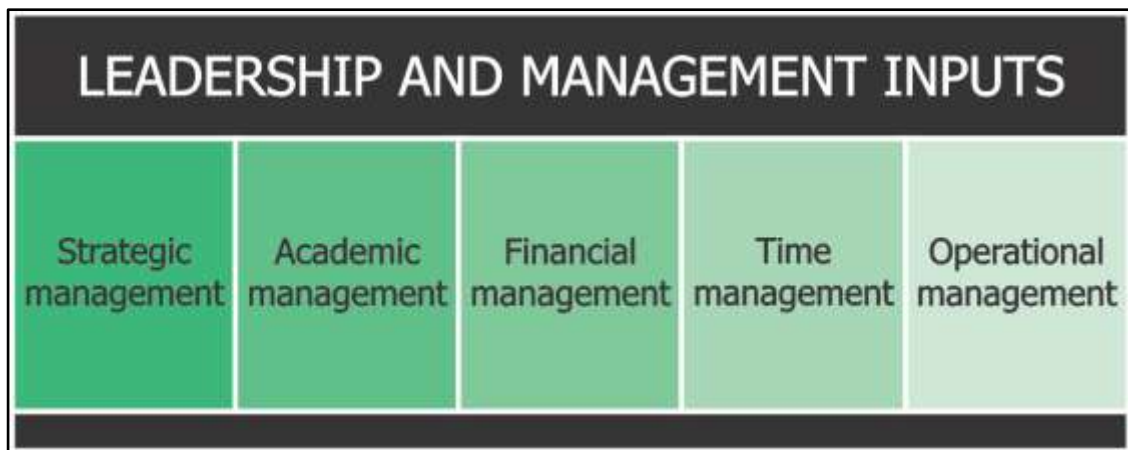


Figure 6.4: The components of leadership and management inputs required for the successful implementation and sustainable management of a SEM research programme at the UFS

[This diagrammatic presentation was compiled by the researcher, Holtzhausen (2012) as part of this PhD research project]

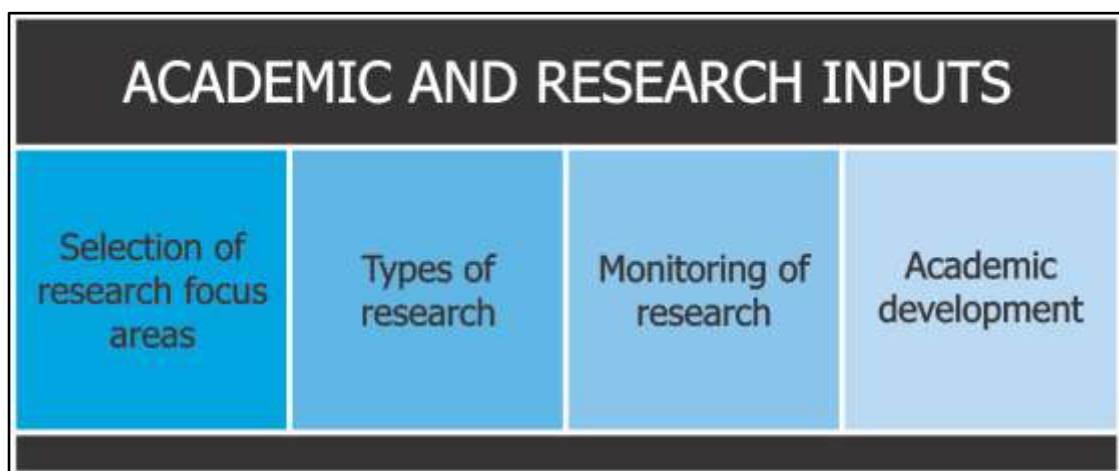


Figure 6.5: The components academic and research inputs required for the successful implementation and sustainable management of a SEM research programme at the UFS

[This diagrammatic presentation was compiled by the researcher, Holtzhausen (2012) as part of this PhD research project]

6.5.1 Leadership and management inputs (Figure 6.4)

6.5.1.1 *Strategic management*

The following strategic processes have been recommended in this study, for successful management of a SEM research programme at the UFS (cf. 5.3.4). These are not exclusive to other appropriate strategic approaches or techniques.

Reference points for strategic activities that have been identified to initiate and manage a successful SEM research programme are:

- Establish a strong, experienced advisory committee, which includes academic-, business-, and community representation,
- Follow a team approach,
- Build trust,
- Nurture creativity,
- Include key university academic departments in strategic processes,
- Establish strategic research focus areas,
- Establish strong research teams, and
- Establish funding models.

The components of a generic strategic plan for SEM research are:

- A vision statement,
- A mission statement,
- Clear objectives,
- Criteria for identification of team members,
- An implementation plan,
- A quality assurance plan, including ethics approval,
- A performance measurement plan,
- An intellectual property plan,
- A policy document to guide the research programme,
- A financial sustainability plan,
- Ethical guidelines, and
- Consensus or general agreement among role players on the strategy and goals of the research programme.

6.5.1.2 Academic management

The following management functions particular to research management are recommended from the research (cf. 5.3.4):

- Build incentives for researchers into the outcomes required from them. This is best done on a team basis, as incentives on individual basis may lead to workload inequalities. The incentives can be of academic or monetary nature.
- Pre-arrange the distribution of academic credits and other rewards for interdisciplinary research.
- Focus research management on results, or research goals and outputs.

6.5.1.3 Financial management

Because of the complexity, variety, and individuality of financial resources and financial systems in different research settings, the financial principles and processes that are recommended, are done so in broad terms only, and need to allow for flexibility. The most appropriate sources of funding identified in this study are also presented (cf. 2.12; 5.3.3.2).

Key financial management principles include:

- The financial plan should be a framework that is flexible with changes in circumstances.
- The funding model must be sustainable in the long term and allow for growth.
- Each project or grant has to have a viable budget.
- Apply strict financial management principles.
- Apply varied fundraising methods.
- Be aware of the competition for limited funding resources.
- A new research programme should receive initial, sufficient financial support from the institution where it is housed.
- Third stream (external) funding must be the eventual main source of funding of the research programme.

Possible sources of funding of a SEM research programme at the UFS include (cf. 5.3.3.2):

- Start-up funding from the University for three to five years. Continued funding from the University should be performance driven.
- Critical academic posts should be adequately funded by the University.
- Government-aligned research agencies are probable sources of funding, on a competitive basis.
- Partnerships with the private or corporate sector for funding purposes may be considered if the partnership is managed well, and academic autonomy and independence is retained by the researchers.
- Commercialisation of research in the form of patents or selling of knowledge may be relevant, but should not be the primary determining factor in the selection of research focus areas. Revenue from clinical services may be used to fund research.
- Collaborations with colleagues that have access to funding is a possible source of funding.

6.5.1.4 *Time management*

Time management is a critical issue in research, as good research is often time consuming, and there are often many competing demands on an academic's time, especially in a Faculty of Health Sciences (cf. 2.8.1; 5.3.4.2). The following recommendations are made:

- Apply strict time schedules, but make provision for flexibility and adjustment.
- Allow sufficient time for researchers to do research.
- Find a balance between research, teaching and clinical duties within the team.

6.5.1.5 *Operational management*

The following operational processes for management of a SEM research programme are recommended (cf. 5.3.4.3):

- Clear operational procedures,
- Clear programme regulations,
- Guidelines for writing research protocols,
- Guidelines for good clinical practice (CGP),

- Regular teaching planning meetings, and
- Regular research management meetings.

Procedures should not be enforced to the point of paralysis of innovation and productivity.

6.5.2 Academic and research inputs (Figure 6.5)

The academic and research inputs in the programme are driven by the required outcomes, as moulded by, amongst many other variables, the following factors:

- Regarding selection of research focus (cf. 5.3.1.2) –
 - Expertise of individual researchers,
 - Gaps in current research,
 - Availability of equipment,
 - Funding opportunities.
- Regarding types of research (cf. 5.3.6.1) -
 - Required outputs, e.g. publication in national and international peer-reviewed journals,
 - Targeting of specific journals for publication,
 - Funding opportunities,
 - Opportunities for collaboration with other disciplines within the institution, and
 - Opportunities for collaboration with other academic health care institutions.
- Regarding monitoring of research (cf. 5.3.7.2) -
 - Monitor and evaluate quantitative key performance indicators, and
 - Monitor and evaluate qualitative key performance indicators.
- Regarding academic development (2.9; 2.11; 4.3.4.4; 5.3) –
 - Attract post-doctoral fellows,
 - Nurture the next generation of researchers,
 - Support conference attendances if staff is contributing or targeting the conference for a specific reason,
 - Take part in the activities of the scientific community, e.g. inviting visiting scholars, take part in review processes for research grants and publications, etc.,
 - Encourage the dissemination of knowledge through public forums,

- Utilise new technologies, and
- Celebrate all, even small successes.

6.5.3 Programme activities

The programme activities embody all the leadership, strategic, and managerial processes; as well as the operational and academic activities identified in this study, for the successful operation of a research programme in SEM at the UFS (cf. 2.6; 2.7; 2.8; 2.12; 5.3.4). The activities need to follow the principles and processes identified in the literature (cf. 2.6; 2.7; 2.8; 2.12) and the Delphi survey (5.3.4) to overcome the challenges, limitations and deficiencies in the research context of SEM at the UFS (cf. 2.8.1; 4.3.4; 5.3.5).

6.6 OUTPUTS OF A SEM RESEARCH PROGRAMME AT THE UFS

The desired outputs or products of a new research programme in the first three to five years are presented in this section according to the results of the Delphi survey (cf. 5.3.6). The recommended outputs are presented according to academic outputs, human products, financial products, levels of focus, and targeted directions of outputs, as illustrated in Figure 6.6. The three groups of outputs are illustrated with the levels of focus (on the left), and the targeted directions (on the right) which influence the nature of the outputs (cf. 5.3.6.2).

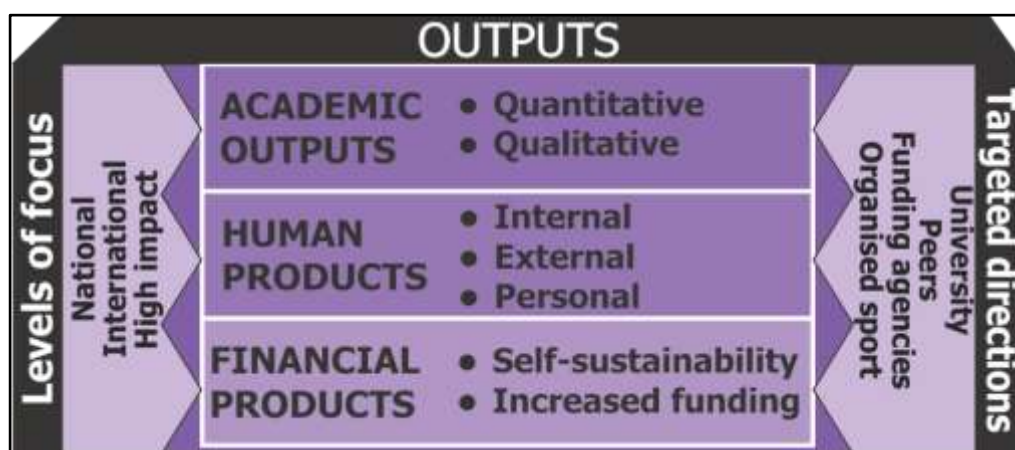


Figure 6.6: The three to five year outputs expected from for the successful implementation and sustainable management of a SEM research programme at the UFS

[This diagrammatic presentation was compiled by the researcher, Holtzhausen (2012) as part of this PhD research project]

6.6.1 Academic outputs

6.6.1.1 *Quantitative outputs*

The primary academic output of a SEM research programme is publications in national and international peer-reviewed scientific publications. It is desirable to publish in journals with high journal impact factors (JIF). Citation of journal articles is desirable. The aim is therefore not only to publish quantities of research, but also to publish work of high quality in publications that are read and used by many peers, and to attain recognition in that way.

Further essential research outputs are national and international conference presentations, as well as Masters and PhD studies.

The production of non-peer reviewed scientific and non-scientific publications is helpful to disseminate knowledge in the community and of particular relevance to SEM. However, these publications should not be pursued at the peril of peer-reviewed publications.

6.6.1.2 *Qualitative outputs*

The following less measurable outputs of a SEM research programme are important to achieve:

- Increased academic stature among peers,
- Invitations for collaboration, and
- The establishment of a network of research collaborators.

6.6.2 Human products

The following effects on researchers within the SEM research programme are desirable in the short and long term:

- Promotion within the University,
- Appointments on University research structures,
- Appointments on national and international research structures and scientific forums,

- Increased levels of expertise within the programme, and
- Personal and professional fulfilment of staff.

6.6.3 Financial products

The only financial gains to be pursued in a SEM research programme are:

- Financial self-sustainability, and
- Increasing amounts of research funding to assist in financial sustainability.

6.6.4 Levels of focus

Both national and international levels of focus should be pursued in the SEM research programme (cf. 5.3.6.2). Specific journals may be targeted, for which to produce the type of research they publish, but only in the case of journals with high impact factors.

6.6.5 Targeted direction of outputs

This section attempted to identify who should be pleased by the outputs of the SEM research programme. The following groups were identified (cf. 5.3.6.2):

- University faculty and management,
- National peers,
- International peers,
- Funding agencies such as the NRF and MRC, and
- Organised sport.

Even though a SEM research programme may intend to satisfy these groupings, the recommendation is that if “good science” is done, if research is published in journals with high impact factors, and is recognised by the scientific community, the targeted groups will be satisfied.

6.7 LONG-TERM OUTCOMES, IMPACT AND SIGNIFICANCE OF A SEM RESEARCH PROGRAMME AT THE UFS

This section presents the desired long-term outcomes of a SEM research programme, and provides guidelines to monitor and measure success (cf. 5.3.7). Many of these outcomes are not readily quantifiable. The outcomes and processes of improvement of these as individual entities as well as a collective body of outcomes are illustrated in Figure 6.7.

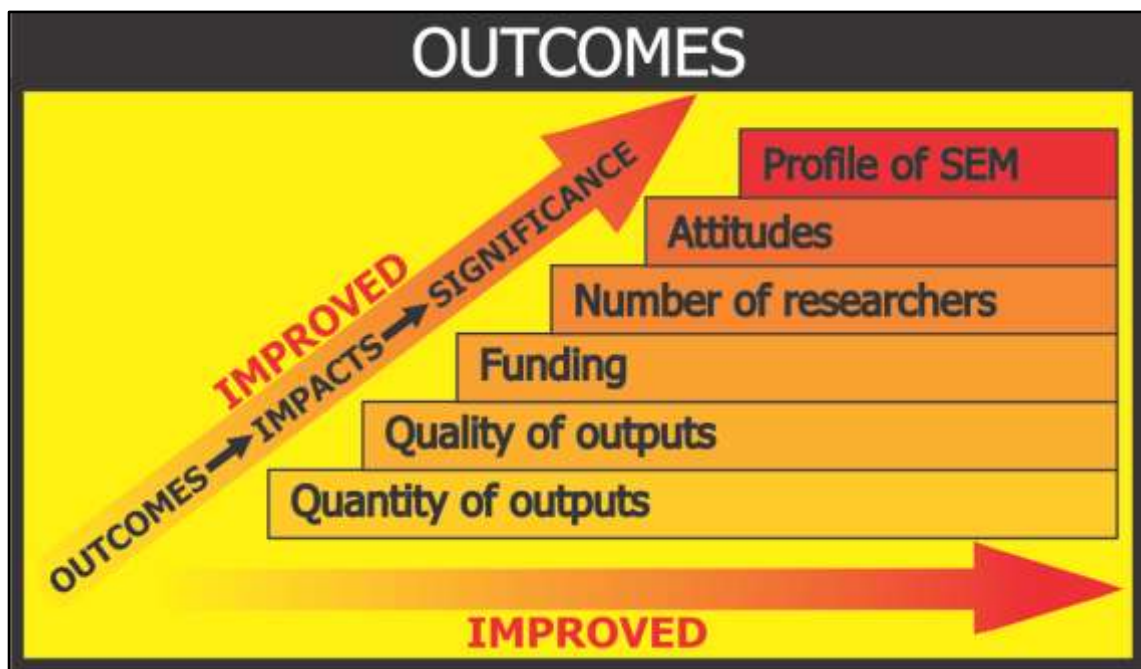


Figure 6.7: The desired outcomes, impact and significance of a SEM research programme at the UFS
 [This diagrammatic presentation was compiled by the researcher, Holtzhausen (2012) as part of this PhD research project]

6.7.1 Types of outcomes, impact and significance

Long-term outcomes, impact and significance of a SEM research programme at the UFS that have been identified in this study, are:

- Increased quality and quantity of academic manuscripts,
- Increased funding of the programme,
- Increase in number of researchers in the programme,
- Increased academic stature of researchers in the programme,

- Increased stature of the programme itself among peers,
- Changes in the attitude of the University towards the programme, and
- Changes in the profile of SEM at the University and possibly further.

6.7.2 Monitoring of outcomes, impact and significance

This study recommends pre-planned short-, medium- and long-term goals, which should be measured and quantified (cf. 5.3.7.2). Continuous monitoring is recommended. However, monitoring and measurement should be done in more subtle, qualitative ways than presented in the corporate literature. In the absence of qualitative assessment tools for research outcomes, the following indicators are presented in this regard:

- Quality is often more important than quantity.
- Too much monitoring can lead to a focus on process rather than the desired focus on output and outcomes.
- Scientific work needs a certain degree of freedom and cannot be planned in detail.
- Many good scientific outcomes are products of chance. A certain amount of luck and opportunity can play a role in this.
- There are many facets of research, not all measurable, which define the significance thereof.

6.8 CHALLENGES AND SOLUTIONS IN THE DEVELOPMENT, IMPLEMENTATION, AND SUSTAINABLE MANAGEMENT OF A SEM RESEARCH PROGRAMME AT THE UFS

6.8.1 Challenges

In an attempt to anticipate challenges which may be encountered in the process of development, implementation and sustainable management of the research programme, possible challenges were identified. The Delphi process showed, however, that some anticipated challenges are not limited to SEM research, but possibly true for many fields of research. Furthermore, it was established that challenges are often circumstantial and specific to a certain environment. Academic and managerial

challenges that should be pre-empted and addressed in the planning of the research programme, are as follows (cf. 5.3.5):

6.8.1.1 *Academic challenges*

- To establish SEM as a multidisciplinary research discipline in medicine,
- To obtain support from university management for interdisciplinary SEM research,
- Fair distribution of research credits,
- To become internationally recognised by peers, and
- To establish the optimal placement of research focus areas in an interdisciplinary grouping.

6.8.1.2 *Managerial challenges*

- Maintenance of effective interdisciplinary co-ordination,
- Interdisciplinary funding of resources, and
- To obtain initial funding for a new research programme.

6.8.2 *Solutions*

The solutions to these anticipated challenges are as circumstantial and environment-specific as the challenges themselves. The solutions lie in the firm scientific foundation and need for such a programme, as well as in comprehensive planning and management of the phases of development and sustainability of the programme, as proposed in the strategic framework provided by this study.

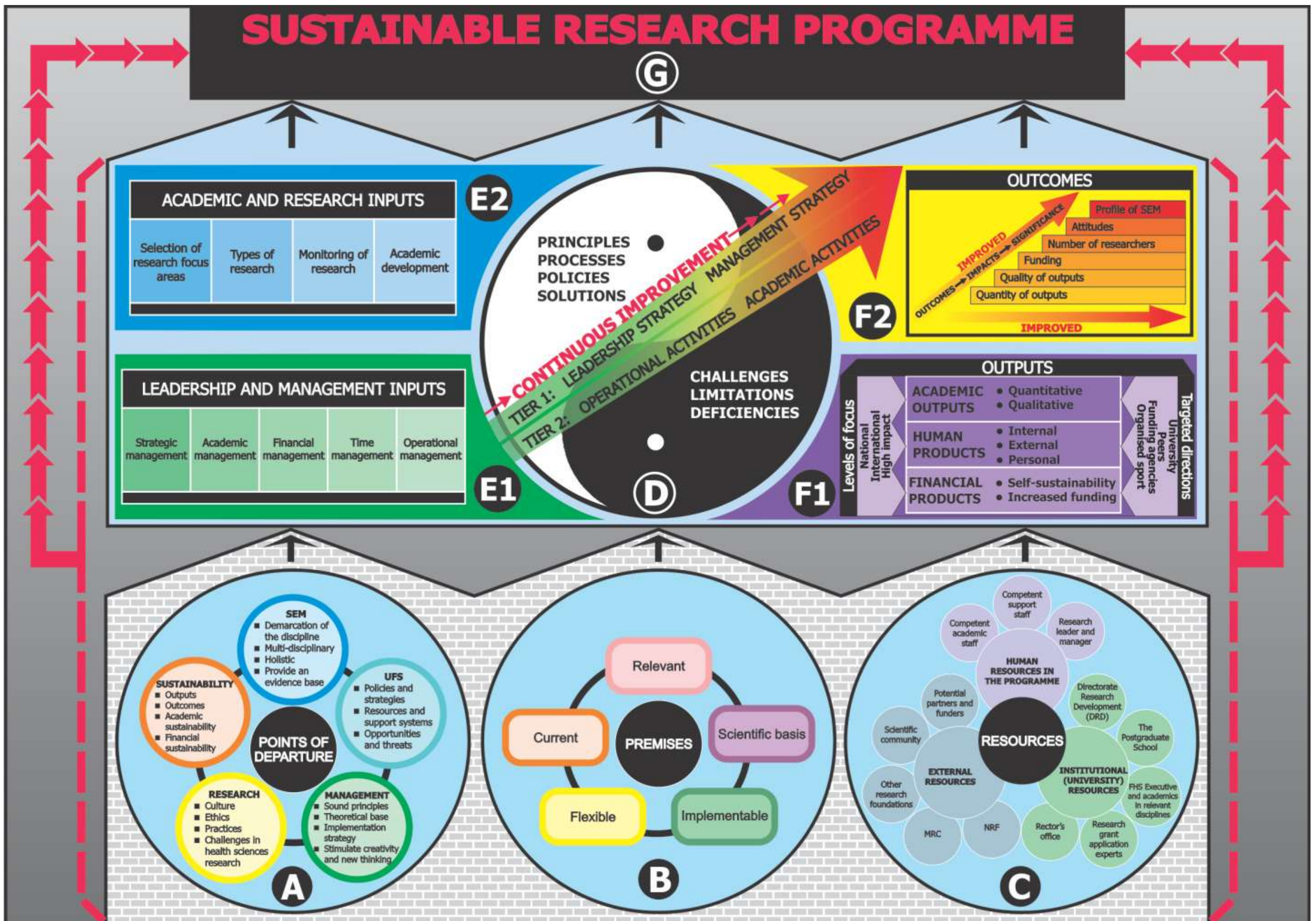


Figure 6.8 A schematic illustration of the strategic framework for research in Sport and Exercise Medicine at the University of the Free State [This diagrammatic presentation was compiled by the researcher, Holtzhausen (2012) as part of this PhD research project]

6.9 A STRATEGIC FRAMEWORK FOR RESEARCH IN SPORT AND EXERCISE MEDICINE AT THE UNIVERSITY OF THE FREE STATE

This strategic framework has been developed from the results of the literature review (cf. Chapter 2), semi-structured interviews (cf. Chapter 4) and the Delphi survey (cf. Chapter 5), as described in this chapter.

6.9.1 Orientation to the strategic framework

Figure 6.8 provides a schematic overview of the proposed strategic framework for research in SEM at the UFS, as described in this chapter. The framework consists of a number of interrelated elements.

The foundations consist of (A) the premises or prerequisites, (B) principles or basic points of departure, and (C) key resources for a successful strategic framework for research in SEM at the UFS.

Figure 6.8 (D) represents the leadership, strategic, and managerial activities (first tier) in the same diagonally upward track as operational and academic activities (second tier, but of equal importance) in the research programme. The upward slant of the track represents continuous improvement of all components within the programme. The track is embedded in a Taijitu wheel or “the diagram of the supreme ultimate” (<http://en.wikipedia.org/wiki/Taijitu>). The wheel represents the totality (whole) of activities within the research programme, while the black and white areas represent interacting parts or manifestations of the whole. The white area, rising on the left, is an indication of positive (“yang”) elements, while the dark area descending on the right indicates the negative (“yin”) elements. These two parts exist in harmony as parts of the whole, which in turn is in perpetual motion, or turning. The small dots of opposing colours in each area indicate how each component will transform into the other (<http://en.wikipedia.org/wiki/Taijitu>). The required inputs, outputs and outcomes expected to culminate from the activities represented by the Taijitu wheel, are depicted outside the wheel, but fundamentally dependent on them. The central upward slanting arrow indicates activities and their continuous improvement originating from leadership and management inputs and culminating in outcomes and impact.

To the left of the wheel, the inputs which are expected within the activities are depicted in Figure 6.8, sections E 1 and E2. Section E1 represents the managerial inputs, while section E2 represents the academic inputs required in a successful SEM research programme.

To the right of the wheel, the expected shorter-term outputs, and longer-term outcomes or impact of the research programme are depicted in Figure 6.8, section F1 and F2 respectively.

The schematic illustration indicates a movement trend from the foundational pillars in the first row (A, B and C), through the activities, inputs and outputs in the second row (D, E1, E2, F1, F2) towards the ultimate goal of a sustainable research programme in the third and final row. The strategic framework therefore culminates in a sustainable research programme as the ultimate outcome (G), built on the foundations and moulded by the activities thereof.

6.10 CONCLUSION

In this chapter, the critical analysis of SEM research in the literature and semi-structured interviews was triangulated with the Delphi survey to produce a strategic framework for a research programme in Sport and Exercise Medicine at the University of the Free State. The premises, foundations and role players were defined, after which inputs at various levels were presented. Finally, the desired outputs, impact and significance were defined, which will ensure sustainability of the programme.

The researcher is of the opinion that the contextualisation and strategic framework presented in this study will, if successfully implemented, make a meaningful contribution to the development of SEM research, and possibly to other interdisciplinary research at the UFS. In the longer term it has the potential to have a positive impact on the quality and quantity of SEM research in South Africa and further.

In the next chapter, **Chapter 7**, final **conclusions** of the study are presented, **limitations** of the study explored, and **recommendations** made.

CHAPTER 7

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS OF THE STUDY

7.1 INTRODUCTION

In this chapter certain findings of the study are revisited, challenges highlighted, and limitations discussed. The chapter concludes with final conclusions and recommendations for implementation and further research.

7.2 OBSERVATIONS RELATED TO THE STUDY

The findings of the study have been described and illustrated in Chapter 6. Certain observations and findings regarding the context of the study, methodology, results, and in general need to be made to round off the research.

7.2.1 Observations regarding the context, aims, and objectives of the study

- The overall goal of the study (cf. 1.4.1) was to facilitate the execution of high quality, publishable research in SEM. The researcher is confident that this goal has been achieved with the successful application of the findings of this study.
- The problem statement (cf. 1.3) that a lack of co-ordinated, published research in the SEM-related disciplines at the UFS existed despite the availability of opportunities will be addressed with the implementation of the findings of this study.
- The aim of the study was to do a critical, research based situation analysis of SEM, as well as aspects of research and research management in order to compile a strategic framework for the development and implementation of a research programme in SEM at the UFS. This aim has been achieved by the pursuit of the objectives of the study, as stated in Chapter 1 (cf. 1.4.3).
- The findings of this study were reported in some detail, but should not be regarded as prescriptive. The findings and the proposed strategic framework should be interpreted in context and applied with a measure of flexibility, as it was intended. The particular version of the framework presented in this study

applies to the context of the UFS, with which strategy and policies are aligned. It is also aligned to the culture and structure of the scientific community in South Africa.

7.2.2 Observations regarding the methodology

- The 100% response rate over three rounds in the Delphi-survey contributes to the reliability and validity of the results.
- The methods applied in this study were appropriate to achieve the desired results. However, many confounding factors can influence the outcomes of these methods, including sample selection and interview methods. These have been taken into consideration throughout the study.
- The scope of the research ranged over an extensive spectrum of topics, and even disciplines. This wide range prohibited a comprehensive study of vast bodies of literature. The selective review of the literature presented in Chapter 2 was carefully undertaken to be appropriate for the outcomes of the study, but is not intended or claimed to be exhaustive.
- Even though semi-structured interviews are guided by an interview guide, the effects that the interviewer may have on the responses should not be ignored. This effect may be related to the method of interviewing, or to the previous perceptions, knowledge, interactions, or experiences of the interviewee related to the interviewer.
- The outcomes of a Delphi survey depend much on the composition of the panel of experts. In this survey, differences in the quantity and quality of comments and observations were observed between South African and international experts. On the one hand, the South African panellists were more responsive towards questions or statements related to local conditions. On the other hand, the international panellists, consisting of international experts of the highest calibre, generally displayed more insight and detailed consideration of questions, as could be detected from their comments, consequently producing more valuable in-depth results. In this study, the blend of South African and international experts added value and richness to the results.

- The contextual, “big picture” interpretation of questions and statements by the Delphi panel exposed the sometimes subjective, narrower thinking of some local experts at the UFS. This effect, however, may either reflect a true culture, but may also have been a product of the format of the questions in the semi-structured interviews.

7.2.3 Observations regarding the interpretation of certain findings

- The scope of practice of SEM covers a broad spectrum. In many countries, including South Africa, SEM is a young discipline with functions in many traditional medical specialties as well as in primary care. In the light of relative ignorance about the scope and roles of SEM in these countries, SEM may be regarded as a threat or unnecessary addition to the status quo. A conscious process by SEM to familiarise the established medical and health care community with the roles and benefits of SEM is foreseen to overcome this obstacle.
- The confident approach and stature of the international panellists are testimony to the established nature of SEM in their contexts. Their responses reflected maturity and stature at least on equal footing with other specialties and should be a goal for SEM in South Africa.
- The broad scope of practice of SEM makes focus of research difficult, especially early in the lifespan of a research programme.. It has been shown unequivocally in this study that focus in specific areas of expertise is required at many levels – for the development of expertise and stature, funding opportunities as well as rating and promotion. The urge to do research over a broad spectrum within SEM should be resisted, to establish research focus and expertise.

7.2.4 General observations

- Research management is a complex art, with as many or more unwritten subtleties as there are hard principles and facts to consider. It should not be confused with any other form of management.
- The study revealed unique and disturbing challenges to academic medicine on an international level, which have a negative impact on health care in general, and particularly on clinical research. The international burden of disease seems to be spiralling out of control.

- In the light of this observation, a shift from the reductionist, biomedical model of medical care towards a holistic, population based, preventative model of health care, is envisaged over time as a solution to this crisis. SEM is well positioned to play a key role in this regard.

7.3 LIMITATIONS OF THE STUDY

The broad spectrum of elements which need to be considered in developing a research programme had a number of effects on the study. Firstly, the literature review does not represent a comprehensive study of the topics at hand, but it has been compensated for by a directed approach to assist the study. Secondly, a vast amount of data was gathered in both the interviews and the Delphi survey. Even though all the data have been presented, all aspects could not be discussed in detail. The unattended data will be addressed in publications. The selection of data to discuss was rather directed at aspects pertinent to the development of a strategic framework. It is necessary to emphasise that the aim of the study was to compile a strategic framework, as opposed to a more detailed model or management plan, which are processes that may emanate from the strategic plan.

The varied backgrounds of the Delphi panellists represented a broad South African and international context, which may not necessarily have been best suited for testing of a framework set at one university in South Africa. The expertise and diligence of the panellists, however, produced insight and depth to the responses which brought an extra dimension to the study, adding value rather than be detrimental.

7.4 FINAL RECOMMENDATIONS

In order for the study to yield significant outcomes, the researcher makes and intends to pursue the following recommendations:

- That the strategic framework for research in SEM at the UFS is submitted to the Faculty of Health Sciences and the Postgraduate School of the UFS in the form of a proposal for implementation.

- That the strategic framework is used to augment current research activities in SEM at the UFS, to initiate the process of development into a sustainable research programme.
- That the research is presented for publication in peer-reviewed journals, and presented at local, national and international scientific congresses and forums in Health Science Education, Research Management, and SEM.
- That the findings of the study are introduced to other interested institutions in South Africa and Africa, either to develop similar programmes or improve current research outcomes.
- That the networking opportunities which will present themselves from the dissemination of this research are nurtured and utilised in the best possible ways.
- That further research is conducted to investigate changes in context, inputs, outputs and outcomes in SEM research which may arise as a consequence of implementation of the findings.
- That the strategic framework is used to establish a research track at postgraduate level in the Division SEM at the UFS, which can function independent of the current structured Masters programme to allow for the imminent era of growth and change in SEM in South Africa in the next decade.

7.5 CONCLUSION

The study originated from the recognition of a relative dearth of research outputs, as well as the poor status and stature of SEM in both the community at large and the health care sector in South Africa. In order for SEM to claim its rightful place and make a meaningful contribution to health care in South Africa, action needs to be taken from within the domain of SEM in South Africa. This study is an attempt to do just that – to spark an interest and to give direction to increased and improved research in SEM and related disciplines in South Africa.

In order to produce the strategic framework, a combination of qualitative and quantitative methods was chosen. It took the form of a literature review, a survey of the current standing of SEM at the UFS in the form of semi-structured interviews, and a Delphi survey amongst national and international experts in the fields of research and SEM to test concepts from the literature and interviews. The methods were found to be appropriate to generate sufficient data to understand the local, national and

international contexts of SEM and SEM research, from which a holistic, scientifically based instrument could be developed in the form of a strategic framework appropriate to further the goals for which it was intended. The key to the usefulness of the instrument was to create a relatively simple roadmap to navigate a complex terrain. The researcher believes that this study will make a unique contribution to the research, further development, and ultimately the status of Sport and Exercise Medicine at the University of the Free State and in South Africa. The challenges identified in the study and the complexities of research development have not gone unnoticed. These challenges will be addressed with passion and determination towards the attainment of the ultimate goal of the study.

"After climbing a great hill, one only finds that there are many more hills to climb"

Nelson Rolihlahla Mandela
(<http://brainyquote.com>).

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APPENDIX A1

LETTER OF REQUEST TO INTERVIEWEES



**Afdeling Sport- en Oefeningsgeneeskunde / Division Sport and Exercise medicine
Skool vir Geneeskunde / School of Medicine
Fakulteit Gesondheidswetenskappe / Faculty of Health Sciences**

APPENDIX A1

Dear Colleague

Request to participate in a PhD study titled: A CRITICAL ANALYSIS AND STRATEGIC FRAMEWORK FOR RESEARCH IN SPORT AND EXERCISE MEDICINE AT THE UNIVERSITY OF THE FREE STATE

I am currently occupying the position of Programme Director of the Masters Programme in Sports Medicine in the School of Medicine, Faculty of Health Sciences at the University of the Free State. I am mainly responsible for post-graduate teaching, clinical care, research, administration and management in Sports Medicine, as well as post-graduate teaching and research in Biokinetics.

I am in the process of writing a thesis to obtain the PhD degree in Health Professions Education in the Faculty of Health Sciences at the University of the Free State (Student number 198023409). The title of my research is **A CRITICAL ANALYSIS AND STRATEGIC FRAMEWORK FOR RESEARCH IN SPORT AND EXERCISE MEDICINE AT THE UNIVERSITY OF THE FREE STATE.**

My supervisors are:

Promoter: Prof GJ van Zyl
Dean: Faculty of Health Sciences
University of the Free State
Bloemfontein, SOUTH AFRICA.

Co-promoter: Prof MM Nel
Head: Health Professions Education
Faculty of Health Sciences
University of the Free State
Bloemfontein, SOUTH AFRICA

It is the **purpose** of my study to compile a strategic framework for the development and implementation of research in Sport and Exercise Medicine at the University of the Free State. The choice of subject was a product of the recent establishment of a Masters programme in sports medicine at the University of the Free State and the need for guidance in selection of research topics. Sport and Exercise Medicine is a young discipline and a strong research component is essential for the status and even the survival of a Sport and Exercise Medicine programme. Science has to keep up with the ever increasing demands of the sport fraternity for methods of improving performance, management of illness and injury in the athletic population and lifestyle/preventive medicine.

The **problem** that has to be addressed is a lack of guidance and co-ordination in research in sports- and exercise medicine, and related fields of study at the University of the Free State. Sports- and exercise medicine is to a large extent a multi-professional field of study, which includes

- basic medical sciences, exercise physiology, anatomy and mechanics of movement
- medical problems of athletes,

- sports injury prevention and management,
- risk reversal of persons with chronic disease by exercise and lifestyle intervention, and
- community health promotion by raising awareness and prescription of exercise and healthy lifestyle to the general public.

Co-ordination of relevant, high quality research in these varied fields of study necessitates a **framework** according to which interdisciplinary research can be managed.

The overall **goal** of the study is to execute quality research in the discipline with the view to improve the scientific grounding of the discipline at the University of the Free State and in general.

The **aim** of the study is to do a critical research situation analysis of sport and exercise medicine with the view to compile a **strategic framework** for the development and implementation of publishable, structured, interdisciplinary research in Sport and Exercise Medicine at the UFS. To achieve the aim the following objectives will be pursued:

- Conceptualising and contextualising the lack of strategic guidelines for the development and implementation of research in Sports and Exercise Medicine (SEM) at the UFS. (This will be done via a literature study.)
- Identifying the factors that play a role in SEM research. (This will be done via semi-structured interviews)
- Determining criteria to develop a strategic research development framework. (This will be done via a literature study as well as from the results of the interviews.)
- Testing the criteria for the strategic framework by a panel of experts. (This will be done by a Delphi process.)
- Finalising the strategic framework and completing the study.

The **methods** that will be used in the study are, firstly, a comprehensive literature study that will address issues within the domains of research management and Sports and Exercise Medicine. Secondly, interviews based on the literature findings, with role-players in the fields of Sports and Exercise Medicine teaching and research, as well as policy-makers, leaders and managers in research will be conducted. A draft set of criteria will be designed from the interview findings and from the literature, which will be used to compile a draft questionnaire, to be tested in a pilot study and then presented to a Delphi panel of experts.

For the **purpose** of this part of the study, **semi-structured interviews** will be conducted, which fall under the category of qualitative research approach. In a semi-structured interview, the same set of questions are asked to individuals, but, other than in a structured interview, room is left for expression of a wider opinion in order to stimulate thought on the research topic. This approach has been chosen to obtain maximal input and ideas on this under-researched field of study as far as health professions education is concerned.

The **value** of this research will be that it will lay the foundation for the production of quality research in Sports and Exercise Medicine on Masters, Doctoral and Post-doctoral level, ultimately establishing centres of expertise in chosen fields of study. Achieving this will make the University of the Free State a significant role player in the development of Sports and Exercise Medicine in South Africa. On a larger scale, it may be used as a strategic guide for the development of similar programmes in the rest of Africa and the rest of the world.

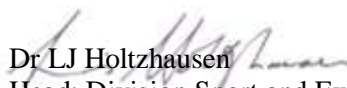
You have been identified as having expert knowledge and experience in the fields of Sports and Exercise Medicine, or in research. I therefore respectfully request your expert co-operation by consenting to be interviewed for this project. I am aware that time is a valuable commodity. The interview will take approximately 45 – 60 minutes. Should you have any questions regarding the study or interview, I can be contacted at:

Telephone: 051 401 2530
Cellular phone: 082 9063 062
Fax: 051 444 2969
Email address: HoltzhausenLJ@ufs.ac.za

Postal address: Internal Box 14
University of the Free State
PO Box 339
Bloemfontein
9300

The interviews are scheduled to take place during the period January to March 2011. Should you be willing to participate, please complete the accompanying consent form and return it to me as soon as possible.

Thank you for taking time to read this communication. I will really appreciate your contribution to the project.
Sincerely,


Dr LJ Holtzhausen
Head: Division Sport and Exercise Medicine
Faculty of Health Sciences
University of the Free State
Bloemfontein

ETOVS Nr: 191/2010
Registered project
LH20101115

APPENDIX A2

LETTER OF CONSENT FORM FOR SEMI-STRUCTURED INTERVIEW

CONSENT FORM FOR SEMI-STRUCTURED INTERVIEW

Title: A CRITICAL ANALYSIS AND STRATEGIC FRAMEWORK FOR RESEARCH IN SPORT AND EXERCISE MEDICINE AT THE UNIVERSITY OF THE FREE STATE (ETOVNS NR: 191/2010)

I, the undersigned, hereby consent to participate in the interview scheduled to take place from January to May 2011. My particulars are as follows:

Title: _____

Surname: _____

Full names: _____

Postal address: _____

Email address: _____

Telephone number: _____

Cellular number: _____

Fax number: _____

Signature

Date

Please return this form on or before 15 April 2011 by fax, email or mail, to:

Fax: 051 444 2969
Email address: HoltzhausenLJ@ufs.ac.za
Postal address: Internal Box 14
University of the Free State
PO Box 339
Bloemfontein
9300

I assure that the information gathered in this interview will be treated in a confidential manner and that there will be no references to any names of participants in the presentation of data. Please take note that the results of this study will be published. Participation in the study is voluntary, and participants may withdraw from the study at any time. Participants will not be rewarded for participation. No costs will be payable by participants.

Thank you in advance for your kind co-operation.
Sincerely,



Dr LJ Holtzhausen
Head: Division Sport and Exercise Medicine
University of the Free State

LH20101115

INTERVIEW SCHEDULE

INTERVIEW DATA SHEET

**A CRITICAL ANALYSIS AND STRATEGIC FRAMEWORK FOR RESEARCH IN
SPORT AND EXERCISE MEDICINE AT THE UNIVERSITY OF THE FREE STATE**

Interviewees not familiar with Sport and Exercise Medicine as academic entity may answer questions from their own perspective/discipline. It is, however, not compulsory to answer questions on Sport and Exercise Medicine when interviewees feel that they have inadequate background/knowledge to do so.

PARTICIPANT NUMBER		
PARTICIPANT QUALIFICATIONS		
PARTICIPANT INVOLVEMENT IN SPORT AND EXERCISE MEDICINE		

Questions:

1. Status and role of SEM:
 - 1.1. What, in your opinion, is the status of Sport and Exercise Medicine (SEM) at the University of the Free State?
 - 1.2. What, in your opinion, is the role (why is it necessary) of research in Sport and Exercise Medicine at the University of the Free State?
 - 1.3. What, in your opinion, is the place (where does it stand) of research in Sport and Exercise Medicine at the University of the Free State?

INTERVIEWEE NOTES	CATEGORY

2. Stakeholders in SEM research:

- 2.1. In your opinion, which disciplines are essential role-players or stakeholders in a sports and exercise medicine research programme (e.g. university, external, and interdisciplinary)?
- 2.2. What, in your opinion, are challenges of interdisciplinary research at the University of the Free State?

INTERVIEWEE NOTES	CATEGORY
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Research strategy:

- 2.3. How do you understand the current research strategy of the University of the Free State? (Appendix A)
- 2.4. How, in your opinion, does research in your own department fit in with the current research strategy of the University of the Free State?
- 2.5. How, in your opinion, does research in sport and exercise medicine fit in with the current research strategy of the University of the Free State?

INTERVIEWEE NOTES	CATEGORY
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3. Challenges in research:

3.1. In your opinion, what challenges are there currently and over the next five years in terms of:

3.1.1. Academic challenges for researchers in sport and exercise medicine disciplines (or your own discipline); and

3.1.2. Challenges for leaders and managers in research?

INTERVIEWEE NOTES	CATEGORY
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4. Solutions in research:

4.1. What, in your opinion, is needed to successfully master these:

4.1.1. Academic challenges?

4.1.2. Leadership and management challenges?

INTERVIEWEE NOTES	CATEGORY
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5. What difficulties might be encountered that can prevent the successful attainment of these challenges?

INTERVIEWEE NOTES	CATEGORY
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6. Skills and knowledge:
- 6.1. What do you think are the disciplinary knowledge and status needed by researchers?
 - 6.2. What leadership skills are, in your opinion, required by researchers and leaders or managers of research programmes?
 - 6.3. What managerial skills are in your opinion required by researchers and leaders or managers of research programme?

INTERVIEWEE NOTES	CATEGORY
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7. Which aspects or criteria would you suggest to be included in a strategic guide for the development and implementation of a research programme in sports and exercise medicine at the University of the Free State (or your own discipline)?

INTERVIEWEE NOTES	CATEGORY
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8. Other comments or recommendations that may be useful in the development of a research strategy for SEM at the UFS.

INTERVIEWEE NOTES	CATEGORY
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APPENDIX A3-A**MISSION REGARDING THE RESEARCH STRATEGY OF THE UNIVERSITY OF THE FREE STATE****MISSION OF THE UFS:**

The UFS Research Management and Implementation Plan is guided by the University's mission:

The pursuit of scholarship as embodied in the creation, integration, application and transmission of knowledge by promoting the following within the ambit of financial sustainability:

- *An academic culture;*
- *Critical scientific reflection;*
- *Relevant scientific education;*
- *Pure and applied research;*
- *Community service; and*
- *Development of the total student as part of its academic culture.*

The overarching goal of the UFS Research Strategy (2009 – 2013) is explicitly stated as the desire:

To foster a contented, well connected and vibrant critical mass of researchers, especially in strategic priority areas, who champion the University's contribution to

- *National growth;*
- *Regional advancement; and*
- *Global excellence.*

This defined goal clearly articulates the UFS's commitment to contribute increasingly to national and regional development and growth through the delivery of people, knowledge, innovations and solutions in selected areas that can serve the interests of the country and the continent. This can only be done if the University is also in a position to contribute to global excellence in research.

The UFS has committed itself to becoming a research-intensive university. This type of university has as its main feature that the nature and content of its teaching, learning and community service are shaped by its research base.

APPENDIX A4

TABULATED RESULTS FROM SEMI-STRUCTURED INTERVIEWS

TABULATED RESULTS FROM SEMI-STRUCTURED INTERVIEWS
Table 4.1: The Status of Sport and Exercise Medicine at the University of the Free State

POSITIVE	NEGATIVE
<p>1. Current status</p> <ul style="list-style-type: none"> • SEM is part of UFS; has its niche [I10] • Status improved in the last year [I3] • Excellent /glamorous/good[I6; I7; I8] • Activities are visible at the UFS; e.g. wellness [I8] <p>2. Growth of SEM at the UFS</p> <ul style="list-style-type: none"> • There is a pledge from FHS to support growth of SEM [P2] • Growth phase [I4] • Small but growing unit [I10] • Can play very important role in Faculty of Health Sciences [I5] <p>3. Research</p> <ul style="list-style-type: none"> • High quality of research at Masters level [I2; I9] • Using good principles of research[I10] • Research protocols good [I8] • Unit had trouble finding its place in the faculty; but is making good progress in research [I10] • SEM research at UFS is of high quality in comparison with other disciplines [I2] • Current research in SEM at UFS appropriate and useful and practical [I9] <p>4. External status</p> <ul style="list-style-type: none"> • Making a good clinical national contribution[I3] <p>5. Status of SEM as academic discipline</p> <ul style="list-style-type: none"> • Up and coming discipline [P2] • Important field of study [I3;I7] • Multi-professional discipline [I5] • Cutting edge discipline [I7] • Sport has high status in society [I9] • High profile of sport demands proper systems for injury management and prevention [I9] <p>6. Recommendations for academic growth</p> <ul style="list-style-type: none"> • A niche is applied science to optimise human health and performance by using exercise physiology [I12] 	<p>1. Current status</p> <ul style="list-style-type: none"> • Status low because of lack of knowledge of SEM among academics [I4; I11] • Status inadequate [I2] • Not recognition it deserves[I2] • Not prominent, should be more prominent[I7] • Boundaries of SEM uncertain (e.g. collaboration with biokinetics [I7] <p>2. Growth of SEM at the UFS</p> <ul style="list-style-type: none"> • Post structure not supporting Faculty decision for growth [P2] • 3 years growth period expected [P2] • Challenge to balance a support service with an academic department [I3] <p>3. Research</p> <ul style="list-style-type: none"> • Research output and contribution can improve nationally and internationally [I3] <p>4. Recommendations to improve status</p> <ul style="list-style-type: none"> • Should use faculty forum to gain recognition [I7] • Should be an autonomic department/entity [I2; I7]

Table 4.2: The role and place of research in SEM at the UFS

ROLE [HOW IMPORTANT SEM RESEARCH IS]	PLACE [WHERE SEM RESEARCH SHOULD BE POSITIONED AT THE UFS]
<p>1. Educational and academic</p> <ul style="list-style-type: none"> • To form basic grounding for/integral part of education [under and postgraduate [P1;I4; I2] • To answer questions in the discipline of SEM [P2;I9] • Research defines the Unit of SEM [I4] • Critical part of the academic programme [I4; I2; I12] • Of cardinal importance [I2; I9] • Provide evidence based basis for discipline[I6] • Establish best practices in SEM[I8] • Improve service delivery in SEM[I8] • Centre of Excellence at UFS [I10] • Research draws people [I11] <p>2. Significance</p> <ul style="list-style-type: none"> • Sport plays an important role in society, community wellness and politics [I3] • Development of new knowledge can make a meaningful contribution to society – conditioning, prevention of injury, the healing process [I3] • Contribution to development of sport [I3] • Cutting edge medicine – athletes lead; scientists follow [I4; I7] • Leader in general/ mainstream medicine research [I4] • Showcase from publications [P2; I2] • To develop the field of SEM [P1; I4; I6] • Stimulation of growth [P2; I6; I11] • Centre of Excellence that addresses needs of the industry [I10] <p>3. Financial</p> <ul style="list-style-type: none"> • Income stream from publications [P1;I11] • Research ensures financial income/subsidy [P1] • Marketing possibilities [I7] <p>4. General</p> <ul style="list-style-type: none"> • Role of research depends on focus of the University/Faculty [e.g. teaching vs. research] [I12] 	<p>1. Academic placement</p> <ul style="list-style-type: none"> • Should have a prominent place in research in the FHS [P1; I6; I10] • Belongs in School of Medicine[I10] • Full support of Faculty of Health Sciences [P2] • Critical part of academic programme [I4] • Head of department determines place and direction [I4] • Multidisciplinary [I2; I5; I8; I10] • Should be independent [I2;I10] • Development of a niche area [I5] <p>2. Focus areas</p> <ul style="list-style-type: none"> • Can be better focused [I10] • Primary care/wellness/exercise medicine is an important growth area [P2] • Includes components of basic sciences and applied [clinical sciences] [I12] • Cutting edge research for smaller communities [I10] • Should assist in promoting/supporting sport at UFS [I11] • Wellness [I8] • Should address needs of broad industry [sport] [I10] • Should use existing opportunities for SEM at UFS [I10] • Diagnostic role [I10] • Prevention of illness and injury role [I10] <p>3. Staff positioning</p> <ul style="list-style-type: none"> • 25% staff time excluding supervision [P1] • One international publication per staff member per year; or minimum requirement for annual publications per staff member [P1] • Staff must obtain PhD and supervise Masters and PhD students • Collaborative partnerships [P1] • Should make up at least a third of Masters programme credit [I6] • Need “constant client” for full M and D research in SEM [I10] <p>4. Networking</p> <ul style="list-style-type: none"> • Generalist discipline that needs to work with specialists [I10] • Should collaborate with other universities [I9] • Should form an integral part of Faculty of Health Sciences in health promotion and wellbeing; treatment and prevention of illness and injuries and sports injuries [I3] <p>5. Recommendations</p> <ul style="list-style-type: none"> • Build databases [I10] in department or for specific populations

Table 4.3: Essential role players and stakeholders in a Sport and Exercise Medicine Research programme

1. INTERNAL ROLE PLAYERS	2. EXTERNAL ROLE PLAYERS	3. STAKEHOLDERS (PART OF OWNERSHIP)
<p>1.1. University support structures</p> <ul style="list-style-type: none"> • UFS research directorate/management [P1; P2; I12] • DIRAP [Department of institutional research] [I12] • UFS Postgraduate School [P1; I12] • Human resources [P1; P2; I2] • UFS International Office [I6; I12] • UFS sport [I11] • Student administration [I12] • UFS Finance department [I12] • UFS Marketing/fundraising department [I12] • Alumni [P1] <p>1.2. FHS support structures</p> <ul style="list-style-type: none"> • SoM executive [P2] • Departmental staff and researchers [P1] • Colleagues [P1] • Biostatistics [I4; I2] • Medical writers [I4; I9] • Internal funders [P1] 	<p>2.1. External academic role players</p> <ul style="list-style-type: none"> • Funding agencies [P1; P2] <ul style="list-style-type: none"> ○ MRC for community driven projects [I11; I12] ○ NRF [I11; I12] ○ Other • Professional Boards/Associations [P1; P2] • Policy makers [E.g. HPCSA; DoH]; [P2; I9] • Other universities [small discipline with only four departments in SA should have inter-university cooperation towards a generic; country-wide research programme to let the experts countrywide take the lead [I5] • UCT Exercise science and sports medicine [I11] • National and International SEM Centres P1 • Colleges of Medicine [P1] <ul style="list-style-type: none"> • CSEM [I10] <p>2.2. External support structure role players</p> <ul style="list-style-type: none"> • Industry; private sector [P1; P2; I4; I2 I10] • Pharmaceutical industry [I4; I8] • Supplement industry [I5] • Fitness industry [I5] • Organised sport/coaches [I3; I6; I8; I10] • Underemphasised sport; e.g. gymnastics; karate; judo; soccer [I8] • COHSASA [accreditation bureau for healthcare facilities] [P2] • Government Departments [I3] 	<p>3.1. In FHS</p> <ul style="list-style-type: none"> • Physiotherapy [P2; I2; I3; I5; I8; I9; I10; I11] • Nutrition and dietetics [I2; I3; I5; I7; I8; I9] • Family Medicine [P2; I2; P10; I2] • Orthopaedics [P2; I2; I7; I10] • Pharmacology [P2; I3; I5; I7] • Division SEM [P2; I2; I9] • Physiology [I2; I3; I5] • Occupational therapy [I5; I9; I10] • SEM is a Faculty of Health Sciences programme. Faculty Board must take responsibility/ownership [P1; P2] • Internal medicine [P2; I2] • Anatomy [I3; I5] • Diagnostic radiology [I3; I10] • Basic medical science [I7; I10] • Haematology [I7] • Nursing [I8] • Laboratories [I8] • Ophthalmology [I3] • Cardiology [I3] • Paediatrics [P2] • Biochemistry [I3] • Wellness grouping in Faculty [P2] <ul style="list-style-type: none"> ○ Community Health [Employee Assistance] ○ Occupational Health ○ Work wellness <p>3.2. Other faculties:</p> <ul style="list-style-type: none"> • Exercise and sport science/biokinetics [P2; I2; I3; I5; I7; I8; I10] • Psychology [I2; I8; I11] • Other Faculties [P1] <p>3.3. General</p> <ul style="list-style-type: none"> • Stakeholders are defined by the project [I4] • Broad spectrum; multi-professional [I4; P1]

Table 4.5: Understanding of the research strategy of the UFS

<p>1. Character of the UFS research strategy</p> <ul style="list-style-type: none"> • UFS is a research active university but not research intensive, and plans to become research intensive [P1; I9; I11] • Current strategy to be top 3 in SA within 3 years is ambitious; but positive/admirable [I11] • Politically correct [I4] • Striving for excellence [I4] • Community driven [I4] • Research is of the utmost importance for any university; therefore the strategy should be supported [I11] • Policy is based on the mission of the University <ul style="list-style-type: none"> ○ Teaching to establish an academic culture ○ Research: Basic, but also applied research is a need ○ Community service – focus on local development and a global contribution <p>2. Application of the UFS research strategy</p> <ul style="list-style-type: none"> • Research culture exists only in pockets at UFS; e.g. nutrition [I6] • Other faculties probably stronger in research than FHS [I9] <p>3. Criticism towards the UFS research strategy</p> <ul style="list-style-type: none"> • University research strategy is not supported by the University [I7] • Strategy should be practically executable, but is not in terms of available research time and resources [I7] • Policy fails to stimulate development of a research culture [I2] • UFS Chancellor promotes local issues as primary focus areas; but vice-chancellor promotes international publication on internationally relevant focus areas. [I8] needs to be redressed by UFS; senate etc; open discussion necessary. • UFS research policy makers need to listen to/consult the academics when establishing policy and promotion criteria [I8] • Policy should support transfer of knowledge to benefit the UFS and the community [I2] 	<p>4. Clusters and niche areas</p> <ul style="list-style-type: none"> • Positive: <ul style="list-style-type: none"> ○ Cluster system groups experts together [P2; I6; I8] ○ Melting pot for development and growth of ideas [P2] ○ Clusters maintain a balance between highlight periods and low yield periods of individuals/groups [P2] ○ Maintains momentum [P2] • Negative: <ul style="list-style-type: none"> ○ Clusters do not accommodate health sciences [I7] ○ Not sufficient funding in clusters [I8] ○ People are not aware of possibilities in clusters [I8] • Recommendations: <ul style="list-style-type: none"> ○ Possibilities in research in education [e.g. simulation] [I8] ○ Transformation as topic to fit into cluster [I8] ○ Communities as topic to fit into cluster e.g. sport community or UFS community [I8]. <p>5. Marketing</p> <ul style="list-style-type: none"> • Universities get their reputation from research [front page] [P2] • New inventions has major marketing value for universities [Opportunity for SEM] [P2] • UFS must benefit from research within [I9] <p>6. Recommendations regarding the UFS research strategy:</p> <ul style="list-style-type: none"> • The five focus areas of the strategy are more important components than the main aim - the strategy should be used to select research in one/more of the following [I12]: <ul style="list-style-type: none"> ○ Enabling environment ○ Funding forum for research – [?commercialisation of SEM to fund academic research; short courses] ○ Focus areas - clusters ○ Leaders and mentors ○ Development of the next generation academics [final outcome of this study] • Scientific growth should be supported [I2] • Policy should stimulate creativity [I2] • Policy should stimulate new thinking [I2] • Follow examples of successful research departments [I7] <p>7. Sustainability of research at the UFS</p> <ul style="list-style-type: none"> • Support to find research funding is needed [I6] • Young researchers should be pooled with experienced [old] researchers to ensure sustainability of research [P2]
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Table 4.6: How own departmental research and SEM research fit in with the current research strategy of the UFS

INTERVIEWEE DEPARTMENT	DIVISION SEM
<p>1. Positive findings</p> <ul style="list-style-type: none"> • Departmental factors <ul style="list-style-type: none"> ○ Nutrition and dietetics has an established research programme [I6] ○ Nutrition and dietetics has an established research culture which makes it easy and enjoyable to do research in the department [I6] • FHS/University factors <ul style="list-style-type: none"> ○ SoM will do more research since M Med students now need to produce research [I10] <p>2. Negative findings</p> <ul style="list-style-type: none"> • Departmental factors <ul style="list-style-type: none"> ○ Other departments not research intensive yet [I9] • Faculty and University factors <ul style="list-style-type: none"> ○ Academic <ul style="list-style-type: none"> ▪ Current strategy is to promote international publication; but local and national issues and development are important to address with excellent research [I8] ▪ Promotion criteria focusing on international research will negatively influence research on local and national issues. Not sustainable for young researchers [I8] ▪ Topics in health care that need attention in Africa and South Africa are not the same as international research interest [I8] ○ Unique character of FHS <ul style="list-style-type: none"> ▪ FHS [SoM] is service orientated and not research intensive because of clinical work load [I10;I2;I11] ▪ Research incentives are not comparable with benefits of limited private practice [I11] ▪ Promotion in DoH is not dependent on research; which is a disincentive [I11] ○ Communication <ul style="list-style-type: none"> ▪ The University has poor communication with FHS [I10] ▪ University needs to understand that better communication regarding unique FHS goals and challenges is needed [I10] <p>3. Recommendations</p> <ul style="list-style-type: none"> • Keep affiliated lectures motivated to publish once a year [I9] • Research component in diploma course as well and attempt to publish [I9] • Trick is to use available data and convert it into a research report [I9] 	<p>1. Place and character of SEM research at the UFS</p> <ul style="list-style-type: none"> • Place <ul style="list-style-type: none"> ○ SEM is an official niche area within the health and wellness cluster [P2] ○ Unique opportunities exist for SEM research within UFS research strategy [I10] ○ SEM research programme fits in with UFS research strategy [I2;I9; I10] ○ SEM makes a valuable contribution to the research strategy [I3] ○ SEM is ideal for interdisciplinary research [I10] • General character <ul style="list-style-type: none"> ○ Research in SEM is essential for sustainability of department [I11] ○ SEM needs Faculty support for recognition in University research cluster program [P2] ○ SEM lends itself to applied/practical research [I10] ○ SEM research on elite athletes can be applied to broader communities [I10] • Character of content <ul style="list-style-type: none"> ○ Possible niche areas <ul style="list-style-type: none"> ▪ UFS staff wellness [P2] ▪ Community wellness [I10] ▪ Sport specific [I4; I10] ▪ Sports nutrition [I6] <p>2. Factors regarding UFS/Faculty of Health Sciences research strategy</p> <ul style="list-style-type: none"> • Faculty of Health Sciences has long established niche areas; [E.g. toxicology] [P2] • Strategic placement of SEM research in niche areas can draw DoH funding [P2] • Establishment of SEM as research area in medicine needs to precede establishment of SEM at the UFS [I5] • SEM is a small; young group within a big broader discipline – difficult to make impact [P2] <p>3. Recommendations</p> <ul style="list-style-type: none"> • Research to fit in with mission and vision; goals; aims of University and Faculty [P1; I11] • Work within research policy and research plan of the UFS [P1] • Research intensive – all functions shaped by its research [P1] • Focus on supportive and stimulating institutional research environment [P1] • Prioritise research and postgraduate research in a department [P1] • SEM research should address the needs of the sport industry [I10]

Table 4.7: Challenges of interdisciplinary research at the UFS

<p>1. Vision</p> <ul style="list-style-type: none"> • Buy-in of University management [I5] • Needs visionary leader for interdisciplinary research [I7] • Recognition by stakeholders of the bigger “us” [P2; I7; I8] • Focus on own/departmental gains from research [I8] • Recognition of output [current drive] vs. impact [vision] [P2] • No good examples of successful interdisciplinary research at UFS in place [I7] • Lack of creativity of primary researchers /broad thinking [I8] • Different disciplines have different points of view/paradigms that are challenging to blend [I12]; to find common “language”. • To motivate people from different academic backgrounds to listen/want to understand each other ‘s points of view [I12] <p>2. Leadership and management:</p> <ul style="list-style-type: none"> • SEM research unit should be independent of an academic department [I4] • All stakeholders want to have say in management and take credit for interdisciplinary programs [I9] • To answer “what is in it for me?”/put own or departmental interest first [I9;I11; I12] • Communication [I10] • Trust [I10] • To establish management/leadership hierarchy in collaborative research [I10; I11] • Create win-win situations [I11] • Placement of the niche areas – who takes ownership and for what reason? [P2] <p>3. Resources</p> <ul style="list-style-type: none"> • Funding [I5] of: <ul style="list-style-type: none"> ○ Human resources [P2] ○ Growth of human resources[P2] ○ Support systems [P2] • Convincing established groupings to invest seed money in a young discipline [P2] • Fair distribution of credits/income/subsidy [I7; I9] • Allocation of time for interdisciplinary work vs. “own: [I9] 	<p>4. Academic</p> <ul style="list-style-type: none"> • Quality control/minimum standard setting for all role players; e.g. ethics committee approval [I4; I6] • Effective academic multiprofessional/interdisciplinary coordination [I3;I4] • Interdisciplinary distribution of academic credits [degrees and publications] per project [I5; I9] • Differences in approach to research; E.g. methodology [I6] • Concentrate of the following research focus areas [I3] <ul style="list-style-type: none"> ○ Exercise physiology and biochemistry ○ Energy metabolism and nutrition ○ Cardiovascular/respiratory ○ All physiological adaptations to training ○ All medical related aspects of sport – preventative and curative ○ Ergogenic substances ○ Environment – temperature, altitude ○ Chronic diseases and exercise ○ Recovery after sport ○ Wellness ○ Chronic disease/metabolic clinics <p>5. New discipline to establish</p> <ul style="list-style-type: none"> • Dissemination of information about new discipline; E.g. information sessions; especially interdisciplinary [I5] • No mechanisms in place to promote interdisciplinary research [I7] • Traditionally, limited interdisciplinary research is done at the UFS [I3] • Interdisciplinary research will be stimulating [I2] • Interdisciplinary research will broaden knowledge at the UFS [I2] • Interdisciplinary research will be to the benefit of the general academic atmosphere at the UFS [I2]
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Table 4.8: Academic and management challenges and solutions for researchers in SEM or in own discipline

CHALLENGES	SOLUTIONS
EXTERNAL CHALLENGES	
<p>1. Benchmarking</p> <ul style="list-style-type: none"> • To be internationally competitive [I4] • To be nationally competitive [with UCT] [I7] • Establishment of excellent research programme with academic credibility [I4; I5] • Gain external recognition for research [I9] 	
<p>2. Competition</p> <ul style="list-style-type: none"> • To compete with role players with ample human and financial resources; E.g. FIFA; IOC [I4] • To know and have intimate knowledge of the strengths and limitations of other research programmes [national and international] and plan accordingly [P1] 	
<p>3. Collaboration</p> <ul style="list-style-type: none"> • To decide which programmes to do in collaboration with others or share expertise [P1] • Form professional networks within fields of research [P1] 	
INTERNAL CHALLENGES	
<p>1. Focus</p> <ul style="list-style-type: none"> • Create a niche/unique focus area/s [I3;I7] • To be creative [I2] • To be at the forefront of new knowledge [I2] • Dilemma with selection of research topics by students or department [former is better student education][I10] • Legal and ethical implications of applied research [I10] 	<p>1. Focus</p> <ul style="list-style-type: none"> • To develop an intelligent research management strategy – a role as leader; manager; entrepreneur in research [P1] • For the head of research to Identify new opportunities in the external research funding environment [large scale funding; new partnerships][P1] • Careful selection of research focus areas: <ul style="list-style-type: none"> ○ Find balance between appropriate focus areas of local; national and international interest to comply with university policy; needs and opportunities [I8] ○ Select appropriate issues in health care to address even if not internationally publishable [I8]
<p>2. Strategy and growth</p> <ul style="list-style-type: none"> • First 3 years much input with small outcomes [I5] • Pressure for early outputs from university [I5] • Simultaneous development of academic programme with research programme [I5] 	<p>2. Strategy and growth</p> <ul style="list-style-type: none"> • Leadership <ul style="list-style-type: none"> ○ Strive for excellence [I4] ○ Inspire young academics [I4] ○ Establish scientific thought patterns [scholarship?] [I4] ○ Set an example as an academic leader [I4; P1]

Table 4.8: Academic and management challenges and solutions for researchers in SEM or in own discipline (continued)

<ul style="list-style-type: none"> • Recognition of academics/units for research [I9] • To establish a research culture [P1;I6] • Deciding which programmes to phase out in time [P1] • To implement research strategy successfully and be productive [I7] • To find good ideas [I10] • To find strong leadership in research in FHS [I9] • To create insight into SEM in the FHS [I4] 	<ul style="list-style-type: none"> • Growth <ul style="list-style-type: none"> ○ To develop an intelligent research management strategy – a role as leader; manager; entrepreneur in research [P1] ○ Create, emphasise and develop full multiprofessional/interdisciplinary cooperation [I3; I4; I9] ○ Develop niche area to a level of national and international excellence [I3] ○ Develop a system that is inviting to researchers in other departments to fit in with the interdisciplinary SEM research programme [I9] • Specific recommendations <ul style="list-style-type: none"> ○ To bring in speakers from foundations; corporations; government agencies that offer competitive scholarships; research funding opportunities and visiting professorships at leading universities around the world [P1] ○ Look at examples of successful research departments [Prof Cronje] [I7] ○ Establish full research Masters and PhDs [I12] • Implement intensive research training programmes: research design workshops; public seminars; academic writing sessions [P1] • Design regularly scheduled seminars; make it worthwhile; bring in top researchers speaking on cutting edge research issues [P1] <ul style="list-style-type: none"> ○ Conversion rate of research to publication should be high [I10] ○ Include generic soft skills training/course work in research programme; e.g. [I12] <ul style="list-style-type: none"> ▪ Funding applications ▪ Project management ▪ Financial management ▪ Public speaking • Good strategic planning [I5; I6] <ul style="list-style-type: none"> ○ Use external resources for strategic planning [I5] ○ For the head of research to Identify new opportunities in the external research funding environment [large scale funding; new partnerships][P1] ○ Compose a research development plan [P1] ○ Set clear and explicit goals on a year by year basis [e.g. 1 international publication per year] [P1] ○ Monitor and review achievement of goals regularly [P1] ○ Regular reflection [I5]
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Table 4.8: Academic and management challenges and solutions for researchers in SEM or in own discipline (continued)

MANAGEMENT AND QUALITY ASSURANCE CHALLENGES	
<p>1. Institutional [I11]</p> <ul style="list-style-type: none"> • University managers have other challenges than research [e.g. personnel; budget] [I11] • UFS has poor research support systems – it is relatively difficult to do research at UFS [I11] • A research culture has not been established yet at UFS [I11] • There are no research funds or fundraising systems at the UFS [I11] <p>2. Provincial Department of Health</p> <ul style="list-style-type: none"> • Working conditions create negativity among personnel which discourages research [I11] • 70/30 work ratio with DoH does not support research [I11] 	<p>1. Management</p> <ul style="list-style-type: none"> • Strict control [I4] • Set processes and stick to them [I8] • Build strong relationships with industry/clients [I10] • Listen to clients [I10] • Be realistic but strict with goal setting [P1] • High quality of work [I4] • Reduce workload in other areas e.g. lecture load [I6] • Good communication to students and staff [P1] <p>2. Institutional:</p> <ul style="list-style-type: none"> • Strategic <ul style="list-style-type: none"> ○ Policy makers should consult and listen to academics regarding research policy [I8] ○ Emphasise and develop multiprofessional cooperation [I4] ○ Find ways to optimise the work of multidisciplinary groups by limiting duplication [I3] ○ Create a dedicated research management and support structure [separate from the dean], including research fundraising structures [I11] ○ To establish strong leadership in research in the FHS [I9] ○ Promote a research culture in academic departments [I2;I9] ○ Convince University to support the programme [I3] • Human resource management <ul style="list-style-type: none"> ○ Nurture institutional recognition and respect for current researchers at UFS [I8] ○ Address staff shortage in SoM [I11] ○ Address double lecture load/address heavy teaching loads [I6] ○ Address heavy clinical loads [P1] <p>3. Provincial Department of Health</p> <ul style="list-style-type: none"> • Use UFS funds and staff to do research [I11]

Table 4.8: Academic and management challenges and solutions for researchers in SEM or in own discipline (continued)

<p>3. Resources</p> <ul style="list-style-type: none"> • Financial resources <ul style="list-style-type: none"> ○ Resources/money [I2; I3;I9] ○ Assimilation of expertise in new department [I5] ○ Funding of this bridging phase; internal or external [I5] ○ To be first to access in an efficient manner the information on new funding and development opportunities to strengthen research initiatives ○ Create the need for staff/students to apply for funding opportunities [P1] ○ Funding of research [I3;I12] ○ To support the SEM program with sufficient resources [I4; I8] • Human resources <ul style="list-style-type: none"> ○ To establish research teams [I6] ○ Management of change in expectations from postgraduate students; e.g. researchers must now find own funding; do project management etc – more than the study itself[I12] ○ Management of personalities/people [I6] ○ To identify specialists [I3] ○ To find good students [I12] ○ Create research capacity [I7] ○ Attract full time researchers [I7] ○ Attract other expertise to department [I7] ○ M students may not be interested in research [I10] • Time <ul style="list-style-type: none"> ○ Time to dedicate to research [I3;I6; I9] ○ Double lecture load [I6] • Physical resources <ul style="list-style-type: none"> ○ Limited apparatus for research [I3] ○ Lack of resources due to low priority of research in government and Faculty of Health Sciences [I9] 	<p>4. Resources</p> <ul style="list-style-type: none"> • Financial resources <ul style="list-style-type: none"> ○ Funding [I3] ○ To follow up and support applications to improve chance of success of funding [P1] ○ Head of research will have to maintain a balance between academics/research and the business world [for funding] [P1] ○ Create third income stream [I12] <ul style="list-style-type: none"> ▪ Know all possible sources of funding /research grants [P1] ▪ Encourage staff and target individual staff to apply for major funding/grants [P1] ▪ Funding sources from marketing department [I5] • Human resources <ul style="list-style-type: none"> ○ Assimilate expertise <ul style="list-style-type: none"> ▪ Identify appropriate academic expertise [I3] ▪ Assimilate a limited pool of qualified postgraduate students and academics; retain the best and most promising [P1] ○ Human resource management <ul style="list-style-type: none"> ▪ Interview all staff and determine their research profiles; problems; personal goals [P1] ▪ Breed success and acknowledge/reward success [I10] ▪ Celebrate every staff achievement in research; circulate good news; create reward systems; build a culture of acknowledgements of big and small achievements [P1; I3] ▪ Make achievement of PhDs a priority [P1] ○ Recommendation for human resource expertise <ul style="list-style-type: none"> ▪ Identify or appoint a departmental fundraising officer and marketing officer [I12] ▪ Find co-supervisors in other departments to promote interdisciplinary research [I9] ▪ Research co-ordinator/driver [I10] ▪ Include non-medical researchers [I12] ▪ Inclusion of a scientific writer [I4; I10] ▪ Inclusion of biostatisticians in Unit [I4] ○ Physical resources <ul style="list-style-type: none"> ▪ Make use of opportunities represented in new technologies for research; e.g. data analysis software [P1] ▪ Ensure that staff and students are exposed to newest technologies for community and research[P1]
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Table 4.9: Potential difficulties and solutions in attainment of the goals

DIFFICULTIES	SOLUTIONS
<p>1. Strategic</p> <ul style="list-style-type: none"> • Failure to see the big picture [I4] • Representation [I4] • Not focussed [P1] 	<p>1. Strategic</p> <ul style="list-style-type: none"> • Good leadership [P1] • Good communication [P1] • Shared ownership of goals/strategy[I12]

<ul style="list-style-type: none"> • Tipping point in research culture not reached [I10] 1. Management • Not informed or not using opportunities for research support from UFS structures [P1] • Difficult to establish research partnerships [P1] • Not informed/lack of understanding of the SEM programme [I7; I9] • Lack of academic support [I2] • Own departmental agendas and priorities [I3] • Professional guarding and envy [I4] • To attract appropriate students [I5] 2. Resources • Human resources <ul style="list-style-type: none"> ○ Shortage of staff/ high work load [P1; I3] ○ No researchers as such appointed [P1] ○ Finding suitable people to work in the research unit [I4] ○ Part-time students <ul style="list-style-type: none"> ▪ problematic in terms of commitment/priorities [I5] ▪ problematic in terms of potential for funding from NRF and MRC etc [I5] • Financial resources <ul style="list-style-type: none"> ○ Lack of money [I4;I2; I6; I8] ○ Too much money [I4] ○ Buy-in of senate without early outputs in first 3-4 years /seed money[I5; I10] ○ Find funding for research assistance [P1] • Time <ul style="list-style-type: none"> ○ Lack of time to dedicate to research[I4;I2; I3 I6; P1; I8] • Infrastructure [I5] <ul style="list-style-type: none"> ○ Lack of physical space [I5] ○ Lack of research facilities [I5] 	<ul style="list-style-type: none"> 2. Operational • Managerial processes to be in place [P1]
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Table 4.10: Disciplinary knowledge and status of researchers and research leaders

<p>1. Knowledge</p> <ul style="list-style-type: none"> • Disciplinary knowledge [I3;I4; I9; I10] <ul style="list-style-type: none"> ○ Disciplinary insight [I2;I7] ○ Multiprofessional / interdisciplinary knowledge for leader [I4; I8] ○ Expertise in certain focus areas [I6; P1; I7] • Research knowledge <ul style="list-style-type: none"> ○ Knowledge of different types of research methodology ; e.g. quantitative; qualitative and mixed methodology[I6; I8; I9; I10] ○ Knowledge of research funding opportunities [I6] ○ Knowledge of research and supervision [P1; P8] ○ Knowledge of research ethics [I9] ○ Ability to translate and apply principles of research into own discipline [I10] • Skills <ul style="list-style-type: none"> ○ Writing skills/knowledge unique to own discipline [I4] ○ Know industry [I5] <p>2. Experience</p> <ul style="list-style-type: none"> • Experience on ground level [I5] • Previous exposure to discipline on wide level [I5] <p>3. Status</p> <ul style="list-style-type: none"> • Any doctor with proper knowledge of research methodology can do research [I11] • Respected/status in the discipline [I2;I3;I12] • Published expert [I3]

Table 4.11: Leadership characteristics of researchers and leaders in research programmes

<p>1. Inspirational characteristics</p> <ul style="list-style-type: none"> • Motivational , inspiring[I3;I4; P1; I7; I12] • Passion/love for discipline [I3;I10; I12] • Stature and character “idol”/lead from the front.[I4; P1; I7] • Ability to lead a team [I2;I11] • “Champion” for the discipline [I12] • Instil trust in leader [I5] <p>2. Managerial skills</p> <ul style="list-style-type: none"> • Communication skills, listening skills, soundboard [P1; I4; I10] • Skills to work with different levels of knowledge and experience[I4; I10] • Not too critical [I4; I10] • Delegating skills [I2;I6] • Coordinating skills[I4] • Time available for students[I4] • Organisational skills [I6] • Autocratic leadership skills [I2] • Strong leadership [I2] • Interpersonal skills [I9] • Supervising skills [research] [I6] • Participating [I7] <p>3. General leadership characteristics</p> <ul style="list-style-type: none"> • Show leadership in daily life and behaviour [I3] • Take responsibility in success and failure [I3] • Integrity [I3] • Sensitivity [I3] • Bravery [I3] <p>4. Vision/insight</p> <ul style="list-style-type: none"> • Wisdom /good judgement[I3] • Visionary/bigger picture [I7; I10] • Leader determines the dynamics of the group [I5]

Table 4.12: Management skills of researchers and leaders in research programmes

<p>1. Financial management, skills [I2;I3;I4; I6; I11]</p> <ul style="list-style-type: none"> • Equal distribution of resources [I9] • Fundraising skills [I12; P1] • Strategic financial management [I12; P1] <p>Knowledge of internal and external sources of funds [P1] Knowledge of policies and procedures for obtaining external funding [P1] Knowledge of institutional and governing board policies and guidelines concerning budgetary operations [P1] Skills in preparing and managing programme budgets [P1] Ability to plan for long-range special programmes and activities [P1]</p> <p>2. General management skills [I2]</p> <ul style="list-style-type: none"> ○ Planning skills[I2; I3] ○ Goal setting [I2;I10] ○ Comprehensive planning [I2] ○ Must work according to a vision and mission [I2] ○ Identification of boundaries and limitations[I2] ○ Ability to lead planning sessions [I3] <ul style="list-style-type: none"> • Operational management skills <ul style="list-style-type: none"> ○ Process management skills [I9] ○ Measurement of progress skills [I10] ○ Appropriate utilisation of resources [I2] ○ Administrative skills [I3] ○ Technical skills [I3] ○ Organisational skills {I3} • Leadership skills [I3] <ul style="list-style-type: none"> ○ Control skills[I2] ○ Previous management experience [I5] <p>3. Project management skills [I2;I9; I11; I12]</p> <ul style="list-style-type: none"> • Coordination of different processes within programme/department [I9] • Skill to implement a plan [I2] <p>4. People management skills [I2;I3;I11]</p> <ul style="list-style-type: none"> • Conflict and problem management skills [I3] • Stress management skills [I3] • Personnel selection skills [I3] • Interpersonal relationship skills [I3] • Professional development of faculty and staff skills [P1] • Ability to maintain faculty morale [P1] <p>5. Specific research management skills</p> <ul style="list-style-type: none"> • A combination of exceptional disciplinary knowledge and experience together with good leadership qualities and management skills [people skills; financial skills] will be required - [I5] • To develop; plan; implement; monitor; evaluate and adapt a research framework [P1] • Knowledge of institutional challenges [I3] • Ability to promote high quality research in the School/programme [P1] • Ability to promote Faculty research [P1]

Table 4.14: Criteria to be included in a strategic guide for development and implementation of a research programme in SEM

<p>1. Strategy and Management</p> <p>Strategy</p> <ul style="list-style-type: none"> • Priority setting • Forward thinking [I11] • Ethical principles [I2] • Vision; mission; objectives – short/med/long term [I9; I11; I12] • Consensus on strategy and goals [I12] • Research related criteria <ul style="list-style-type: none"> ○ Create a departmental research culture [I11] ○ Create space for research within department [I11] <p>Focus</p> <ul style="list-style-type: none"> • Establish focus areas/niche areas to avoid duplication with other institutions [I6; I7; I10] • Strategic development and implementation with University professions council [I5] • Focus areas in research must address needs [answer necessary questions] [I9] • Integrated research programme with common goal [Focus areas] [I9] <p>Management</p> <ul style="list-style-type: none"> • Establish a clear departmental policy [I10] • Establishment of an interdisciplinary scientific committee [I6] • Have regular research meetings [I11] • Detail of flow of protocols [I2; I4] <p>External quality assessment [I4]</p> <ul style="list-style-type: none"> • Planning <ul style="list-style-type: none"> ○ SAQA and DoE requirements must be met [I5] ○ Ethics committee requirements [I2] <p>Insurance requirements [I2]</p>	<p>2. Inputs</p> <p>Resources and resource allocation</p> <ul style="list-style-type: none"> • Human resources <ul style="list-style-type: none"> ○ Criteria for identification of team [I4] ○ Contract/agreement with researchers/students [I6] ○ Identify and address research inactive or non-productive staff ○ Outsourcing of research methodology/biostatistics [I6] ○ Undergraduate exposure to discipline [I5] ○ Flow of undergraduate into postgraduate programme [I5] ○ Admission criteria of appropriate students without MBChB [I5] • Financial resources <ul style="list-style-type: none"> ○ Sources of financial assistance/funding must be identified [I2] ○ Create a fundraising strategy for research [I11] • Organisational resources <ul style="list-style-type: none"> ○ Use research policies of the University; Faculty and School to develop own policy document [I6] • Community/external resources <ul style="list-style-type: none"> ○ National research coordinating committee in SEM [I6] ○ Networking [I11]
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Table 4.14: Criteria to be included in a strategic guide for development and implementation of a research programme in SEM (continued)

<p>3. Outputs</p> <p>Direct products</p> <ul style="list-style-type: none"> • Guidelines for publication [I2] • Incentives for publication [I2] • Registration of research Masters/doctorate program in SEM – specific criteria [I5] • Criteria re research methodology [I5] • Guidelines for writing of protocols [I2] • Clear procedures [I6] • Clear regulations [I6] • Time schedule [I2] • Clear budgeting procedure [I2] • Action plans from objectives plan [I4; I6; I9] • Good clinical practice guidelines [I2] <p>Direct products</p> <ul style="list-style-type: none"> • Goal setting [I4; I6] • Quality control – objective criteria [I4] 	<p>4. Outcomes</p> <p>Of research programme</p> <ul style="list-style-type: none"> • Appropriate name of qualification [I5] • Increased academic credits [I2] • Increasing publication output <ul style="list-style-type: none"> ○ The Faculty recognizes the importance of setting targets as norms for research productivity. The Faculty’s criteria for appointment; confirmation and promotion have numerical requirements; however the Faculty believes that quality is also important. Policy for departments to be in place. • Fair distribution of credits in interdisciplinary research [I2] • Increasing the number of staff with PhDs • Nurturing a new generation of researchers [P1] • Attracting and hosting Postdoctoral fellows [P1] • Publications by and with PhD students [P1] • Improving the intellectual climate: Hosting Distinguished Professors [P1] • Research promotion and time out grants [P1] • Supporting Conference attendance [P1] • Dissemination of research through public forums [P1] • Balance between teaching and research in the Department [P1] • Future developments – Multidisciplinary and interdisciplinary research [P1]
<p>5. Impact</p> <p>Changes in 7 – 10 years</p>	<p>6. Recommendations</p> <ul style="list-style-type: none"> • Hard work [I11]

Table 4.15: Other comments or suggestions that may be useful in the development of a strategic framework for a multi-disciplinary research programme in SEM at the UFS

<p>1. Significance</p> <ul style="list-style-type: none"> • This is important work [I10; I11] • Sensible exercise to develop framework [I10] <p>2. Positioning</p> <ul style="list-style-type: none"> • Multidisciplinary or departmental approach? [I4] • Use opportunity to align sports science with SEM [I4] • Associate with clusters/lead a cluster [I10] <p>3. Process</p> <ul style="list-style-type: none"> • Quality is not negotiable [I4] • Model: “The Kellogg’s logic model for development” may be helpful [I8] <p>4. Content</p> <ul style="list-style-type: none"> • Cutting edge physiology and public health are both important [I10] • Public health promotion more difficult to measure [I10] <p>5. New programme development at the UFS [P1]</p> <ul style="list-style-type: none"> • Research Objectives [in line with UFS and Faculty’s vision; mission; goals]: As example the following: <ul style="list-style-type: none"> ○ To produce research of the highest quality; ensuring that the Department retains and enhances its reputation as one of the leading centres for research and graduate studies ○ To encourage and enable all academic staff to be research active ○ To produce research of a pure or theoretical nature that contributes to the fundamental understanding of the disciplines and the relation between different disciplines ○ To produce research of an applied nature that contributes to the solution to problems in the Southern African region particularly; and the continent more generally ○ To produce a culture of intellectual interest and engagement and a community of scholars dedicated to the development of knowledge and the rational appraisal of ideas; and ready to use their intellectual skills and expertise to engage in debate in the public domain ○ To help produce the next generation of researchers through the prioritising of graduate studies and through the commitment to developing research capacity amongst young or new members of staff and graduate students <p>6. Research criteria for appointment; confirmation and promotion</p> <ul style="list-style-type: none"> • Must be in line with: revised criteria for appointment; confirmation and promotion; with the goal of being research intensive. <p>7. NRF ratings</p> <ul style="list-style-type: none"> • The Faculty does not have in all Schools; as the University does; a policy that all academic staff should get an NRF rating. Policy for department to be in place. <p>8. Possible grouping of researchers</p> <ul style="list-style-type: none"> • South African Research Chairs Initiative; • Research groups; • Research programmes and research entities • Research in the Faculty is carried out by individuals; • Research groups; • Postgraduate programmes and research entities which include Centres and Research Institutes/UFS clusters. • Resourcing research in the Department?
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APPENDIX B1

LETTER OF REQUEST TO PARTICIPANTS OF A DELPHI STUDY

LETTER OF REQUEST TO PARTICIPANTS OF A DELPHI STUDY

Dear Participant

Request to participate in a study titled: A CRITICAL ANALYSIS AND STRATEGIC FRAMEWORK FOR RESEARCH IN SPORT AND EXERCISE MEDICINE AT THE UNIVERSITY OF THE FREE STATE

I am currently occupying the position of Programme Director of the Masters Programme in Sports Medicine in the School of Medicine, Faculty of Health Sciences at the University of the Free State. I am mainly responsible for post-graduate teaching, clinical care, research, administration and management in Sport and Exercise Medicine, as well as post-graduate teaching and research in Biokinetics.

I am in the process of writing a thesis to obtain a PhD degree in Health Professions Education in the Faculty of Health Sciences at the University of the Free State (Student number 198023409). The title of my research is **A CRITICAL ANALYSIS AND STRATEGIC FRAMEWORK FOR RESEARCH IN SPORT AND EXERCISE MEDICINE AT THE UNIVERSITY OF THE FREE STATE**

My supervisors are:

Promoter: Prof GJ van Zyl
Dean: Faculty of Health Sciences
University of the Free State
Bloemfontein, SOUTH AFRICA.

Co-promoter: Prof MM Nel
Head: Health Professions Education
Faculty of Health Sciences
University of the Free State
Bloemfontein, SOUTH AFRICA

As indicated in the title, it is the **purpose** of my study to compile a strategic framework for the development and implementation of interdisciplinary research in Sport and Exercise Medicine at the University of the Free State. The choice of subject was a product of the recent establishment of a Masters programme in sports medicine at the University of the Free State and the need for guidance in selection of research topics and clusters. Sport and Exercise Medicine is a young discipline and a strong research component is essential for the status and even the survival of a Sport and Exercise Medicine programme. Science has to keep up with the ever increasing demands of the sport fraternity for methods of improving performance, management of illness and injury in the athletic population and lifestyle/preventive medicine.

The **problem** that has to be addressed is a lack of guidance and co-ordination in research in Sport and Exercise Medicine, and related fields of study at the University of the Free State. Sports- and exercise medicine is to a large extent a multi-professional field of study, which necessitates a **framework** according to which quality research in all the disciplines with sports or preventative medicine components can be co-ordinated.

The overall **goal** of the study is to execute quality research in the discipline with the view to improve the scientific grounding of the discipline at the University of the Free State and in general.

The **aim** of the study is to do a critical situation analysis of research in sport and exercise medicine with the view to compile a strategic framework for the **development** and **implementation** of co-ordinated research in Sport and Exercise Medicine at the UFS.

To achieve the aim the following **objectives** of the study will be pursued:

- Conceptualising and contextualising the lack of strategic guidelines for the development and implementation of research in Sport and Exercise Medicine (SEM) at the UFS. (This will be done via a literature study.)
- Identifying the factors that play a role in SEM research. (This will be done via semi-structured interviews)
- Determining criteria to develop a strategic research development framework. (This will be done via a literature study as well as from the results of the interviews.)
- Testing the criteria for the strategic framework by a panel of experts. (This will be done by a Delphi process.)
- Finalising the strategic framework and completing the study.
- Using the results to provide a framework for the development and implementation of a research programme in Sport and Exercise Medicine at the University of the Free State.

The **methods** that will be used in the study are, firstly, a comprehensive literature study that will address issues within the domains of research management and Sport and Exercise Medicine. Secondly, interviews based on the literature findings, with role-players in the fields of Sports and Exercise Medicine teaching and research, as well as policy-makers, leaders and managers in research will be conducted. A draft set of criteria will be designed from the interview findings and the literature, which will be used to compile a draft questionnaire, to be tested in a pilot study and then presented to a Delphi panel of experts.

For the purposes of this part of the study, Delphi technique will be employed, which fall under the categories of qualitative and quantitative research approaches. The Delphi technique is a method for the collection of opinion on a particular topic based on the premise that “pooled intelligence” enhances individual judgement and collective opinion of experts. The Delphi questionnaire will be compiled by using information that had been obtained from the literature review as well as from the findings of the interviews. The questionnaire will be sent to the panel of experts to be answered. Each set of replies will then be assessed and adjusted by the researcher, and a follow-up set of questions will be sent to the panel of experts. This process will continue until acceptable consensus has been reached by the panel.

The **value** of this research will be that it will lay the foundation for the production of quality research in Sport and Exercise Medicine on Masters, Doctoral and Post-doctoral level, ultimately establishing centres of expertise in chosen fields of study. Achieving this will make the University of the Free State a significant role player in the development of Sport and Exercise Medicine in South Africa. On a larger scale, it may be used as a strategic guide/plan for the development of similar programmes in the rest of Africa and the rest of the world.

You have been selected according to predetermined criteria, as having expert knowledge and experience in the fields of Sports and Exercise Medicine or in research. I therefore respectfully request your expert co-operation by consenting to be included in the Delphi panel of experts. I am aware that time is a valuable commodity. Completion of the first Delphi questionnaire will take approximately 45 minutes, and the follow-up two or three rounds of questionnaires will take approximately 30 minutes each. The Delphi survey and other relevant information will be sent to you via email and hard copy. Should you have any questions regarding the study or the Delphi survey, I can be contacted at:

Telephone: 051 401 2530
Cellular phone: 082 9063 062
Fax: 051 444 2969
Email address: HoltzhausenLJ@ufs.ac.za.

Postal address: Internal Box 14
University of the Free State
PO Box 339
Bloemfontein
9300

The different rounds of the Delphi survey are scheduled to take place during the period August to October 2011. Should you be willing to participate, please complete the accompanying consent form and return it to me as soon as possible.

I assure that the information gathered in this Delphi process will be treated in a confidential manner and that there will be no references to any names of participants in the presentation of data. Please take note that the results of this study will be published. Participation in the study is voluntary, and participants may withdraw from the study at any time. Participants will not be rewarded for participation. No costs will be payable by participants.

Thank you for taking time to read this communication. I will really appreciate your contribution to the project.

Sincerely,

A handwritten signature in black ink, appearing to read "L.J. Holtzhausen".

Dr LJ Holtzhausen
Head: Division Sport and Exercise Medicine
Faculty of Health Sciences
University of the Free State
Bloemfontein

ETOVS NR: 191/2010
Registered project

LH20110727

CONSENT FORM FOR DELPHI SURVEY

APPENDIX B2

CONSENT FORM FOR DELPHI SURVEY

**Title: A CRITICAL ANALYSIS AND STRATEGIC FRAMEWORK FOR
RESEARCH IN SPORT AND EXERCISE MEDICINE AT THE UNIVERSITY OF THE
FREE STATE
(ETOVNS NR: 191/2010)**

I, the undersigned, hereby consent to participate in the Delphi survey scheduled to take place from August to October 2011. My particulars are as follows:

Title: _____

Surname: _____

Full names: _____

Postal address: _____

Email address: _____

Telephone number: _____

Cellular number: _____

Fax number: _____

Signature

Date

Please return this form on or before 20 August 2011 by fax, email or mail, to:

Fax: 051 444 2969
Email address: HoltzhausenLJ@ufs.ac.za
Postal address: Internal Box 14
University of the Free State
PO Box 339
Bloemfontein
9300

I assure that the information gathered in this interview will be treated in a confidential manner and that there will be no references to any names of participants in the presentation of data. Please take note that the results of this study will be published.

Thank you in advance for your kind co-operation.

Sincerely,



Dr LJ Holtzhausen
Head: Division Sport and Exercise Medicine
University of the Free State

LH20101115

APPENDIX C1

LETTER TO DELPHI PANEL: ROUND 1

LETTER TO DELPHI PANEL ROUND 1

A CRITICAL ANALYSIS AND STRATEGIC FRAMEWORK FOR RESEARCH IN SPORT AND EXERCISE MEDICINE AT THE UNIVERSITY OF THE FREE STATE

Dear Colleague

Thank you for agreeing to participate in this Delphi research process. Attached please find the first round Delphi questionnaire. Your time and sharing of your expertise is much appreciated.

STRUCTURE OF THE QUESTIONNAIRE

The questionnaire was developed after conducting a literature survey and semi-structured interviews with academics involved in sport and exercise medicine (SEM), as well as academics involved in research and research management at the University of the Free State. From these, questions were formulated and categorised in 8 categories, numbered from A to H, using the Kellogg's Logic Model and Harvard Business Essentials Strategy as basis. These categories are envisaged to form the basis of a strategic framework for a research programme in sport and exercise medicine at the University of the Free State. The statements in the questionnaire provide you with the opportunity to offer an opinion on their relative importance, as well as additional comments or suggestions on the particular question or category.

PROCEDURE OF THE DELPHI PROCESS

Your opinion as expert panellist is required on the relative importance of each question. You are also invited to provide additional comments. All information and opinions will be treated as strictly confidential. Please note that no panellist will know the identity of any other panellist. The researcher and supervisors alone will know the identity of the panellists. You are also requested to keep all information regarding the research and questionnaire strictly confidential during the entire Delphi process, as the research process may be thus contaminated. Feedback will be provided to all panellists after each round of questions.

Please answer all the questions in all sections.

COMPLETION OF THE QUESTIONNAIRE

Each statement in the questionnaire must be evaluated according to your perceived importance thereof as an aspect that must be included in a strategic framework for research in sport and exercise medicine, according to the following three-point Likert scale:

- | |
|---|
| 1 = Fully agree [<i>Must definitely</i> be considered in the designing of a research framework] |
| 2 = Partially agree [<i>Can</i> be considered in the designing of a research framework] |
| 3 = Disagree [<i>Irrelevant</i> for consideration in the designing of a research framework] |

Please select the answer of your choice from the drop down menu marked “SELECT ONE OPTION”. You are welcome to qualify your choice or make comments regarding any question in the right hand column of the questionnaire table.

If possible, please complete the questionnaire in its electronic form after saving it as a MS Word or related word processing document.

The questionnaire in this round should take approximately one hour of your time. Possible subsequent questionnaires should be considerably shorter. Please contact me in the event of any questions or uncertainties.

Please return the completed questionnaire to me by **8 November 2011**. My contact details are as follows:

Email: HoltzhausenLJ@ufs.ac.za

Fax: +27 51 444 2969

Cellular phone: +27 82 906 3062

Thank you once again for your assistance with this important project.



Dr LJ Holtzhausen
Head: Division Sport and Exercise Medicine
Faculty of Health Sciences
University of the Free State
Bloemfontein

UFS registered project
Ethical clearance no: ETOVS NR: 191/2010

LH20110930
LH20101115

DELPHI QUESTIONNAIRE ROUND 1

QUESTIONNAIRE FOR DELPHI PANEL: ROUND 1

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SECTION A: STRATEGIC FOUNDATIONS OF A RESEARCH FRAMEWORK IN SPORT AND EXERCISE MEDICINE			
<p>This section deals with the foundational reference points of a generic research programme, but also applicable to a research programme in Sport and Exercise Medicine (SEM).</p> <p>Please indicate how important you regard each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list, by clicking on “Select one option”. You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>			
A1	OVERALL STRATEGY IN RESEARCH PLANNING AND MANAGEMENT		
In designing and managing a research programme, the following statements are relevant:			
		SELECT	COMMENTS
a.	Research should be guided by:		
	• a research strategy	Select one option	TYPE COMMENTS HERE
	• an implementation plan	Select one option	TYPE COMMENTS HERE
b.	The success of a research programme can be enhanced by		
	• pre-determination of the direction of research in the programme	Select one option	TYPE COMMENTS HERE
	• strong leadership	Select one option	TYPE COMMENTS HERE
	• strong mentorship	Select one option	TYPE COMMENTS HERE
	• An enabling environment such as a university with a strong research culture	Select one option	TYPE COMMENTS HERE
	• An established research culture	Select one option	TYPE COMMENTS HERE
	• Development of the next generation of researchers	Select one option	TYPE COMMENTS HERE
c.	The policy of a research programme should:		
	• stimulate creativity	Select one option	TYPE COMMENTS HERE
	• stimulate new thinking	Select one option	TYPE COMMENTS HERE
	• support transfer of knowledge to benefit the university	Select one option	TYPE COMMENTS HERE
	• support transfer of knowledge to benefit the community	Select one option	TYPE COMMENTS HERE
d.	• The role of research in SEM at a university department is dependent on the balance between teaching and research of the university	Select one option	TYPE COMMENTS HERE
e.	A SEM research programme at a university should be supported by:		
	• University management	Select one option	TYPE COMMENTS HERE
	• Faculty management	Select one option	TYPE COMMENTS HERE
	• Academics in relevant disciplines at the university	Select one option	TYPE COMMENTS HERE
A2	PRIORITISATION OF RESEARCH IN FOCUS AREAS		
The following statements relate to the development of focus areas in a research programme:			
a.	In determining research focus areas the following statements are true:		
	• A university-based research programme should not be restricted by pre-determined	Select one option	TYPE COMMENTS HERE

	research focus areas of the <i>university</i>		
	<ul style="list-style-type: none"> The selection of predetermined research focus areas will enhance interdisciplinary research 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> A research programme should concentrate on pre-determined focus areas in the research environment (SEM) 	Select one option	TYPE COMMENTS HERE
b.	The following are important determinants in the selection of research <i>focus areas</i> :		
	<ul style="list-style-type: none"> Market demands 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Interests of individual researchers 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Expertise of individual researchers 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Gaps in current research 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Availability of equipment 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Availability of time 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Availability of financial resources 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Availability of study populations 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Availability of support staff 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Community needs (including local, regional and national) 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> International trends in an academic discipline (such as SEM) 	Select one option	TYPE COMMENTS HERE
c.	In addition to selection of research focus areas, the following are important determinants in the selection of <i>individual research projects</i> within a research programme		
	<ul style="list-style-type: none"> Adherence to pre-determined focus areas of the research programme 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Possible available financing for specific projects 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Individual research projects should not be selected according to focus areas within a research programme 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Market demands 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Interests of individual researchers 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Expertise of individual researchers 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Gaps in current research 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Availability of equipment 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Availability of time 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Availability of financial resources 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Availability of study populations 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Availability of support staff 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Community needs [including local, regional and national] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> International trends in an academic discipline (such as SEM) 	Select one option	TYPE COMMENTS HERE

A3	MONITORING OF THE SUCCESS OF A RESEARCH PROGRAMME		
	The following statements relate to monitoring and evaluation of the success of a research programme		
a.	A research programme should regularly be		
	<ul style="list-style-type: none"> Monitored according to <i>quantitative</i> key performance indicators [specific, measurable outcomes of success] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Monitored according to <i>qualitative</i> key performance indicators [subjective outcomes of success] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Evaluated according to <i>quantitative</i> key performance indicators [specific, measurable outcomes of success] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Evaluated according to <i>qualitative</i> key performance indicators [subjective outcomes of success] 	Select one option	TYPE COMMENTS HERE
A4	ADDITIONAL RELEVANT INPUT FROM EXPERT PANELLISTS REGARDING STRATEGY IN RESEARCH PLANNING AND MANAGEMENT		
a.	In your opinion, are there additional relevant statements to be considered in determining a research strategy?		
	TYPE COMMENTS HERE		
b.	Do you have any further comments regarding the strategic planning of a research framework?		
	TYPE COMMENTS HERE		
SECTION B: THE ROLE, PLACE AND CHARACTER OF RESEARCH IN SPORT AND EXERCISE MEDICINE [SEM] AT A UNIVERSITY			
<p>This section deals with the role, place and character of a research programme in sport and exercise medicine at a university.</p> <p>Please indicate how important you regard each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>1 = Fully agree [Must be considered in the designing of a research framework] 2 = Partially agree [Can be considered in the designing of a research framework] 3 = Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list, by clicking on “Select one option”. You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>			
B1	THE EDUCATIONAL AND ACADEMIC ROLE OF RESEARCH IN SPORT AND EXERCISE MEDICINE		
		SELECT	COMMENTS
a.	Research in SEM plays an important <i>educational</i> role in:		
	<ul style="list-style-type: none"> Basic grounding for undergraduate teaching 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Basic grounding for postgraduate teaching 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Defining SEM as academic discipline at the university in which it is housed 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> A postgraduate Sport and Exercise Medicine programme 	Select one option	TYPE COMMENTS HERE
b.	Research in SEM plays an important role in the <i>development of SEM</i> as an academic discipline regarding:		
	<ul style="list-style-type: none"> The development of the discipline of Sport and Exercise medicine 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Establishing best practice in clinical Sport and Exercise Medicine 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The development of sport 	Select one option	TYPE COMMENTS HERE
c.	Regarding the role of SEM research in society:		
	<ul style="list-style-type: none"> Sport and Exercise Medicine research can lead the way in mainstream medicine research 	Select one option	TYPE COMMENTS HERE

	<ul style="list-style-type: none"> Research on elite athletes can often be applied to broader communities 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The development of new knowledge in Sport and Exercise Medicine can make a meaningful contribution to public health care 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> SEM research plays an important role in addressing the scientific needs of the athletic population 	Select one option	TYPE COMMENTS HERE
d.	Sport plays an important role in:		
	<ul style="list-style-type: none"> Society 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Community wellness 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Politics 	Select one option	TYPE COMMENTS HERE
B2	THE ACADEMIC PLACE (POSITIONING) OF A RESEARCH PROGRAMME IN SPORT AND EXERCISE MEDICINE AT A UNIVERSITY		
a.	Regarding the place of a SEM research programme in a university:		
	<ul style="list-style-type: none"> A SEM research programme is best positioned in a Faculty of Health Sciences 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Research should be an essential part of a structured Masters programme in SEM 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> A SEM department should engage in collaborative research partnerships with other disciplines within the institution 	Select one option	TYPE COMMENTS HERE
b.	The following groupings are relevant partners in a SEM research programme:		
	<ul style="list-style-type: none"> Other academic health care institutions 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Primary health care institutions 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Sport federations 	Select one option	TYPE COMMENTS HERE
c.	The following fields of study are relevant in an interdisciplinary SEM research programme:		
	<ul style="list-style-type: none"> Health promotion 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Public wellness 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Prevention of chronic disease 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Prevention of exercise related illness 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Management of exercise related illness 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Prevention of exercise related injuries 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Management of exercise related injuries 	Select one option	TYPE COMMENTS HERE
d.	SEM is a particularly suitable discipline for:		
	<ul style="list-style-type: none"> applied research 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> pure scientific research 	Select one option	TYPE COMMENTS HERE

B3	THE POSITIONING OF A MULTI-DISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME WITHIN EXISTING RESEARCH FOCUS AREAS AT THE UNIVERSITY OF THE FREE STATE		
	<p>This section deals with the existing strategic interdisciplinary research clusters [focus areas] at the University of the Free State. These clusters have been selected predominantly on the basis of regional need and existing expertise and research. The clusters are intended to enhance the strategic research focus of the university, as well as interdisciplinary/collaborative research. They get preferential university funding and support before research that are not included in a cluster. It is therefore beneficial for any research programme to find common ground within one of the clusters.</p> <p>Please indicate your level of agreement with the likelihood of SEM research to fit into each strategic cluster:</p>		
a.	<p><i>Cluster 1:</i> Enabling technologies/technologies for the future [Suggested constituent focus areas: High throughput biology, nanotechnology [solid state lighting], chemical and allied technologies]</p>	Select one option	TYPE COMMENTS HERE
b.	<p><i>Cluster 2:</i> Food production, quality and safety for Africa [Suggested constituent focus areas: Animal production and protection, plant production and protection, human nutrition, food quality and safety]</p>	Select one option	TYPE COMMENTS HERE
c.	<p><i>Cluster 3:</i> Regional community development and alleviation of poverty [Suggested constituent focus areas: Urban development, rural development: sustainable livelihoods in the QwaQwa region [a rural region where a satellite campus of the University of the Free State is situated], resource management and development [tourism, small business development, local government], healthy communities [communicable diseases, chronic diseases of lifestyle, children with disabilities]</p>	Select one option	TYPE COMMENTS HERE
d.	<p><i>Cluster 4:</i> Social transformation [citizenship and identity, diverse histories, globalisation and governance, human rights and social equity]</p>	Select one option	TYPE COMMENTS HERE
e.	<p><i>Cluster 5:</i> Water resources and ecosystem management [freshwater ecology, environmental change, water resource management, sustainable utilisation of terrestrial ecosystems]</p>	Select one option	TYPE COMMENTS HERE
f.	<p><i>Cluster 6:</i> Towards a competitive chemical industry [new drug manufacturing, petrochemicals, natural product development, polymers]</p>	Select one option	TYPE COMMENTS HERE
g.	<p>Interdisciplinary SEM research at the UFS will not develop optimally if accommodated in one or more of the above existing strategic clusters</p>	Select one option	TYPE COMMENTS HERE

B4	THE MULTI-DISCIPLINARY CHARACTER OF SPORT AND EXERCISE MEDICINE		
a.	The following statements are true regarding SEM:		
	• SEM is a multi-disciplinary field of study	Select one option	TYPE COMMENTS HERE
	• A SEM research programme should have an multi-disciplinary character	Select one option	TYPE COMMENTS HERE
	• An interdisciplinary SEM research programme should be managed independent of academic departments	Select one option	TYPE COMMENTS HERE
B5	ADDITIONAL RELEVANT INPUT FROM EXPERT PANELLISTS REGARDING THE ROLE, POSITIONING AND CHARACTER OF A SEM RESEARCH PROGRAMME		
a.	In your opinion, are there additional relevant statements regarding the role, place and character of research in SEM to be considered in determining a strategic research framework?		
	TYPE COMMENTS HERE		
b.	Do you have any further comments regarding the role, place and character of SEM research in the planning of a strategic research framework:		
	TYPE COMMENTS HERE		
SECTION C: INPUTS THAT ARE REQUIRED BY A RESEARCH PROGRAMME IN SPORT AND EXERCISE MEDICINE			
	<p>This section deals with different inputs required for the successful operation of a multi-disciplinary research programme, and the activities within such a programme.</p> <p>Please indicate your perceived importance of each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>1 = Fully agree [Must be considered in the designing of a research framework] 2 = Partially agree [Can be considered in the designing of a research framework] 3 = Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list, by clicking on "Select one option". You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>		
C1: RESOURCES			
		SELECT	COMMENTS
C1.1	HUMAN RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:		
a.	The following staff components are important for the successful operation of a SEM research programme:		
	• Competent academic staff	Select one option	TYPE COMMENTS HERE
	• Competent departmental support staff	Select one option	TYPE COMMENTS HERE
	• Faculty research support staff	Select one option	TYPE COMMENTS HERE
	• University research support staff	Select one option	TYPE COMMENTS HERE
	• Post-magister degree fellows	Select one option	TYPE COMMENTS HERE
	• Post-doctoral fellows	Select one option	TYPE COMMENTS HERE
b.	The following statements are true regarding the academic staff in a SEM research programme:		
	• All academic staff in SEM must obtain PhD degrees	Select one option	TYPE COMMENTS HERE
	• All academic SEM staff must supervise PhD students research	Select one option	TYPE COMMENTS HERE

	<ul style="list-style-type: none"> All academic SEM staff must supervise Masters students research 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Researchers in a research programme should be assimilated by retaining the best postgraduate students 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Continuous staff development is relevant to the success of a SEM research programme 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The staff profile of a successful SEM research programme should reflect a balance between experienced and young researchers 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> At least 25% of time of academic staff in a SEM department must be devoted to research supervision 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> There must be minimum requirements for national publications for all staff members in a department of SEM 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> There must be minimum requirements for international publications for all staff members in a department of SEM 	Select one option	TYPE COMMENTS HERE
c.	Critical characteristics required to be a <i>successful researcher</i> in SEM include:		
	<ul style="list-style-type: none"> Disciplinary knowledge 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Disciplinary insight 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Writing skills 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Experience on ground level 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Knowledge of the industry 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Previous exposure to the discipline 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Knowledge of research methodology 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Knowledge of funding opportunities 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Expertise in certain focus areas 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Knowledge of research supervision 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Knowledge of research ethics 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The ability to apply general research principles into SEM research 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Have status [respect] among peers in the discipline 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Experience in publication of research 	Select one option	TYPE COMMENTS HERE
d.	The following <i>leadership characteristics</i> are required by leaders in research programmes:		
	<ul style="list-style-type: none"> Motivational leadership 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Passion for the discipline 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Stature in the discipline 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Ability to see the bigger picture 	Select one option	TYPE COMMENTS

	[vision]		HERE
	• Inspirational leadership	Select one option	TYPE COMMENTS HERE
	• Skills to work with different levels of knowledge and experience	Select one option	TYPE COMMENTS HERE
	• Not too critical	Select one option	TYPE COMMENTS HERE
	• Delegating skills	Select one option	TYPE COMMENTS HERE
	• Leadership in daily life	Select one option	TYPE COMMENTS HERE
	• Listening skills	Select one option	TYPE COMMENTS HERE
	• Co-ordinating [organisational] skills	Select one option	TYPE COMMENTS HERE
	• Autocratic leadership skills	Select one option	TYPE COMMENTS HERE
	• Interpersonal skills	Select one option	TYPE COMMENTS HERE
	• Communication skills	Select one option	TYPE COMMENTS HERE
	• Ability to take responsibility in success	Select one option	TYPE COMMENTS HERE
	• Ability to take responsibility in failure	Select one option	TYPE COMMENTS HERE
	• Integrity	Select one option	TYPE COMMENTS HERE
	• Sensitivity	Select one option	TYPE COMMENTS HERE
	• Bravery	Select one option	TYPE COMMENTS HERE
	• Trust	Select one option	TYPE COMMENTS HERE
	• Honesty	Select one option	TYPE COMMENTS HERE
	• Wisdom [good judgement]	Select one option	TYPE COMMENTS HERE
e.	The following <i>management skills</i> are required by research programme managers:		
	• Financial management skills	Select one option	TYPE COMMENTS HERE
	• Project management skills	Select one option	TYPE COMMENTS HERE
	• People management skills	Select one option	TYPE COMMENTS HERE
	• Process management skills	Select one option	TYPE COMMENTS HERE
	• Goal setting skills	Select one option	TYPE COMMENTS HERE
	• Planning skills	Select one option	TYPE COMMENTS HERE
	• Conflict management skills	Select one option	TYPE COMMENTS HERE
	• Administrative skills	Select one option	TYPE COMMENTS HERE
	• Stress management skills	Select one option	TYPE COMMENTS HERE
	• Interpersonal relationship skills	Select one option	TYPE COMMENTS HERE
	• Fundraising skills	Select one option	TYPE COMMENTS

			HERE
	<ul style="list-style-type: none"> • Skill to implement a plan 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • Technical skills 	Select one option	TYPE COMMENTS HERE
f.	Additional information on human resources in a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> • In your opinion, are there additional relevant statements regarding the human resources relevant to a successful research programme in SEM to be considered in determining a strategic research framework? 		
	TYPE COMMENTS HERE		
	<ul style="list-style-type: none"> • Do you have any further comments regarding the human resources in the planning of a strategic research framework? 		
	TYPE COMMENTS HERE		
C1.2	FINANCIAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:		
a.	A SEM research programme should be funded by:		
	<ul style="list-style-type: none"> • Commercialisation of research 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • Commercialisation of clinical services 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • The university in which it is housed 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • Government subsidy 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • Research funding agencies, such as the National Research Foundation or Medical Research Council of South Africa 	Select one option	TYPE COMMENTS HERE

	<ul style="list-style-type: none"> Partnerships between the research programme and private corporations 	Select one option	TYPE COMMENTS HERE
b.	A newly established research programme should receive initial start-up funding (seed capital) from the university in which it is housed	Select one option	TYPE COMMENTS HERE
c.	There is a risk of losing academic autonomy of a research programme due to interference from funders	Select one option	TYPE COMMENTS HERE
d.	Additional information on human resources in a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> In your opinion, are there additional relevant statements regarding the financial resources relevant to a successful research programme in SEM to be considered in determining a strategic research framework? 		
	TYPE COMMENTS HERE		
	<ul style="list-style-type: none"> Do you have any further comments regarding the financial resources in the planning of a strategic research framework? 		
	TYPE COMMENTS HERE		
C1.3	INTERNAL INSTITUTIONAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:		
	This section deals with the <i>internal (institutional) resources of the university</i> relevant to the successful operation of a SEM research programme. The following statements are true in this regard:		
a.	The following institutional resources at a university are relevant role players in a SEM research programme:		
	<ul style="list-style-type: none"> The institutional research directorate 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The post-graduate school 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The finance department 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The human resources department 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The Faculty of Health Sciences executive 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The university sport department 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The university health and wellness centre 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The department of biostatistics 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The institutional marketing/fundraising department 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Academic writers 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Research grant application experts 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The university Alumni association 	Select one option	TYPE COMMENTS HERE
b.	Additional information on internal university (institutional) resources in a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> In your opinion, are there additional relevant statements regarding the institutional resources relevant to a successful research programme in SEM to be considered in determining a strategic research framework? 		
	TYPE COMMENTS HERE		
	<ul style="list-style-type: none"> Do you have any further comments regarding the financial resources in the planning of a strategic research framework? 		
	TYPE COMMENTS HERE		

C1.4	EXTERNAL ORGANISATIONAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:		
	This section deals with the <i>external resources</i> relevant to the successful operation of a multi-disciplinary SEM research programme.		
a.	The following organisations outside of the university are relevant role players in the successful operation of a SEM research programme:		
	<ul style="list-style-type: none"> Research funding agencies [National Research Foundation of South Africa; Medical Research Council of South Africa] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Research foundations 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Professional associations, e.g. the South African Sports Medicine Association [SASMA]; the International Sports Medicine Federation [FIMS]; the International Olympic Committee [IOC] medical committee 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The private healthcare industry 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The pharmaceutical industry 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The nutritional supplement industry 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Anti doping agencies [e.g. the South African Institute for Drugs in Sport [SAIDS], the World Anti-doping agency [WADA] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The fitness industry 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> National sport federations 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The South African Sports Confederation and Olympic Committee [SASCOC] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Underemphasised sport codes in South Africa [e.g. gymnastics, karate, boxing] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Government departments [Department of Health, Department of Sport and Recreation, Department of Education, Department of Science and Technology] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Government departments of other countries in Africa or internationally 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The College of Sport and Exercise Medicine of Medicine of South Africa [CSEM(SA)] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The College of Medicine of South Africa [CMSA] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The community in which the research programme is located 	Select one option	TYPE COMMENTS HERE
b.	Additional information on external resources in a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> In your opinion, are there other organisations that may be relevant to a SEM research programme? 		
	TYPE COMMENTS HERE		

	<ul style="list-style-type: none"> Do you have any further comments regarding external resources in the planning of a strategic research framework in SEM? 		
	TYPE COMMENTS HERE		
C1.5	ACADEMIC ROLEPLAYERS AND STAKEHOLDERS IN A MULTI-DISCIPLINARY SPORT AND EXERCISE MEDICINE RESEARCH PROGRAMME		
	This section attempts to identify the most relevant potential academic role players in a multi-disciplinary SEM research programme:		
a.	The following academic disciplines are relevant role players in a multi-disciplinary SEM research programme		
	<ul style="list-style-type: none"> Sport and Exercise science/Biokinetics 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Human nutrition and dietetics 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Physiology 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Anatomy and cell biology 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Family medicine 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Orthopaedics 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Pharmacology 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Occupational therapy 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Psychology 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Sport and Exercise Medicine 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Internal medicine 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Diagnostic radiology 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Biochemistry 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Haematology 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Nursing 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Ophthalmology 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Paediatrics 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Community health 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Occupational health 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Work wellness/employee assistance 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Pathology/biochemistry/haematology laboratory services 	Select one option	TYPE COMMENTS HERE
b.	Additional information regarding academic disciplines that may be relevant to a SEM research programme.		
	<ul style="list-style-type: none"> In your opinion, are there other academic disciplines that may be relevant role players in a multi-disciplinary SEM research programme? 		
	TYPE COMMENTS HERE		
	<ul style="list-style-type: none"> Do you have any further comments regarding identification of academic role players in the planning of a strategic research framework in SEM? 		
	TYPE COMMENTS HERE		

C2	PROCESSES RELEVANT TO THE SUCCESSFUL OPERATION OF A MULTI-DISCIPLINARY SEM RESEARCH PROGRAMME		
C2.1	STRATEGIC PROCESSES		
		SELECT	COMMENTS
a.	The following are relevant components of a <i>strategic plan</i> for a multi-disciplinary SEM research programme:		
	<ul style="list-style-type: none"> • A vision statement 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • A mission statement 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • Clear objectives 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • Criteria for identification of team members 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • An implementation plan 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • A quality assurance plan 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • A risk management plan 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • A performance measurement plan 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • An intellectual property plan 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • Consensus among role players on the strategy and goals of the research programme 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • A policy document to guide the research programme 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • A financial sustainability plan 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • Ethical guidelines 	Select one option	TYPE COMMENTS HERE
b.	The following are relevant reference points for <i>strategic goal setting</i> for a multi-disciplinary SEM research programme:		
	<ul style="list-style-type: none"> • Establishment of research teams 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • Utilisation of new technologies 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • Establishment of strategic research focus areas 	Select one option	TYPE COMMENTS HERE
c.	The following are key <i>strategic activities</i> to ensure success of a multi-disciplinary SEM research programme:		
	<ul style="list-style-type: none"> • Increase the number of PhDs of staff in the programme 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • Nurture a new generation of researchers 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • Attract post-doctoral fellows 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • Encourage publication of research 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • Host international leaders in SEM in the programme 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • Encourage dissemination of research through public forums 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • Support conference attendance 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> • Monitoring of activities of other research units 	Select one option	TYPE COMMENTS HERE

	• Research focus areas	Select one option	TYPE COMMENTS HERE
	• Management models	Select one option	TYPE COMMENTS HERE
	• Funding models	Select one option	TYPE COMMENTS HERE
	• Research outputs	Select one option	TYPE COMMENTS HERE
d.	A national SEM research co-ordinating body will make a positive contribution to SEM research in South Africa		
e.	Additional information on strategic processes in a Sport and Exercise Medicine research programme that panellists wish to include:		
	• In your opinion, are there other strategic concepts that may be relevant to a SEM research programme?		
	TYPE COMMENTS HERE		
	• Do you have any further comments regarding strategic processes in the planning of a strategic research framework in SEM?		
	TYPE COMMENTS HERE		
C2.2	MANAGERIAL PROCESSES		
a.	Regarding <i>human resource [people] management</i> , the following aspects are relevant in a multi-disciplinary SEM research programme:		
	• The establishment of a multi-disciplinary scientific committee	Select one option	TYPE COMMENTS HERE
	• Building trust among all role players	Select one option	TYPE COMMENTS HERE
	• Nurture teamwork	Select one option	TYPE COMMENTS HERE
	• Nurture a shared vision among team members	Select one option	TYPE COMMENTS HERE
	• Focus on professional development [career planning] of all members of the team	Select one option	TYPE COMMENTS HERE
	• Nurture creativity of team members	Select one option	TYPE COMMENTS HERE
	• Align professional fulfilment with personal fulfilment of team members	Select one option	TYPE COMMENTS HERE
b.	Regarding <i>academic management</i> of research the following aspects are important managerial functions:		
	• Incentives to researchers for publication	Select one option	TYPE COMMENTS HERE
	• Pre-arrangement of distribution of credits for interdisciplinary research	Select one option	TYPE COMMENTS HERE
	• Focus on results [research outputs]	Select one option	TYPE COMMENTS HERE
c.	Regarding <i>financial management</i> of research, the following aspects are important managerial functions:		
	• Following a set budgeting procedure for research projects	Select one option	TYPE COMMENTS HERE
	• Fundraising must be a specialised function within the research programme	Select one option	TYPE COMMENTS HERE
	• Strict financial management principles must apply to all research projects	Select one option	TYPE COMMENTS HERE
d.	It is important for a research programme to work according to strict <i>time schedules</i>	Select one option	TYPE COMMENTS HERE
e.	Additional information on managerial processes in a Sport and Exercise Medicine research programme that panellists wish to include:		
	• In your opinion, are there management considerations that may be relevant to a SEM		

	research programme?		
	TYPE COMMENTS HERE		
	<ul style="list-style-type: none"> Do you have any further comments regarding managerial processes in the planning of a strategic research framework in SEM? 		
	TYPE COMMENTS HERE		
C2.3	OPERATIONAL PROCESSES		
a.	<i>Operational processes</i> of a multi-disciplinary SEM research programme should include the following		
	<ul style="list-style-type: none"> Clear operational procedures 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Clear programme regulations 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Formal agreements on procedures with researchers 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Formal agreements on expected outcomes with researchers 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Guidelines for writing protocols 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Guidelines for publication 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Good clinical practice guidelines in research 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Creation of patient databases 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Regular research planning meetings 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Regular research feedback meetings 	Select one option	TYPE COMMENTS HERE

b.	Additional information on operational processes in a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> In your opinion, are there other operational processes that may be relevant to a SEM research programme? 		
	TYPE COMMENTS HERE		
	<ul style="list-style-type: none"> Do you have any further comments regarding operational processes in the planning of a strategic research framework in SEM? 		
	TYPE COMMENTS HERE		
	•		
SECTION D: CHALLENGES IN MULTI-DISCIPLINARY RESEARCH IN SPORT AND EXERCISE MEDICINE			
		SELECT	COMMENTS
D1	ACADEMIC CHALLENGES IN MULTI-DISCIPLINARY SEM RESEARCH		
a.	The following are relevant <i>academic</i> challenges in the establishment and management of a multi-disciplinary SEM research programme:		
	<ul style="list-style-type: none"> To establish SEM as a multi-disciplinary research discipline in medicine 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> To obtain support from university management for interdisciplinary SEM research 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> To motivate people from different academic backgrounds to listen [want to understand] each other 's points of view 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Fair distribution of research credits 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Lack of trust among multi-disciplinary role players 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> To become nationally recognised by peers 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> To become internationally recognised by peers 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> To compete with institutions with ample human and financial resources [such as the IOC] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> To form professional networks 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> To become part of existing professional networks 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Potential interdisciplinary stakeholders may fail to recognise the merit/importance of the "bigger picture" or vision 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> It may be difficult for interdisciplinary research stakeholders to distinguish between research output [current drive] and impact [vision] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Lack of creativity of primary researchers may have a negative impact on interdisciplinary research 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> SEM is a small, young discipline that finds it difficult to make an impact in a broader interdisciplinary medical context 	Select one option	TYPE COMMENTS HERE

	<ul style="list-style-type: none"> Optimal placement of research focus areas in an interdisciplinary grouping is an important consideration in interdisciplinary research 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Different disciplines have different points of view/paradigms that are challenging to blend and to find a common “language” 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> To identify specialists to collaborate with 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> To find good research ideas 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> To find good students 	Select one option	TYPE COMMENTS HERE
D2	MANAGEMENT CHALLENGES IN MULTI-DISCIPLINARY SEM RESEARCH		
a.	The following are <i>management</i> challenges in the successful operation of a multidisciplinary SEM research programme		
	<ul style="list-style-type: none"> The establishment of a management/leadership hierarchy in interdisciplinary research 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Departmental interest above interdisciplinary research interest 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Personal research interest above interdisciplinary research interest 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Maintenance of effective interdisciplinary communication 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Maintenance of effective interdisciplinary co-ordination 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Interdisciplinary funding of resources 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> To obtain initial funding for a new research programme 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Time allocation/prioritising for interdisciplinary work versus own departmental work 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Quality control and minimum standard setting in an interdisciplinary research environment 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> To attract full time researchers 	Select one option	TYPE COMMENTS HERE
D3	ADDITIONAL INFORMATION REGARDING CHALLENGES IN MULTI-DISCIPLINARY SEM RESEARCH		
a.	Additional information on external resources in a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> In your opinion, are there other challenges that may be relevant to a SEM research programme? 		
	TYPE COMMENTS HERE		
	<ul style="list-style-type: none"> Do you have any further comments regarding challenges in the planning of a strategic research framework in SEM? 		
	TYPE COMMENTS HERE		

SECTION E: OUTPUTS [PRODUCTS] OF A MULTI-DISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME			
This section deals with types, levels and targets of outputs of a multi-disciplinary SEM research programme.			
		SELECT	COMMENTS
E1	TYPES OF OUTPUTS FROM A MULTI-DISCIPLINARY RESEARCH PROGRAMME		
a.	The following are essential academic products of a multi-disciplinary SEM research programme:		
	• Non-scientific informational publications	Select one option	TYPE COMMENTS HERE
	• Non-peer reviewed scientific publications	Select one option	TYPE COMMENTS HERE
	• National peer-reviewed scientific publications	Select one option	TYPE COMMENTS HERE
	• International peer-reviewed scientific publications	Select one option	TYPE COMMENTS HERE
	• Citation of publications	Select one option	TYPE COMMENTS HERE
	• Citation with high impact factor of publications	Select one option	TYPE COMMENTS HERE
	• Masters degrees	Select one option	TYPE COMMENTS HERE
	• PhD degrees	Select one option	TYPE COMMENTS HERE
	• Registered patents	Select one option	TYPE COMMENTS HERE
	• National conference presentations	Select one option	TYPE COMMENTS HERE
	• International conference presentations	Select one option	TYPE COMMENTS HERE
	• Chapters in books	Select one option	TYPE COMMENTS HERE
	• Scholarly books	Select one option	TYPE COMMENTS HERE
	• Textbooks and published guidelines	Select one option	TYPE COMMENTS HERE
	• Short learning courses	Select one option	TYPE COMMENTS HERE
	• Increased academic stature among peers	Select one option	TYPE COMMENTS HERE
	• Invitations for collaboration from research units of high standing	Select one option	TYPE COMMENTS HERE
	• A network of research partners [collaborators]	Select one option	TYPE COMMENTS HERE
b.	The following are desired human outcomes of a multi-disciplinary SEM research programme:		
	• Promotion of staff within the university	Select one option	TYPE COMMENTS HERE
	• Appointment of staff members on university research structures	Select one option	TYPE COMMENTS HERE
	• Appointment of staff members on national research structures	Select one option	TYPE COMMENTS HERE
	• Appointment of staff members on national governmental scientific bodies	Select one option	TYPE COMMENTS HERE
	• Appointment of staff members on international research structures	Select one option	TYPE COMMENTS HERE
	• Appointment of staff members on international scientific forums	Select one option	TYPE COMMENTS HERE

	<ul style="list-style-type: none"> Increased levels of academic expertise within the programme 	Select one option	TYPE COMMENTS HERE
c.	The following objectives deal with desired financial outcomes within a multi-disciplinary SEM research programme at a university. Select your level of agreement with each objective:		
	<ul style="list-style-type: none"> Financial self-sustainability 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Profitability 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Commercialisation of research by contract research 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Commercialisation of research by selling new knowledge 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Commercialisation of research by registering patents 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Growth of the programme by obtaining increasing amounts of research funding 	Select one option	TYPE COMMENTS HERE
E2	LEVELS OF FOCUS OF A MULTI-DISCIPLINARY SEM RESEARCH PROGRAMME		
a.	The following are important levels at which research outputs should be focused:		
	<ul style="list-style-type: none"> Community [regional] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> National 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> International 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Specific publications 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Specific industries 	Select one option	TYPE COMMENTS HERE
b.	The following are important persons and bodies at which research outputs should be focused [who should be pleased with the outcome?]:		
	<ul style="list-style-type: none"> University faculty 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> University management 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> National peers 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> International peers 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Funding agencies [MRC, NRF] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Organised sport 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Government departments [sport, education, health etc] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The public 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The healthcare industry 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The fitness industry 	Select one option	TYPE COMMENTS HERE
E3	ADDITIONAL INFORMATION REGARDING OUTPUTS OF A MULTI-DISCIPLINARY SEM RESEARCH PROGRAMME		
a.	Additional information on outputs of a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> In your opinion, are there other significant outputs that may be relevant to a SEM research programme? 		
	TYPE COMMENTS HERE		

	<ul style="list-style-type: none"> Do you have any further comments regarding outputs in the planning of a strategic research framework in SEM? 		
	TYPE COMMENTS HERE		
	SECTION F: OUTCOMES [IMPACT] OF A MULTI-DISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME		
	This section deals with longer term outcomes [impact] and significance of a multi-disciplinary SEM research programme.		
		SELECT	COMMENTS
F1	TYPES OF OUTCOMES FROM A MULTI-DISCIPLINARY RESEARCH PROGRAMME		
a.	The following are significant <i>academic outcomes</i> of a multi-disciplinary SEM research programme:		
	<ul style="list-style-type: none"> Increased quantity of academic manuscripts 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Increased quality of academic manuscripts 	Select one option	TYPE COMMENTS HERE

	<ul style="list-style-type: none"> Increased funding of the research programme 	Select one option	TYPE COMMENTS HERE
b.	The following are significant <i>internal effects</i> [changes] that may indicate outcomes of the research programme:		
	<ul style="list-style-type: none"> Changes in number of researchers in the programme 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Changes in behaviour of researchers 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Changes in stature of researchers 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Changes in stature of the research programme 	Select one option	TYPE COMMENTS HERE
b.	The following are significant <i>external effects</i> [changes] that may indicate outcomes [significance] of the research programme:		
	<ul style="list-style-type: none"> Changes in the university [e.g. attitude, placement of the programme] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Implementation of research findings in communities 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Changes in the community 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Changes in the profile of sport and exercise medicine 	Select one option	TYPE COMMENTS HERE
F2	MEASUREMENT OF OUTCOMES FROM A MULTI-DISCIPLINARY RESEARCH PROGRAMME		
a.	In order to measure progress [success], specific outcomes of a research programme should be:		
	<ul style="list-style-type: none"> pre-planned [short, medium and long term goals] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> quantified 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> monitored 	Select one option	TYPE COMMENTS HERE
b.	The outcomes of a research programme should be monitored, but not necessarily planned and quantified	Select one option	TYPE COMMENTS HERE
F3	ADDITIONAL INFORMATION REGARDING OUTCOMES [IMPACT] OF A MULTI-DISCIPLINARY SEM RESEARCH PROGRAMME		
a.	Additional information on the outcomes [impact] of a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> In your opinion, are there other significant outcomes [impact] that may be relevant to a SEM research programme? 		TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Do you have any further comments regarding outcomes [impact] in the planning of a strategic research framework in SEM? 		TYPE COMMENTS HERE
	SECTION G: EXPERT PANELLISTS FINAL COMMENTS		
G1	Are there other aspects that, according to your knowledge and experience, should be included in planning a strategic framework for SEM research?		
	TYPE COMMENTS HERE		

Thank you for taking the time to complete the questionnaire. Results will be analysed and questions where no consensus could be reached among expert panellists, will be redistributed to you soon. It should be a much shorter questionnaire than this one. You will also receive feedback on the results of this questionnaire.

Your valuable input in this research is much appreciated.

Sincerely

Louis Holtzhausen

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FEEDBACK FOR DELPHI PANEL: ROUND 1

FEEDBACK FOR DELPHI PANEL: ROUND 1

This document provides feedback of round 1 for your perusal, before completing the round 2 questionnaire.

Questions highlighted in grey have reached consensus among the panel of experts.

Comments by panel members are included.

Comments by the researcher are included and written in bold font.

Questions where consensus has not been reached are redistributed for consideration by the expert panel in round 2.

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SECTION A: STRATEGIC FOUNDATIONS OF A RESEARCH FRAMEWORK IN SPORT AND EXERCISE MEDICINE																									
	<p>This section deals with the foundational reference points of a generic research programme, but is also applicable to a research programme in Sport and Exercise Medicine (SEM). Please indicate how important you regard each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list by clicking on "Select one option". You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>																								
A1	OVERALL STRATEGY IN RESEARCH PLANNING AND MANAGEMENT																								
	In designing and managing a research programme, the following statements are relevant:																								
	<table border="1"> <thead> <tr> <th>STATEMENT</th> <th>COMMENTS</th> </tr> </thead> <tbody> <tr> <td>a.</td> <td>Research should be guided by:</td> </tr> <tr> <td></td> <td> <ul style="list-style-type: none"> a research strategy </td> </tr> <tr> <td></td> <td>08 This is pivotal to the type of research undertaken and grants applied to as well as recruiting for staff 14 with inherent flexibility to respond to changes in external environment</td> </tr> <tr> <td></td> <td> <ul style="list-style-type: none"> an implementation plan </td> </tr> <tr> <td>b.</td> <td>The success of a research programme can be enhanced by:</td> </tr> <tr> <td></td> <td> <ul style="list-style-type: none"> pre-determination of the direction of research in the programme </td> </tr> <tr> <td></td> <td>08 This may change depending on results and learnings. 10 Some flexibility is needed for high-quality research and not every decision can be anticipated. 14 in general - but responsive to opportunity/changing needs/creativity/opportunities</td> </tr> <tr> <td></td> <td> <ul style="list-style-type: none"> strong leadership </td> </tr> <tr> <td></td> <td>10 But the leader should give the researchers to pursue their interests.</td> </tr> <tr> <td></td> <td> <ul style="list-style-type: none"> strong mentorship </td> </tr> <tr> <td></td> <td>14 need to understand the environment</td> </tr> </tbody> </table>	STATEMENT	COMMENTS	a.	Research should be guided by:		<ul style="list-style-type: none"> a research strategy 		08 This is pivotal to the type of research undertaken and grants applied to as well as recruiting for staff 14 with inherent flexibility to respond to changes in external environment		<ul style="list-style-type: none"> an implementation plan 	b.	The success of a research programme can be enhanced by:		<ul style="list-style-type: none"> pre-determination of the direction of research in the programme 		08 This may change depending on results and learnings. 10 Some flexibility is needed for high-quality research and not every decision can be anticipated. 14 in general - but responsive to opportunity/changing needs/creativity/opportunities		<ul style="list-style-type: none"> strong leadership 		10 But the leader should give the researchers to pursue their interests.		<ul style="list-style-type: none"> strong mentorship 		14 need to understand the environment
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	<ul style="list-style-type: none"> strong mentorship 																								
	14 need to understand the environment																								

	<ul style="list-style-type: none"> An enabling environment such as a university with a strong research culture 	08 More likely to have a supportive infrastructure but can be done in the community
	<ul style="list-style-type: none"> An established research culture 	08 New research cultures often are innovative 10 A "new" culture may be necessary 14 the development of this seems to be the point of this exercise
	<ul style="list-style-type: none"> Development of the next generation of researchers 	
c.	The policy of a research programme should:	
	<ul style="list-style-type: none"> stimulate creativity 	14 need to allow time for this activity
	<ul style="list-style-type: none"> stimulate new thinking 	
	<ul style="list-style-type: none"> support transfer of knowledge to benefit the university 	08 Although collaborative benefits are valued in the university, I don't think it should be policy driven.
	<ul style="list-style-type: none"> support transfer of knowledge to benefit the community 	08 If community means patient and outcome measures 10 Not all beneficial research outcomes will be transferable
d.	<ul style="list-style-type: none"> The role of research in SEM at a university department is dependent on the balance between teaching and research of the university 	14 there is also the possibility of research dedicated staff
e.	A SEM research programme at a university should be supported by:	
	<ul style="list-style-type: none"> University management 	14 Top down support is high priority -must be viewed as important as cancer research
	<ul style="list-style-type: none"> Faculty management 	
	<ul style="list-style-type: none"> Academics in relevant disciplines at the university 	08 need supportive collaborations to continue to innovate and a university setting should provide this. 14 Top down support is high priority -must be viewed as important as cancer research
A2	PRIORITISATION OF RESEARCH IN FOCUS AREAS	
	The following statements relate to the development of focus areas in a research programme:	
a.	In determining research focus areas the following statements are true:	
	<ul style="list-style-type: none"> A university-based research programme should not be restricted by pre-determined research focus areas of the <i>university</i> 	08 A focused approach often leads to excellence and large grant funds. This has to be considered when the university is contributing staffing and infrastructure. 14 Top down support is high priority -must be viewed as important as cancer research
	<ul style="list-style-type: none"> The selection of predetermined research focus areas will enhance interdisciplinary research 	10 Some compatibility may facilitate the use of existing resources 14 Top down support is high priority -must be viewed as important as cancer research
	<ul style="list-style-type: none"> A research programme should concentrate on pre-determined focus areas in the research environment (SEM) 	10 Openness for new areas should be maintained 14 Aligned with funding priorities but also need for forward thinking and addressing opportunities
b.	The following are important determinants in the selection of research focus areas:	
	<ul style="list-style-type: none"> Market demands 	
	<ul style="list-style-type: none"> Interests of individual researchers 	
	<ul style="list-style-type: none"> Expertise of individual researchers 	
	<ul style="list-style-type: none"> Gaps in current research 	

	<ul style="list-style-type: none"> • Availability of equipment 	<p>08 Should not be a deterrent to a research framework as many solutions are possible for equipment share, lease, purchase.</p> <p>10 Not all equipment needs can be anticipated and the research should be driven by ideas and questions, not by equipment.</p> <p>14 ideas/productivity should be in advance of equipment</p>
	<ul style="list-style-type: none"> • Availability of time 	<p>08 Should be able to change around time and personnel. Not a framework piece.</p> <p>14 research is a business not a hobby</p>
	<ul style="list-style-type: none"> • Availability of financial resources 	<p>14 but innovative research can proceed with limited funding</p>
	<ul style="list-style-type: none"> • Availability of study populations 	
	<ul style="list-style-type: none"> • Availability of support staff 	
	<ul style="list-style-type: none"> • Community needs (including local, regional and national) 	<p>14 room for innovation</p>
	<ul style="list-style-type: none"> • International trends in an academic discipline (such as SEM) 	<p>14 true, but need to be forward thinking and look to providing leadership</p>
c.	<p>In addition to selection of research focus areas, the following are important determinants in the selection of <i>individual research projects</i> within a research programme:</p>	
	<ul style="list-style-type: none"> • Adherence to pre-determined focus areas of the research programme 	<p>14 but not at expense of innovation</p>
	<ul style="list-style-type: none"> • Possible available financing for specific projects 	
	<ul style="list-style-type: none"> • Individual research projects should not be selected according to focus areas within a research programme 	<p>10 Again, with some flexibility for new ideas</p> <p>14 need to address selected areas but</p>
	<ul style="list-style-type: none"> • Market demands 	
	<ul style="list-style-type: none"> • Interests of individual researchers 	<p>10 The recruitment of researchers should follow the plan</p>
	<ul style="list-style-type: none"> • Expertise of individual researchers 	<p>14 not limited - need to develop to meet market demands</p>
	<ul style="list-style-type: none"> • Gaps in current research 	
	<ul style="list-style-type: none"> • Availability of equipment 	
	<ul style="list-style-type: none"> • Availability of time 	<p>14 quality and innovative research takes time..</p>
	<ul style="list-style-type: none"> • Availability of financial resources 	
	<ul style="list-style-type: none"> • Availability of study populations 	<p>14 but not limited by availability</p>
	<ul style="list-style-type: none"> • Availability of support staff 	
	<ul style="list-style-type: none"> • Community needs [including local, regional and national] 	
	<ul style="list-style-type: none"> • International trends in an academic discipline (such as SEM) 	
A3	MONITORING OF THE SUCCESS OF A RESEARCH PROGRAMME	
	<p>The following statements relate to monitoring and evaluation of the success of a research programme</p>	
a.	<p>A research programme should regularly be:</p>	
	<ul style="list-style-type: none"> • <i>Monitored</i> according to <i>quantitative</i> key performance indicators [specific, measurable outcomes of success] 	
	<ul style="list-style-type: none"> • <i>Monitored</i> according to <i>qualitative</i> key performance indicators [subjective outcomes of success] 	

	<ul style="list-style-type: none"> • <i>Evaluated according to quantitative</i> key performance indicators [specific, measurable outcomes of success] 	
	<ul style="list-style-type: none"> • <i>Evaluated according to qualitative</i> key performance indicators [subjective outcomes of success] 	
A4	ADDITIONAL RELEVANT INPUT FROM EXPERT PANELLISTS REGARDING STRATEGY IN RESEARCH PLANNING AND MANAGEMENT	
a.	In your opinion, are there additional relevant statements to be considered in determining a research strategy?	
	<p>03 In South Africa (and other countries) the political climate both within and outside of the university also dictate research funding and therefore direction.</p> <p>08 Research should have clinical or educational practice applicability. All research should attempt to include both genders in the study population and outcome analysis.</p> <p>10 Scientific themes can also be selected based on local and regional needs that may be unique.</p> <p>14 Any strategy must be realistically aligned with institutional goals so as maximize institutional support and allow staff career projections. Basically, it must be viewed as an entrepreneurial business not a dream.</p> <p>Must successfully incorporate and bridge the clinical/research divide by clearly defining and optimizing staff capabilities and roles.</p>	
b.	Do you have any further comments regarding the strategic planning of a research framework?	
	<p>08 Research should include an advisory or steering committee to ensure that all needs are being represented.</p> <p>10 Also consider what do you want to be known and recognized for?</p>	
SECTION B: THE ROLE, PLACE AND CHARACTER OF RESEARCH IN SPORT AND EXERCISE MEDICINE [SEM] AT A UNIVERSITY		
	<p>This section deals with the role, place and character of a research programme in sport and exercise medicine at a university. Please indicate how important you regard each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list, by clicking on “Select one option”. You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>	
B1	THE EDUCATIONAL AND ACADEMIC ROLE OF RESEARCH IN SPORT AND EXERCISE MEDICINE	
	STATEMENT	COMMENTS
a.	Research in SEM plays an important <i>educational</i> role in:	
	<ul style="list-style-type: none"> • Basic grounding for undergraduate teaching 	<p>08 This tends to be concluded established research information.</p> <p>14 c inhouse research should be informing teaching</p>
	<ul style="list-style-type: none"> • Basic grounding for postgraduate teaching 	14 ditto
	<ul style="list-style-type: none"> • Defining SEM as academic discipline at the university in which it is housed 	<p>08 SEM is by its definition multidisciplinary among medical specialities and interprofessional in its application. Therefore, it may be grounded in other disciplines versus being defined as its own discipline.</p> <p>14 A Key step in obtaining recognition</p>
	<ul style="list-style-type: none"> • A postgraduate Sport and Exercise Medicine programme 	14 a must to demonstrate SEM as a serious discipline in the University
b.	Research in SEM plays an important role in the <i>development of SEM</i> as an academic discipline regarding:	
	<ul style="list-style-type: none"> • The development of the discipline of Sport and Exercise medicine 	

	<ul style="list-style-type: none"> Establishing best practice in clinical Sport and Exercise Medicine 	
	<ul style="list-style-type: none"> The development of sport 	14 -but not limited to sport
c.	Regarding the role of SEM research in society:	
	<ul style="list-style-type: none"> Sport and Exercise Medicine research can lead the way in mainstream medicine research 	08 Within this decade and the next, I see it as a supporting area of research, and a lens of research. I do not see it a leader in mainstream medicine. 10 Not always but in some areas the answer is yes
	<ul style="list-style-type: none"> Research on elite athletes can often be applied to broader communities 	10 Lessons learned from elite athletes may be useful with other populations just like lessons learned from space research have been useful in the practice of medicine. 14 depends on research and transfer of knowledge
	<ul style="list-style-type: none"> The development of new knowledge in Sport and Exercise Medicine can make a meaningful contribution to public health care 	14 absolutely -- and this needs to be highlighted in any SEM research framework documents
	<ul style="list-style-type: none"> SEM research plays an important role in addressing the scientific needs of the athletic population 	
d.	Sport plays an important role in:	
	<ul style="list-style-type: none"> Society 	08 The word "sport" versus exercise reduces the applicability of this question. LH Comment: Valid point. As consensus has already been reached on this, "exercise" will be implied as playing a role in society and community wellness and will the questions not be posed in Round 2.
	<ul style="list-style-type: none"> Community wellness 	
	<ul style="list-style-type: none"> Politics 	
B2	THE ACADEMIC PLACE (POSITIONING) OF A RESEARCH PROGRAMME IN SPORT AND EXERCISE MEDICINE AT A UNIVERSITY	
a.	Regarding the place of an SEM research programme in a university:	
	<ul style="list-style-type: none"> An SEM research programme is best positioned in a Faculty of Health Sciences 	08 This will vary from university to university. In a health science faculty, it may flourish or be overshadowed. In a health and physical education faculty, it may be a practical and needed application. 14 - but as an equal contributor not "little" brother/sister" and starved of realistic core funding
	<ul style="list-style-type: none"> Research should be an essential part of a structured Master's programme in SEM 	10 Or any other degree
	<ul style="list-style-type: none"> An SEM department should engage in collaborative research partnerships with other disciplines within the institution 	

b.	The following groupings are relevant partners in an SEM research programme:	
	• Other academic health care institutions	
	• Primary health care institutions	
	• Sport federations	14 should not be the focus
c.	The following fields of study are relevant in an interdisciplinary SEM research programme:	
	• Health promotion	08 The operative word "relevant" makes all statements true as there are non that unrelated. Comment LH: The list was compiled by means of interviews with internal researchers and stakeholders in SEM research. The value of the exercise lies in the confirmation of these fields of study within the domain of SEM. If a field of study is irrelevant according to any panel member, he/she should disagree.
	• Public wellness	
	• Prevention of chronic disease	
	• Prevention of exercise related illness	
	• Management of exercise related illness	
	• Prevention of exercise related injuries	
	• Management of exercise related injuries	
d.	SEM is a particularly suitable discipline for:	
	• applied research	
	• pure scientific research	14 Exercise has been used to understand basic biochemical and physiological phenomena
B3	THE POSITIONING OF A MULTIDISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME WITHIN EXISTING RESEARCH FOCUS AREAS AT THE UNIVERSITY OF THE FREE STATE	
	This section deals with the existing strategic interdisciplinary research clusters [focus areas] at the University of the Free State. These clusters have been selected predominantly on the basis of regional need and existing expertise and research. The clusters are intended to enhance the strategic research focus of the university, as well as interdisciplinary/collaborative research. They get preferential university funding and support before research that is not included in a cluster. It is therefore beneficial for any research programme to find common ground within one of the clusters.	
	Please indicate your level of agreement with the likelihood of SEM research to fit into each strategic cluster:	
a.	<i>Cluster 1:</i> Enabling technologies/technologies for the future [Suggested constituent focus areas: High throughput biology, nanotechnology [solid state lighting], chemical and allied technologies	10 Nanotechnology
b.	<i>Cluster 2:</i> Food production, quality and safety for Africa [Suggested constituent focus areas: Animal production and protection, plant production and protection, human nutrition, food quality and safety]	08 Human nutrition and performance 10 Human nutrition in the context of high-caloric demands

c.	<i>Cluster 3:</i> Regional community development and alleviation of poverty [Suggested constituent focus areas: Urban development, rural development: sustainable livelihoods in the QwaQwa region [a rural region where a satellite campus of the University of the Free State is situated], resource management and development [tourism, small business development, local government], healthy communities [communicable diseases, chronic diseases of lifestyle, children with disabilities]	08 Role of exercise in healthy communities 10 Chronic diseases LH Comment: Consensus has been reached on “partially agree”
d.	<i>Cluster 4:</i> Social transformation [citizenship and identity, diverse histories, globalisation and governance, human rights and social equity]	08 Gender, age, racism and sport
e.	<i>Cluster 5:</i> Water resources and ecosystem management [freshwater ecology, environmental change, water resource management, sustainable utilisation of terrestrial ecosystems]	
f.	<i>Cluster 6:</i> Towards a competitive chemical industry [new drug manufacturing, petrochemicals, natural product development, polymers]	
g.	Interdisciplinary SEM research at the UFS will not develop optimally if accommodated in one or more of the above existing strategic clusters	03 Aspects can fit into some of the existing clusters but new cluster should be created 08 Although not the core areas of SEM, these clusters and their integration with SEM are aimed as sustainable changes in health. 10 Some areas noted above related directly to research in SEM 14 SEM does not appear to logically fit into any of these clusters. Surprisingly there is not a stronger "health" cluster.
B4	THE MULTIDISCIPLINARY CHARACTER OF SPORT AND EXERCISE MEDICINE	
a.	The following statements are true regarding SEM:	
	<ul style="list-style-type: none"> SEM is a multidisciplinary field of study 	
	<ul style="list-style-type: none"> A SEM research programme should have an multidisciplinary character 	14 This is fundamental and critical to the development of generating collaborations and addressing funding opportunities
	<ul style="list-style-type: none"> An interdisciplinary SEM research programme should be managed independent of academic departments 	08 Department collaboration is essential 10 The management model may depend on the institutional culture. In our University, SEM has been successful and is housed within an academic department with collaborations with other departments 14 SEM is a standalone discipline and will not flourish buried in an irrelevant Department.

B5	ADDITIONAL RELEVANT INPUT FROM EXPERT PANELLISTS REGARDING THE ROLE, POSITIONING AND CHARACTER OF A SEM RESEARCH PROGRAMME	
a.	In your opinion, are there additional relevant statements regarding the role, place and character of research in SEM to be considered in determining a strategic research framework?	
	<p>08 It would be relevant to consider population health trends and their integration with exercise and sport. In addition, lifecycle and lifestyle integration.</p> <p>14 SEM is built on interdisciplinary interactions with a clear focus on research/clinical objectives. SEM will never obtain a status equal to established academic units if it is buried in a larger established unit.</p> <p>Internationally SEM is well a recognised academic discipline and should control its own academic destiny.</p> <p>SEM is as much about public health as it is about sports and thus must be treated and supported as serious academic discipline</p>	
b.	Do you have any further comments regarding the role, place and character of SEM research in the planning of a strategic research framework?	
	08 The opportunity to enhance evidence based rehabilitation through SEM is key since much funding is spent by governments without good evidence of proven benefit or treatment consensus.	
SECTION C: INPUTS THAT ARE REQUIRED BY A RESEARCH PROGRAMME IN SPORT AND EXERCISE MEDICINE		
	<p>This section deals with different inputs required for the successful operation of a multidisciplinary research programme, and the activities within such a programme. Please indicate your perceived importance of each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list, by clicking on “Select one option”. You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>	
C1: RESOURCES		
	STATEMENTS	COMMENTS
C1.1	HUMAN RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:	
a.	The following staff components are important for the successful operation of a SEM research programme:	
	• Competent academic staff	14 Clinical staff may not have a PhD
	• Competent departmental support staff	
	• Faculty research support staff	
	• University research support staff	
	• Post-magister degree fellows	14 a must
	• Post-doctoral fellows	14 an absolute strength of a productive programme
b.	The following statements are true regarding the academic staff in a SEM research programme:	
	• All academic staff in SEM must obtain PhD degrees	08 Should be 2 out of 3 from MD, Masters, PHD. Experience should be taken into consideration. 14 Staff with PhD should only be recruited in the future.
	• All academic SEM staff must supervise PhD students research	03 If they have PhD themselves 08 Should have a PhD to supervise Phd, so it is linked to previous question 10 It is possible to have an excellent faculty research who is not supervising students
	• All academic SEM staff must supervise Master’s students research	
	• Researchers in a research programme should be assimilated by retaining the	08 Not sure exactly what you mean by assimilated. If you mean consistent and uniform, than I have

	best postgraduate students	answered the question with that understanding. 10 This is one strategy to recruit faculty, but not the only one 14 True, but also recruit Postgraduate students from other institutions to increase research vitality
	<ul style="list-style-type: none"> Continuous staff development is relevant to the success of an SEM research programme 	14 as per any other Department/discipline in the University
	<ul style="list-style-type: none"> The staff profile of a successful SEM research programme should reflect a balance between experienced and young researchers 	
	<ul style="list-style-type: none"> At least 25% of time of academic staff in an SEM department must be devoted to research supervision 	08 There are sliding scale models from 10-25% 10 For productive researchers I suggest >50% 14 Agree - but it could be more depending on funding situation and may vary with individual depending on opportunities
	<ul style="list-style-type: none"> There must be minimum requirements for national publications for all staff members in a department of SEM 	08 This leaves open the type of publication and that is appropriate for national 14 -but on a rolling basis - with a strong/fast move to international level publications
	<ul style="list-style-type: none"> There must be minimum requirements for international publications for all staff members in a department of SEM 	08 There should be a minimum requirement for Scholarship work as defined in the educational literature. This would include publication but not limited to.
c.	Critical characteristics required to be a <i>successful researcher</i> in SEM include:	
	<ul style="list-style-type: none"> Disciplinary knowledge 	
	<ul style="list-style-type: none"> Disciplinary insight 	
	<ul style="list-style-type: none"> Writing skills 	
	<ul style="list-style-type: none"> Experience on ground level 	
	<ul style="list-style-type: none"> Knowledge of the industry 	
	<ul style="list-style-type: none"> Previous exposure to the discipline 	
	<ul style="list-style-type: none"> Knowledge of research methodology 	14 a must to be able to produce quality research
	<ul style="list-style-type: none"> Knowledge of funding opportunities 	
	<ul style="list-style-type: none"> Expertise in certain focus areas 	
	<ul style="list-style-type: none"> Knowledge of research supervision 	
	<ul style="list-style-type: none"> Knowledge of research ethics 	
	<ul style="list-style-type: none"> The ability to apply general research principles into SEM research 	
	<ul style="list-style-type: none"> Have status [respect] among peers in the discipline 	14 publications count
	<ul style="list-style-type: none"> Experience in publication of research 	

d.	The following <i>leadership characteristics</i> are required by leaders in research programmes:	
	• Motivational leadership	
	• Passion for the discipline	
	• Stature in the discipline	14 published research is more powerful than "gurus"
	• Ability to see the bigger picture [vision]	
	• Inspirational leadership	08 I think that motivational leadership is more critical
	• Skills to work with different levels of knowledge and experience	
	• Not too critical	08 Can't really answer this question as it does not detail a characteristic but more a behaviour. There is a need for critical thinking and constructive criticism. "Not too critical" is not defined enough to answer.
	• Delegating skills	
	• Leadership in daily life	10 Not always transferable to the laboratory
	• Listening skills	
	• Co-ordinating [organisational] skills	
	• Autocratic leadership skills	LH comment: Consensus has been reached on "disagree"
	• Interpersonal skills	
	• Communication skills	
	• Ability to take responsibility in success	
	• Ability to take responsibility in failure	
	• Integrity	
	• Sensitivity	
	• Bravery	
	• Trust	
	• Honesty	
	• Wisdom [good judgement]	
e.	The following <i>management skills</i> are required by research programme managers:	
	• Financial management skills	
	• Project management skills	
	• People management skills	
	• Process management skills	
	• Goal setting skills	
	• Planning skills	
	• Conflict management skills	
	• Administrative skills	
	• Stress management skills	
	• Interpersonal relationship skills	
	• Fundraising skills	
	• Skill to implement a plan	
	• Technical skills	

f.	Additional information on human resources in a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> In your opinion, are there additional relevant statements regarding the human resources relevant to a successful research programme in SEM to be considered in determining a strategic research framework? 	
	08 Research and Ethics Certificate. 08 Attention To detail. 08 Organized 10 The above list is very inclusive. 13 Consider also MD#s as member of an academic SEM staff 14 All good -but not all successful leaders has the whole package! Communication and people skills are critical.	
	<ul style="list-style-type: none"> Do you have any further comments regarding the human resources in the planning of a strategic research framework? 	
	08 Probably appropriate for associate staff to have presentation skills	
C1.2	FINANCIAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF AN SEM RESEARCH PROGRAMME:	
a.	An SEM research programme should be funded by:	
	<ul style="list-style-type: none"> Commercialisation of research 	10 Some commercial sources may be acceptable
	<ul style="list-style-type: none"> Commercialisation of clinical services 	10 Revenue from clinical practice may be used to support research 14 Agree, if it's also a platform for research and learning opportunities
	<ul style="list-style-type: none"> The university in which it is housed 	14 Agree and it must be sustained during the start-up phase.
	<ul style="list-style-type: none"> Government subsidy 	10 It is an obligation of the government (and good policy too)
	<ul style="list-style-type: none"> Research funding agencies, such as the National Research Foundation or Medical Research Council of South Africa 	
	<ul style="list-style-type: none"> Partnerships between the research programme and private corporations 	10 As long as potential conflicts of interest are managed 14 Agree-if managed well
b.	A newly established research programme should receive initial start-up funding (seed capital) from the university in which it is housed	14 Agree and it must be sustained during the start-up phase.
c.	There is a risk of losing academic autonomy of a research programme due to interference from funders	14 Should be covered in the negotiated contract
d.	Additional information on human resources in a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> In your opinion, are there additional relevant statements regarding the financial resources relevant to a successful research programme in SEM to be considered in determining a strategic research framework? 	
	03 proper funding (not partial or under-funding) of clinical academic posts should be a priority 10 Given the global financial crisis, multiple sources must be considered 14 The need for a variety of funding streams 14 Guaranteed base funding during the establishment period (say 5 years) 14 External competitive funding will not happen immediately. 14 There is a need to balance outputs with the seeking of external funding. 14 Quality outputs will provide the base for external funding.	
	<ul style="list-style-type: none"> Do you have any further comments regarding the financial resources in the planning of a strategic research framework? 	
C1.3	INTERNAL INSTITUTIONAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF AN SEM RESEARCH PROGRAMME:	
	This section deals with the <i>internal (institutional) resources of the university</i> relevant to the	

	successful operation of a SEM research programme. The following statements are true in this regard:	
a.	The following institutional resources at a university are relevant role players in an SEM research programme:	
	• The institutional research directorate	
	• The post-graduate school	
	• The finance department	10 Contributes but does not make final decisions
	• The human resources department	10 Contributes but does not make final decisions
	• The Faculty of Health Sciences executive	
	• The university sport department	
	• The university health and wellness centre	
	• The department of biostatistics	
	• The institutional marketing/fundraising department	
	• Academic writers	
	• Research grant application experts	
	• The university Alumni association	
b.	Additional information on internal university (institutional) resources in a Sport and Exercise Medicine research programme that panellists wish to include:	
	• In your opinion, are there additional relevant statements regarding the institutional resources relevant to a successful research programme in SEM to be considered in determining a strategic research framework?	
	08 I think that all of the above mentioned resources are important however some can be outsourced and don't have to be in a university for a program to be successful. I have rated those as Fully Agree that should be in the university. 14 Internal publications and newsletters 14 The president's Office 14 Promotions Committee's and Human Resources	
	• Do you have any further comments regarding the financial resources in the planning of a strategic research framework?	
C1.4	EXTERNAL ORGANISATIONAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:	
	This section deals with the <i>external resources</i> relevant to the successful operation of a multidisciplinary SEM research programme.	
a.	The following organisations outside of the university are relevant role players in the successful operation of an SEM research programme:	
	• Research funding agencies [National Research Foundation of South Africa; Medical Research Council of South Africa]	
	• Research foundations	
	• Professional associations, e.g. the South African Sports Medicine Association [SASMA]; the International Sports Medicine Federation [FIMS]; the International Olympic Committee [IOC] medical committee	08 These institutions may be part of the network that provides a vehicle for knowledge transfer of research findings but generally do not provide significant funding.

	<ul style="list-style-type: none"> The private healthcare industry 	<p>08 The issue with the next four partners is that although they may be sources of funding, they should not be seen partners as their reason for research would be bias to the process.</p> <p>10 Contributes but does not make final decisions</p>
	<ul style="list-style-type: none"> The pharmaceutical industry 	<p>10 Contributes but does not make final decisions</p> <p>14 only if there is research potential/contracts</p>
	<ul style="list-style-type: none"> The nutritional supplement industry 	<p>10 Contributes but does not make final decisions</p>
	<ul style="list-style-type: none"> Anti doping agencies [e.g. the South African Institute for Drugs in Sport [SAIDS], the World Anti-doping agency [WADA] 	<p>14 only if these lead to research opportunities</p>
	<ul style="list-style-type: none"> The fitness industry 	<p>10 As long as potential conflicts of interest are managed correctly</p>
	<ul style="list-style-type: none"> National sport federations 	
	<ul style="list-style-type: none"> The South African Sports Confederation and Olympic Committee [SASCOC] 	
	<ul style="list-style-type: none"> Underemphasised sport codes in South Africa [e.g. gymnastics, karate, boxing] 	<p>14 these create unique/opportunist activities</p>
	<ul style="list-style-type: none"> Government departments [Department of Health, Department of Sport and Recreation, Department of Education, Department of Science and Technology] 	
	<ul style="list-style-type: none"> Government departments of other countries in Africa or internationally 	<p>LH comment: Consensus has been reached on “partially agree”</p>
	<ul style="list-style-type: none"> The College of Sport and Exercise Medicine of Medicine of South Africa [CSEM(SA)] 	
	<ul style="list-style-type: none"> The College of Medicine of Medicine of South Africa [CMSA] 	
	<ul style="list-style-type: none"> The community in which the research programme is located 	
b.	Additional information on external resources in a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> In your opinion, are there other organisations that may be relevant to an SEM research programme? 	
	<p>03 Difficult to differentiate between what exists in reality (at present) and what should exist in an ideal world. Local politics within organizations unfortunately can direct attitude towards research.</p> <p>08 I think you may want to consider some of the other professional organizations like the Physiotherapy association etc.</p> <p>10 Similar organizations in universities in other countries</p>	
	<ul style="list-style-type: none"> Do you have any further comments regarding external resources in the planning of a strategic research framework in SEM? 	

C1.5	ACADEMIC ROLEPLAYERS AND STAKEHOLDERS IN A MULTIDISCIPLINARY SPORT AND EXERCISE MEDICINE RESEARCH PROGRAMME	
	This section attempts to identify the most relevant potential academic role players in a multidisciplinary SEM research programme:	
a.	The following academic disciplines are relevant role players in a multidisciplinary SEM research programme:	
	• Sport and Exercise science/Biokinetics	
	• Human nutrition and dietetics	
	• Physiology	
	• Anatomy and cell biology	
	• Family medicine	
	• Orthopaedics	
	• Pharmacology	
	• Occupational therapy	
	• Psychology	
	• Sport and Exercise Medicine	
	• Internal medicine	
	• Diagnostic radiology	
	• Biochemistry	
	• Haematology	
	• Nursing	
	• Ophthalmology	
	• Paediatrics	
	• Community health	
	• Occupational health	
	• Work wellness/employee assistance	
	• Pathology/biochemistry/haematology laboratory services	
	• Physiotherapy	
b.	Additional information regarding academic disciplines that may be relevant to an SEM research programme.	
	• In your opinion, are there other academic disciplines that may be relevant role players in a multidisciplinary SEM research programme?	
	<p>08 Rehabilitation/ Physiotherapy. Comment LH: Physiotherapy was accidentally omitted from the list. It is included in Round 2 for consideration by the panel. Rehabilitation generally falls within the domain of biokinetics in the South African setting. The list was compiled by means of interviews with internal stakeholders in SEM research.</p> <p>08 Physical Education</p> <p>08 Coaching and Sport Administration</p> <p>10 Many of these disciplines may be part of the effort but are not considered core, eg. those listed as "partially agree"</p> <p>14 Biostatistics</p> <p>14 Bioethics</p> <p>14 Public and Community Health</p> <p>14 Bioengineering</p> <p>14 Sociology/gender/disability studies</p>	
	• Do you have any further comments regarding identification of academic role players in the planning of a strategic research framework in SEM?	

C2	PROCESSES RELEVANT TO THE SUCCESSFUL OPERATION OF A MULTIDISCIPLINARY SEM RESEARCH PROGRAMME	
C2.1	STRATEGIC PROCESSES	
	STATEMENTS	COMMENTS
a.	The following are relevant components of a <i>strategic plan</i> for a multidisciplinary SEM research programme:	
	• A vision statement	
	• A mission statement	
	• Clear objectives	
	• Criteria for identification of team members	
	• An implementation plan	
	• A quality assurance plan	08 This should be integrated as part of the ethics approval of the research
	• A risk management plan	
	• A performance measurement plan	
	• An intellectual property plan	
	• Consensus among role players on the strategy and goals of the research programme	08 Not sure that full consensus is required as some dissent can lead to more creative and collaborative efforts.
	• A policy document to guide the research programme	
	• A financial sustainability plan	08 The word Financial Plan might be too long term and difficult to predict. There has to be some financial stability for the infrastructure and then each grant has to have a viable financial budget. The financial plan should be a framework that is flexible with change.
	• Ethical guidelines	
b.	The following are relevant reference points for <i>strategic goal setting</i> for a multidisciplinary SEM research programme:	
	• Establishment of research teams	14 Teams drive research and must be clearly defined and supported. Teams should be focused
	• Utilisation of new technologies	
	• Establishment of strategic research focus areas	
c.	The following are key <i>strategic activities</i> to ensure success of a multidisciplinary SEM research programme:	
	• Increase the number of PhDs of staff in the programme	10 Assuming this is a new program 14 by both internal upskilling recruiting PhDs --- a must
	• Nurture a new generation of researchers	
	• Attract post-doctoral fellows	
	• Encourage publication of research	4 Highest priority
	• Host international leaders in SEM in the programme	
	• Encourage dissemination of research through public forums	
	• Support conference attendance	14 but only if contributing or targeted
	• Monitoring of activities of other research units	
	• Research focus areas	
	• Management models	
	• Funding models	
	• Research outputs	
d.	A national SEM research co-ordinating	14 Agree - but only if it productive driven and not

	body will make a positive contribution to SEM research in South Africa	internally reflecting
e.	Additional information on strategic processes in a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> In your opinion, are there other strategic concepts that may be relevant to an SEM research programme? 	
	<p>03 By nature of the activities, there will always be competition for limited resources, thus limiting the role of a National research co-ordinating body.</p> <p>08 Representation of key partners in planning process</p> <p>10 Enhancing institutional infrastructure and culture for this type of research.</p> <p>14 Build strong links with key University academic Departments</p> <p>14 Develop a strong and experienced advisory committee (academics/business/community members)</p> <p>14 Develop a strong SEM team attitude with strong support for development and academic growth</p> <p>14 Celebrate all and small successes</p>	
	<ul style="list-style-type: none"> Do you have any further comments regarding strategic processes in the planning of a strategic research framework in SEM? 	
C2.2	MANAGERIAL PROCESSES	
a.	Regarding <i>human resource [people] management</i> , the following aspects are relevant in a multidisciplinary SEM research programme:	
	<ul style="list-style-type: none"> The establishment of a multidisciplinary scientific committee 	14 depends on goals - can take away self growth
	<ul style="list-style-type: none"> Building trust among all role players 	
	<ul style="list-style-type: none"> Nurture teamwork 	
	<ul style="list-style-type: none"> Nurture a shared vision among team members 	
	<ul style="list-style-type: none"> Focus on professional development [career planning] of all members of the team 	
	<ul style="list-style-type: none"> Nurture creativity of team members 	
	<ul style="list-style-type: none"> Align professional fulfilment with personal fulfilment of team members 	14 Important in a tough career promotion environment.
b.	Regarding <i>academic management</i> of research the following aspects are important managerial functions:	
	<ul style="list-style-type: none"> Incentives to researchers for publication 	08 Should be academic versus monetary incentives. 14 This should be by teams/SEM group -not individual as it can be divisive and see workload inequalities. Must be managed very carefully. SEM must be the winner -not individuals.
	<ul style="list-style-type: none"> Pre-arrangement of distribution of credits for interdisciplinary research 	
	<ul style="list-style-type: none"> Focus on results [research outputs] 	
c.	Regarding <i>financial management</i> of research, the following aspects are important managerial functions:	
	<ul style="list-style-type: none"> Following a set budgeting procedure for research projects 	
	<ul style="list-style-type: none"> Fundraising must be a specialised function within the research programme 	
	<ul style="list-style-type: none"> Strict financial management principles must apply to all research projects 	
d.	It is important for a research programme to work according to strict <i>time schedules</i>	10 Some flexibility is needed considering the nature of the results and the need to adjust course 14 research is a business

		Comment LH: Consensus has been reached on “partially agree”
e.	Additional information on managerial processes in a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> In your opinion, are there management considerations that may be relevant to a SEM research programme? 	
	<p>03 Difficult sometimes within the SEM framework to adhere to strict time schedules.</p> <p>08 Managing budget and human resources are the key. Time planning is important but often goes astray so project should have a contingency plan and budget .</p> <p>10 Managers must have experience in research management. Successful managers in clinical operations and other activities need professional training before moving to a research environment.</p>	
	<ul style="list-style-type: none"> Do you have any further comments regarding managerial processes in the planning of a strategic research framework in SEM? 	
C2.3	OPERATIONAL PROCESSES	
a.	<i>Operational processes</i> of a multidisciplinary SEM research programme should include the following	
	<ul style="list-style-type: none"> Clear operational procedures 	
	<ul style="list-style-type: none"> Clear programme regulations 	
	<ul style="list-style-type: none"> Formal agreements on procedures with researchers 	
	<ul style="list-style-type: none"> Formal agreements on expected outcomes with researchers 	
	<ul style="list-style-type: none"> Guidelines for writing protocols 	
	<ul style="list-style-type: none"> Guidelines for publication 	14 these are an individual responsibility
	<ul style="list-style-type: none"> Good clinical practice guidelines in research 	
	<ul style="list-style-type: none"> Creation of patient databases 	
	<ul style="list-style-type: none"> Regular research planning meetings 	
	<ul style="list-style-type: none"> Regular research feedback meetings 	
b.	Additional information on operational processes in a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> In your opinion, are there other operational processes that may be relevant to an SEM research programme? 	
	10 Frequent and formal evaluation of outcomes and performance	
	<ul style="list-style-type: none"> Do you have any further comments regarding operational processes in the planning of a strategic research framework in SEM? 	

SECTION D: CHALLENGES IN MULTIDISCIPLINARY RESEARCH IN SPORT AND EXERCISE MEDICINE		
	<p>This section deals with challenges in multi-disciplinary research in general, but also in sport and exercise medicine at a university. Please indicate how important you regard each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list, by clicking on “Select one option”. You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>	
	STATEMENTS	COMMENTS
D1	ACADEMIC CHALLENGES IN MULTIDISCIPLINARY SEM RESEARCH	
a.	The following are relevant <i>academic</i> challenges in the establishment and management of a multidisciplinary SEM research programme:	
	<ul style="list-style-type: none"> To establish SEM as a multidisciplinary research discipline in medicine 	
	<ul style="list-style-type: none"> To obtain support from university management for interdisciplinary SEM research 	10 This is true for all disciplines
	<ul style="list-style-type: none"> To motivate people from different academic backgrounds to listen [want to understand] each other ‘s points of view 	
	<ul style="list-style-type: none"> Fair distribution of research credits 	10 Disagree, but this is not limited to SEM research
	<ul style="list-style-type: none"> Lack of trust among multi-disciplinary team members 	10 Disagree, but this is not limited to SEM research
	<ul style="list-style-type: none"> To become nationally recognised by peers 	
	<ul style="list-style-type: none"> To become internationally recognised by peers 	
	<ul style="list-style-type: none"> To compete with institutions with ample human and financial resources [such as the IOC] 	14 this is a different world
	<ul style="list-style-type: none"> To form professional networks 	
	<ul style="list-style-type: none"> To become part of existing professional networks 	
	<ul style="list-style-type: none"> Potential interdisciplinary stakeholders may fail to recognise the merit/importance of the “bigger picture” or vision 	
	<ul style="list-style-type: none"> It may be difficult for interdisciplinary research stakeholders to distinguish between research output [current drive] and impact [vision] 	
	<ul style="list-style-type: none"> Lack of creativity of primary researchers may have a negative impact on interdisciplinary research 	10 This is true for all types of research

	<ul style="list-style-type: none"> SEM is a small, young discipline that finds it difficult to make an impact in a broader interdisciplinary medical context 	10 The field has grown significantly in the last 20-30 years as the importance of physical activity as a public health intervention has been recognized 14 Quality and relevant publications talk
	<ul style="list-style-type: none"> Optimal placement of research focus areas in an interdisciplinary grouping is an important consideration in interdisciplinary research 	
	<ul style="list-style-type: none"> Different disciplines have different points of view/paradigms that are challenging to blend and to find a common “language” 	
	<ul style="list-style-type: none"> To identify specialists to collaborate with 	
	<ul style="list-style-type: none"> To find good research ideas 	
	<ul style="list-style-type: none"> To find good students 	
D2	MANAGEMENT CHALLENGES IN MULTIDISCIPLINARY SEM RESEARCH	
a.	The following are <i>management</i> challenges in the successful operation of a multidisciplinary SEM research programme:	
	<ul style="list-style-type: none"> The establishment of a management/leadership hierarchy in interdisciplinary research 	
	<ul style="list-style-type: none"> Departmental interest above interdisciplinary research interest 	
	<ul style="list-style-type: none"> Personal research interest above interdisciplinary research interest 	
	<ul style="list-style-type: none"> Maintenance of effective interdisciplinary communication 	
	<ul style="list-style-type: none"> Maintenance of effective interdisciplinary co-ordination 	
	<ul style="list-style-type: none"> Interdisciplinary funding of resources 	
	<ul style="list-style-type: none"> To obtain initial funding for a new research programme 	
	<ul style="list-style-type: none"> Time allocation/prioritising for interdisciplinary work versus own departmental work 	
	<ul style="list-style-type: none"> Quality control and minimum standard setting in an interdisciplinary research environment 	
	<ul style="list-style-type: none"> To attract full-time researchers 	
D3	ADDITIONAL INFORMATION REGARDING CHALLENGES IN MULTIDISCIPLINARY SEM RESEARCH	
a.	Additional information on external resources in a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> In your opinion, are there other challenges that may be relevant to an SEM research programme? 	
	10 The challenges listed above, in my opinion, apply to many fields of inquiry and are not specific to SEM. In fact, the nature of SEM may simplify some of the challenges typical of interdisciplinary activities.	
	14 SEM researchers need to have the belief that their research is important and publish in quality peer-reviewed journals. This is the key step in obtaining recognition from more colleagues in more established research areas.	
	<ul style="list-style-type: none"> Do you have any further comments regarding challenges in the planning of a strategic research framework in SEM? 	
	SECTION E: OUTPUTS [PRODUCTS] OF A MULTIDISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME	
	This section deals with types, levels and targets of outputs of a multidisciplinary SEM research	

	<p>programme. Please indicate how important you regard each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list, by clicking on “Select one option”. You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>	
	STATEMENTS	COMMENTS
E1	TYPES OF OUTPUTS FROM A MULTIDISCIPLINARY RESEARCH PROGRAMME	
a.	The following are essential academic products of a multidisciplinary SEM research programme:	
	<ul style="list-style-type: none"> • Non-scientific informational publications 	10 An essential but non-academic product that may help the community in generally help the community in general
	<ul style="list-style-type: none"> • Non-peer reviewed scientific publications 	
	<ul style="list-style-type: none"> • National peer-reviewed scientific publications 	
	<ul style="list-style-type: none"> • International peer-reviewed scientific publications 	
	<ul style="list-style-type: none"> • Citation of publications 	
	<ul style="list-style-type: none"> • Citation with high impact factor of publications 	
	<ul style="list-style-type: none"> • Master’s degrees 	
	<ul style="list-style-type: none"> • PhD degrees 	
	<ul style="list-style-type: none"> • Registered patents 	
	<ul style="list-style-type: none"> • National conference presentations 	
	<ul style="list-style-type: none"> • International conference presentations 	
	<ul style="list-style-type: none"> • Chapters in books 	
	<ul style="list-style-type: none"> • Scholarly books 	
	<ul style="list-style-type: none"> • Textbooks and published guidelines 	
	<ul style="list-style-type: none"> • Short learning courses 	
	<ul style="list-style-type: none"> • Increased academic stature among peers 	
	<ul style="list-style-type: none"> • Invitations for collaboration from research units of high standing 	
	<ul style="list-style-type: none"> • A network of research partners [collaborators] 	
b.	The following are desired human outcomes of a multidisciplinary SEM research programme:	
	<ul style="list-style-type: none"> • Promotion of staff within the university 	
	<ul style="list-style-type: none"> • Appointment of staff members on university research structures 	
	<ul style="list-style-type: none"> • Appointment of staff members on national research structures 	
	<ul style="list-style-type: none"> • Appointment of staff members on national governmental scientific bodies 	
	<ul style="list-style-type: none"> • Appointment of staff members on international research structures 	
	<ul style="list-style-type: none"> • Appointment of staff members on international scientific forums 	
	<ul style="list-style-type: none"> • Increased levels of academic expertise within the programme 	
c.	The following objectives deal with desired financial outcomes within a multidisciplinary SEM research programme at a university. Select your level of agreement with each objective:	

	<ul style="list-style-type: none"> Financial self-sustainability 	
	<ul style="list-style-type: none"> Profitability 	10 Not for an academic program
	<ul style="list-style-type: none"> Commercialisation of research by contract research 	
	<ul style="list-style-type: none"> Commercialisation of research by selling new knowledge 	
	<ul style="list-style-type: none"> Commercialisation of research by registering patents 	
	<ul style="list-style-type: none"> Growth of the programme by obtaining increasing amounts of research funding 	
E2	LEVELS OF FOCUS OF MULTIDISCIPLINARY SEM RESEARCH PROGRAMME	
a.	The following are important levels at which research outputs should be focused:	
	<ul style="list-style-type: none"> Community [regional] 	
	<ul style="list-style-type: none"> National 	
	<ul style="list-style-type: none"> International 	
	<ul style="list-style-type: none"> Specific publications 	
	<ul style="list-style-type: none"> Specific industries 	
b.	The following are important persons and bodies at which research outputs should be focused [who should be pleased with the outcome?]:	
	<ul style="list-style-type: none"> University faculty 	
	<ul style="list-style-type: none"> University management 	
	<ul style="list-style-type: none"> National peers 	
	<ul style="list-style-type: none"> International peers 	
	<ul style="list-style-type: none"> Funding agencies [MRC, NRF] 	
	<ul style="list-style-type: none"> Organised sport 	Comment LH: Consensus has been reached on “partially agree”
	<ul style="list-style-type: none"> Government departments [sport, education, health etc] 	
	<ul style="list-style-type: none"> The public 	
	<ul style="list-style-type: none"> The healthcare industry 	
	<ul style="list-style-type: none"> The fitness industry 	
E3	ADDITIONAL INFORMATION REGARDING OUTPUTS OF A MULTIDISCIPLINARY SEM RESEARCH PROGRAMME	
a.	Additional information on outputs of a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> In your opinion, are there other significant outputs that may be relevant to a SEM research programme? 	
	<ul style="list-style-type: none"> Do you have any further comments regarding outputs in the planning of a strategic research framework in SEM? 	

SECTION F: OUTCOMES [IMPACT] OF A MULTIDISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME	
<p>This section deals with longer term outcomes [impact] and significance of a multidisciplinary SEM research programme. Please indicate how important you regard each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list, by clicking on “Select one option”. You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>	
STATEMENTS	COMMENTS
F1 TYPES OF OUTCOMES FROM A MULTIDISCIPLINARY RESEARCH PROGRAMME	
a.	The following are significant <i>academic outcomes</i> of a multidisciplinary SEM research programme:
	<ul style="list-style-type: none"> Increased quantity of academic manuscripts
	<ul style="list-style-type: none"> Increased quality of academic manuscripts
	<ul style="list-style-type: none"> Increased funding of the research programme
b.	The following are significant <i>internal effects</i> [changes] that may indicate outcomes of the research programme:
	<ul style="list-style-type: none"> Changes in number of researchers in the programme
	<ul style="list-style-type: none"> Changes in behaviour of researchers
	14 assume the development of a research output culture
	<ul style="list-style-type: none"> Changes in stature of researchers
	<ul style="list-style-type: none"> Changes in stature of the research programme
c.	The following are significant <i>external effects</i> [changes] that may indicate outcomes [significance] of the research programme:
	<ul style="list-style-type: none"> Changes in the university [e.g. attitude, placement of the programme]
	<ul style="list-style-type: none"> Implementation of research findings in communities
	<ul style="list-style-type: none"> Changes in the community
	<ul style="list-style-type: none"> Changes in the profile of sport and exercise medicine
F2 MEASUREMENT OF OUTCOMES FROM A MULTIDISCIPLINARY RESEARCH PROGRAMME	
a.	In order to measure progress [success], specific outcomes of a research programme should be:
	<ul style="list-style-type: none"> pre-planned [short-, medium- and long-term goals]
	<ul style="list-style-type: none"> quantified
	<ul style="list-style-type: none"> monitored
b.	The outcomes of a research programme should be monitored, but not necessarily planned and quantified
	14 to much monitoring can lead to process -not output focus

F3	ADDITIONAL INFORMATION REGARDING OUTCOMES [IMPACT] OF A MULTIDISCIPLINARY SEM RESEARCH PROGRAMME
a.	Additional information on the outcomes [impact] of a Sport and Exercise Medicine research programme that panellists wish to include:
	<ul style="list-style-type: none"> In your opinion, are there other significant outcomes [impact] that may be relevant to a SEM research programme?
	12 No
	<ul style="list-style-type: none"> Do you have any further comments regarding outcomes [impact] in the planning of a strategic research framework in SEM?
	12 Scientific work needs a certain degree of freedom and cannot be planned in detail. Sometimes one should be able to follow uncertain or abstruse ways.
	SECTION G: EXPERT PANELLISTS FINAL COMMENTS
G1	Are there other aspects that, according to your knowledge and experience, should be included in planning a strategic framework for SEM research?
	12 No, the most important points are mentioned.
	14 Thank you for providing me with the opportunity of sharing my experiences with you via completing this survey.

Thank you for taking the time to complete the questionnaire. Results will be analysed and questions where no consensus could be reached among expert panellists, will be redistributed to you soon. It should be a much shorter questionnaire than this one. You will also receive feedback on the results of this questionnaire.

Your valuable input in this research is much appreciated.

Sincerely

Louis Holtzhausen

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APPENDIX D1

LETTER TO DELPHI PANEL: ROUND 2

LETTER TO DELPHI PANEL ROUND 2

A CRITICAL ANALYSIS AND STRATEGIC FRAMEWORK FOR RESEARCH IN SPORT AND EXERCISE MEDICINE AT THE UNIVERSITY OF THE FREE STATE

Dear Colleague

Thank you once more for your participation in this Delphi research process and your valuable feedback in round 1. Attached please find the second round Delphi questionnaire.

PURPOSE OF ROUND 2

The questionnaire for round 2 is made up of all the statements in round 1 where consensus has not been reached by the panel. Consensus was pre-defined where 80% of panel members agreed on their responses to a question. All the questions on which consensus were reached, have been removed from the questionnaire. Feedback on round 1 is attached to indicate where consensus have been reached, as well as comments from panel members and clarifications from the researcher. You are kindly requested to peruse the feedback document before completing the round 2 questionnaire.

In round 2 you are given an opportunity to reconsider your opinion on the remaining statements after taking into account the feedback from round 1.

PROCEDURE OF THE SECOND ROUND

The procedure in round 2 is exactly the same as in round 1. Your opinion as expert panellist is required on the relative importance of each question. You are also invited to provide additional comments. All information and opinions will be treated as strictly confidential.

Please answer all the questions in all sections.

COMPLETION OF THE QUESTIONNAIRE

As no consensus has been reached on the questions that are redistributed, you are allowed to change your opinion or maintain your previous opinion. You are also invited to make new comments. Please use the following three-point Likert scale again:

- 1 = Fully agree [*Must definitely* be considered in the designing of a research framework]
- 2 = Partially agree [*Can* be considered in the designing of a research framework]
- 3 = Disagree [*Irrelevant* for consideration in the designing of a research framework]

Please select the answer of your choice from the drop down menu marked "SELECT ONE OPTION". You are welcome to qualify your choice or make comments regarding any question in the right hand column of the questionnaire table.

If possible, please complete the questionnaire in its electronic form after saving it as a MS Word or related word processing document. A hard copy of the questionnaire can be made available if required.

The questionnaire in this round is much shorter and should take approximately 30 minutes of your time. Please contact me in the event of any questions or uncertainties.

Analysis of data can only be done once all questionnaires have been received. It will be much appreciated if the completed questionnaires can reach me before or on **Tuesday, 17 January 2012**. The return details remain as follows:

Email: HoltzhausenLJ@ufs.ac.za
Fax: +27 51 444 2969
Cellular phone: +27 82 906 3062

Thank you once again for your tremendously valuable input into this project so far.



Dr LJ Holtzhausen
Head: Division Sport and Exercise Medicine
Faculty of Health Sciences
University of the Free State
Bloemfontein

UFS registered project
Ethical clearance no: ETOVS NR: 191/2010

LH20111208

QUESTIONNAIRE FOR DELPHI PANEL: ROUND 2

QUESTIONNAIRE FOR DELPHI PANEL: ROUND 2

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SECTION A: STRATEGIC FOUNDATIONS OF A RESEARCH FRAMEWORK IN SPORT AND EXERCISE MEDICINE			
	<p>This section deals with the foundational reference points of a generic research programme, but is also applicable to a research programme in Sport and Exercise Medicine (SEM). Please indicate how important you regard each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list by clicking on “Select one option”. You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>		
A1	OVERALL STRATEGY IN RESEARCH PLANNING AND MANAGEMENT		
	In designing and managing a research programme, the following statements are relevant:		
		SELECT	COMMENTS
a.	Research should be guided by:		
	• an implementation plan	Select one option	TYPE COMMENTS HERE
b.	The success of a research programme can be enhanced by:		
	• pre-determination of the direction of research in the programme	Select one option	TYPE COMMENTS HERE
	• strong leadership	Select one option	TYPE COMMENTS HERE
	• strong mentorship	Select one option	TYPE COMMENTS HERE
	• An enabling environment such as a university with a strong research culture	Select one option	TYPE COMMENTS HERE
c.	The policy of a research programme should:		
	• support transfer of knowledge to benefit the university	Select one option	TYPE COMMENTS HERE
	• support transfer of knowledge to benefit the community	Select one option	TYPE COMMENTS HERE
d.	• The role of research in SEM at a university department is dependent on the balance between teaching and research of the university	Select one option	TYPE COMMENTS HERE
e.	A SEM research programme at a university should be supported by:		
	• University management	Select one option	TYPE COMMENTS HERE

A2	PRIORITISATION OF RESEARCH IN FOCUS AREAS		
The following statements relate to the development of focus areas in a research programme:			
a.	In determining research focus areas the following statements are true:		
	<ul style="list-style-type: none"> A university-based research programme should not be restricted by pre-determined research focus areas of the <i>university</i> 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The selection of predetermined research focus areas will enhance interdisciplinary research 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> A research programme should concentrate on pre-determined focus areas in the research environment (SEM) 	Select one option	TYPE COMMENTS HERE
b.	The following are important determinants in the selection of research focus areas:		
	<ul style="list-style-type: none"> Market demands 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Interests of individual researchers 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Availability of equipment 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Availability of time 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Availability of financial resources 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Availability of study populations 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Availability of support staff 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Community needs (including local, regional and national) 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> International trends in an academic discipline (such as SEM) 	Select one option	TYPE COMMENTS HERE
c.	In addition to selection of research focus areas, the following are important determinants in the selection of <i>individual research projects</i> within a research programme:		
	<ul style="list-style-type: none"> Adherence to pre-determined focus areas of the research programme 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Possible available financing for specific projects 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Individual research projects should not be selected according to focus areas within a research programme 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Market demands 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Interests of individual researchers 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Gaps in current research 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Availability of equipment 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Availability of time 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Availability of financial resources 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Availability of study populations 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Availability of support staff 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Community needs [including local, regional and national] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> International trends in an academic discipline (such as SEM) 	Select one option	TYPE COMMENTS HERE
A3	MONITORING OF THE SUCCESS OF A RESEARCH PROGRAMME		
The following statements relate to monitoring and evaluation of the success of a research programme			
a.	A research programme should regularly be:		
	<ul style="list-style-type: none"> <i>Monitored</i> according to <i>quantitative</i> key performance indicators [specific, measurable outcomes of success] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> <i>Monitored</i> according to <i>qualitative</i> key performance indicators [subjective outcomes of success] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> <i>Evaluated</i> according to <i>qualitative</i> key performance indicators [subjective outcomes of success] 	Select one option	TYPE COMMENTS HERE

A4	ADDITIONAL RELEVANT INPUT FROM EXPERT PANELLISTS REGARDING STRATEGY IN RESEARCH PLANNING AND MANAGEMENT		
a.	In your opinion, are there additional relevant statements to be considered in determining a research strategy?		
	TYPE COMMENTS HERE		
b.	Do you have any further comments regarding the strategic planning of a research framework?		
	TYPE COMMENTS HERE		
SECTION B: THE ROLE, PLACE AND CHARACTER OF RESEARCH IN SPORT AND EXERCISE MEDICINE [SEM] AT A UNIVERSITY			
	<p>This section deals with the role, place and character of a research programme in sport and exercise medicine at a university. Please indicate how important you regard each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list, by clicking on “Select one option”. You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>		
B1	THE EDUCATIONAL AND ACADEMIC ROLE OF RESEARCH IN SPORT AND EXERCISE MEDICINE		
		SELECT	COMMENTS
a.	Research in SEM plays an important <i>educational</i> role in:		
	<ul style="list-style-type: none"> Basic grounding for undergraduate teaching 	Select one option	TYPE COMMENTS HERE
b.	Research in SEM plays an important role in the <i>development of SEM</i> as an academic discipline regarding:		
	<ul style="list-style-type: none"> The development of sport 	Select one option	TYPE COMMENTS HERE
c.	Regarding the role of SEM research in society:		
	<ul style="list-style-type: none"> Sport and Exercise Medicine research can lead the way in mainstream medicine research 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Research on elite athletes can often be applied to broader communities 	Select one option	TYPE COMMENTS HERE
d.	Sport plays an important role in:		
	<ul style="list-style-type: none"> Politics 	Select one option	TYPE COMMENTS HERE
B2	THE ACADEMIC PLACE (POSITIONING) OF A RESEARCH PROGRAMME IN SPORT AND EXERCISE MEDICINE AT A UNIVERSITY		
a.	Regarding the place of an SEM research programme in a university:		
b.	The following groupings are relevant partners in an SEM research programme:		
	<ul style="list-style-type: none"> Primary health care institutions 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Sport federations 	Select one option	TYPE COMMENTS HERE
c.	The following fields of study are relevant in an interdisciplinary SEM research programme:		
d.	SEM is a particularly suitable discipline for:		
	<ul style="list-style-type: none"> pure scientific research 	Select one option	TYPE COMMENTS HERE

B3	THE POSITIONING OF A MULTIDISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME WITHIN EXISTING RESEARCH FOCUS AREAS AT THE UNIVERSITY OF THE FREE STATE		
	<p>This section deals with the existing strategic interdisciplinary research clusters [focus areas] at the University of the Free State. These clusters have been selected predominantly on the basis of regional need and existing expertise and research. The clusters are intended to enhance the strategic research focus of the university, as well as interdisciplinary/collaborative research. They get preferential university funding and support before research that is not included in a cluster. It is therefore beneficial for any research programme to find common ground within one of the clusters.</p> <p>Please indicate your level of agreement with the likelihood of SEM research to fit into each strategic cluster:</p>		
a.	<i>Cluster 1:</i> Enabling technologies/technologies for the future [Suggested constituent focus areas: High throughput biology, nanotechnology [solid state lighting], chemical and allied technologies]	Select one option	TYPE COMMENTS HERE
b.	<i>Cluster 2:</i> Food production, quality and safety for Africa [Suggested constituent focus areas: Animal production and protection, plant production and protection, human nutrition, food quality and safety]	Select one option	TYPE COMMENTS HERE
d.	<i>Cluster 4:</i> Social transformation [citizenship and identity, diverse histories, globalisation and governance, human rights and social equity]	Select one option	TYPE COMMENTS HERE
f.	<i>Cluster 6:</i> Towards a competitive chemical industry [new drug manufacturing, petrochemicals, natural product development, polymers]	Select one option	TYPE COMMENTS HERE
g.	Interdisciplinary SEM research at the UFS will not develop optimally if accommodated in one or more of the above existing strategic clusters	Select one option	TYPE COMMENTS HERE
B4	THE MULTIDISCIPLINARY CHARACTER OF SPORT AND EXERCISE MEDICINE		
a.	The following statements are true regarding SEM:		
	<ul style="list-style-type: none"> An interdisciplinary SEM research programme should be managed independent of academic departments 	Select one option	TYPE COMMENTS HERE
B5	ADDITIONAL RELEVANT INPUT FROM EXPERT PANELLISTS REGARDING THE ROLE, POSITIONING AND CHARACTER OF A SEM RESEARCH PROGRAMME		
a.	In your opinion, are there additional relevant statements regarding the role, place and character of research in SEM to be considered in determining a strategic research framework?		
	TYPE COMMENTS HERE		
b.	Do you have any further comments regarding the role, place and character of SEM research in the planning of a strategic research framework?		
	TYPE COMMENTS HERE		

SECTION C: INPUTS THAT ARE REQUIRED BY A RESEARCH PROGRAMME IN SPORT AND EXERCISE MEDICINE			
<p>This section deals with different inputs required for the successful operation of a multidisciplinary research programme, and the activities within such a programme. Please indicate your perceived importance of each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list, by clicking on “Select one option”. You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>			
C1: RESOURCES			
		SELECT	COMMENTS
C1.1	HUMAN RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:		
a.	The following staff components are important for the successful operation of a SEM research programme:		
	• Post-magister degree fellows	Select one option	TYPE COMMENTS HERE
	• Post-doctoral fellows	Select one option	TYPE COMMENTS HERE
b.	The following statements are true regarding the academic staff in a SEM research programme:		
	• All academic staff in SEM must obtain PhD degrees	Select one option	TYPE COMMENTS HERE
	• All academic SEM staff must supervise PhD students research	Select one option	TYPE COMMENTS HERE
	• Researchers in a research programme should be assimilated by retaining the best postgraduate students	Select one option	TYPE COMMENTS HERE
	• At least 25% of time of academic staff in an SEM department must be devoted to research supervision	Select one option	TYPE COMMENTS HERE
c.	Critical characteristics required to be a <i>successful researcher</i> in SEM include:		
	• Experience on ground level	Select one option	TYPE COMMENTS HERE
	• Knowledge of the industry	Select one option	TYPE COMMENTS HERE
	• Previous exposure to the discipline	Select one option	TYPE COMMENTS HERE
	• Knowledge of funding opportunities	Select one option	TYPE COMMENTS HERE
	• Expertise in certain focus areas	Select one option	TYPE COMMENTS HERE
	• Have status [respect] among peers in the discipline	Select one option	TYPE COMMENTS HERE
d.	The following <i>leadership characteristics</i> are required by leaders in research programmes:		
	• Stature in the discipline	Select one option	TYPE COMMENTS HERE
	• Not too critical	Select one option	TYPE COMMENTS HERE
	• Leadership in daily life	Select one option	TYPE COMMENTS HERE
	• Bravery	Select one option	TYPE COMMENTS HERE
e.	The following <i>management skills</i> are required by research programme managers:		
	• Financial management skills	Select one option	TYPE COMMENTS HERE
	• Conflict management skills	Select one option	TYPE COMMENTS HERE
	• Administrative skills	Select one option	TYPE COMMENTS HERE
	• Stress management skills	Select one option	TYPE COMMENTS HERE
	• Fundraising skills	Select one option	TYPE COMMENTS HERE
	• Technical skills	Select one option	TYPE COMMENTS HERE

f.	Additional information on human resources in a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> In your opinion, are there additional relevant statements regarding the human resources relevant to a successful research programme in SEM to be considered in determining a strategic research framework? 		
	TYPE COMMENTS HERE		
	<ul style="list-style-type: none"> Do you have any further comments regarding the human resources in the planning of a strategic research framework? 		
	TYPE COMMENTS HERE		
C1.2	FINANCIAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF AN SEM RESEARCH PROGRAMME:		
a.	An SEM research programme should be funded by:		
	<ul style="list-style-type: none"> Commercialisation of research 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Commercialisation of clinical services 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The university in which it is housed 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Government subsidy 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Research funding agencies, such as the National Research Foundation or Medical Research Council of South Africa 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Partnerships between the research programme and private corporations 	Select one option	TYPE COMMENTS HERE
b.	A newly established research programme should receive initial start-up funding (seed capital) from the university in which it is housed	Select one option	TYPE COMMENTS HERE
c.	There is a risk of losing academic autonomy of a research programme due to interference from funders	Select one option	TYPE COMMENTS HERE
d.	Additional information on human resources in a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> In your opinion, are there additional relevant statements regarding the financial resources relevant to a successful research programme in SEM to be considered in determining a strategic research framework? 		
	TYPE COMMENTS HERE		
	<ul style="list-style-type: none"> Do you have any further comments regarding the financial resources in the planning of a strategic research framework? 		
	TYPE COMMENTS HERE		
C1.3	INTERNAL INSTITUTIONAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF AN SEM RESEARCH PROGRAMME:		
	This section deals with the <i>internal (institutional) resources of the university</i> relevant to the successful operation of a SEM research programme. The following statements are true in this regard:		
a.	The following institutional resources at a university are relevant role players in an SEM research programme:		
	<ul style="list-style-type: none"> The post-graduate school 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The finance department 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> The human resources department 	Select one option	TYPE COMMENTS HERE

	• The Faculty of Health Sciences executive	Select one option	TYPE COMMENTS HERE
	• The university sport department	Select one option	TYPE COMMENTS HERE
	• The university health and wellness centre	Select one option	TYPE COMMENTS HERE
	• The department of biostatistics	Select one option	TYPE COMMENTS HERE
	• The institutional marketing/fundraising department	Select one option	TYPE COMMENTS HERE
	• Academic writers	Select one option	TYPE COMMENTS HERE
	• Research grant application experts	Select one option	TYPE COMMENTS HERE
	• The university Alumni association	Select one option	TYPE COMMENTS HERE
b.	Additional information on internal university (institutional) resources in a Sport and Exercise Medicine research programme that panellists wish to include:		
	• In your opinion, are there additional relevant statements regarding the institutional resources relevant to a successful research programme in SEM to be considered in determining a strategic research framework?		
	TYPE COMMENTS HERE		
	• Do you have any further comments regarding the financial resources in the planning of a strategic research framework?		
	TYPE COMMENTS HERE		
C1.4	EXTERNAL ORGANISATIONAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:		
	This section deals with the <i>external resources</i> relevant to the successful operation of a multidisciplinary SEM research programme.		
a.	The following organisations outside of the university are relevant role players in the successful operation of an SEM research programme:		
	• Professional associations, e.g. the South African Sports Medicine Association [SASMA]; the International Sports Medicine Federation [FIMS]; the International Olympic Committee [IOC] medical committee	Select one option	TYPE COMMENTS HERE
	• The private healthcare industry	Select one option	TYPE COMMENTS HERE
	• The pharmaceutical industry	Select one option	TYPE COMMENTS HERE
	• The nutritional supplement industry	Select one option	TYPE COMMENTS HERE
	• Anti doping agencies [e.g. the South African Institute for Drugs in Sport [SAIDS], the World Anti-doping agency [WADA]	Select one option	TYPE COMMENTS HERE
	• The fitness industry	Select one option	TYPE COMMENTS HERE
	• National sport federations	Select one option	TYPE COMMENTS HERE
	• The South African Sports Confederation and Olympic Committee [SASCOC]	Select one option	TYPE COMMENTS HERE
	• Underemphasised sport codes in South Africa [e.g. gymnastics, karate, boxing]	Select one option	TYPE COMMENTS HERE
	• Government departments [Department of Health, Department of Sport and Recreation, Department of Education, Department of Science and Technology]	Select one option	TYPE COMMENTS HERE
	• The College of Sport and Exercise Medicine of Medicine of South Africa [CSEM(SA)]	Select one option	TYPE COMMENTS HERE
	• The College of Medicine of Medicine of South Africa [CMSA]	Select one option	TYPE COMMENTS HERE
	• The community in which the research programme is located	Select one option	TYPE COMMENTS HERE
b.	Additional information on external resources in a Sport and Exercise Medicine research programme		

	that panellists wish to include:		
	<ul style="list-style-type: none"> In your opinion, are there other organisations that may be relevant to an SEM research programme? 		
	TYPE COMMENTS HERE		
	<ul style="list-style-type: none"> Do you have any further comments regarding external resources in the planning of a strategic research framework in SEM? 		
	TYPE COMMENTS HERE		
C1.5	ACADEMIC ROLEPLAYERS AND STAKEHOLDERS IN A MULTIDISCIPLINARY SPORT AND EXERCISE MEDICINE RESEARCH PROGRAMME		
	This section attempts to identify the most relevant potential academic role players in a multidisciplinary SEM research programme:		
a.	The following academic disciplines are relevant role players in a multidisciplinary SEM research programme:		
	<ul style="list-style-type: none"> Anatomy and cell biology 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Family medicine 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Pharmacology 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Occupational therapy 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Psychology 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Internal medicine 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Diagnostic radiology 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Biochemistry 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Haematology 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Nursing 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Ophthalmology 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Paediatrics 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Community health 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Occupational health 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Work wellness/employee assistance 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Pathology/biochemistry/haematology laboratory services 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Physiotherapy 	Select one option	TYPE COMMENTS HERE
b.	Additional information regarding academic disciplines that may be relevant to an SEM research programme.		
	<ul style="list-style-type: none"> In your opinion, are there other academic disciplines that may be relevant role players in a multidisciplinary SEM research programme? 		
	TYPE COMMENTS HERE		

	<ul style="list-style-type: none"> Do you have any further comments regarding identification of academic role players in the planning of a strategic research framework in SEM? 		
	TYPE COMMENTS HERE		
C2	PROCESSES RELEVANT TO THE SUCCESSFUL OPERATION OF A MULTIDISCIPLINARY SEM RESEARCH PROGRAMME		
C2.1	STRATEGIC PROCESSES		
		SELECT	COMMENTS
a.	The following are relevant components of a <i>strategic plan</i> for a multidisciplinary SEM research programme:		
	<ul style="list-style-type: none"> A quality assurance plan 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> A risk management plan 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Consensus among role players on the strategy and goals of the research programme 	Select one option	TYPE COMMENTS HERE
b.	The following are relevant reference points for strategic <i>goal setting</i> for a multidisciplinary SEM research programme:		
c.	The following are key strategic <i>activities</i> to ensure success of a multidisciplinary SEM research programme:		
	<ul style="list-style-type: none"> Increase the number of PhDs of staff in the programme 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Attract post-doctoral fellows 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Monitoring of activities of other research units 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Management models 	Select one option	TYPE COMMENTS HERE
d.	A national SEM research co-ordinating body will make a positive contribution to SEM research in South Africa		Select one option
e.	Additional information on strategic processes in a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> In your opinion, are there other strategic concepts that may be relevant to an SEM research programme? 		
	TYPE COMMENTS HERE		
	<ul style="list-style-type: none"> Do you have any further comments regarding strategic processes in the planning of a strategic research framework in SEM? 		
	TYPE COMMENTS HERE		
C2.2	MANAGERIAL PROCESSES		
a.	Regarding <i>human resource [people] management</i> , the following aspects are relevant in a multidisciplinary SEM research programme:		
	<ul style="list-style-type: none"> The establishment of a multidisciplinary scientific committee 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Focus on professional development [career planning] of all members of the team 	Select one option	TYPE COMMENTS HERE
b.	Regarding <i>academic management</i> of research the following aspects are important managerial functions:		
	<ul style="list-style-type: none"> Incentives to researchers for publication 	Select one option	TYPE COMMENTS HERE

c.	Regarding <i>financial management</i> of research, the following aspects are important managerial functions:		
	<ul style="list-style-type: none"> Following a set budgeting procedure for research projects 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Fundraising must be a specialised function within the research programme 	Select one option	TYPE COMMENTS HERE
e.	Additional information on managerial processes in a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> In your opinion, are there management considerations that may be relevant to a SEM research programme? 		
	TYPE COMMENTS HERE		
	<ul style="list-style-type: none"> Do you have any further comments regarding managerial processes in the planning of a strategic research framework in SEM? 		
	TYPE COMMENTS HERE		
C2.3	OPERATIONAL PROCESSES		
a.	<i>Operational processes</i> of a multidisciplinary SEM research programme should include the following		
	<ul style="list-style-type: none"> Formal agreements on procedures with researchers 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Formal agreements on expected outcomes with researchers 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Guidelines for publication 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Creation of patient databases 	Select one option	TYPE COMMENTS HERE
b.	Additional information on operational processes in a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> In your opinion, are there other operational processes that may be relevant to an SEM research programme? 		
	TYPE COMMENTS HERE		
	<ul style="list-style-type: none"> Do you have any further comments regarding operational processes in the planning of a strategic research framework in SEM? 		
	TYPE COMMENTS HERE		
SECTION D: CHALLENGES IN MULTIDISCIPLINARY RESEARCH IN SPORT AND EXERCISE MEDICINE			
This section deals with challenges in multi-disciplinary research in general, but also in sport and exercise medicine at a university. Please indicate how important you regard each of the following statements to be included in a strategic framework for research in SEM, according to the following scale: Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework] Please pick the appropriate option in each option list, by clicking on "Select one option". You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.			
		SELECT	COMMENTS
D1	ACADEMIC CHALLENGES IN MULTIDISCIPLINARY SEM RESEARCH		
a.	The following are relevant <i>academic</i> challenges in the establishment and management of a multidisciplinary SEM research programme:		

	<ul style="list-style-type: none"> To motivate people from different academic backgrounds to listen [want to understand] each other 's points of view 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Fair distribution of research credits 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Lack of trust among multi-disciplinary team members 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> To become nationally recognised by peers 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> To compete with institutions with ample human and financial resources [such as the IOC] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> To form professional networks 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> To become part of existing professional networks 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Potential interdisciplinary stakeholders may fail to recognise the merit/importance of the "bigger picture" or vision 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> It may be difficult for interdisciplinary research stakeholders to distinguish between research output [current drive] and impact [vision] 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Lack of creativity of primary researchers may have a negative impact on interdisciplinary research 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> SEM is a small, young discipline that finds it difficult to make an impact in a broader interdisciplinary medical context 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Different disciplines have different points of view/paradigms that are challenging to blend and to find a common "language" 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> To identify specialists to collaborate with 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> To find good research ideas 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> To find good students 	Select one option	TYPE COMMENTS HERE
D2	MANAGEMENT CHALLENGES IN MULTIDISCIPLINARY SEM RESEARCH		
a.	The following are <i>management</i> challenges in the successful operation of a multidisciplinary SEM research programme:		
	<ul style="list-style-type: none"> The establishment of a management/leadership hierarchy in interdisciplinary research 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Departmental interest above interdisciplinary research interest 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Personal research interest above interdisciplinary research interest 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Maintenance of effective interdisciplinary communication 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Maintenance of effective interdisciplinary co-ordination 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> To obtain initial funding for a new research programme 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Time allocation/prioritising for interdisciplinary work versus own departmental work 	Select one option	TYPE COMMENTS HERE

	<ul style="list-style-type: none"> Quality control and minimum standard setting in an interdisciplinary research environment 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> To attract full-time researchers 	Select one option	TYPE COMMENTS HERE
D3	ADDITIONAL INFORMATION REGARDING CHALLENGES IN MULTIDISCIPLINARY SEM RESEARCH		
a.	Additional information on external resources in a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> In your opinion, are there other challenges that may be relevant to an SEM research programme? 		
	TYPE COMMENTS HERE		
	<ul style="list-style-type: none"> Do you have any further comments regarding challenges in the planning of a strategic research framework in SEM? 		
	TYPE COMMENTS HERE		
SECTION E: OUTPUTS [PRODUCTS] OF A MULTIDISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME			
<p>This section deals with types, levels and targets of outputs of a multidisciplinary SEM research programme. Please indicate how important you regard each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list, by clicking on “Select one option”. You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>			
		SELECT	COMMENTS
E1	TYPES OF OUTPUTS FROM A MULTIDISCIPLINARY RESEARCH PROGRAMME		
a.	The following are essential academic products of a multidisciplinary SEM research programme:		
	<ul style="list-style-type: none"> Non-scientific informational publications 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Non-peer reviewed scientific publications 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Registered patents 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Chapters in books 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Scholarly books 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Textbooks and published guidelines 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Short learning courses 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Increased academic stature among peers 	Select one option	TYPE COMMENTS HERE
b.	The following are desired human outcomes of a multidisciplinary SEM research programme:		
	<ul style="list-style-type: none"> Appointment of staff members on national governmental scientific bodies 	Select one option	TYPE COMMENTS HERE
c.	The following objectives deal with desired financial outcomes within a multidisciplinary SEM research programme at a university. Select your level of agreement with each objective:		
	<ul style="list-style-type: none"> Financial self-sustainability 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Profitability 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Commercialisation of research by contract research 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Commercialisation of research by selling new knowledge 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Commercialisation of research by registering patents 	Select one option	TYPE COMMENTS HERE
E2	LEVELS OF FOCUS OF MULTIDISCIPLINARY SEM RESEARCH PROGRAMME		
a.	The following are important levels at which research outputs should be focused:		
	<ul style="list-style-type: none"> Community [regional] 	Select one option	TYPE COMMENTS HERE

	• National	Select one option	TYPE COMMENTS HERE
	• International	Select one option	TYPE COMMENTS HERE
	• Specific publications	Select one option	TYPE COMMENTS HERE
	• Specific industries	Select one option	TYPE COMMENTS HERE
b.	The following are important persons and bodies at which research outputs should be focused [who should be pleased with the outcome?]:		
	• University management	Select one option	TYPE COMMENTS HERE
	• Government departments [sport, education, health etc]	Select one option	TYPE COMMENTS HERE
	• The public	Select one option	TYPE COMMENTS HERE
	• The healthcare industry	Select one option	TYPE COMMENTS HERE
E3	ADDITIONAL INFORMATION REGARDING OUTPUTS OF A MULTIDISCIPLINARY SEM RESEARCH PROGRAMME		
a.	Additional information on outputs of a Sport and Exercise Medicine research programme that panellists wish to include:		
	• In your opinion, are there other significant outputs that may be relevant to a SEM research programme?		
	TYPE COMMENTS HERE		
	• Do you have any further comments regarding outputs in the planning of a strategic research framework in SEM?		
	TYPE COMMENTS HERE		
SECTION F: OUTCOMES [IMPACT] OF A MULTIDISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME			
This section deals with longer term outcomes [impact] and significance of a multidisciplinary SEM research programme. Please indicate how important you regard each of the following statements to be included in a strategic framework for research in SEM, according to the following scale: Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework] Please pick the appropriate option in each option list, by clicking on "Select one option". You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.			
		SELECT	COMMENTS
F1	TYPES OF OUTCOMES FROM A MULTIDISCIPLINARY RESEARCH PROGRAMME		
b.	The following are significant <i>internal effects</i> [changes] that may indicate outcomes of the research programme:		
	• Changes in number of researchers in the programme	Select one option	TYPE COMMENTS HERE
	• Changes in behaviour of researchers	Select one option	TYPE COMMENTS HERE

c.	The following are significant <i>external effects</i> [changes] that may indicate outcomes [significance] of the research programme:		
	• Changes in the university [e.g. attitude, placement of the programme]	Select one option	TYPE COMMENTS HERE
	• Implementation of research findings in communities	Select one option	TYPE COMMENTS HERE
	• Changes in the community	Select one option	TYPE COMMENTS HERE
F2	MEASUREMENT OF OUTCOMES FROM A MULTIDISCIPLINARY RESEARCH PROGRAMME		
a.	In order to measure progress [success], specific outcomes of a research programme should be:		
	• quantified	Select one option	TYPE COMMENTS HERE
b.	The outcomes of a research programme should be monitored, but not necessarily planned and quantified		TYPE COMMENTS HERE
F3	ADDITIONAL INFORMATION REGARDING OUTCOMES [IMPACT] OF A MULTIDISCIPLINARY SEM RESEARCH PROGRAMME		
a.	Additional information on the outcomes [impact] of a Sport and Exercise Medicine research programme that panellists wish to include:		
	• In your opinion, are there other significant outcomes [impact] that may be relevant to a SEM research programme?		
	TYPE COMMENTS HERE		
	• Do you have any further comments regarding outcomes [impact] in the planning of a strategic research framework in SEM?		
	TYPE COMMENTS HERE		
SECTION G: EXPERT PANELLISTS FINAL COMMENTS			
G1	Are there other aspects that, according to your knowledge and experience, should be included in planning a strategic framework for SEM research?		
	TYPE COMMENTS HERE		

Thank you for taking the time to complete the questionnaire. Results will be analysed and questions where no consensus could be reached among expert panellists, will be redistributed to you once more. It is envisaged that stability will be reached in most statements after this round. You will again receive feedback on the results of this questionnaire and possibly be requested to complete a short round 3 questionnaire.

Your valuable input in this research is much appreciated.

Sincerely

Louis Holtzhausen

FEEDBACK FOR DELPHI PANEL: ROUND 2

FEEDBACK FOR DELPHI PANEL: ROUND 2

This document provides feedback of round 2 for your perusal before completing the round 3 questionnaire.

Questions highlighted in grey have reached consensus among the panel of experts. Comments by panel members are included. Comments by the researcher are included and written in bold font.

Comments by panel members are included.

Comments by the researcher are included and written in bold font.

Questions where consensus has not been reached, are redistributed for consideration or for final comments by the expert panel in round 3.

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SECTION A: STRATEGIC FOUNDATIONS OF A RESEARCH FRAMEWORK IN SPORT AND EXERCISE MEDICINE													
	<p>This section deals with the foundational reference points of a generic research programme, but is also applicable to a research programme in Sport and Exercise Medicine (SEM). Please indicate how important you regard each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list by clicking on “Select one option”. You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>												
A1	OVERALL STRATEGY IN RESEARCH PLANNING AND MANAGEMENT												
	In designing and managing a research programme, the following statements are relevant:												
	<table border="1"> <thead> <tr> <th>STATEMENTS</th> <th>COMMENTS</th> </tr> </thead> <tbody> <tr> <td>a. Research should be guided by:</td> <td></td> </tr> <tr> <td>• an implementation plan</td> <td></td> </tr> <tr> <td>b. The success of a research programme can be enhanced by:</td> <td></td> </tr> <tr> <td>• pre-determination of the direction of research in the programme</td> <td>10 The direction may change depending on the findings 14 this sets the scene for role of leadership etc.</td> </tr> <tr> <td>• strong leadership</td> <td>10 Good leadership may be needed for some types of research programs more than others; i.e. infrastructure grants. 14 A must</td> </tr> </tbody> </table>	STATEMENTS	COMMENTS	a. Research should be guided by:		• an implementation plan		b. The success of a research programme can be enhanced by:		• pre-determination of the direction of research in the programme	10 The direction may change depending on the findings 14 this sets the scene for role of leadership etc.	• strong leadership	10 Good leadership may be needed for some types of research programs more than others; i.e. infrastructure grants. 14 A must
STATEMENTS	COMMENTS												
a. Research should be guided by:													
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b. The success of a research programme can be enhanced by:													
• pre-determination of the direction of research in the programme	10 The direction may change depending on the findings 14 this sets the scene for role of leadership etc.												
• strong leadership	10 Good leadership may be needed for some types of research programs more than others; i.e. infrastructure grants. 14 A must												

	<ul style="list-style-type: none"> strong mentorship 	<p>14 This must be viewed in an operational sense and different from leadership. LH Comment: Or in the sense of broader coaching on approach, vision and sharing of one's experience.</p>
	<ul style="list-style-type: none"> An enabling environment such as a university with a strong research culture 	14 No question of this.
c.	The policy of a research programme should:	
	<ul style="list-style-type: none"> support transfer of knowledge to benefit the university 	14 Sure, through general marketing. Research is about generating new knowledge
	<ul style="list-style-type: none"> support transfer of knowledge to benefit the community 	14. Yes, a bit lower priority
d.	<ul style="list-style-type: none"> The role of research in SEM at a university department is dependent on the balance between teaching and research of the university 	<p>10 Good leadership may be needed for some types of research programs more than others; ie. infrastructure grants.</p> <p>14. This is a critical point. Research is no add on activity – it requires dedicated time.</p>
e.	A SEM research programme at a university should be supported by:	
	<ul style="list-style-type: none"> University management 	<p>01 without this support many aspects of success may be compromised.</p> <p>10 It is not the only source of support.</p> <p>14 Unconditional institutional support is totally necessary.</p>
A2	PRIORITISATION OF RESEARCH IN FOCUS AREAS	
	The following statements relate to the development of focus areas in a research programme:	
a.	In determining research focus areas the following statements are true:	
	<ul style="list-style-type: none"> A university-based research programme should not be restricted by pre-determined research focus areas of the <i>university</i> 	<p>01 a university may have focus in some things which SEM may differ from; but have strong outputs and quality research.</p> <p>14 this may depend on relevance, may reduce external funding potential.</p>
	<ul style="list-style-type: none"> The selection of predetermined research focus areas will enhance interdisciplinary research 	<p>01 depends on the area of research, may be valid for some and not for others</p> <p>10 May help because of the availability of resources</p> <p>12 This is not true in the case of research in doping or anti-doping</p> <p>14 Depends on individuals and communication</p>
	<ul style="list-style-type: none"> A research programme should concentrate on pre-determined focus areas in the research environment (SEM) 	<p>01 depends on the area of research, may be valid for some and not for others.</p> <p>10 May help because of the availability of resources.</p> <p>12 This is not true in the case of research in doping or anti-doping.</p> <p>14 Drives funding.</p>
b.	The following are important determinants in the selection of research focus areas:	
	<ul style="list-style-type: none"> Market demands 	01 for funding purposes and to contribute to areas of knowledge 'needs'.
	<ul style="list-style-type: none"> Interests of individual researchers 	<p>10 An important driver.</p> <p>14 A blend of individual and corporate.</p>

	<ul style="list-style-type: none"> • Availability of equipment 	10 Facilitates the development of a research program. 14 Not all research require expensive equipment.
	<ul style="list-style-type: none"> • Availability of time 	14 Critical
	<ul style="list-style-type: none"> • Availability of financial resources 	
	<ul style="list-style-type: none"> • Availability of study populations 	10 Clearly important for clinical research.
	<ul style="list-style-type: none"> • Availability of support staff 	
	<ul style="list-style-type: none"> • Community needs (including local, regional and national) 	
	<ul style="list-style-type: none"> • International trends in an academic discipline (such as SEM) 	14 Needs to be attuned – but explore new ideas.
c.	In addition to selection of research focus areas, the following are important determinants in the selection of <i>individual research projects</i> within a research programme:	
	<ul style="list-style-type: none"> • Adherence to pre-determined focus areas of the research programme 	
	<ul style="list-style-type: none"> • Possible available financing for specific projects 	
	<ul style="list-style-type: none"> • Individual research projects should not be selected according to focus areas within a research programme 	
	<ul style="list-style-type: none"> • Market demands 	14 If market = money, yes.
	<ul style="list-style-type: none"> • Interests of individual researchers 	
	<ul style="list-style-type: none"> • Gaps in current research 	
	<ul style="list-style-type: none"> • Availability of equipment 	
	<ul style="list-style-type: none"> • Availability of time 	
	<ul style="list-style-type: none"> • Availability of financial resources 	
	<ul style="list-style-type: none"> • Availability of study populations 	
	<ul style="list-style-type: none"> • Availability of support staff 	
	<ul style="list-style-type: none"> • Community needs [including local, regional and national] 	
	<ul style="list-style-type: none"> • International trends in an academic discipline (such as SEM) 	
A3	MONITORING OF THE SUCCESS OF A RESEARCH PROGRAMME	
	The following statements relate to monitoring and evaluation of the success of a research programme	
a.	A research programme should regularly be:	
	<ul style="list-style-type: none"> • <i>Monitored</i> according to <i>quantitative</i> key performance indicators [specific, measurable outcomes of success] 	14 These are the international currency.
	<ul style="list-style-type: none"> • <i>Monitored</i> according to <i>qualitative</i> key performance indicators [subjective outcomes of success] 	10 Both quantity and quality are important.
	<ul style="list-style-type: none"> • <i>Evaluated</i> according to <i>qualitative</i> key performance indicators [subjective outcomes of success] 	
A4	ADDITIONAL RELEVANT INPUT FROM EXPERT PANELLISTS REGARDING STRATEGY IN RESEARCH PLANNING AND MANAGEMENT	
a.	In your opinion, are there additional relevant statements to be considered in determining a research strategy?	
	01 There needs to be coherence of all these aspects. For example the funding for specific equipment would be relevant for research in the area of someone who has expertise and an interest - but if they left, what then? Would it be possible to continue the research; and does that area of research fit in with the unit and university.	
	10 Consider the potential for collaborative efforts.	

	12 Ethical considerations are important.	
b.	Do you have any further comments regarding the strategic planning of a research framework?	
	14 Goals/objectives need to be aligned with national/regional/local sustainable funding opportunities	
SECTION B: THE ROLE, PLACE AND CHARACTER OF RESEARCH IN SPORT AND EXERCISE MEDICINE [SEM] AT A UNIVERSITY		
	<p>This section deals with the role, place and character of a research programme in sport and exercise medicine at a university. Please indicate how important you regard each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list, by clicking on “Select one option”. You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>	
B1	THE EDUCATIONAL AND ACADEMIC ROLE OF RESEARCH IN SPORT AND EXERCISE MEDICINE	
	STATEMENTS	COMMENTS
a.	Research in SEM plays an important <i>educational</i> role in:	
	<ul style="list-style-type: none"> Basic grounding for undergraduate teaching 	14 Informs teaching – clinical and general
b.	Research in SEM plays an important role in the <i>development of SEM</i> as an academic discipline regarding:	
	<ul style="list-style-type: none"> The development of sport 	14 I am not sure I understand the question. LH Comment: The development of sport refers to the improvement of performance at the level where it is directed, as well as broader participation.
c.	Regarding the role of SEM research in society:	
	<ul style="list-style-type: none"> Sport and Exercise Medicine research can lead the way in mainstream medicine research 	01 In certain areas, such as chronic disease prevention and management. 10 Particularly in health promotion and disease prevention. 14 Public health and activity areas.
	<ul style="list-style-type: none"> Research on elite athletes can often be applied to broader communities 	
d.	Sport plays an important role in:	
	<ul style="list-style-type: none"> Politics 	01 This may be so, but how does this question tie in with SEM research? LH Comment: If true it may have an effect on the direction of research focus in SEM, funding opportunities and more. 10 Not always positive.
B2	THE ACADEMIC PLACE (POSITIONING) OF A RESEARCH PROGRAMME IN SPORT AND EXERCISE MEDICINE AT A UNIVERSITY	
a.	Regarding the place of an SEM research programme in a university:	
b.	The following groupings are relevant partners in an SEM research programme:	
	<ul style="list-style-type: none"> Primary health care institutions 	
	<ul style="list-style-type: none"> Sport federations 	12 Not in Germany.

c.	The following fields of study are relevant in an interdisciplinary SEM research programme:	
d.	SEM is a particularly suitable discipline for:	
	<ul style="list-style-type: none"> pure scientific research 	<p>01 There is a role for pure scientific research, but I would not say "particularly suitable".</p> <p>10 Some degree of interaction is possible and desirable.</p> <p>12 we have broad range from applied to pure scientific research (Germany).</p>
B3	THE POSITIONING OF A MULTIDISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME WITHIN EXISTING RESEARCH FOCUS AREAS AT THE UNIVERSITY OF THE FREE STATE	
	<p>This section deals with the existing strategic interdisciplinary research clusters [focus areas] at the University of the Free State. These clusters have been selected predominantly on the basis of regional need and existing expertise and research. The clusters are intended to enhance the strategic research focus of the university, as well as interdisciplinary/collaborative research. They get preferential university funding and support before research that is not included in a cluster. It is therefore beneficial for any research programme to find common ground within one of the clusters.</p> <p>Please indicate your level of agreement with the likelihood of SEM research to fit into each strategic cluster:</p>	
a.	<p><i>Cluster 1:</i> Enabling technologies/technologies for the future [Suggested constituent focus areas: High throughput biology, nanotechnology [solid state lighting], chemical and allied technologies</p>	

b.	<i>Cluster 2: Food production, quality and safety for Africa [Suggested constituent focus areas: Animal production and protection, plant production and protection, human nutrition, food quality and safety]</i>	01 Human nutrition perhaps, for example in relation to communities with high energy expenditure like farm and mine labourers etc; but the others. 10 Given the important interaction between physical activity and nutrition. 12 You know, I am a German. LH Comment: If you refer to the importance of quality and safety of food production, I understand. If you are indicating that the question is not relevant to a German, I also concur – which is why many of the questions in this section have been removed from the main questionnaire.
d.	<i>Cluster 4: Social transformation [citizenship and identity, diverse histories, globalisation and governance, human rights and social equity]</i>	01 Politically with sport and exercise participation 03 Right to be healthy?
f.	<i>Cluster 6: Towards a competitive chemical industry [new drug manufacturing, petrochemicals, natural product development, polymers]</i>	10 In the case of drugs for the treatment of sports-related injuries.
g.	Interdisciplinary SEM research at the UFS will not develop optimally if accommodated in one or more of the above existing strategic clusters	03 Needs a better fitting cluster. Where is number 5 14 None of these are a logical fit for a fruitful and productive development LH Comment: Number 5 (or e) has been removed because consensus has already been reached on that statement in Round 1
B4	THE MULTIDISCIPLINARY CHARACTER OF SPORT AND EXERCISE MEDICINE	
a.	The following statements are true regarding SEM:	
	<ul style="list-style-type: none"> An interdisciplinary SEM research programme should be managed independent of academic departments 	10 This is equivalent to the creation of yet another department. 14 Really depend on politics/structures and funding.
B5	ADDITIONAL RELEVANT INPUT FROM EXPERT PANELLISTS REGARDING THE ROLE, POSITIONING AND CHARACTER OF A SEM RESEARCH PROGRAMME	
a.	In your opinion, are there additional relevant statements regarding the role, place and character of research in SEM to be considered in determining a strategic research framework?	
	10 Research in SEM can be very broad and interdisciplinary; great area for clinical and translational research. 14 The forcing of SEM into pre-developed clusters will impede the development and growth of research.	
b.	Do you have any further comments regarding the role, place and character of SEM research in the planning of a strategic research framework?	

SECTION C: INPUTS THAT ARE REQUIRED BY A RESEARCH PROGRAMME IN SPORT AND EXERCISE MEDICINE		
	<p>This section deals with different inputs required for the successful operation of a multidisciplinary research programme, and the activities within such a programme. Please indicate your perceived importance of each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list, by clicking on "Select one option". You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>	
C1: RESOURCES		
	STATEMENTS	COMMENTS
C1.1	HUMAN RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:	
a.	The following staff components are important for the successful operation of a SEM research programme:	
	<ul style="list-style-type: none"> • Post-magister degree fellows 	
	<ul style="list-style-type: none"> • Post-doctoral fellows 	
b.	The following statements are true regarding the academic staff in a SEM research programme:	
	<ul style="list-style-type: none"> • All academic staff in SEM must obtain PhD degrees 	01 Some may be clinicians, or research assistants 14 Or the medical equivalent
	<ul style="list-style-type: none"> • All academic SEM staff must supervise PhD students research 	Those that have PhDs
	<ul style="list-style-type: none"> • Researchers in a research programme should be assimilated by retaining the best postgraduate students 	01 difficult to determine what 'assimilate' means and also what defines "best postgraduate students" - there are many aspect that make that up and the 'best' may not be most productive, conducive, cooperative etc. 10 This is one of the many strategies. 14 Need to recruit students from other programmes to maintain growth and development.
	<ul style="list-style-type: none"> • At least 25% of time of academic staff in an SEM department must be devoted to research supervision 	Depends on amount of research, staff, "maturity" of the unit etc - so this may vary form 10-90%, and differ for different staff members. 10 Some staff may be dedicated to other functions but the majority of the staff should spend a significant amount of their time in research. 12 This depends on the research programme. 14 Required to make sure.

c.	Critical characteristics required to be a <i>successful researcher</i> in SEM include:	
	<ul style="list-style-type: none"> • Experience on ground level 	12 Not clear what ground level is? LH Comment: Ground level refers to experience at junior level, from the level of research assistant, data capturing and other junior functions in the research team up to more senior positions.
	<ul style="list-style-type: none"> • Knowledge of the industry 	
	<ul style="list-style-type: none"> • Previous exposure to the discipline 	
	<ul style="list-style-type: none"> • Knowledge of funding opportunities 	
	<ul style="list-style-type: none"> • Expertise in certain focus areas 	
	<ul style="list-style-type: none"> • Have status [respect] among peers in the discipline 	12 Of course, I mean one must have the skills to get the respect of other researchers.
d.	The following <i>leadership characteristics</i> are required by leaders in research programmes:	
	<ul style="list-style-type: none"> • Stature in the discipline 	14 Competent scientists, not “old boys’ network”.
	<ul style="list-style-type: none"> • Not too critical 	
	<ul style="list-style-type: none"> • Leadership in daily life 	14 Leadership in the environment is key.
	<ul style="list-style-type: none"> • Bravery 	
e.	The following <i>management skills</i> are required by research programme managers:	
	<ul style="list-style-type: none"> • Financial management skills 	
	<ul style="list-style-type: none"> • Conflict management skills 	
	<ul style="list-style-type: none"> • Administrative skills 	
	<ul style="list-style-type: none"> • Stress management skills 	
	<ul style="list-style-type: none"> • Fundraising skills 	
	<ul style="list-style-type: none"> • Technical skills 	14 Other can provide these.
f.	Additional information on human resources in a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> • In your opinion, are there additional relevant statements regarding the human resources relevant to a successful research programme in SEM to be considered in determining a strategic research framework? 	
	10 The administrative team should have some knowledge of the science.	
	12 The management skills should include motivating and discussing with the members of a research group.	
	14 The ability to work in a team is critical. There may be a team hierarchy/team vision – Researchers/adjunct researchers/research physicians.	
	<ul style="list-style-type: none"> • Do you have any further comments regarding the human resources in the planning of a strategic research framework? 	
	14 Don’t forget that most research is conducted in team situations and there is the need for persons filling different defined roles.	
C1.2	FINANCIAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF AN SEM RESEARCH PROGRAMME:	
a.	An SEM research programme should be funded by:	
	<ul style="list-style-type: none"> • Commercialisation of research 	01 sometimes for some research this may be true and relevant, but not the primary determining factor.
	<ul style="list-style-type: none"> • Commercialisation of clinical services 	01 I would say 'could', not 'should'. 14 But with a clearly defined goal – access to cases – income generation
	<ul style="list-style-type: none"> • The university in which it is housed 	
	<ul style="list-style-type: none"> • Government subsidy 	10 Funding should not be from the government only.
	<ul style="list-style-type: none"> • Research funding agencies, such as the National Research Foundation 	

	or Medical Research Council of South Africa	
	<ul style="list-style-type: none"> Partnerships between the research programme and private corporations 	
b.	A newly established research programme should receive initial start-up funding (seed capital) from the university in which it is housed	<p>01 Depends on factors that may have contributed to setting up the unit, the university support, etc.</p> <p>14 Absolutely – as this institutional support is important for other sources of funding.</p>
c.	There is a risk of losing academic autonomy of a research programme due to interference from funders	<p>01 This should not happen unless there are 'funny' deals, which should not be the case in good research programmes with good governance etc.</p> <p>10 The agreement between the donor and the researcher should be very clear.</p> <p>14 Universities should be monitoring this.</p>
d.	Additional information on human resources in a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> In your opinion, are there additional relevant statements regarding the financial resources relevant to a successful research programme in SEM to be considered in determining a strategic research framework? 	
	<p>10 Collaborate with colleagues that may have solid funding.</p> <p>12 Funding is necessary, but researchers should always be independent.</p> <p>14 Initial programme plans should be based on sustainability and subsequent growth.</p>	
	<ul style="list-style-type: none"> Do you have any further comments regarding the financial resources in the planning of a strategic research framework? 	
	14 Long term view is needed to allow research growth.	
C1.3	INTERNAL INSTITUTIONAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF AN SEM RESEARCH PROGRAMME:	
	This section deals with the <i>internal (institutional) resources of the university</i> relevant to the successful operation of a SEM research programme. The following statements are true in this regard:	
a.	The following institutional resources at a university are relevant role players in an SEM research programme:	
	<ul style="list-style-type: none"> The post-graduate school 	
	<ul style="list-style-type: none"> The finance department 	
	<ul style="list-style-type: none"> The human resources department 	
	<ul style="list-style-type: none"> The Faculty of Health Sciences executive 	
	<ul style="list-style-type: none"> The university sport department 	10 Good resource but not essential.
	<ul style="list-style-type: none"> The university health and wellness centre 	
	<ul style="list-style-type: none"> The department of biostatistics 	
	<ul style="list-style-type: none"> The institutional marketing/fundraising department 	
	<ul style="list-style-type: none"> Academic writers 	
	<ul style="list-style-type: none"> Research grant application experts 	
	<ul style="list-style-type: none"> The university Alumni association 	
b.	Additional information on internal university (institutional) resources in a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> In your opinion, are there additional relevant statements regarding the institutional resources relevant to a successful research programme in SEM to be considered in determining a 	

	strategic research framework?	
	14 Possibly bioethics	
	<ul style="list-style-type: none"> Do you have any further comments regarding the financial resources in the planning of a strategic research framework? 	
	10 Funds should come from diverse sources.	
C1.4	EXTERNAL ORGANISATIONAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:	
	This section deals with the <i>external resources</i> relevant to the successful operation of a multidisciplinary SEM research programme.	
a.	The following organisations outside of the university are relevant role players in the successful operation of an SEM research programme:	
	<ul style="list-style-type: none"> Professional associations, e.g. the South African Sports Medicine Association [SASMA]; the International Sports Medicine Federation [FIMS]; the International Olympic Committee [IOC] medical committee 	10 Useful but not essential. 12 Not all of them.
	<ul style="list-style-type: none"> The private healthcare industry 	
	<ul style="list-style-type: none"> The pharmaceutical industry 	
	<ul style="list-style-type: none"> The nutritional supplement industry 	10 May be a partner.
	<ul style="list-style-type: none"> Anti doping agencies [e.g. the South African Institute for Drugs in Sport [SAIDS], the World Anti-doping agency [WADA] 	
	<ul style="list-style-type: none"> The fitness industry 	10 May be a good partner for some types of research
	<ul style="list-style-type: none"> National sport federations 	
	<ul style="list-style-type: none"> The South African Sports Confederation and Olympic Committee [SASCOC] 	10 Usually, very difficult to work with NOC's.
	<ul style="list-style-type: none"> Underemphasised sport codes in South Africa [e.g. gymnastics, karate, boxing] 	
	<ul style="list-style-type: none"> Government departments [Department of Health, Department of Sport and Recreation, Department of Education, Department of Science and Technology] 	
	<ul style="list-style-type: none"> The College of Sport and Exercise Medicine of Medicine of South Africa [CSEM(SA)] 	
	<ul style="list-style-type: none"> The College of Medicine of Medicine of South Africa [CMSA] 	
	<ul style="list-style-type: none"> The community in which the research programme is located 	
b.	Additional information on external resources in a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> In your opinion, are there other organisations that may be relevant to an SEM research programme? 	
	10 The above organizations can be good partners but a research program does not need all of them.	
	12 My knowledge of the South African structure is too low to answer these questions.	
	<ul style="list-style-type: none"> Do you have any further comments regarding external resources in the planning of a strategic research framework in SEM? 	
	14 The relevance depends on whether it is funding, collaborations, cases, sharing of risk, etc.	

C1.5	ACADEMIC ROLEPLAYERS AND STAKEHOLDERS IN A MULTIDISCIPLINARY SPORT AND EXERCISE MEDICINE RESEARCH PROGRAMME	
	This section attempts to identify the most relevant potential academic role players in a multidisciplinary SEM research programme:	
a.	The following academic disciplines are relevant role players in a multidisciplinary SEM research programme:	
	• Anatomy and cell biology	
	• Family medicine	
	• Pharmacology	
	• Occupational therapy	
	• Psychology	
	• Internal medicine	
	• Diagnostic radiology	
	• Biochemistry	
	• Haematology	
	• Nursing	
	• Ophthalmology	
	• Paediatrics	
	• Community health	
	• Occupational health	
	• Work wellness/employee assistance	
	• Pathology/biochemistry/haematology laboratory services	
	• Physiotherapy	
b.	Additional information regarding academic disciplines that may be relevant to an SEM research programme.	
	• In your opinion, are there other academic disciplines that may be relevant role players in a multidisciplinary SEM research programme?	
	10 Physical Medicine and Rehabilitation, Orthopedics, Biomechanics, Physiology.	
	• Do you have any further comments regarding identification of academic role players in the planning of a strategic research framework in SEM?	
	01 The above list depends on the focus of research of the unit and of individuals. the logic of my answers is based on generalisation, for example biochemistry and anatomy for most areas of SEM research, therefore agree. Something like Paediatrics may be so in some cases, therefore partially agree.	
	14 Very much depends on research directions and projects.	
C2	PROCESSES RELEVANT TO THE SUCCESSFUL OPERATION OF A MULTIDISCIPLINARY SEM RESEARCH PROGRAMME	
C2.1	STRATEGIC PROCESSES	
	STATEMENTS	COMMENTS
a.	The following are relevant components of a <i>strategic plan</i> for a multidisciplinary SEM research programme:	
	• A quality assurance plan	
	• A risk management plan	
	• Consensus among role players on the strategy and goals of the research programme	01 general agreement may be possible even if consensus would be optimal.
b.	The following are relevant reference points for strategic <i>goal setting</i> for a multidisciplinary SEM research programme:	
c.	The following are key strategic <i>activities</i> to ensure success of a multidisciplinary SEM research programme:	
	• Increase the number of PhDs of	

	staff in the programme	
	<ul style="list-style-type: none"> Attract post-doctoral fellows 	
	<ul style="list-style-type: none"> Monitoring of activities of other research units 	
	<ul style="list-style-type: none"> Management models 	
d.	A national SEM research co-ordinating body will make a positive contribution to SEM research in South Africa	14 Really difficult to know the political situation.
e.	Additional information on strategic processes in a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> In your opinion, are there other strategic concepts that may be relevant to an SEM research programme? 	
	10 Protection of time to do the research.	
	14 Researcher time commitments.	
	<ul style="list-style-type: none"> Do you have any further comments regarding strategic processes in the planning of a strategic research framework in SEM? 	
C2.2 MANAGERIAL PROCESSES		
a.	Regarding <i>human resource [people] management</i> , the following aspects are relevant in a multidisciplinary SEM research programme:	
	<ul style="list-style-type: none"> The establishment of a multidisciplinary scientific committee 	12 Might be helpful.
	<ul style="list-style-type: none"> Focus on professional development [career planning] of all members of the team 	
b.	Regarding <i>academic management</i> of research the following aspects are important managerial functions:	
	<ul style="list-style-type: none"> Incentives to researchers for publication 	14 These should be negotiated and averaged over say 3 year time frame.
c.	Regarding <i>financial management</i> of research, the following aspects are important managerial functions:	
	<ul style="list-style-type: none"> Following a set budgeting procedure for research projects 	
	<ul style="list-style-type: none"> Fundraising must be a specialised function within the research programme 	14 Also a personal responsibility.
e.	Additional information on managerial processes in a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> In your opinion, are there management considerations that may be relevant to a SEM research programme? 	
	<ul style="list-style-type: none"> Do you have any further comments regarding managerial processes in the planning of a strategic research framework in SEM? 	
C2.3 OPERATIONAL PROCESSES		
a.	<i>Operational processes</i> of a multidisciplinary SEM research programme should include the following	
	<ul style="list-style-type: none"> Formal agreements on procedures with researchers 	14 I guess this means an operational code of best practice. LH Comment: Indeed.
	<ul style="list-style-type: none"> Formal agreements on expected outcomes with researchers 	10 Room is needed for innovation; do not make it too strict. 14 An integral part of goal setting.
	<ul style="list-style-type: none"> Guidelines for publication 	14 I assume this means number and journals. LH Comment: Agreed.
	<ul style="list-style-type: none"> Creation of patient databases 	

b.	Additional information on operational processes in a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> In your opinion, are there other operational processes that may be relevant to an SEM research programme? 	
	14 Negotiation of research time – on long term basis	
	<ul style="list-style-type: none"> Do you have any further comments regarding operational processes in the planning of a strategic research framework in SEM? 	
SECTION D: CHALLENGES IN MULTIDISCIPLINARY RESEARCH IN SPORT AND EXERCISE MEDICINE		
	<p>This section deals with challenges in multi-disciplinary research in general, but also in sport and exercise medicine at a university. Please indicate how important you regard each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list, by clicking on “Select one option”. You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>	
	STATEMENTS	COMMENTS
D1	ACADEMIC CHALLENGES IN MULTIDISCIPLINARY SEM RESEARCH	
a.	The following are relevant <i>academic</i> challenges in the establishment and management of a multidisciplinary SEM research programme:	
	<ul style="list-style-type: none"> To motivate people from different academic backgrounds to listen [want to understand] each other ‘s points of view 	10 This is true in any field and not limited to SEM.
	<ul style="list-style-type: none"> Fair distribution of research credits 	
	<ul style="list-style-type: none"> Lack of trust among multi-disciplinary team members 	10 The typical SEM unit is multidisciplinary by nature. 12 Important point.

	<ul style="list-style-type: none"> To become nationally recognised by peers 	
	<ul style="list-style-type: none"> To compete with institutions with ample human and financial resources [such as the IOC] 	10 The IOC is not a good research model!!!
	<ul style="list-style-type: none"> To form professional networks 	
	<ul style="list-style-type: none"> To become part of existing professional networks 	
	<ul style="list-style-type: none"> Potential interdisciplinary stakeholders may fail to recognise the merit/importance of the “bigger picture” or vision 	
	<ul style="list-style-type: none"> It may be difficult for interdisciplinary research stakeholders to distinguish between research output [current drive] and impact [vision] 	
	<ul style="list-style-type: none"> Lack of creativity of primary researchers may have a negative impact on interdisciplinary research 	
	<ul style="list-style-type: none"> SEM is a small, young discipline that finds it difficult to make an impact in a broader interdisciplinary medical context 	10 This was true many years ago.
	<ul style="list-style-type: none"> Different disciplines have different points of view/paradigms that are challenging to blend and to find a common “language” 	
	<ul style="list-style-type: none"> To identify specialists to collaborate with 	
	<ul style="list-style-type: none"> To find good research ideas 	12 Always a challenge and not specific to SEM.
	<ul style="list-style-type: none"> To find good students 	
D2	MANAGEMENT CHALLENGES IN MULTIDISCIPLINARY SEM RESEARCH	
a.	The following are <i>management</i> challenges in the successful operation of a multidisciplinary SEM research programme:	
	<ul style="list-style-type: none"> The establishment of a management/leadership hierarchy in interdisciplinary research 	<p>12 The hierarchy should be very falt. (sic)</p> <p>LH Comment: The meaning of this statement is unclear. Will the respondent please explain in different words?</p> <p>14 Depends on the structure.</p>
	<ul style="list-style-type: none"> Departmental interest above interdisciplinary research interest 	14 Depends on the higher level goals and whether just research or teaching also.
	<ul style="list-style-type: none"> Personal research interest above interdisciplinary research interest 	14 Depends on a higher strategy.
	<ul style="list-style-type: none"> Maintenance of effective interdisciplinary communication 	
	<ul style="list-style-type: none"> Maintenance of effective interdisciplinary co-ordination 	
	<ul style="list-style-type: none"> To obtain initial funding for a new research programme 	
	<ul style="list-style-type: none"> Time allocation/prioritising for interdisciplinary work versus own departmental work 	12 This depends of the priority in the single case.
	<ul style="list-style-type: none"> Quality control and minimum standard setting in an interdisciplinary research 	

	environment	
	<ul style="list-style-type: none"> To attract full-time researchers 	
D3	ADDITIONAL INFORMATION REGARDING CHALLENGES IN MULTIDISCIPLINARY SEM RESEARCH	
a.	Additional information on external resources in a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> In your opinion, are there other challenges that may be relevant to an SEM research programme? 	
	<ul style="list-style-type: none"> Do you have any further comments regarding challenges in the planning of a strategic research framework in SEM? 	
	<p>14 Many of the above points are clearly dependent on the over goal setting and role of the individuals – whether they are seconded for research purposes to the SEM research programme. In some instances teach in adept but develop a major/or all of their research in a specialised research unit (sic).</p> <p>LH Comment: The meaning of this statement is unclear. Will the respondent please explain in different words?</p>	
SECTION E: OUTPUTS [PRODUCTS] OF A MULTIDISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME		
	<p>This section deals with types, levels and targets of outputs of a multidisciplinary SEM research programme. Please indicate how important you regard each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list, by clicking on “Select one option”. You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>	
	STATEMENTS	COMMENTS
E1	TYPES OF OUTPUTS FROM A MULTIDISCIPLINARY RESEARCH PROGRAMME	
a.	The following are essential academic products of a multidisciplinary SEM research programme:	
	<ul style="list-style-type: none"> Non-scientific informational publications 	12 not excluding scientific publications!
	<ul style="list-style-type: none"> Non-peer reviewed scientific publications 	12 not excluding peer-reviewed publications.
	<ul style="list-style-type: none"> Registered patents 	
	<ul style="list-style-type: none"> Chapters in books 	
	<ul style="list-style-type: none"> Scholarly books 	
	<ul style="list-style-type: none"> Textbooks and published guidelines 	
	<ul style="list-style-type: none"> Short learning courses 	
	<ul style="list-style-type: none"> Increased academic stature among peers 	
b.	The following are desired human outcomes of a multidisciplinary SEM research programme:	
	<ul style="list-style-type: none"> Appointment of staff members on national governmental scientific bodies 	
c.	The following objectives deal with desired financial outcomes within a multidisciplinary SEM research programme at a university. Select your level of agreement with each objective:	
	<ul style="list-style-type: none"> Financial self-sustainability 	
	<ul style="list-style-type: none"> Profitability 	
	<ul style="list-style-type: none"> Commercialisation of research by 	10 If it happens it should be accepted but it is not the

	contract research	goal.
	<ul style="list-style-type: none"> Commercialisation of research by selling new knowledge 	
	<ul style="list-style-type: none"> Commercialisation of research by registering patents 	
E2	LEVELS OF FOCUS OF MULTIDISCIPLINARY SEM RESEARCH PROGRAMME	
a.	The following are important levels at which research outputs should be focused:	
	<ul style="list-style-type: none"> Community [regional] 	
	<ul style="list-style-type: none"> National 	
	<ul style="list-style-type: none"> International 	
	<ul style="list-style-type: none"> Specific publications 	14 Don't really understand this point. LH Comment: To focus on research preferable to a certain publication
	<ul style="list-style-type: none"> Specific industries 	
b.	The following are important persons and bodies at which research outputs should be focused [who should be pleased with the outcome?]:	
	<ul style="list-style-type: none"> University management 	14 They will be impressed with quality outputs.
	<ul style="list-style-type: none"> Government departments [sport, education, health etc] 	
	<ul style="list-style-type: none"> The public 	
	<ul style="list-style-type: none"> The healthcare industry 	
E3	ADDITIONAL INFORMATION REGARDING OUTPUTS OF A MULTIDISCIPLINARY SEM RESEARCH PROGRAMME	
a.	Additional information on outputs of a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> In your opinion, are there other significant outputs that may be relevant to a SEM research programme? 	
	10 It is difficult to please all constituents. The important thing is to do good science.	
	14 Unless I missed it – peer reviewed outputs in Journals with high Impact Factors – should be the primary output.	
	<ul style="list-style-type: none"> Do you have any further comments regarding outputs in the planning of a strategic research framework in SEM? 	
	12 SEM is important for high-level scientific research but it is also important to spread out the knowledge to those who might have a benefit. That includes all kind of publications.	
	14 Peer reviewed outputs in high Impact Factor journals should clearly be the focus – other forms of publication should be seen as supporting and not a primary focus.	

SECTION F: OUTCOMES [IMPACT] OF A MULTIDISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME		
<p>This section deals with longer term outcomes [impact] and significance of a multidisciplinary SEM research programme. Please indicate how important you regard each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list, by clicking on “Select one option”. You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>		
	STATEMENTS	COMMENTS
F1	TYPES OF OUTCOMES FROM A MULTIDISCIPLINARY RESEARCH PROGRAMME	
b.	The following are significant <i>internal effects</i> [changes] that may indicate outcomes of the research programme:	
	<ul style="list-style-type: none"> Changes in number of researchers in the programme 	14 Agree – stability and growth.
	<ul style="list-style-type: none"> Changes in behaviour of researchers 	14 Agree – more from individual to team oriented.
c.	The following are significant <i>external effects</i> [changes] that may indicate outcomes [significance] of the research programme:	
	<ul style="list-style-type: none"> Changes in the university [e.g. attitude, placement of the programme] 	
	<ul style="list-style-type: none"> Implementation of research findings in communities 	
	<ul style="list-style-type: none"> Changes in the community 	
F2	MEASUREMENT OF OUTCOMES FROM A MULTIDISCIPLINARY RESEARCH PROGRAMME	
a.	In order to measure progress [success], specific outcomes of a research programme should be:	
	<ul style="list-style-type: none"> quantified 	10 There is a need to develop qualitative assessment tools. 12 quality is more important than quantity.
b.	The outcomes of a research programme should be monitored, but not necessarily planned and quantified	
F3	ADDITIONAL INFORMATION REGARDING OUTCOMES [IMPACT] OF A MULTIDISCIPLINARY SEM RESEARCH PROGRAMME	
a.	Additional information on the outcomes [impact] of a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> In your opinion, are there other significant outcomes [impact] that may be relevant to a SEM research programme? 	
	<ul style="list-style-type: none"> Do you have any further comments regarding outcomes [impact] in the planning of a strategic research framework in SEM? 	

SECTION G: EXPERT PANELLISTS FINAL COMMENTS	
G1	Are there other aspects that, according to your knowledge and experience, should be included in planning a strategic framework for SEM research?
	<p>12 Currently no, not every can be planned. Researchers must have enough space for try and error. A lot of good scientific ideas are a product by chance.</p> <p>Thank you</p>

Thank you for taking the time to complete the questionnaire. Results will be analysed and questions where no consensus could be reached among expert panellists, will be redistributed to you once more. It is envisaged that stability will be reached in most statements after this round. You will again receive feedback on the results of this questionnaire.

Your valuable input in this research is much appreciated.

Sincerely

Louis Holtzhausen

LH 20120307

APPENDIX E1

LETTER TO DELPHI PANEL: ROUND 3

LETTER TO DELPHI PANEL ROUND 3

A CRITICAL ANALYSIS AND STRATEGIC FRAMEWORK FOR RESEARCH IN SPORT AND EXERCISE MEDICINE AT THE UNIVERSITY OF THE FREE STATE

Dear Colleague

Thank you once more for your participation in this Delphi research process and your valuable feedback in round 1 and 2. Attached please find the third round Delphi questionnaire.

PURPOSE OF ROUND 3

The questionnaire for round 3 is made up of all the statements in round 2 where consensus has not been reached by the panel. Consensus was pre-defined where 80% of panel members agreed on their responses to a question. All the questions on which consensus was reached, have been removed from the questionnaire. Feedback on round 2 is attached to indicate where consensus has been reached, as well as comments from panel members and clarifications from the researcher. You are kindly requested to peruse the feedback document before completing the round 3 questionnaire.

It became clear after round 2 that questions or statements in certain categories are difficult to address in the format of this questionnaire (only selecting agree, partially agree or disagree), because many confounding factors or lack of knowledge of expert panellists of local or South African conditions require either more information to make an informed pointed selection, or further discussion or more comprehensive explanation by panellists. For that reason these sections have been put into a separate category in the new questionnaire (part 2), where no selections need to be made, but only final comments are requested if appropriate. The lack of consensus or stability in these sections will be addressed from the comments and relevant literature.

In part one of round 3 you are given an opportunity to reconsider your opinion on the remaining statements after taking into account the feedback from round 2.

PROCEDURE OF THE THIRD ROUND

The procedure in *part 1* of round 3 is exactly the same as in round 1 and 2. Your opinion as expert panellist is required on the relative importance of each question. You are also invited to provide additional comments.

The procedure in *part 2* of round 3 is to read the questions and comments by experts in previous rounds. You can either persist with your previous comments by not making further comments, or make final comments in the spaces provided.

If you wish to persist with your selections and comments in the previous round, you are welcome to do so. If your completed questionnaire has not been received by the cut-off date of Tuesday, 10 April 2012, it will be assumed that you have decided to persist with

your selections and comments in the previous round, round 2 for part 1 and that you have no new comments to add to part 2.

All information and opinions will be treated as strictly confidential.

Please answer all the questions in all sections.

COMPLETION OF THE QUESTIONNAIRE

PART 1

As no consensus have been reached on the questions that are redistributed, you are allowed to change your opinion or maintain your previous opinion. You are also invited to make new comments. Please use the following three-point Likert scale again:

1 = Fully agree [*Must definitely* be considered in the designing of a research framework]
 2 = Partially agree [*Can* be considered in the designing of a research framework]
 3 = Disagree [*Irrelevant* for consideration in the designing of a research framework]

Please select the answer of your choice from the drop down menu marked “SELECT ONE OPTION”. You are welcome to qualify your choice or make comments regarding any question in the right hand column of the questionnaire table.

PART 2

Please consider the questions in these sections in which many confounding factors or lack of information makes it difficult to select a simple option. All previous comments have been included. You are invited to make final comments on these categories, especially if you can share general principles that can be applied to address these issues.

If possible, please complete the questionnaire in its electronic form after saving it as a MS Word or related word processing document. A hard copy of the questionnaire can be made available if required.

The questionnaire in this round should take approximately 30 minutes of your time. Please contact me in the event of any questions or uncertainties.

Analysis of data can only be done once all questionnaires have been received or after 10 April 2012. It will therefore be much appreciated if the completed questionnaires can reach me before or on **Tuesday, 10 April 2012**. The return details remain as follows:

Email: HoltzhausenLJ@ufs.ac.za
 Fax: +27 51 444 2969
 Cellular phone: +27 82 906 3062

Thank you once again for your tremendously valuable input into this project so far.



Dr LJ Holtzhausen
 Head: Division Sport and Exercise Medicine
 Faculty of Health Sciences
 University of the Free State

Bloemfontein

UFS registered project

Ethical clearance no: ETOVS NR: 191/2010

QUESTIONNAIRE FOR DELPHI PANEL: ROUND 3

QUESTIONNAIRE FOR DELPHI EXPERT PANEL: ROUND 3

This round consists of two parts. You do not have to answer all questions again.

Instructions:

Part 1: Please select the most appropriate response to each statement. You are invited to qualify your response, or lack thereof, with a comment in the last column. Comments from previous rounds are included to assist you (Round 2 in normal font; Round 1 in *Italics*.)

Part 2: Please read the comments made during the previous rounds and make final comments in the spaces marked “TYPE COMMENT HERE”, if you have any.

If you wish to persist with your replies in the previous round, you are welcome to do so by not answering the questions.

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PART 1

SECTION A: STRATEGIC FOUNDATIONS OF A RESEARCH FRAMEWORK IN SPORT AND EXERCISE MEDICINE			
	<p>This section deals with the foundational reference points of a generic research programme, but is also applicable to a research programme in Sport and Exercise Medicine (SEM). Please indicate how important you regard each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list by clicking on “Select one option”. You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>		
A1	OVERALL STRATEGY IN RESEARCH PLANNING AND MANAGEMENT		
	In designing and managing a research programme, the following statements are relevant:		
	STATEMENTS	SELECT	COMMENTS
a.	Research should be guided by:		
	<ul style="list-style-type: none"> an implementation plan 	Select one option	TYPE COMMENTS HERE
b.	The success of a research programme can be enhanced by:		
	<ul style="list-style-type: none"> pre-determination of the direction of research in the programme 	Select one option	10 The direction may change depending on the findings 14 This sets the scene for role of leadership, etc. <i>08 This may change depending on results and learnings.</i> <i>10 Some flexibility is needed for high-quality research and not every decision can be anticipated.</i> <i>14 in general - but responsive to opportunity/changing needs/creativity/opportunities.</i> TYPE COMMENTS HERE
	<ul style="list-style-type: none"> strong leadership 	Select one option	10 Good leadership may be needed for some types of research programs more than others; i.e. Infrastructure, grants. 14 A must. <i>10 But the leader should give the researchers to pursue their interests.</i> TYPE COMMENTS HERE
	<ul style="list-style-type: none"> strong mentorship 	Select one option	14 This must be viewed in an operational sense and different from leadership. LH Comment: Or in the sense of broader coaching on approach, vision and sharing of one’s experience.

			<i>14 Need to understand the environment.</i> TYPE COMMENTS HERE
	<ul style="list-style-type: none"> An enabling environment such as a university with a strong research culture 	Select one option	<p>14 No question about this.</p> <p><i>08 More likely to have a supportive infrastructure but can be done in the community.</i></p> <p>TYPE COMMENTS HERE</p>
c.	The policy of a research programme should:		
	<ul style="list-style-type: none"> support transfer of knowledge to benefit the university 	Select one option	<p>14 Sure, through general marketing. Research is about generating new knowledge.</p> <p><i>08 Although collaborative benefits are valued in the university, I don't think it should be policy driven.</i></p> <p>TYPE COMMENTS HERE</p>
	<ul style="list-style-type: none"> support transfer of knowledge to benefit the community 	Select one option	<p>14. Yes, a bit lower priority.</p> <p><i>08 If community means patient and outcome measures.</i></p> <p><i>10 Not all beneficial research outcomes will be transferable.</i></p> <p>TYPE COMMENTS HERE</p>
d.	<ul style="list-style-type: none"> The role of research in SEM at a university department is dependent on the balance between teaching and research of the university 	Select one option	<p>01 There may be dedicated research programmes with dedicated researchers that do not focus on teaching.</p> <p>12 This depends of the field of research. It is true for sport medicine, it is less true for exercise physiology.</p> <p>14. This is a critical point. Research is no add on activity – it requires dedicated time.</p> <p><i>14 there is also the possibility of research dedicated staff.</i></p> <p>TYPE COMMENTS HERE</p>
e.	A SEM research programme at a university should be supported by:		
	<ul style="list-style-type: none"> University management 	Select one option	<p>01 without this support many aspects of success may be compromised.</p> <p>10 It is not the only source of support.</p> <p>14 Unconditional institutional support is totally necessary.</p> <p><i>14 Top down support is high priority -must be viewed as important as cancer research.</i></p> <p>TYPE COMMENTS HERE</p>
A3	MONITORING OF THE SUCCESS OF A RESEARCH PROGRAMME		
	The following statements relate to monitoring and evaluation of the success of a research programme		
a.	A research programme should regularly be:		
	<ul style="list-style-type: none"> <i>Monitored</i> according to <i>qualitative</i> key performance indicators [subjective outcomes of success] 	Select one option	<p>10 Both quantity and quality are important.</p> <p>TYPE COMMENTS HERE</p>

	<ul style="list-style-type: none"> Evaluated according to qualitative key performance indicators [subjective outcomes of success] 	Select one option	TYPE COMMENTS HERE
A4	ADDITIONAL RELEVANT INPUT FROM EXPERT PANELLISTS REGARDING STRATEGY IN RESEARCH PLANNING AND MANAGEMENT		
a.	In your opinion, are there additional relevant statements to be considered in determining a research strategy?		
	<p>01 There needs to be coherence of all these aspects. For example, the funding for specific equipment would be relevant for research in the area of someone who has expertise and an interest - but if they left, what then? Would it be possible to continue the research; and does that area of research fit in with the unit and university</p> <p>10 Consider the potential for collaborative efforts.</p> <p>12 Ethical considerations are important.</p> <p>03 In South Africa (and other countries) the political climate both within and outside of the university also dictate research funding and therefore direction.</p> <p>08 Research should have clinical or educational practice applicability. All research should attempt to include both genders in the study population and outcome analysis.</p> <p>10 Scientific themes can also be selected based on local and regional needs that may be unique.</p> <p>TYPE COMMENTS HERE</p>		
b.	Do you have any further comments regarding the strategic planning of a research framework?		
	<p>14 Goals/objectives need to be aligned with national/regional/local sustainable funding opportunities.</p> <p>TYPE COMMENTS HERE</p>		
SECTION B: THE ROLE, PLACE AND CHARACTER OF RESEARCH IN SPORT AND EXERCISE MEDICINE [SEM] AT A UNIVERSITY			
	<p>This section deals with the role, place and character of a research programme in sport and exercise medicine at a university. Please indicate how important you regard each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list, by clicking on "Select one option". You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>		
B1	THE EDUCATIONAL AND ACADEMIC ROLE OF RESEARCH IN SPORT AND EXERCISE MEDICINE		
	STATEMENTS	SELECT	COMMENTS
a.	Research in SEM plays an important <i>educational</i> role in:		
	<ul style="list-style-type: none"> Basic grounding for undergraduate teaching 	Select one option	<p>14 Informs teaching – clinical and general.</p> <p>08 This tends to be concluded established research information.</p> <p>14 In-house research should be informing teaching.</p> <p>TYPE COMMENTS HERE</p>
b.	Research in SEM plays an important role in the <i>development of SEM</i> as an academic discipline regarding:		
	<ul style="list-style-type: none"> The development of sport 	Select one option	<p>14 I am not sure I understand the question.</p> <p>LH Comment: The development of sport refers to the improvement of performance at the level where it is directed, as well as broader participation.</p> <p>14 -But not limited to sport.</p> <p>TYPE COMMENTS HERE</p>

c.	Regarding the role of SEM research in society:		
	<ul style="list-style-type: none"> Sport and Exercise Medicine research can lead the way in mainstream medicine research 	Select one option	<p>01 In certain areas, such as chronic disease prevention and management.</p> <p>10 Particularly in health promotion and disease prevention.</p> <p>14 Public health and activity areas.</p> <p>08 <i>Within this decade and the next, I see it as a supporting area of research, and a lens of research. I do not see it a leader in mainstream medicine.</i></p> <p>10 <i>Not always but in some areas the answer is yes.</i></p> <p>TYPE COMMENTS HERE</p>
	<ul style="list-style-type: none"> Research on elite athletes can often be applied to broader communities 	Select one option	TYPE COMMENTS HERE
d.	Sport plays an important role in:		
	<ul style="list-style-type: none"> Politics 	Select one option	<p>01 This may be so, but how does this question tie in with SEM research?</p> <p>LH Comment: If true it may have an effect on the direction of research focus in SEM, funding opportunities and more.</p> <p>10 Not always positive.</p> <p>TYPE COMMENTS HERE</p>
B2 THE ACADEMIC PLACE (POSITIONING) OF A RESEARCH PROGRAMME IN SPORT AND EXERCISE MEDICINE AT A UNIVERSITY			
a.	Regarding the place of an SEM research programme in a university:		
b.	The following groupings are relevant partners in an SEM research programme:		
	<ul style="list-style-type: none"> Primary health care institutions 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Sport federations 	Select one option	<p>12 Not in Germany.</p> <p>14 <i>It should not be the focus.</i></p> <p>TYPE COMMENTS HERE</p>
c.	The following fields of study are relevant in an interdisciplinary SEM research programme:		
d.	SEM is a particularly suitable discipline for:		
	<ul style="list-style-type: none"> pure scientific research 	Select one option	<p>01 There is a role for pure scientific research, but I would not say "particularly suitable".</p> <p>10 Some degree of interaction is possible and desirable.</p> <p>12 we have broad range from applied to pure scientific research(Germany).</p> <p>14 <i>Exercise has been used to understand basic biochemical and physiological phenomena.</i></p> <p>TYPE COMMENTS HERE</p>

B4	THE MULTIDISCIPLINARY CHARACTER OF SPORT AND EXERCISE MEDICINE		
a.	The following statements are true regarding SEM:		
	<ul style="list-style-type: none"> An interdisciplinary SEM research programme should be managed independent of academic departments 	Select one option	<p>10 This is equivalent to the creation of yet another department.</p> <p>14 Really depends on politics/structures and funding.</p> <p><i>08 Departmental collaboration is essential.</i></p> <p><i>10 The management model may depend on the institutional culture. In our University, SEM has been successful and is housed within an academic department with collaborations with other departments.</i></p> <p><i>14 SEM is a stand-alone discipline and will not flourish buried in an irrelevant Department.</i></p> <p>TYPE COMMENTS HERE</p>
B5	ADDITIONAL RELEVANT INPUT FROM EXPERT PANELLISTS REGARDING THE ROLE, POSITIONING AND CHARACTER OF A SEM RESEARCH PROGRAMME		
a.	In your opinion, are there additional relevant statements regarding the role, place and character of research in SEM to be considered in determining a strategic research framework?		
	<p>10 Research in SEM can be very broad and interdisciplinary; great area for clinical and translational research.</p> <p>14 The forcing of SEM into pre-developed clusters will impede the development and growth of research.</p> <p><i>08 It would be relevant to consider population health trends and their integration with exercise and sport. In addition, lifecycle and lifestyle integration.</i></p> <p><i>14 SEM is built on interdisciplinary interactions with a clear focus on research/clinical objectives. SEM will never obtain a status equal to established academic units if it is buried in a larger established unit. Internationally SEM is well a recognised academic discipline and should control its own academic destiny. SEM is as much about public health as it is about sports and thus must be treated and supported as serious academic discipline.</i></p> <p>TYPE COMMENTS HERE</p>		
b.	Do you have any further comments regarding the role, place and character of SEM research in the planning of a strategic research framework?		
	<p><i>08 The opportunity to enhance evidence based rehabilitation through SEM is key since much funding is spent by governments without good evidence of proven benefit or treatment consensus.</i></p> <p>TYPE COMMENTS HERE</p>		

SECTION C: INPUTS THAT ARE REQUIRED BY A RESEARCH PROGRAMME IN SPORT AND EXERCISE MEDICINE		
<p>This section deals with different inputs required for the successful operation of a multidisciplinary research programme, and the activities within such a programme. Please indicate your perceived importance of each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list, by clicking on "Select one option". You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>		
C1: RESOURCES		
STATEMENTS	SELECT	COMMENTS
C1.1 HUMAN RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:		
b. The following statements are true regarding the academic staff in a SEM research programme:		
<ul style="list-style-type: none"> All academic staff in SEM must obtain PhD degrees 	Select one option	01 Some may be clinicians, or research assistants. 14 Or the medical equivalent. <i>08 Should be 2 out of 3 from MD, Masters, and PHD. Experience should be taken into consideration.</i> <i>14 Only staff with PhDs should be recruited in the future.</i> TYPE COMMENTS HERE
<ul style="list-style-type: none"> All academic SEM staff must supervise PhD students research 	Select one option	03 If they have PhD themselves. <i>03; 08 If they have PhD themselves.</i> <i>08 Should have a PhD to supervise PhD, so it is linked to previous question.</i> <i>10 It is possible to have an excellent faculty researcher who is not supervising students.</i> TYPE COMMENTS HERE
<ul style="list-style-type: none"> Researchers in a research programme should be assimilated by retaining the best postgraduate students 	Select one option	01 It is difficult to determine what 'assimilate' means and also what defines "best postgraduate students" - there are many aspect that make that up and the 'best' may not be most productive, conducive, cooperative etc. 10 This is one of the many strategies. 14 A programme needs to recruit students from other programmes to maintain growth and development. <i>08 Not sure exactly what you mean by assimilated. If you mean consistent and uniform, than I have answered the question with that understanding.</i> <i>10 This is one strategy to recruit faculty, but not the only one.</i> <i>14 True, but also recruit Postgraduate students from other institutions to increase research vitality.</i> TYPE COMMENTS HERE
<ul style="list-style-type: none"> At least 25% of time of academic staff in an SEM department must be devoted to research supervision 	Select one option	14 Required to make sure. <i>08 There are sliding scale models from 10-25%.</i> <i>10 For productive researchers I suggest >50%.</i> <i>14 Agree - but it could be more depending on funding situation and may vary with individual</i>

			<i>depending on opportunities.</i> TYPE COMMENTS HERE
c.	Critical characteristics required to be a <i>successful researcher</i> in SEM include:		
	<ul style="list-style-type: none"> Experience on ground level 	Select one option	12 Not clear what ground level is? LH Comment: Ground level refers to experience at junior level, from the level of research assistant, data capturing and other junior functions in the research team, up to more senior positions. TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Knowledge of the industry 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Previous exposure to the discipline 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Knowledge of funding opportunities 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Expertise in certain focus areas 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Have status [respect] among peers in the discipline 	Select one option	12 Of course, I mean one must have the skills to get the respect of other researchers. <i>14 Publications count.</i> TYPE COMMENTS HERE
d.	The following <i>leadership characteristics</i> are required by leaders in research programmes:		
	<ul style="list-style-type: none"> Stature in the discipline 	Select one option	14 Competent scientists, not "old boys' network". <i>14 Published research is more powerful than "gurus".</i> TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Not too critical 	Select one option	08 Can't really answer this question as it does not detail a characteristic but more a behaviour. There is a need for critical thinking and constructive criticism. "Not too critical" is not defined enough to answer. LH Comment: The term refers to allowing freedom for growth within the team and makes mistakes or produce less than perfect work in the process. TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Leadership in daily life 	Select one option	14 Leadership in the research environment is key. <i>10 Not always transferable to the laboratory.</i> TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Bravery 	Select one option	TYPE COMMENTS HERE
e.	The following <i>management skills</i> are required by research programme managers:		
	<ul style="list-style-type: none"> Financial management skills 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Conflict management skills 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Administrative skills 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Stress management skills 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Fundraising skills 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Technical skills 	Select one option	14 Other can provide these. TYPE COMMENTS HERE
f.	Additional information on human resources in a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> In your opinion, are there additional relevant statements regarding the human resources relevant to a successful research programme in SEM to be considered in determining a strategic research framework? 		
	10 The administrative team should have some knowledge of the science.		
	12 The management skills should include motivating and discussing with the members of a research group.		

	<p>14 The ability to work in a team is critical. There may be a team hierarchy/team vision – Researchers/adjunct researchers/research physicians.</p> <p><i>08 Research and Ethics Certificate.</i> <i>08 Attention To detail.</i> <i>08 Organized.</i> <i>10 The above list is very inclusive.</i> <i>13 Consider also MD#s as member of an academic SEM staff.</i> <i>14 All good -but not all successful leaders have the whole package! Communication and people skills are critical.</i></p> <p>TYPE COMMENTS HERE</p>
	<ul style="list-style-type: none"> Do you have any further comments regarding the human resources in the planning of a strategic research framework?
	<p>14 Don't forget that most research is conducted in team situations and there is the need for persons filling different defined roles.</p> <p><i>08 Probably appropriate for associate staff to have presentation skills.</i></p> <p>TYPE COMMENTS HERE</p>
C1.2	FINANCIAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF AN SEM RESEARCH PROGRAMME:
a.	An SEM research programme should be funded by:
	<ul style="list-style-type: none"> Commercialisation of research
	Select one option
	<p>01 Sometimes for some research this may be true and relevant, but not the primary determining factor.</p> <p><i>10 Some commercial sources may be acceptable.</i></p> <p>TYPE COMMENTS HERE</p>
	<ul style="list-style-type: none"> Commercialisation of clinical services
	Select one option
	<p>01 I would say 'could', not 'should'.</p> <p>14 But with a clearly defined goal – access to cases – income generation.</p> <p><i>10 Revenue from clinical practice may be used to support research.</i> <i>14 Agree, if it's also a platform for research and learning opportunities.</i></p> <p>TYPE COMMENTS HERE</p>
	<ul style="list-style-type: none"> The university in which it is housed
	Select one option
	<p><i>14 Agree and it must be sustained during the start-up phase.</i></p> <p>TYPE COMMENTS HERE</p>
	<ul style="list-style-type: none"> Government subsidy
	Select one option
	<p>10 Funding should not be from the government only.</p> <p><i>10 It is an obligation of the government (and good policy too).</i></p> <p>TYPE COMMENTS HERE</p>
	<ul style="list-style-type: none"> Research funding agencies, such as the National Research Foundation or Medical Research Council of South Africa
	Select one option
	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Partnerships between the research programme and private corporations
	Select one option
	<p><i>10 As long as potential conflicts of interest are managed.</i></p> <p><i>14 Agree-if managed well.</i></p> <p>TYPE COMMENTS HERE</p>
b.	<p>A newly established research programme should receive initial start-up funding (seed capital) from the university in which it is housed</p>
	Select one option
	<p>01 Depends on factors that may have contributed to setting up the unit, the university support, etc.</p> <p>14 Absolutely – as this institutional support is important for other sources of funding.</p> <p><i>14 Agree and it must be sustained during the start-up phase.</i></p> <p>TYPE COMMENTS HERE</p>

c.	There is a risk of losing academic autonomy of a research programme due to interference from funders	Select one option	<p>01 This should not happen unless there are 'funny' deals, which should not be the case in good research programmes with good governance etc.</p> <p>10 The agreement between the donor and the researcher should be very clear.</p> <p>14 Universities should be monitoring this. <i>14 Should be covered in the negotiated contract.</i></p> <p>TYPE COMMENTS HERE</p>
d.	Additional information on human resources in a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> In your opinion, are there additional relevant statements regarding the financial resources relevant to a successful research programme in SEM to be considered in determining a strategic research framework? 		
	<p>10 Collaborate with colleagues that may have solid funding.</p> <p>12 Funding is necessary, but researchers should always be independent.</p> <p>14 Initial programme plans should be based on sustainability and subsequent growth.</p> <p><i>03 proper funding (not partial or under-funding) of clinical academic posts should be a priority.</i></p> <p><i>10 Given the global financial crisis, multiple sources must be considered.</i></p> <p><i>14 The need for a variety of funding streams.</i></p> <p><i>14 Guaranteed base funding during the establishment period (say 5 years).</i></p> <p><i>14 External competitive funding will not happen immediately.</i></p> <p><i>14 There is a need to balance outputs with the seeking of external funding.</i></p> <p><i>14 Quality outputs will provide the base for external funding.</i></p> <p>TYPE COMMENTS HERE</p>		
	<ul style="list-style-type: none"> Do you have any further comments regarding the financial resources in the planning of a strategic research framework? 		
	<p>14 Long term view is needed to allow research growth.</p> <p>TYPE COMMENTS HERE</p>		

C2 PROCESSES RELEVANT TO THE SUCCESSFUL OPERATION OF A MULTIDISCIPLINARY SEM RESEARCH PROGRAMME			
C2.1 STRATEGIC PROCESSES			
	STATEMENTS	SELECT	COMMENTS
a.	The following are relevant components of a <i>strategic plan</i> for a multidisciplinary SEM research programme:		
	<ul style="list-style-type: none"> A quality assurance plan 	Select one option	<p>08 <i>This should be integrated as part of the ethics approval of the research.</i></p> <p>TYPE COMMENTS HERE</p>
	<ul style="list-style-type: none"> A risk management plan 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Consensus among role players on the strategy and goals of the research programme 	Select one option	<p>01 General agreement may be possible even if consensus would be optimal.</p> <p>08 <i>Not sure that full consensus is required as some dissent can lead to more creative and collaborative efforts.</i></p> <p>TYPE COMMENTS HERE</p>
b.	The following are relevant reference points for <i>strategic goal setting</i> for a multidisciplinary SEM research programme:		
c.	The following are key <i>strategic activities</i> to ensure success of a multidisciplinary SEM research programme:		
	<ul style="list-style-type: none"> Increase the number of PhDs of staff in the programme 	Select one option	<p>10 <i>Assuming this is a new program.</i></p> <p>14 <i>by both internal up skilling recruiting PhDs --- a must.</i></p> <p>TYPE COMMENTS HERE</p>
	<ul style="list-style-type: none"> Attract post-doctoral fellows 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Monitoring of activities of other research units 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Management models 	Select one option	TYPE COMMENTS HERE
d.	A national SEM research co-ordinating body will make a positive contribution to SEM research in South Africa	Select one option	<p>14 Really difficult to know the political situation.</p> <p>14 <i>Agree - but only if it productive driven and not internally reflecting.</i></p> <p>TYPE COMMENTS HERE</p>
e.	Additional information on strategic processes in a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> In your opinion, are there other strategic concepts that may be relevant to an SEM research programme? 		
	<p>10 Protection of time to do the research.</p> <p>14 Researcher time commitments.</p> <p>03 <i>By nature of the activities, there will always be competition for limited resources, thus limiting the role of a National research co-ordinating body.</i></p> <p>08 <i>Representation of key partners in planning process.</i></p> <p>10 <i>Enhancing institutional infrastructure and culture for this type of research.</i></p> <p>14 <i>Build strong links with key University academic Departments.</i></p> <p>14 <i>Develop a strong and experienced advisory committee (academics/business/community members).</i></p> <p>14 <i>Develop a strong SEM team attitude with strong support for development and academic growth.</i></p> <p>14 <i>Celebrate all and small successes.</i></p> <p>TYPE COMMENTS HERE</p>		
	<ul style="list-style-type: none"> Do you have any further comments regarding strategic processes in the planning of a strategic research framework in SEM? 		
	TYPE COMMENTS HERE		

C2.2 MANAGERIAL PROCESSES			
	STATEMENTS	SELECT	COMMENTS
a.	Regarding <i>human resource [people] management</i> , the following aspects are relevant in a multidisciplinary SEM research programme:		
	<ul style="list-style-type: none"> The establishment of a multidisciplinary scientific committee 	Select one option	<p>12 Might be helpful.</p> <p>14 <i>depends on goals - can take away self growth.</i></p> <p>TYPE COMMENTS HERE</p>
	<ul style="list-style-type: none"> Focus on professional development [career planning] of all members of the team 	Select one option	TYPE COMMENTS HERE
b.	Regarding <i>academic management</i> of research the following aspects are important managerial functions:		
	<ul style="list-style-type: none"> Incentives to researchers for publication 	Select one option	<p>14 These should be negotiated and averaged over say 3 year time frame.</p> <p>08 <i>Should be academic versus monetary incentives.</i></p> <p>14 <i>This should be by teams/SEM group -not individual as it can be divisive and see workload inequalities. Must be managed very carefully. SEM must be the winner -not individuals.</i></p> <p>TYPE COMMENTS HERE</p>
c.	Regarding <i>financial management</i> of research, the following aspects are important managerial functions:		
	<ul style="list-style-type: none"> Following a set budgeting procedure for research projects 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Fundraising must be a specialised function within the research programme 	Select one option	<p>14 Also a personal responsibility.</p> <p>TYPE COMMENTS HERE</p>
e.	Additional information on managerial processes in a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> In your opinion, are there management considerations that may be relevant to a SEM research programme? <p>03 <i>Difficult sometimes within the SEM framework to adhere to strict time schedules.</i></p> <p>08 <i>Managing budget and human resources is the key. Time planning is important but often goes astray so project should have a contingency plan and budget.</i></p> <p>10 <i>Managers must have experience in research management. Successful managers in clinical operations and other activities need professional training before moving to a research environment.</i></p> <p>TYPE COMMENTS HERE</p>		
	<ul style="list-style-type: none"> Do you have any further comments regarding managerial processes in the planning of a strategic research framework in SEM? <p>TYPE COMMENTS HERE</p>		
C2.3 OPERATIONAL PROCESSES			
a.	<i>Operational processes</i> of a multidisciplinary SEM research programme should include the following :		
	<ul style="list-style-type: none"> Formal agreements on procedures with researchers 	Select one option	<p>14 I guess this means an operational code of best practice.</p> <p>LH Comment: Indeed.</p> <p>TYPE COMMENTS HERE</p>
	<ul style="list-style-type: none"> Formal agreements on expected outcomes with researchers 	Select one option	<p>10 Room is needed for innovation; do not make it too strict.</p> <p>14 An integral part of goal setting.</p> <p>TYPE COMMENTS HERE</p>

	<ul style="list-style-type: none"> Guidelines for publication 	Select one option	<p>14 I assume this means number and journals.</p> <p>LH Comment: Agreed.</p> <p><i>14 These are an individual responsibility.</i></p> <p>TYPE COMMENTS HERE</p>
	<ul style="list-style-type: none"> Creation of patient databases 	Select one option	TYPE COMMENTS HERE
b.	Additional information on operational processes in a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> In your opinion, are there other operational processes that may be relevant to an SEM research programme? 		
	<p>14 Negotiation of research time – on long term basis.</p> <p><i>10 Frequent and formal evaluation of outcomes and performance.</i></p> <p>TYPE COMMENTS HERE</p>		
	<ul style="list-style-type: none"> Do you have any further comments regarding operational processes in the planning of a strategic research framework in SEM? 		
	TYPE COMMENTS HERE		
SECTION E: OUTPUTS (PRODUCTS) OF A MULTIDISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME			
<p>This section deals with types, levels and targets of outputs of a multidisciplinary SEM research programme. Please indicate how important you regard each of the following statements to be included in a strategic framework for research in SEM, according to the following scale:</p> <p>Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Please pick the appropriate option in each option list, by clicking on “Select one option”. You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.</p>			
	STATEMENTS	SELECT	COMMENTS
E1	TYPES OF OUTPUTS FROM A MULTIDISCIPLINARY RESEARCH PROGRAMME		
a.	The following are essential academic products of a multidisciplinary SEM research programme:		
	<ul style="list-style-type: none"> Non-scientific informational publications 	Select one option	<p>12 Not excluding scientific publications!</p> <p><i>10 An essential but non-academic product that may help the community in general.</i></p> <p>TYPE COMMENTS HERE</p>
	<ul style="list-style-type: none"> Non-peer reviewed scientific publications 	Select one option	<p>12 Not excluding peer-reviewed publications.</p> <p>TYPE COMMENTS HERE</p>
	<ul style="list-style-type: none"> Registered patents 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Chapters in books 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Scholarly books 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Textbooks and published guidelines 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Short learning courses 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Increased academic stature among peers 	Select one option	TYPE COMMENTS HERE
b.	The following are desired human outcomes of a multidisciplinary SEM research programme:		
	<ul style="list-style-type: none"> Appointment of staff members on national governmental scientific bodies 	Select one option	TYPE COMMENTS HERE
c.	The following objectives deal with desired financial outcomes within a multidisciplinary SEM research programme at a university. Select your level of agreement with each objective:		
	<ul style="list-style-type: none"> Financial self-sustainability 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Profitability 	Select one option	<p><i>10 Not for an academic program.</i></p> <p>TYPE COMMENTS HERE</p>
	<ul style="list-style-type: none"> Commercialisation of research by contract research 	Select one option	<p>10 If it happens it should be accepted but it is not the goal.</p> <p>TYPE COMMENTS HERE</p>
	<ul style="list-style-type: none"> Commercialisation of research by selling new knowledge 	Select one option	TYPE COMMENTS HERE
	<ul style="list-style-type: none"> Commercialisation of research by registering patents 	Select one option	TYPE COMMENTS HERE

E2 LEVELS OF FOCUS OF MULTIDISCIPLINARY SEM RESEARCH PROGRAMME			
a.	The following are important levels at which research outputs should be focused:		
	• Community [regional]	Select one option	TYPE COMMENTS HERE
	• National	Select one option	TYPE COMMENTS HERE
	• International	Select one option	TYPE COMMENTS HERE
	• Specific publications	Select one option	14 Don't really understand this point. LH Comment: To focus on research preferable to a certain publication. TYPE COMMENTS HERE
	• Specific industries		TYPE COMMENTS HERE
b.	The following are important persons and bodies at which research outputs should be focused [who should be pleased with the outcome?]:		
	• University management	Select one option	14 They will be impressed with quality outputs. TYPE COMMENTS HERE
	• Government departments [sport, education, health etc]	Select one option	TYPE COMMENTS HERE
	• The public	Select one option	TYPE COMMENTS HERE
	• The healthcare industry	Select one option	TYPE COMMENTS HERE
E3 ADDITIONAL INFORMATION REGARDING OUTPUTS OF A MULTIDISCIPLINARY SEM RESEARCH PROGRAMME			
a.	Additional information on outputs of a Sport and Exercise Medicine research programme that panellists wish to include:		
	• In your opinion, are there other significant outputs that may be relevant to a SEM research programme?		
	10 It is difficult to please all constituents. The important thing is to do good science. 14 Unless I missed it – peer reviewed outputs in Journals with high Impact Factors – should be the primary output. TYPE COMMENTS HERE		
	• Do you have any further comments regarding outputs in the planning of a strategic research framework in SEM?		
	12 SEM is important for high-level scientific research but it is also important to spread out the knowledge to those who might have a benefit. That includes all kind of publications. 14 Peer reviewed outputs in high Impact Factor journals should clearly be the focus – other formats of publication should be seen as supporting and not a primary focus. TYPE COMMENTS HERE		
SECTION F: OUTCOMES [IMPACT] OF A MULTIDISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME			
	This section deals with longer term outcomes [impact] and significance of a multidisciplinary SEM research programme. Please indicate how important you regard each of the following statements to be included in a strategic framework for research in SEM, according to the following scale: Fully agree [Must be considered in the designing of a research framework] Partially agree [Can be considered in the designing of a research framework] Disagree [Irrelevant for consideration in the designing of a research framework] Please pick the appropriate option in each option list, by clicking on "Select one option". You are welcome to qualify your choice or make comments regarding any question by typing comments in the right hand column of the questionnaire table.		
	STATEMENTS	SELECT	COMMENTS
F1 TYPES OF OUTCOMES FROM A MULTIDISCIPLINARY RESEARCH PROGRAMME			
b.	The following are significant <i>internal effects</i> [changes] that may indicate outcomes of the research programme:		
	• Changes in number of researchers in the programme	Select one option	14 Agree – stability and growth. TYPE COMMENTS HERE
	• Changes in behaviour of researchers	Select one option	14 Agree – more from individual to team oriented. 14 Assume the development of a research output culture. TYPE COMMENTS HERE
c.	The following are significant <i>external effects</i> [changes] that may indicate outcomes [significance] of the research programme:		
	• Changes in the university [e.g. attitude, placement of the programme]	Select one option	TYPE COMMENTS HERE
	• Implementation of research findings in communities	Select one option	TYPE COMMENTS HERE

	• Changes in the community	Select one option	TYPE COMMENTS HERE
F2	MEASUREMENT OF OUTCOMES FROM A MULTIDISCIPLINARY RESEARCH PROGRAMME		
a.	In order to measure progress [success], specific outcomes of a research programme should be:		
	• quantified	Select one option	10 There is a need to develop qualitative assessment tools. 12 Quality is more important than quantity. TYPE COMMENTS HERE
b.	The outcomes of a research programme should be monitored, but not necessarily planned and quantified	Select one option	14 <i>Too much monitoring can lead to process -not output focus.</i> TYPE COMMENTS HERE
F3	ADDITIONAL INFORMATION REGARDING OUTCOMES [IMPACT] OF A MULTIDISCIPLINARY SEM RESEARCH PROGRAMME		
a.	Additional information on the outcomes [impact] of a Sport and Exercise Medicine research programme that panellists wish to include:		
	• In your opinion, are there other significant outcomes [impact] that may be relevant to a SEM research programme?		
	TYPE COMMENTS HERE		
	• Do you have any further comments regarding outcomes [impact] in the planning of a strategic research framework in SEM?		
	12 <i>Scientific work needs a certain degree of freedom and cannot be planned in detail. Sometimes one should be able to follow uncertain or abstruse ways.</i> TYPE COMMENTS HERE		
	SECTION G: EXPERT PANELLISTS FINAL COMMENTS		
G1	Are there other aspects that, according to your knowledge and experience, should be included in planning a strategic framework for SEM research?		
	12 Currently no, not everything can be planned. Researchers must have enough space for trial and error. A lot of good scientific ideas are a product of chance. Thank you. 12 <i>No, the most important points are mentioned.</i> 14 <i>Thank you for providing me with the opportunity of sharing my experiences with you via completing this survey.</i> TYPE COMMENTS HERE		

PART 2

	Please read the statements and comments from previous rounds presented in this part. You have opportunity to make additional comments in the spaces marked "TYPE COMMENTS HERE", at the end of each section. There is no need to select an option of agree, partially agree, or disagree. If you wish to persist with your replies and comments offered in the previous round, you may do so by not answering this section.		
A2	PRIORITISATION OF RESEARCH IN FOCUS AREAS		
	The following statements relate to the development of focus areas in a research programme. Please read the comments made by expert panellists and add additional comments in the area marked "TYPE COMMENTS HERE".		
a.	In determining research focus areas the following statements are true:		
	STATEMENT	COMMENTS ROUND 1	COMMENTS ROUND 2
	<ul style="list-style-type: none"> A university-based research programme should not be restricted by pre-determined research focus areas of the university 	<p><i>08 A focused approach often leads to excellence and large grant funds. This has to be considered when the university is contributing staffing and infrastructure.</i></p> <p><i>14 Top down support is high priority - must be viewed as important as cancer research.</i></p>	<p>01 A university may have focus in some things which SEM may differ from; but have strong outputs and quality research.</p> <p>14 This may depend on relevance, may reduce external funding potential.</p>
	<ul style="list-style-type: none"> The selection of predetermined research focus areas will enhance interdisciplinary research 	<p><i>10 Some compatibility may facilitate the use of existing resources.</i></p>	<p>01 It depends on the area of research, may be valid for some and not for others.</p> <p>10 May help because of the availability of resources.</p> <p>12 This is not true in the case of research in doping or anti-doping.</p> <p>14 Depends on individuals and communication.</p>
	<ul style="list-style-type: none"> A research programme should concentrate on pre-determined focus areas in the research environment (SEM) 	<p><i>10 Openness for new areas should be maintained.</i></p> <p><i>14 Aligned with funding priorities but also need for forward thinking and addressing opportunities.</i></p>	<p>12 One should avoid mainstream research.</p> <p>14 Drives funding.</p>
b.	The following are important determinants in the selection of research focus areas:		
	<ul style="list-style-type: none"> Market demands 		01 For funding purposes and to contribute to areas of knowledge 'needs'.
	<ul style="list-style-type: none"> Interests of individual researchers 		10 An important driver. 14 A blend of individual and corporate interests.
	<ul style="list-style-type: none"> Availability of time 		14 Critical.
	<ul style="list-style-type: none"> Availability of financial resources 		
	<ul style="list-style-type: none"> Availability of study populations 		10 Clearly important for clinical research.
	<ul style="list-style-type: none"> Availability of support staff 		
	<ul style="list-style-type: none"> Community needs (including local, regional and national) 		
	<ul style="list-style-type: none"> International trends in an academic discipline (such as SEM) 		14 Needs to be attuned – but explore new ideas.
c.	In addition to selection of research focus areas, the following are important determinants in the selection of <i>individual research projects</i> within a research programme:		
	<ul style="list-style-type: none"> Adherence to pre-determined focus areas of the research programme 		
	<ul style="list-style-type: none"> Possible available financing for specific projects 		

	<ul style="list-style-type: none"> Individual research projects should not be selected according to focus areas within a research programme 		
	<ul style="list-style-type: none"> Market demands 		14 If market = money, yes.
	<ul style="list-style-type: none"> Interests of individual researchers 		
	<ul style="list-style-type: none"> Gaps in current research 		
	<ul style="list-style-type: none"> Availability of time 	<p>08 <i>Should be able to change around time and personnel. Not a framework piece.</i></p> <p>14 <i>Research is a business not a hobby.</i></p>	
	<ul style="list-style-type: none"> Availability of financial resources 	14 <i>But innovative research can proceed with limited funding.</i>	
	<ul style="list-style-type: none"> Availability of study populations 		
	<ul style="list-style-type: none"> Availability of support staff 		
	<ul style="list-style-type: none"> Community needs [including local, regional and national] 	14 <i>Room (opportunity) for innovation.</i>	
	<ul style="list-style-type: none"> International trends in an academic discipline (such as SEM) 	14 <i>True, but need to be forward thinking and look to providing leadership.</i>	
	Do you have any further comments on the development of research focus areas in SEM or otherwise?		
	TYPE COMMENTS HERE		
B3	THE POSITIONING OF A MULTIDISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME WITHIN EXISTING RESEARCH FOCUS AREAS AT THE UNIVERSITY OF THE FREE STATE		
	<p>This section deals with the existing strategic interdisciplinary research clusters [focus areas] at the University of the Free State. These clusters have been selected predominantly on the basis of regional need and existing expertise and research. The clusters are intended to enhance the strategic research focus of the university, as well as interdisciplinary/collaborative research. They get preferential university funding and support before research that is not included in a cluster. It is therefore beneficial for any research programme to find common ground within one of the clusters.</p> <p>Please read the description of clusters and comments from previous rounds. You have opportunity to make additional comments in the spaced marked "TYPE COMMENTS HERE". There is no need to select an option of agree, partially agree, or disagree. If you wish to persist with your replies and comments offered in the previous round, you may do so by not answering this section.</p>		
	STATEMENTS	COMMENTS ROUND 1	COMMENTS ROUND 2
a.	<p><i>Cluster 1: Enabling technologies/technologies for the future [Suggested constituent focus areas: High throughput biology, nanotechnology [solid state lighting], chemical and allied technologies]</i></p>	10 <i>Nanotechnology.</i>	
b.	<p><i>Cluster 2: Food production, quality and safety for Africa [Suggested constituent focus areas: Animal production and protection, plant production and protection, human nutrition, food quality and safety]</i></p>	<p>08 <i>Human nutrition and performance.</i></p> <p>10 <i>Human nutrition in the context of high-caloric demands.</i></p>	<p>01 Human nutrition perhaps, for example in relation to communities with high energy expenditure like farm and mine labourers etc; but the others do not fit.</p> <p>10 Given the important interaction between physical activity and nutrition.</p> <p>12 You know, I am a German.</p> <p>LH Comment: If you refer to the importance of quality and safety of food production, I understand. If you are indicating that the question is not relevant to a German, I also concur – which is why many of the questions in this section have been removed from the main questionnaire.</p>
d.	<p><i>Cluster 4: Social transformation [citizenship and identity, diverse histories, globalisation and governance, human rights and social equity]</i></p>	08 Gender, age, racism and sport.	<p>01 Politically with sport and exercise participation.</p> <p>03 Right to be healthy?</p>
f.	<p><i>Cluster 6: Towards a competitive chemical industry [new drug</i></p>		10 In the case of drugs for the treatment of sports-related injuries.

	manufacturing, petrochemicals, natural product development, polymers]		
g.	Interdisciplinary SEM research at the UFS will not develop optimally if accommodated in one or more of the above existing strategic clusters	<p><i>03 Aspects can fit into some of the existing clusters but a new cluster should be created.</i></p> <p><i>08 Although not the core areas of SEM, these clusters and their integration with SEM are aimed at sustainable changes in health.</i></p> <p><i>10 Some areas noted above related directly to research in SEM</i></p>	<p>03 Needs a better fitting cluster. Where is number 5?</p> <p>LH Comment: Number 5 (or e) has been removed because consensus has already been reached on that statement in Round 1.</p> <p>14 None of these are a logical fit for a fruitful and productive development of a SEM research programme.</p>
	Do you have any further comments on interdisciplinary research clusters?		
	TYPE COMMENTS HERE		
C1.3	INTERNAL INSTITUTIONAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF AN SEM RESEARCH PROGRAMME:		
	This section deals with the <i>internal (institutional) resources of the university</i> relevant to the successful operation of a SEM research programme. Please read the statements and comments from previous rounds. You have opportunity to make additional comments in the spaced marked "TYPE COMMENTS HERE". There is no need to select an option of agree, partially agree, or disagree. If you wish to persist with your replies and comments offered in the previous round, you may do so by not answering this section.		
a.	The following institutional resources at a university are relevant role players in an SEM research programme:		
	STATEMENTS	COMMENTS ROUND 1	COMMENTS ROUND 2
	• The post-graduate school		
	• The finance department	<i>10 Contributes but does not make final decisions.</i>	
	• The human resources department	<i>10 Contributes but does not make final decisions.</i>	
	• The Faculty of Health Sciences executive		
	• The university sport department		10 Good resource but not essential.
	• The university health and wellness centre		
	• The department of biostatistics		
	• The institutional marketing/fundraising department		
	• Academic writers		
	• Research grant application experts		
	• The university Alumni association		

b.	Additional information on internal university (institutional) resources in a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> In your opinion, are there additional relevant statements regarding the institutional resources relevant to a successful research programme in SEM to be considered in determining a strategic research framework? 		
	<p>14 Possibly bioethics.</p> <p><i>08 I think that all of the above mentioned resources are important however some can be outsourced and don't have to be in a university for a program to be successful. I have rated those as Fully Agree that should be in the university.</i></p> <p><i>14 Internal publications and newsletters.</i></p> <p><i>14 The president's Office.</i></p> <p><i>14 Promotions Committee's and Human Resources.</i></p> <p>TYPE COMMENTS HERE</p>		
	<ul style="list-style-type: none"> Do you have any further comments regarding the financial resources in the planning of a strategic research framework? 		
	<p>10 Funds should come from diverse sources.</p> <p>TYPE COMMENTS HERE</p>		
C1.4	EXTERNAL ORGANISATIONAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:		
	This section deals with the <i>external resources</i> relevant to the successful operation of a multidisciplinary SEM research programme. Please read the statements and comments from previous rounds. You have opportunity to make additional comments in the spaced marked "TYPE COMMENTS HERE". There is no need to select an option of agree, partially agree, or disagree. If you wish to persist with your replies and comments offered in the previous round, you may do so by not answering this section.		
a.	The following organisations outside of the university are relevant role players in the successful operation of an SEM research programme:		
	STATEMENTS	COMMENTS ROUND 1	COMMENTS ROUND 2
	<ul style="list-style-type: none"> Professional associations, e.g. the South African Sports Medicine Association [SASMA]; the International Sports Medicine Federation [FIMS]; the International Olympic Committee [IOC] medical committee 	<p><i>08 These institutions may be part of the network that provides a vehicle for knowledge transfer of research findings but generally do not provide significant funding.</i></p>	<p>10 Useful but not essential.</p> <p>12 Not all of them.</p>
	<ul style="list-style-type: none"> The private healthcare industry 	<p><i>08 The issue with the next four partners is that although they may be sources of funding, they should not be seen partners as their reason for research would be bias to the process.</i></p> <p><i>10 Contributes but does not make final decisions.</i></p>	
	<ul style="list-style-type: none"> The pharmaceutical industry 	<p><i>10 Contributes but does not make final decisions.</i></p> <p><i>14 only if there is research potential/contracts.</i></p>	
	<ul style="list-style-type: none"> The nutritional supplement industry 	<p><i>10 Contributes but does not make final decisions.</i></p>	10 May be a partner.
	<ul style="list-style-type: none"> Anti doping agencies [e.g. the South African Institute for Drugs in Sport [SAIDS], the World Anti-doping agency [WADA] 	<p><i>14 only if these lead to research opportunities.</i></p>	
	<ul style="list-style-type: none"> The fitness industry 	<p><i>10 As long as potential conflicts of interest are managed correctly.</i></p>	10 May be a good partner for some types of research.
	<ul style="list-style-type: none"> National sport federations 		
	<ul style="list-style-type: none"> The South African Sports Confederation and Olympic Committee [SASCOC] 		10 Usually, very difficult to work with NOC's.
	<ul style="list-style-type: none"> Underemphasised sport codes in South Africa [e.g. gymnastics, karate, boxing] 	<p><i>14 These create unique/opportunist activities.</i></p>	
	<ul style="list-style-type: none"> Government departments [Department of Health, Department of Sport and Recreation, Department of Education, Department of 		

	Science and Technology]		
	<ul style="list-style-type: none"> The College of Sport and Exercise Medicine of Medicine of South Africa [CSEM(SA)] 		
	<ul style="list-style-type: none"> The College of Medicine of Medicine of South Africa [CMSA] 		
	<ul style="list-style-type: none"> The community in which the research programme is located 		
b.	Additional information on external resources in a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> In your opinion, are there other organisations that may be relevant to an SEM research programme? 		
	<p>10 The above organizations can be good partners but a research program does not need all of them.</p> <p>12 My knowledge of the South African structure is too low to answer these questions.</p> <p><i>03 Difficult to differentiate between what exists in reality (at present) and what should exist in an ideal world. Local politics within organizations unfortunately can direct attitude towards research.</i></p> <p><i>08 I think you may want to consider some of the other professional organizations like the Physiotherapy association etc.</i></p> <p><i>10 Similar organizations in universities in other countries.</i></p> <p>TYPE COMMENTS HERE</p>		
	<ul style="list-style-type: none"> Do you have any further comments regarding external resources in the planning of a strategic research framework in SEM? 		
	<p>14 The relevance depends on whether it is funding, collaborations, cases, sharing of risk, etc.</p> <p>TYPE COMMENTS HERE</p>		
C1.5	ACADEMIC ROLEPLAYERS AND STAKEHOLDERS IN A MULTIDISCIPLINARY SPORT AND EXERCISE MEDICINE RESEARCH PROGRAMME		
	This section attempts to identify the most relevant potential academic role players in a multidisciplinary SEM research programme. Please read the statements and comments from previous rounds. You have opportunity to make additional comments in the spaced marked "TYPE COMMENTS HERE". There is no need to select an option of agree, partially agree, or disagree. If you wish to persist with your replies and comments offered in the previous round, you may do so by not answering this section.		
a.	The following academic disciplines are relevant role players in a multidisciplinary SEM research programme:		
	STATEMENTS	COMMENTS ROUND 1	COMMENTS ROUND 2
	<ul style="list-style-type: none"> Anatomy and cell biology 		
	<ul style="list-style-type: none"> Family medicine 		
	<ul style="list-style-type: none"> Pharmacology 		
	<ul style="list-style-type: none"> Occupational therapy 		
	<ul style="list-style-type: none"> Psychology 		
	<ul style="list-style-type: none"> Internal medicine 		
	<ul style="list-style-type: none"> Diagnostic radiology 		
	<ul style="list-style-type: none"> Biochemistry 		
	<ul style="list-style-type: none"> Haematology 		
	<ul style="list-style-type: none"> Nursing 		
	<ul style="list-style-type: none"> Ophthalmology 		
	<ul style="list-style-type: none"> Paediatrics 		
	<ul style="list-style-type: none"> Community health 		
	<ul style="list-style-type: none"> Occupational health 		
	<ul style="list-style-type: none"> Work wellness/employee assistance 		

	<ul style="list-style-type: none"> Pathology/biochemistry/haematology laboratory services 		
	<ul style="list-style-type: none"> Physiotherapy 		
b.	Additional information regarding academic disciplines that may be relevant to an SEM research programme.		
	<ul style="list-style-type: none"> In your opinion, are there other academic disciplines that may be relevant role players in a multidisciplinary SEM research programme? 		
	<p>10 Physical Medicine and Rehabilitation, Orthopaedics, Biomechanics, Physiology.</p> <p><i>08 Rehabilitation.</i> <i>08 Physical Education.</i> <i>08 Coaching and Sport Administration.</i></p> <p><i>10 Many of these disciplines may be part of the effort but are not considered core, e.g. those listed as "partially agree".</i></p> <p><i>14 Biostatistics.</i> <i>14 Bioethics.</i> <i>14 Public and Community Health.</i> <i>14 Bioengineering.</i> <i>14 Sociology/gender/disability studies.</i></p> <p>TYPE COMMENTS HERE</p>		
	<ul style="list-style-type: none"> Do you have any further comments regarding identification of academic role players in the planning of a strategic research framework in SEM? 		
	<p>01 The above list depends on the focus of research of the unit and of individuals. The logic of my answers is based on generalisation, for example biochemistry and anatomy for most areas of SEM research, therefore agree. Something like Paediatrics may be so in some cases, therefore partially agree.</p> <p>14 Very much depends on research directions and projects.</p> <p>TYPE COMMENTS HERE</p>		
SECTION D: CHALLENGES IN MULTIDISCIPLINARY RESEARCH IN SPORT AND EXERCISE MEDICINE			
This section deals with challenges in multi-disciplinary research in general, but also in sport and exercise medicine at a university. Please read the statements and comments from previous rounds. You have opportunity to make additional comments in the spaced marked "TYPE COMMENTS HERE". There is no need to select an option of agree, partially agree, or disagree. If you wish to persist with your replies and comments offered in the previous round, you may do so by not answering this section.			
	STATEMENTS	COMMENTS ROUND 1	COMMENTS ROUND 2
D1	ACADEMIC CHALLENGES IN MULTIDISCIPLINARY SEM RESEARCH		
a.	The following are relevant <i>academic</i> challenges in the establishment and management of a multidisciplinary SEM research programme:		
	<ul style="list-style-type: none"> To motivate people from different academic backgrounds to listen [want to understand] each other 's points of view 		10 This is true in any field and not limited to SEM.
	<ul style="list-style-type: none"> Fair distribution of research credits 		
	<ul style="list-style-type: none"> Lack of trust among multi-disciplinary team members 	<i>10 Disagree, but This is not limited to SEM research.</i>	10 The typical SEM unit is multidisciplinary by nature. 12 Important point.
	<ul style="list-style-type: none"> To become nationally recognised by peers 		
	<ul style="list-style-type: none"> To compete with institutions with ample human and financial resources [such as the IOC] 	<i>14 This is a different world.</i>	10 The IOC is not a good research model!!!
	<ul style="list-style-type: none"> To form professional networks 		
	<ul style="list-style-type: none"> To become part of existing professional networks 		

	<ul style="list-style-type: none"> Potential interdisciplinary stakeholders may fail to recognise the merit/importance of the “bigger picture” or vision 		
	<ul style="list-style-type: none"> It may be difficult for interdisciplinary research stakeholders to distinguish between research output [current drive] and impact [vision] 		
	<ul style="list-style-type: none"> Lack of creativity of primary researchers may have a negative impact on interdisciplinary research 	<i>10 This is true for all types of research.</i>	
	<ul style="list-style-type: none"> SEM is a small, young discipline that finds it difficult to make an impact in a broader interdisciplinary medical context 	<p><i>10 The field has grown significantly in the last 20-30 years as the importance of physical activity as a public health intervention has been recognized.</i></p> <p><i>14 Quality and relevant publications talk.</i></p>	10 This was true many years ago.
	<ul style="list-style-type: none"> Different disciplines have different points of view/paradigms that are challenging to blend and to find a common “language” 		
	<ul style="list-style-type: none"> To identify specialists to collaborate with 		
	<ul style="list-style-type: none"> To find good research ideas 		12 Always a challenge and not specific to SEM.
	<ul style="list-style-type: none"> To find good students 		
D2	MANAGEMENT CHALLENGES IN MULTIDISCIPLINARY SEM RESEARCH		
a.	The following are <i>management</i> challenges in the successful operation of a multidisciplinary SEM research programme:		
	<ul style="list-style-type: none"> The establishment of a management/leadership hierarchy in interdisciplinary research 		<p>12 The hierarchy should be very falt (sic).</p> <p>LH Comment: The meaning of this statement is unclear. Will the respondent please explain in different words?</p> <p>14 Depends on the structure.</p>
	<ul style="list-style-type: none"> Departmental interest above interdisciplinary research interest 		14 Depends on the higher level goals and whether just research or teaching also.
	<ul style="list-style-type: none"> Personal research interest above interdisciplinary research interest 		14 Depends on a higher strategy.
	<ul style="list-style-type: none"> Maintenance of effective interdisciplinary communication 		
	<ul style="list-style-type: none"> Maintenance of effective interdisciplinary co-ordination 		
	<ul style="list-style-type: none"> To obtain initial funding for a new research programme 		
	<ul style="list-style-type: none"> Time allocation/prioritising for interdisciplinary work versus own departmental work 		12 This depends of the priority in the single case.
	<ul style="list-style-type: none"> Quality control and minimum standard setting in an interdisciplinary research environment 		
	<ul style="list-style-type: none"> To attract full-time researchers 		
D3	ADDITIONAL INFORMATION REGARDING CHALLENGES IN MULTIDISCIPLINARY SEM RESEARCH		
a.	Additional information on external resources in a Sport and Exercise Medicine research programme that panellists wish to include:		

	<ul style="list-style-type: none"> • In your opinion, are there other challenges that may be relevant to an SEM research programme?
	<p>10 The challenges listed above, in my opinion, apply to many fields of inquiry and are not specific to SEM. In fact, the nature of SEM may simplify some of the challenges typical of interdisciplinary activities.</p> <p>14 SEM researchers need to have the belief that their research is important and publish in quality peer-reviewed journals. This is the key step in obtaining recognition from more colleagues in more established research areas.</p> <p>TYPE COMMENTS HERE</p>
	<ul style="list-style-type: none"> • Do you have any further comments regarding challenges in the planning of a strategic research framework in SEM?
	<p>14 Many of the above points are clearly dependent on the over goal setting and role of the individuals – whether they are seconded for research purposes to the SEM research programme. In some instances teach in adept but develop a major/or all of their research in a specialised research unit (sic).</p> <p>LH Comment: The meaning of the above statement is unclear. Will the respondent please explain in different words?</p> <p>TYPE COMMENTS HERE</p>

Thank you for taking the time to complete the questionnaire. The outcome of the round will again be sent to you.

Your valuable input in this research is much appreciated.

Sincerely

Louis Holtzhausen

LH 201203011

APPENDIX F1

CONSOLIDATED FINDINGS FROM THE DELPHI SURVEY

CONSOLIDATED FINDINGS FROM THE DELPHI SURVEY

This document shows the results of the Delphi process, indicating on which statements consensus or stability were reached, and which statements did not reach either.

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SECTION A: STRATEGIC FOUNDATIONS OF A RESEARCH FRAMEWORK IN SPORT AND EXERCISE MEDICINE

This section deals with the foundational reference points of a generic research programme, but is also applicable to a research programme in Sport and Exercise Medicine (SEM). Selections were between the following options:

SL1*= Fully agree
[Must be considered in the designing of a research framework]

SL2*= Partially agree
[Can be considered in the designing of a research framework]

SL3*= Disagree
[Irrelevant for consideration in the designing of a research framework]

(*SL = selection)

Consensus was reached when 80% of the Delphi expert panel agreed on either of the statements. Stability was reached when, after three rounds, less than 20% of the panel changed their options and consensus was not reached.

	STATEMENTS	SELECTION	OUTCOME
A1	OVERALL STRATEGY IN RESEARCH PLANNING AND MANAGEMENT		
	In designing and managing a research programme, the following statements are relevant:		
a.	Research should be guided by:		
	• a research strategy	Agree	Consensus SL1 90:10:0
	• an implementation plan	Agree	Consensus SL1 80:20:0
b.	The success of a research programme can be enhanced by		
	• pre-determination of the direction of research in the programme		Stability 50:40:10
	• strong leadership		Stability 60:30:10
	• strong mentorship		Stability 60:40:0
	• An enabling environment such as a university with a strong research culture	Agree	Consensus SL1 80:20:0
	• An established research culture	Partially Agree	Consensus SL2 10:90:0
	• Development of the next generation of researchers	Agree	Consensus SL1 80:20:0

c.	The policy of a research programme should:		
	• stimulate creativity	Agree	Consensus SL1 90:10:0
	• stimulate new thinking	Agree	Consensus SL1 100:0:0
	• support transfer of knowledge to benefit the university		Stability 30:40:30
	• support transfer of knowledge to benefit the community		Stability 50:50:0
d.	• The role of research in SEM at a university department is dependent on the balance between teaching and research of the university		Stability 40:40:20
e.	A SEM research programme at a university should be supported by:		
	• University management		Stability 60:40:0
	• Faculty management	Agree	Consensus SL1 80:20:0
	• Academics in relevant disciplines at the university	Agree	Consensus SL1 80:20:0
A2	PRIORITISATION OF RESEARCH IN FOCUS AREAS		
	The following statements relate to the development of focus areas in a research programme. Statements where No consensus were reached in round 1 and 2, were only distributed for comments in round 3, as the expert panel found it difficult to make a selection, either because of lack of knowledge or insight of local (UFS) or South African circumstances, or because the development of research focus areas depend on many variables and is highly situation bound.		
a.	In determining research focus areas the following statements are true:		
	• A university-based research programme should not be restricted by pre-determined research focus areas of the <i>university</i>		Early stability 50:40:10
	• The selection of predetermined research focus areas will enhance interdisciplinary research		Early stability 50:40:10
	• A research programme should concentrate on pre-determined focus areas in the research environment (SEM)		Early stability 60:30:10
b.	The following are important determinants in the selection of research <i>focus areas</i> :		
	• Market demands		Early stability 10:50:40
	• Interests of individual researchers		Early stability 40:50:10
	• Expertise of individual researchers	Agree	Consensus SL1 80:20:0
	• Gaps in current research	Agree	Consensus SL1 80:20:0
	• Availability of equipment	Partially Agree	Consensus SL2 10:80:10
	• Availability of time		Early stability 60:40:0
	• Availability of financial resources		Early stability 60:40:0
	• Availability of study populations		Early stability 60:40:0
	• Availability of support staff		Early stability 30:50:20
	• Community needs (including local, regional and national)		Early stability 30:50:20
	• International trends in an academic discipline (such as SEM)		Early stability 56:22:22
c.	In addition to selection of research focus areas, the following are important determinants		

	in the selection of <i>individual research projects</i> within a research programme		
	• Adherence to pre-determined focus areas of the research programme		Early stability 50:50:0
	• Possible available financing for specific projects		Early stability 60:40:0
	• Individual research projects should not be selected according to focus areas within a research programme		Early stability 0:40:60
	• Market demands		Early stability 0:50:50
	• Interests of individual researchers		Early stability 60:40:0
	• Expertise of individual researchers	Agree	Consensus SL1 80:20:0
	• Gaps in current research		Early stability 60:40:0
	• Availability of equipment	Partially Agree	Consensus SL2 20:80:0
	• Availability of time		Early stability 60:40:0
	• Availability of financial resources		Early stability 60:40:0
	• Availability of study populations		Early stability 50:50:0
	• Availability of support staff		Early stability 50:50:0
	• Community needs [including local, regional and national]		Early stability 40:50:10
	• International trends in an academic discipline (such as SEM)		Early stability 40:50:10
A3	MONITORING OF THE SUCCESS OF A RESEARCH PROGRAMME		
	The following statements relate to monitoring and evaluation of the success of a research programme		
a.	A research programme should regularly be		
	• <i>Monitored</i> according to <i>quantitative</i> key performance indicators [specific, measurable outcomes of success]	Agree	Consensus SL1 90:10:0
	• <i>Monitored</i> according to <i>qualitative</i> key performance indicators [subjective outcomes of success]		Stability 78:11:11
	• <i>Evaluated</i> according to <i>quantitative</i> key performance indicators [specific, measurable outcomes of success]	Agree	Consensus SL1 80:10:10
	• <i>Evaluated</i> according to <i>qualitative</i> key performance indicators [subjective outcomes of success]	Agree	Consensus SL1 89:11:0
A4	ADDITIONAL RELEVANT INPUT FROM EXPERT PANELLISTS REGARDING STRATEGY IN RESEARCH PLANNING AND MANAGEMENT		
a.	In your opinion, are there additional relevant statements to be considered in determining a research strategy?		
b.	Do you have any further comments regarding the strategic planning of a research framework?		
SECTION B: THE ROLE, PLACE AND CHARACTER OF RESEARCH IN SPORT AND EXERCISE MEDICINE [SEM] AT A UNIVERSITY			
	This section deals with the role, place and character of a research programme in sport and exercise medicine at a university.		
	Selections were between the following options:		

	<p>SL1= Fully agree [Must be considered in the designing of a research framework] SL2= Partially agree [Can be considered in the designing of a research framework] SL3= Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Consensus was reached when 80% of the Delphi expert panel agreed on either of the statements. Stability was reached when, after three rounds, less than 20% of the panel changed their options and consensus was not reached.</p>		
	STATEMENTS	SELECT	COMMENTS
B1	THE EDUCATIONAL AND ACADEMIC ROLE OF RESEARCH IN SPORT AND EXERCISE MEDICINE		
a.	Research in SEM plays an important <i>educational</i> role in:		
	<ul style="list-style-type: none"> Basic grounding for undergraduate teaching 		Stability 50:50:0
	<ul style="list-style-type: none"> Basic grounding for postgraduate teaching 	Agree	Consensus SL1 90:10:0
	<ul style="list-style-type: none"> Defining SEM as academic discipline at the university in which it is housed 	Agree	Consensus SL1 90:10:0
	<ul style="list-style-type: none"> A postgraduate Sport and Exercise Medicine programme 	Agree	Consensus SL1 100:0:0
b.	Research in SEM plays an important role in the <i>development of SEM</i> as an academic discipline regarding:		
	<ul style="list-style-type: none"> The development of the discipline of Sport and Exercise medicine 	Agree	Consensus SL1 90:10:0
	<ul style="list-style-type: none"> Establishing best practice in clinical Sport and Exercise Medicine 	Agree	Consensus SL1 80:20:0
	<ul style="list-style-type: none"> The development of sport 		Stability 40:60:0

c.	Regarding the role of SEM research in society:		
	• Sport and Exercise Medicine research can lead the way in mainstream medicine research		Stability 30:60:10
	• Research on elite athletes can often be applied to broader communities		Stability 30:60:10
	• The development of new knowledge in Sport and Exercise Medicine can make a meaningful contribution to public health care	Agree	Consensus 90:10:0
	• SEM research plays an important role in addressing the scientific needs of the athletic population	Agree	Consensus 80:20:0
d.	Sport plays an important role in:		
	• Society	Agree	Consensus 80:20:0
	• Community wellness	Agree	Consensus 100:0:0
	• Politics		Stability 45:33:22
B2	THE ACADEMIC PLACE (POSITIONING) OF A RESEARCH PROGRAMME IN SPORT AND EXERCISE MEDICINE AT A UNIVERSITY		
a.	Regarding the place of a SEM research programme in a university:		
	• A SEM research programme is best positioned in a Faculty of Health Sciences	Agree	Consensus SL1 80:20:0
	• Research should be an essential part of a structured Masters programme in SEM	Agree	Consensus SL1 100:0:0
	• A SEM department should engage in collaborative research partnerships with other disciplines within the institution	Agree	Consensus SL1 80:20:0
b.	The following groupings are relevant partners in a SEM research programme:		
	• Other academic health care institutions	Agree	Consensus SL1 90:10:0
	• Primary health care institutions	Agree	Consensus SL1 80:20:0
	• Sport federations		Stability 40:60:0
c.	The following fields of study are relevant in an interdisciplinary SEM research programme:		
	• Health promotion	Agree	Consensus SL1 100:0:0
	• Public wellness	Agree	Consensus SL1 90:10:0
	• Prevention of chronic disease	Agree	Consensus SL1 100:0:0
	• Prevention of exercise related illness	Agree	Consensus SL1 100:0:0
	• Management of exercise related illness	Agree	Consensus SL1 90:0:0
	• Prevention of exercise related injuries	Agree	Consensus SL1 90:10:0
	• Management of exercise related injuries	Agree	Consensus SL1 90:10:0
d.	SEM is a particularly suitable discipline for:		
	• applied research	Agree	Consensus SL1 90:10:0
	• pure scientific research		Stability 20:80:20

B3	THE POSITIONING OF A MULTI-DISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME WITHIN EXISTING RESEARCH FOCUS AREAS AT THE UNIVERSITY OF THE FREE STATE		
	<p>This section deals with the existing strategic interdisciplinary research clusters [focus areas] at the University of the Free State. These clusters have been selected predominantly on the basis of regional need and existing expertise and research. The clusters are intended to enhance the strategic research focus of the university, as well as interdisciplinary/collaborative research. They get preferential university funding and support before research that are not included in a cluster. It is therefore beneficial for any research programme to find common ground within one of the clusters.</p> <p>Selections were between the following options:</p> <p>SL1= Fully agree [Must be considered in the designing of a research framework]</p> <p>SL2= Partially agree [Can be considered in the designing of a research framework]</p> <p>SL3= Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Consensus was reached when 80% of the Delphi expert panel agreed on either of the statements. Stability was reached when, after three rounds, less than 20% of the panel changed their options and consensus was not reached.</p>		
a.	<p><i>Cluster 1:</i> Enabling technologies/technologies for the future [Suggested constituent focus areas: High throughput biology, nanotechnology [solid state lighting], chemical and allied technologies</p>		<p>Early stability 10:60:30</p>
b.	<p><i>Cluster 2:</i> Food production, quality and safety for Africa [Suggested constituent focus areas: Animal production and protection, plant production and protection, human nutrition, food quality and safety]</p>		<p>No consensus</p>

c.	<i>Cluster 3:</i> Regional community development and alleviation of poverty [Suggested constituent focus areas: Urban development, rural development: sustainable livelihoods in the QwaQwa region [a rural region where a satellite campus of the University of the Free State is situated], resource management and development [tourism, small business development, local government], healthy communities [communicable diseases, chronic diseases of lifestyle, children with disabilities]	Partially Agree	Consensus SL2 10:80:10
d.	<i>Cluster 4:</i> Social transformation [citizenship and identity, diverse histories, globalisation and governance, human rights and social equity]		Early stability 0:60:40
e.	<i>Cluster 5:</i> Water resources and ecosystem management [freshwater ecology, environmental change, water resource management, sustainable utilisation of terrestrial ecosystems]	Disagree	Consensus SL3 0:10:90
f.	<i>Cluster 6:</i> Towards a competitive chemical industry [new drug manufacturing, petrochemicals, natural product development, polymers]		Early stability 0:50:50
g.	Interdisciplinary SEM research at the UFS will not develop optimally if accommodated in one or more of the above existing strategic clusters		Early stability 40:50:10
B4	THE MULTI-DISCIPLINARY CHARACTER OF SPORT AND EXERCISE MEDICINE		
a.	The following statements are true regarding SEM:		
	• SEM is a multi-disciplinary field of study	Agree	Consensus SL1 100:0:0
	• A SEM research programme should have a multi-disciplinary character	Agree	Consensus SL1 90:10:0
	• An interdisciplinary SEM research programme should be managed independent of academic departments		Stability 22:11:67

B5	ADDITIONAL RELEVANT INPUT FROM EXPERT PANELLISTS REGARDING THE ROLE, POSITIONING AND CHARACTER OF A SEM RESEARCH PROGRAMME		
a.	In your opinion, are there additional relevant statements regarding the role, place and character of research in SEM to be considered in determining a strategic research framework?		
b.	Do you have any further comments regarding the role, place and character of SEM research in the planning of a strategic research framework:		
SECTION C: INPUTS THAT ARE REQUIRED BY A RESEARCH PROGRAMME IN SPORT AND EXERCISE MEDICINE			
<p>This section deals with different inputs required for the successful operation of a multi-disciplinary research programme, and the activities within such a programme.</p> <p>Selections were between the following options:</p> <p>SL1 =Fully agree [Must be considered in the designing of a research framework]</p> <p>SL2 =Partially agree [Can be considered in the designing of a research framework]</p> <p>SL3 =Disagree [Irrelevant for consideration in the designing of a research framework]</p> <p>Consensus was reached when 80% of the Delphi expert panel agreed on either of the statements. Stability was reached when, after three rounds, less than 20% of the panel changed their options and consensus was not reached.</p>			
	STATEMENTS	SELECT	COMMENTS
C1	RESOURCES		
C1.1	HUMAN RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:		
a.	The following staff components are important for the successful operation of a SEM research programme:		
	• Competent academic staff	Agree	Consensus SL1 100:0:0
	• Competent departmental support staff	Agree	Consensus SL1 90:10:0
	• Faculty research support staff	Agree	Consensus SL1 80:20:0
	• University research support staff	Agree	Consensus SL1 100:0:0
	• Post-magister degree fellows	Agree	Consensus SL1 80:20:0
	• Post-doctoral fellows	Agree	Consensus SL1 90:10:0
b.	The following statements are true regarding the academic staff in a SEM research programme:		
	• All academic staff in SEM must obtain PhD degrees		Stability 30:40:30
	• All academic SEM staff must supervise PhD students research		Stability 40:40:20

	<ul style="list-style-type: none"> All academic SEM staff must supervise Masters students research 	Agree	Consensus SL1 80:20:0
	<ul style="list-style-type: none"> Researchers in a research programme should be assimilated by retaining the best postgraduate students 		Stability 30:70:0
	<ul style="list-style-type: none"> Continuous staff development is relevant to the success of a SEM research programme 	Agree	Consensus SL1 100:0:0
	<ul style="list-style-type: none"> The staff profile of a successful SEM research programme should reflect a balance between experienced and young researchers 	Agree	Consensus SL1 90:10:0
	<ul style="list-style-type: none"> At least 25% of time of academic staff in a SEM department must be devoted to research supervision 		Stability 50:30:20
	<ul style="list-style-type: none"> There must be minimum requirements for national publications for all staff members in a department of SEM 	Agree	Consensus SL1 90:10:0
	<ul style="list-style-type: none"> There must be minimum requirements for international publications for all staff members in a department of SEM 	Agree	Consensus SL1 80:20:0
c.	Critical characteristics required to be a <i>successful researcher</i> in SEM include:		
	<ul style="list-style-type: none"> Disciplinary knowledge 	Agree	Consensus SL1 100:0:0
	<ul style="list-style-type: none"> Disciplinary insight 	Agree	Consensus SL1 100:0:0
	<ul style="list-style-type: none"> Writing skills 	Agree	Consensus SL1 80:20:0
	<ul style="list-style-type: none"> Experience on ground level 		Stability 50:50:0
	<ul style="list-style-type: none"> Knowledge of the industry 		Stability 60:20:20
	<ul style="list-style-type: none"> Previous exposure to the discipline 		Stability 70:30:0
	<ul style="list-style-type: none"> Knowledge of research methodology 	Agree	Consensus SL1 90:10:0
	<ul style="list-style-type: none"> Knowledge of funding opportunities 		Stability 40:60:0
	<ul style="list-style-type: none"> Expertise in certain focus areas 	Agree	Consensus SL1 80:20:0
	<ul style="list-style-type: none"> Knowledge of research supervision 	Agree	Consensus SL1 80:20:0
	<ul style="list-style-type: none"> Knowledge of research ethics 	Agree	Consensus SL1 100:0:0
	<ul style="list-style-type: none"> The ability to apply general research principles into SEM research 	Agree	Consensus SL1 100:0:0
	<ul style="list-style-type: none"> Have status [respect] among peers in the discipline 		Stability 56:44:0

	• Experience in publication of research	Agree	Consensus SL1 80:10:10
d.	The following <i>leadership characteristics</i> are required by leaders in research programmes:		
	• Motivational leadership	Agree	Consensus SL1 100:0:0
	• Passion for the discipline	Agree	Consensus SL1 90:10:0
	• Stature in the discipline	Agree	Consensus SL1 90:10:0
	• Ability to see the bigger picture [vision]	Agree	Consensus SL1 100:0:0
	• Inspirational leadership	Agree	Consensus SL1 90:0:10
	• Skills to work with different levels of knowledge and experience	Agree	Consensus SL1 90:0:0
	• Not too critical		Stability 20:30:50
	• Delegating skills	Agree	Consensus SL1 80:20:0
	• Leadership in daily life		Stability 40:60:0
	• Listening skills	Agree	Consensus SL1 90:0:0
	• Co-ordinating [organisational] skills	Agree	Consensus SL1 80:10:0
	• Autocratic leadership skills	Disagree	Consensus SL3 0:20:80
	• Interpersonal skills	Agree	Consensus SL1 100:0:0
	• Communication skills	Agree	Consensus SL1 100:0:0
	• Ability to take responsibility in success	Agree	Consensus SL1 90:10:0
	• Ability to take responsibility in failure	Agree	Consensus SL1 100:0:0
	• Integrity	Agree	Consensus SL1 100:0:0
	• Sensitivity	Agree	Consensus SL1 80:10:10
	• Bravery		Stability 20:70:10
	• Trust	Agree	Consensus SL1 90:10:0
	• Honesty	Agree	Consensus SL1 100:0:0
	• Wisdom [good judgement]	Agree	Consensus SL1 100:0:0
e.	The following <i>management skills</i> are required by research programme managers:		
	• Financial management skills	Agree	Consensus SL1 80:20:0
	• Project management skills	Agree	Consensus SL1 100:0:0
	• People management skills	Agree	Consensus SL1 100:0:0
	• Process management skills	Agree	Consensus SL1 100:0:0
	• Goal setting skills	Agree	Consensus SL1 90:10:0
	• Planning skills	Agree	Consensus SL1 100:0:0
	• Conflict management skills	Agree	Consensus SL1 80:20:0
	• Administrative skills	Agree	Consensus SL1 80:20:0
	• Stress management skills		Stability 50:30:20
	• Interpersonal relationship skills	Agree	Consensus SL1 80:20:0
	• Fundraising skills		Stability 70:30:0
	• Skill to implement a plan	Agree	Consensus SL1 90:10:0
	• Technical skills		Stability 40:60:0
f.	Additional information on human resources in a Sport and Exercise Medicine research programme that panellists wish to include:		
	• In your opinion, are there additional relevant statements regarding the human resources relevant to a successful research programme in SEM to be considered in		

	determining a strategic research framework?		
	<ul style="list-style-type: none"> Do you have any further comments regarding the human resources in the planning of a strategic research framework? 		
C1.2	FINANCIAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:		
a.	A SEM research programme should be funded by:		
	<ul style="list-style-type: none"> Commercialisation of research 		Stability 10:50:40
	<ul style="list-style-type: none"> Commercialisation of clinical services 		Stability 20:50:30
	<ul style="list-style-type: none"> The university in which it is housed 		Stability 70:30:0
	<ul style="list-style-type: none"> Government subsidy 		Stability 40:60:0
	<ul style="list-style-type: none"> Research funding agencies, such as the National Research Foundation or Medical Research Council of South Africa 		Stability 70:30:0
	<ul style="list-style-type: none"> Partnerships between the research programme and private corporations 		Stability 50:50:0
b.	A newly established research programme should receive initial start-up funding (seed capital) from the university in which it is housed	Agree	Consensus SL1 90:10:0
c.	There is a risk of losing academic autonomy of a research programme due to interference from funders		Stability 20:50:30
d.	Additional information on human resources in a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> In your opinion, are there additional relevant statements regarding the financial resources relevant to a successful research programme in SEM to be considered in determining a strategic research framework? 		
	<ul style="list-style-type: none"> Do you have any further comments regarding the financial resources in the planning of a strategic research framework? 		
C1.3	INTERNAL INSTITUTIONAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:		
	This section deals with the <i>internal (institutional) resources of the university</i> relevant to the successful operation of a SEM research programme. The following statements are true in this regard:		
a.	The following institutional resources at a university are relevant role players in a SEM research programme:		
	<ul style="list-style-type: none"> The institutional research directorate 	Agree	Consensus SL1 100:0:0
	<ul style="list-style-type: none"> The post-graduate school 	Agree	Consensus SL1 80:20:0
	<ul style="list-style-type: none"> The finance department 		Early stability 70:30:0
	<ul style="list-style-type: none"> The human resources department 		Early stability 70:30:0
	<ul style="list-style-type: none"> The Faculty of Health Sciences executive 	Agree	Consensus SL1 90:10:0
	<ul style="list-style-type: none"> The university sport department 		Early stability 50:50:0
	<ul style="list-style-type: none"> The university health and wellness centre 		Early stability 70:30:0
	<ul style="list-style-type: none"> The department of biostatistics 		Early stability 60:40:0
	<ul style="list-style-type: none"> The institutional marketing/fundraising department 		Early stability 70:30:0

	• Academic writers		Early stability 30:40:30
	• Research grant application experts	Agree	Consensus SL1 80:20:0
	• The university Alumni association		No consensus
b.	Additional information on internal university (institutional) resources in a Sport and Exercise Medicine research programme that panellists wish to include:		
	• In your opinion, are there additional relevant statements regarding the institutional resources relevant to a successful research programme in SEM to be considered in determining a strategic research framework?		
	• Do you have any further comments regarding the financial resources in the planning of a strategic research framework?		
C1.4	EXTERNAL ORGANISATIONAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:		
	This section deals with the <i>external resources</i> relevant to the successful operation of a multi-disciplinary SEM research programme.		
a.	The following organisations outside of the university are relevant role players in the successful operation of a SEM research programme:		
	• Research funding agencies [National Research Foundation of South Africa; Medical Research Council of South Africa]	Agree	Consensus SL1 90:10:0
	• Research foundations	Agree	Consensus SL1 90:10:0
	• Professional associations, e.g. the South African Sports Medicine Association [SASMA]; the International Sports Medicine Federation [FIMS]; the International Olympic Committee [IOC] medical committee		Early stability 30:70:0
	• The private healthcare industry		Early stability 30:40:20
	• The pharmaceutical industry		No consensus
	• The nutritional supplement industry		Early stability 20:30:40
	• Anti doping agencies [e.g. the South African Institute for Drugs in Sport [SAIDS], the World Anti-doping agency [WADA]		Early stability 10:70:10
	• The fitness industry		Early stability 20:60:10
	• National sport federations		Early stability 30:60:0
	• The South African Sports Confederation and Olympic Committee [SASCOC]		Early stability 30:40:20
	• Underemphasised sport codes in South Africa [e.g. gymnastics, karate, boxing]		Early stability 10:70:10
	• Government departments [Department of Health, Department of Sport and Recreation, Department of Education, Department of Science and Technology]		Early stability 50:40:0
	• Government departments of other countries in Africa or internationally	Partially Agree	Consensus SL2 10:80:10
	• The College of Sport and Exercise		Early stability 50:40:0

	Medicine of Medicine of South Africa [CSEM(SA)]		
	• The College of Medicine of South Africa [CMSA]		Early stability 50:30:10
	• The community in which the research programme is located		Early stability 40:50:0
b.	Additional information on external resources in a Sport and Exercise Medicine research programme that panellists wish to include:		
	• In your opinion, are there other organisations that may be relevant to a SEM research programme?		
	• Do you have any further comments regarding external resources in the planning of a strategic research framework in SEM?		
C1.5	ACADEMIC ROLEPLAYERS AND STAKEHOLDERS IN A MULTI-DISCIPLINARY SPORT AND EXERCISE MEDICINE RESEARCH PROGRAMME		
	This section attempts to identify the most relevant potential academic role players in a multi-disciplinary SEM research programme:		
a.	The following academic disciplines are relevant role players in a multi-disciplinary SEM research programme		
	• Sport and Exercise science/Biokinetics	Agree	Consensus SL1 100:0:0
	• Human nutrition and dietetics	Agree	Consensus SL1 80:20:0
	• Physiology	Agree	Consensus SL1 80:20:0
	• Anatomy and cell biology		Early stability 70:30:0
	• Family medicine		Early stability 60:40:0
	• Orthopaedics	Agree	Consensus SL1 90:10:0
	• Pharmacology		Early stability 30:40:30
	• Occupational therapy		Early stability 20:50:30
	• Psychology		Early stability 50:50:0
	• Sport and Exercise Medicine	Agree	Consensus SL1 100:0:0
	• Internal medicine		Early stability 60:40:0
	• Diagnostic radiology		Early stability 60:30:10
	• Biochemistry		No consensus
	• Haematology		Early stability 50:30:20
	• Nursing		Early stability 10:50:40
	• Ophthalmology		Early stability 0:70:30
	• Paediatrics		Early stability 50:50:0
	• Community health		Early stability 40:60:0
	• Occupational health		Early stability 30:70:0
	• Work wellness/employee assistance		Early stability 30:50:20
	• Pathology/biochemistry/haematology laboratory services		Early stability 70:30:0
	• Physiotherapy		Early stability 70:30:0
b.	Additional information regarding academic disciplines that may be relevant to a SEM research programme.		
	• In your opinion, are there other academic disciplines that may be relevant role players in a multi-disciplinary SEM research programme?		
	• Do you have any further comments regarding identification of academic role players in the planning of a strategic research framework in SEM?		
C2	PROCESSES RELEVANT TO THE SUCCESSFUL OPERATION OF A MULTI-DISCIPLINARY SEM RESEARCH PROGRAMME		

C2.1	STRATEGIC PROCESSES		
a.	The following are relevant components of a <i>strategic plan</i> for a multi-disciplinary SEM research programme:		
	• A vision statement	Agree	Consensus SL1 90:10:0
	• A mission statement	Agree	Consensus SL1 100:0:0
	• Clear objectives	Agree	Consensus SL1 100:0:0
	• Criteria for identification of team members	Agree	Consensus SL1 80:20:0
	• An implementation plan	Agree	Consensus SL1 90:10:0
	• A quality assurance plan	Agree	Consensus SL1 90:10:0
	• A risk management plan		Stability60:40:0
	• A performance measurement plan	Agree	Consensus SL1 80:10:10
	• An intellectual property plan	Agree	Consensus SL1 90:0:10
	• Consensus among role players on the strategy and goals of the research programme	Agree	Consensus SL1 80:20:0
	• A policy document to guide the research programme	Agree	Consensus SL1 100:0:0
	• A financial sustainability plan	Agree	Consensus SL1 80:20:0
	• Ethical guidelines	Agree	Consensus SL1 100:0:0
b.	The following are relevant reference points for strategic <i>goal setting</i> for a multi-disciplinary SEM research programme:		
	• Establishment of research teams	Agree	Consensus SL1 80:20:0
	• Utilisation of new technologies	Agree	Consensus SL1 80:20:0
	• Establishment of strategic research focus areas	Agree	Consensus SL1 100:0:0
c.	The following are key strategic <i>activities</i> to ensure success of a multi-disciplinary SEM research programme:		
	• Increase the number of PhDs of staff in the programme		Stability 70:30:0
	• Nurture a new generation of researchers	Agree	Consensus SL1 80:20:0
	• Attract post-doctoral fellows	Agree	Consensus SL1 100:0:0

	• Encourage publication of research	Agree	Consensus SL1 100:0:0
	• Host international leaders in SEM in the programme	Agree	Consensus SL1 80:20:0
	• Encourage dissemination of research through public forums	Agree	Consensus SL1 80:10:10
	• Support conference attendance	Agree	Consensus SL1 80:20:0
	• Monitoring of activities of other research units		Stability 70:30:0
	• Research focus areas	Agree	Consensus SL1 100:0:0
	• Management models		Stability 44:44:12
	• Funding models	Agree	Consensus SL1 80:20:0
	• Research outputs	Agree	Consensus SL1 80:20:0
d.	A national SEM research co-ordinating body will make a positive contribution to SEM research in South Africa		No consensus
e.	Additional information on strategic processes in a Sport and Exercise Medicine research programme that panellists wish to include:		
	• In your opinion, are there other strategic concepts that may be relevant to a SEM research programme?		
	• Do you have any further comments regarding strategic processes in the planning of a strategic research framework in SEM?		
C2.2 MANAGERIAL PROCESSES			
a.	Regarding <i>human resource [people] management</i> , the following aspects are relevant in a multi-disciplinary SEM research programme:		
	• The establishment of a multi-disciplinary scientific committee		Stability 60:30:10
	• Building trust among all role players	Agree	Consensus SL1 100:0:0
	• Nurture teamwork	Agree	Consensus SL1 90:10:0
	• Nurture a shared vision among team members	Agree	Consensus SL1 90:10:0
	• Focus on professional development [career planning] of all members of the team	Agree	Consensus SL1 80:20:0
	• Nurture creativity of team members	Agree	Consensus SL1 100:0:0
	• Align professional fulfilment with personal fulfilment of team members	Agree	Consensus SL1 80:20:0
b.	Regarding <i>academic management</i> of research the following aspects are important managerial functions:		
	• Incentives to researchers for publication	Agree	Consensus SL1 80:20:0
	• Pre-arrangement of distribution of credits for interdisciplinary research	Agree	Consensus SL1 80:0:10
	• Focus on results [research outputs]	Agree	Consensus SL1 80:10:10

c.	Regarding <i>financial management</i> of research, the following aspects are important managerial functions:		
	• Following a set budgeting procedure for research projects		Stability 60:40:0
	• Fundraising must be a specialised function within the research programme		Stability 50:40:10
	• Strict financial management principles must apply to all research projects	Agree	Consensus SL1 90:10:0
d.	It is important for a research programme to work according to strict <i>time schedules</i>	Partially Agree	Consensus SL2 20:80:0
e.	Additional information on managerial processes in a Sport and Exercise Medicine research programme that panellists wish to include:		
	• In your opinion, are there management considerations that may be relevant to a SEM research programme?		
	• Do you have any further comments regarding managerial processes in the planning of a strategic research framework in SEM?		
C2.3	OPERATIONAL PROCESSES		
a.	<i>Operational processes</i> of a multi-disciplinary SEM research programme should include the following		
	• Clear operational procedures	Agree	Consensus SL1 80:10:10
	• Clear programme regulations	Agree	Consensus SL1 80:10:10
	• Formal agreements on procedures with researchers		Stability 70:30:0
	• Formal agreements on expected outcomes with researchers		Stability 70:30:0
	• Guidelines for writing protocols	Agree	Consensus SL1 80:20:0
	• Guidelines for publication		Stability 70:30:0
	• Good clinical practice guidelines in research	Agree	Consensus SL1 80:20:0
	• Creation of patient databases		Stability 50:50:0
	• Regular research planning meetings	Agree	Consensus SL1 90:10:0
	• Regular research feedback meetings	Agree	Consensus SL1 80:20:0
b.	Additional information on operational processes in a Sport and Exercise Medicine research programme that panellists wish to include:		
	• In your opinion, are there other operational processes that may be relevant to a SEM research programme?		
	• Do you have any further comments regarding operational processes in the planning of a strategic research framework in SEM?		
SECTION D: CHALLENGES IN MULTI-DISCIPLINARY RESEARCH IN SPORT AND EXERCISE MEDICINE			
D1	ACADEMIC CHALLENGES IN MULTI-DISCIPLINARY SEM RESEARCH		
a.	The following are relevant <i>academic</i> challenges in the establishment and management of a multi-disciplinary SEM research programme:		
	• To establish SEM as a multi-disciplinary research discipline in medicine	Agree	Consensus SL1 90:10:0
	• To obtain support from university management for interdisciplinary	Agree	Consensus SL1 90:10:0

	SEM research		
	<ul style="list-style-type: none"> To motivate people from different academic backgrounds to listen [want to understand] each other 's points of view 		Early stability 60:30:10
	<ul style="list-style-type: none"> Fair distribution of research credits 	Agree	Consensus SL1 80:20:0
	<ul style="list-style-type: none"> Lack of trust among multi-disciplinary role players 		No consensus
	<ul style="list-style-type: none"> To become nationally recognised by peers 		Early stability 60:40:0
	<ul style="list-style-type: none"> To become internationally recognised by peers 	Agree	Consensus SL1 100:0:0
	<ul style="list-style-type: none"> To compete with institutions with ample human and financial resources [such as the IOC] 		Early stability 50:30:20
	<ul style="list-style-type: none"> To form professional networks 		Early stability 60:40:0
	<ul style="list-style-type: none"> To become part of existing professional networks 		Early stability 70:30:0
	<ul style="list-style-type: none"> Potential interdisciplinary stakeholders may fail to recognise the merit/importance of the "bigger picture" or vision 		Early stability 30:60:10
	<ul style="list-style-type: none"> It may be difficult for interdisciplinary research stakeholders to distinguish between research output [current drive] and impact [vision] 		Early stability 40:50:10
	<ul style="list-style-type: none"> Lack of creativity of primary researchers may have a negative impact on interdisciplinary research 		Early stability 70:20:10
	<ul style="list-style-type: none"> SEM is a small, young discipline that finds it difficult to make an impact in a broader interdisciplinary medical context 		Early stability 40:30:30
	<ul style="list-style-type: none"> Optimal placement of research focus areas in an interdisciplinary grouping is an important consideration in interdisciplinary research 	Agree	Consensus SL1 90:10:0
	<ul style="list-style-type: none"> Different disciplines have different points of view/paradigms that are challenging to blend and to find a common "language" 		No consensus
	<ul style="list-style-type: none"> To identify specialists to collaborate with 		Early stability 50:40:10
	<ul style="list-style-type: none"> To find good research ideas 		Early stability 60:20:20
	<ul style="list-style-type: none"> To find good students 		Early stability 50:30:20
D2	MANAGEMENT CHALLENGES IN MULTI-DISCIPLINARY SEM RESEARCH		
a.	The following are <i>management</i> challenges in the successful operation of a multidisciplinary SEM research programme		
	<ul style="list-style-type: none"> The establishment of a management/leadership hierarchy in interdisciplinary research 		Early stability 40:50:10

	<ul style="list-style-type: none"> • Departmental interest above interdisciplinary research interest 		Early stability 70:30:0
	<ul style="list-style-type: none"> • Personal research interest above interdisciplinary research interest 		Early stability 40:50:10
	<ul style="list-style-type: none"> • Maintenance of effective interdisciplinary communication 		Early stability 70:30:0
	<ul style="list-style-type: none"> • Maintenance of effective interdisciplinary co-ordination 	Agree	Consensus SL1 80:20:0
	<ul style="list-style-type: none"> • Interdisciplinary funding of resources 	Agree	Consensus SL1 80:20:0
	<ul style="list-style-type: none"> • To obtain initial funding for a new research programme 	Agree	Consensus SL1 80:20:0
	<ul style="list-style-type: none"> • Time allocation/prioritising for interdisciplinary work versus own departmental work 		Early stability 50:50:0
	<ul style="list-style-type: none"> • Quality control and minimum standard setting in an interdisciplinary research environment 		Early stability 40:40:20
	<ul style="list-style-type: none"> • To attract full time researchers 		Early stability 50:30:20
D3	ADDITIONAL INFORMATION REGARDING CHALLENGES IN MULTI-DISCIPLINARY SEM RESEARCH		
a.	Additional information on external resources in a Sport and Exercise Medicine research programme that panellists wish to include:		
	<ul style="list-style-type: none"> • In your opinion, are there other challenges that may be relevant to a SEM research programme? 		
	<ul style="list-style-type: none"> • Do you have any further comments regarding challenges in the planning of a strategic research framework in SEM? 		
SECTION E: OUTPUTS [PRODUCTS] OF A MULTI-DISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME			
	This section deals with types, levels and targets of outputs of a multi-disciplinary SEM research programme.		
E1	TYPES OF OUTPUTS FROM A MULTI-DISCIPLINARY RESEARCH PROGRAMME		
a.	The following are essential academic products of a multi-disciplinary SEM research programme:		
	<ul style="list-style-type: none"> • Non-scientific informational publications 		Stability 30:50:20
	<ul style="list-style-type: none"> • Non-peer reviewed scientific publications 		No consensus

	• National peer-reviewed scientific publications	Agree	Consensus SL1 90:0:10
	• International peer-reviewed scientific publications	Agree	Consensus SL1 100:0:0
	• Citation of publications	Agree	Consensus SL1 100:0:0
	• Citation with high impact factor of publications	Agree	Consensus SL1 100:0:0
	• Masters degrees	Agree	Consensus SL1 90:0:10
	• PhD degrees	Agree	Consensus SL1 80:10:10
	• Registered patents		Stability 40:20:40
	• National conference presentations	Agree	Consensus SL1 90:10:0
	• International conference presentations	Agree	Consensus SL1 90:10:0
	• Chapters in books		Stability 70:30:0
	• Scholarly books		Stability 60:40:0
	• Textbooks and published guidelines		Stability 60:40:0
	• Short learning courses		Stability 40:50:10
	• Increased academic stature among peers	Agree	Consensus SL1 80:20:0
	• Invitations for collaboration from research units of high standing	Agree	Consensus SL1 90:10:0
	• A network of research partners [collaborators]	Agree	Consensus SL1 90:10:0
b.	The following are desired human outcomes of a multi-disciplinary SEM research programme:		
	• Promotion of staff within the university	Agree	Consensus SL1 100:0:0
	• Appointment of staff members on university research structures	Agree	Consensus SL1 90:10:0
	• Appointment of staff members on national research structures	Agree	Consensus SL1 90:10:0
	• Appointment of staff members on national governmental scientific bodies		Stability 70:30:0
	• Appointment of staff members on international research structures	Agree	Consensus SL1 90:0:10
	• Appointment of staff members on international scientific forums	Agree	Consensus SL1 90:10:0
	• Increased levels of academic expertise within the programme	Agree	Consensus SL1 100:0:0
c.	The following objectives deal with desired financial outcomes within a multi-disciplinary SEM research programme at a university. Select your level of agreement with each objective:		
	• Financial self-sustainability	Agree	Consensus SL1 80:20:0
	• Profitability		No consensus
	• Commercialisation of research by contract research		Stability 20:60:20
	• Commercialisation of research by selling new knowledge		No consensus
	• Commercialisation of research by registering patents		Stability 30:50:20
	• Growth of the programme by	Agree	Consensus SL1 90:0:0

	obtaining increasing amounts of research funding		
E2	LEVELS OF FOCUS OF A MULTI-DISCIPLINARY SEM RESEARCH PROGRAMME		
a.	The following are important levels at which research outputs should be focused:		
	• Community [regional]		Stability 70:30:0
	• National	Agree	Consensus SL1 80:20:0
	• International	Agree	Consensus SL1 80:20:0
	• Specific publications	Agree	Consensus SL1 80:10:10
	• Specific industries		Stability 43:14:43
b.	The following are important persons and bodies at which research outputs should be focused [who should be pleased with the outcome?]:		
	• University faculty	Agree	Consensus SL1 80:20:0
	• University management	Agree	Consensus SL1 80:20:0
	• National peers	Agree	Consensus SL1 90:10:0
	• International peers		Consensus SL1 90:10:0
	• Funding agencies [MRC, NRF]		Consensus SL1 90:10:0
	• Organised sport	Partially Agree	Consensus SL2 10:80:10
	• Government departments [sport, education, health etc]		Stability 40:50:10
	• The public		Stability 70:20:10
	• The healthcare industry		Stability 40:60:0
	• The fitness industry	Partially Agree	Consensus SL2 20:80:0
E3	ADDITIONAL INFORMATION REGARDING OUTPUTS OF A MULTI-DISCIPLINARY SEM RESEARCH PROGRAMME		
a.	Additional information on outputs of a Sport and Exercise Medicine research programme that panellists wish to include:		
	• In your opinion, are there other significant outputs that may be relevant to a SEM research programme?		
	• Do you have any further comments regarding outputs in the planning of a strategic research framework in SEM?		
SECTION F: OUTCOMES [IMPACT] OF A MULTI-DISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME			
	This section deals with longer term outcomes [impact] and significance of a multi-disciplinary SEM research programme.		
F1	TYPES OF OUTCOMES FROM A MULTI-DISCIPLINARY RESEARCH PROGRAMME		
a.	The following are significant <i>academic outcomes</i> of a multi-disciplinary SEM research programme:		
	• Increased quantity of academic manuscripts	Agree	Consensus SL1 80:20:0
	• Increased quality of academic manuscripts	Agree	Consensus SL1 100:0:0
	• Increased funding of the research programme	Agree	Consensus SL1 100:0:0
b.	The following are significant <i>internal effects</i> [changes] that may indicate outcomes of the research programme:		
	• Changes in number of researchers in the programme	Agree	Consensus SL1 80:20:0
	• Changes in behaviour of	Agree	Consensus SL1 90:10:0

	researchers		
	• Changes in stature of researchers	Agree	Consensus SL1 80:20:0
	• Changes in stature of the research programme	Agree	Consensus SL1 90:10:0
C.	The following are significant <i>external effects</i> [changes] that may indicate outcomes [significance] of the research programme:		
	• Changes in the university [e.g. attitude, placement of the programme]	Agree	Consensus SL1 80:20:0
	• Implementation of research findings in communities		Stability 50:50:0
	• Changes in the community		Stability 40:50:10
	• Changes in the profile of sport and exercise medicine	Agree	Consensus SL1 80:10:10
F2	MEASUREMENT OF OUTCOMES FROM A MULTI-DISCIPLINARY RESEARCH PROGRAMME		
a.	In order to measure progress [success], specific outcomes of a research programme should be:		
	• pre-planned [short, medium and long term goals]	Agree	Consensus SL1 80:20:0
	• quantified	Agree	Consensus SL1 80:20:0
	• monitored	Agree	Consensus SL1 80:20:0
b.	The outcomes of a research programme should be monitored, but not necessarily planned and quantified		Stability 22:22:56
F3	ADDITIONAL INFORMATION REGARDING OUTCOMES [IMPACT] OF A MULTI-DISCIPLINARY SEM RESEARCH PROGRAMME		
a.	Additional information on the outcomes [impact] of a Sport and Exercise Medicine research programme that panellists wish to include:		
	• In your opinion, are there other significant outcomes [impact] that may be relevant to a SEM research programme?		
	• Do you have any further comments regarding outcomes [impact] in the planning of a strategic research framework in SEM?		
SECTION G: EXPERT PANELLISTS FINAL COMMENTS			
G1	Are there other aspects that, according to your knowledge and experience, should be included in planning a strategic framework for SEM research?		

APPENDIX F2

CONSOLIDATED COMMENTS FROM DELPHI PANEL OF EXPERTS: ROUND 1-3

		<p>Infrastructure, grants.</p> <p>14 A must.</p> <p><i>10 But the leader should give the researchers to pursue their interests.</i></p>
	<ul style="list-style-type: none"> strong mentorship 	<p>14 This must be viewed in an operational sense and different from leadership.</p> <p>LH Comment: Or in the sense of broader coaching on approach, vision and sharing of one's experience.</p> <p><i>14 Need to understand the environment.</i></p>
	<ul style="list-style-type: none"> An enabling environment such as a university with a strong research culture 	<p>14 No question about this.</p> <p><i>08 More likely to have a supportive infrastructure but can be done in the community</i></p> <p>14 Unlikely to succeed outside such an environment - at least not with an academic focus</p> <p>Consensus Round 3 SL1</p>
	<ul style="list-style-type: none"> An established research culture 	<p>08 New research cultures often are innovative</p> <p>10 A "new" culture may be necessary</p> <p>14 the development of this seems to be the point of this exercise</p> <p>Consensus Round 1 SL1</p>
	<ul style="list-style-type: none"> Development of the next generation of researchers 	Consensus Round 1 SL1
c.	The policy of a research programme should:	
	<ul style="list-style-type: none"> stimulate creativity 	<p>14 need to allow time for this activity</p> <p>Consensus Round 1 SL1</p>
	<ul style="list-style-type: none"> stimulate new thinking 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> support transfer of knowledge to benefit the university 	<p>14 Sure, through general marketing. Research is about generating new knowledge.</p> <p><i>08 Although collaborative benefits are valued in the university, I don't think it should be policy driven.</i></p> <p>14 sure in a general sense -the public extends beyond University</p>
	<ul style="list-style-type: none"> support transfer of knowledge to benefit the community 	<p>14. Yes, a bit lower priority.</p> <p><i>08 If community means patient and outcome measures.</i></p> <p><i>10 Not all beneficial research outcomes will be transferable.</i></p> <p>14 support all these comments</p>
d.	<ul style="list-style-type: none"> The role of research in SEM at a university department is dependent 	01 There may be dedicated research programmes with dedicated researchers that do not focus on teaching.

	on the balance between teaching and research of the university	<p>12 This depends of the field of research. It is true for sport medicine, it is less true for exercise physiology.</p> <p>14. This is a critical point. Research is no add on activity – it requires dedicated time.</p> <p><i>14 there is also the possibility of research dedicated staff.</i></p> <p>14 Yes - but the teaching function is Unit or group - not necessarily an individual -- and includes research (PhD) students</p>
e.	A SEM research programme at a university should be supported by:	
	<ul style="list-style-type: none"> University management 	<p>01 without this support many aspects of success may be compromised.</p> <p>10 It is not the only source of support.</p> <p>14 Unconditional institutional support is totally necessary.</p> <p><i>14 Top down support is high priority -must be viewed as important as cancer research.</i></p>
	<ul style="list-style-type: none"> Faculty management 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Academics in relevant disciplines at the university 	<p>08 need supportive collaborations to continue to innovate and a university setting should provide this.</p> <p>14 Top down support is high priority -must be viewed as important as cancer research</p> <p>Consensus Round 1 SL1</p>

A2	PRIORITISATION OF RESEARCH IN FOCUS AREAS	
	The following statements relate to the development of focus areas in a research programme:	
a.	In determining research focus areas the following statements are true:	
	<ul style="list-style-type: none"> A university-based research programme should not be restricted by pre-determined research focus areas of the <i>university</i> 	<p>08 A focused approach often leads to excellence and large grant funds. This has to be considered when the university is contributing staffing and infrastructure.</p> <p>14 Top down support is high priority -must be viewed as important as cancer research</p> <p><i>01 A university may have focus in some things which SEM may differ from; but have strong outputs and quality research.</i></p> <p><i>14 This may depend on relevance, may reduce external funding potential.</i></p>
	<ul style="list-style-type: none"> The selection of predetermined research focus areas will enhance interdisciplinary research 	<p>10 Some compatibility may facilitate the use of existing resources</p> <p>14 Top down support is high priority -must be viewed as important as cancer research</p> <p><i>01 It depends on the area of research, may be valid for some and not for others.</i></p> <p><i>10 May help because of the availability of resources.</i></p> <p><i>12 This is not true in the case of research in doping or anti-doping.</i></p> <p><i>14 Depends on individuals and communication</i></p>
	<ul style="list-style-type: none"> A research programme should concentrate on pre-determined focus areas in the research environment (SEM) 	<p>10 Openness for new areas should be maintained</p> <p>14 Aligned with funding priorities but also need for forward thinking and addressing opportunities</p> <p><i>12 One should avoid mainstream research.</i></p> <p><i>14 Drives funding</i></p>
b.	The following are important determinants in the selection of research focus areas:	
	<ul style="list-style-type: none"> Market demands 	<p><i>01 For funding purposes and to contribute to areas of knowledge 'needs'</i></p>
	<ul style="list-style-type: none"> Interests of individual researchers 	<p><i>10 An important driver.</i></p> <p><i>14 A blend of individual and corporate interests</i></p>
	<ul style="list-style-type: none"> Expertise of individual researchers 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Gaps in current research 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Availability of equipment 	<p>08 Should not be a deterrent to a research framework as many solutions are possible for equipment share, lease, and purchase.</p> <p>10 Not all equipment needs can be anticipated and the research should be driven by ideas and questions, not by equipment.</p> <p>14 ideas/productivity should be in advance of equipment</p>

		Consensus Round 2 SL1
	<ul style="list-style-type: none"> Availability of time 	08 Should be able to change around time and personnel. Not a framework piece. 14 research is a business not a hobby <i>14 Critical</i>
	<ul style="list-style-type: none"> Availability of financial resources 	14 but innovative research can proceed with limited funding
	<ul style="list-style-type: none"> Availability of study populations 	<i>10 Clearly important for clinical research.</i>
	<ul style="list-style-type: none"> Availability of support staff 	
	<ul style="list-style-type: none"> Community needs (including local, regional and national) 	14 room for innovation
	<ul style="list-style-type: none"> International trends in an academic discipline (such as SEM) 	14 true, but need to be forward thinking and look to providing leadership
c.	In addition to selection of research focus areas, the following are important determinants in the selection of <i>individual research projects</i> within a research programme:	
	<ul style="list-style-type: none"> Adherence to pre-determined focus areas of the research programme 	14 but not at expense of innovation
	<ul style="list-style-type: none"> Possible available financing for specific projects 	
	<ul style="list-style-type: none"> Individual research projects should not be selected according to focus areas within a research programme 	10 Again, with some flexibility for new ideas 14 need to address selected areas but
	<ul style="list-style-type: none"> Market demands 	<i>14 If market = money, yes.</i>
	<ul style="list-style-type: none"> Interests of individual researchers 	10 The recruitment of researchers should follow the plan
	<ul style="list-style-type: none"> Expertise of individual researchers 	14 not limited - need to develop to meet market demands Consensus Round 1 SL1
	<ul style="list-style-type: none"> Gaps in current research 	
	<ul style="list-style-type: none"> Availability of equipment 	Consensus Round 2 SL1
	<ul style="list-style-type: none"> Availability of time 	14 quality and innovative research takes time..
	<ul style="list-style-type: none"> Availability of financial resources 	
	<ul style="list-style-type: none"> Availability of study populations 	14 but not limited by availability
	<ul style="list-style-type: none"> Availability of support staff 	
	<ul style="list-style-type: none"> Community needs [including local, regional and national] 	
	<ul style="list-style-type: none"> International trends in an academic discipline (such as SEM) 	<i>14 Needs to be attuned – but explore new ideas</i>
A3	MONITORING OF THE SUCCESS OF A RESEARCH PROGRAMME	
	The following statements relate to monitoring and evaluation of the success of a research programme	
a.	A research programme should regularly be:	
	<ul style="list-style-type: none"> <i>Monitored</i> according to <i>quantitative</i> key performance indicators [specific, measurable outcomes of success] 	10 Both quantity and quality are important.
	<ul style="list-style-type: none"> <i>Monitored</i> according to <i>qualitative</i> key performance indicators [subjective outcomes of success] 	
	<ul style="list-style-type: none"> <i>Evaluated</i> according to <i>quantitative</i> key performance 	Consensus Round 1 SL1

	indicators [specific, measurable outcomes of success]	
	<ul style="list-style-type: none"> • <i>Evaluated</i> according to <i>qualitative</i> key performance indicators [subjective outcomes of success] 	Consensus Round 3 SL1
A4	ADDITIONAL RELEVANT INPUT FROM EXPERT PANELLISTS REGARDING STRATEGY IN RESEARCH PLANNING AND MANAGEMENT	
a.	In your opinion, are there additional relevant statements to be considered in determining a research strategy?	
	<p>01 There needs to be coherence of all these aspects. For example, the funding for specific equipment would be relevant for research in the area of someone who has expertise and an interest - but if they left, what then? Would it be possible to continue the research; and does that area of research fit in with the unit and university</p> <p>10 Consider the potential for collaborative efforts.</p> <p>12 Ethical considerations are important.</p> <p><i>03 In South Africa (and other countries) the political climate both within and outside of the university also dictate research funding and therefore direction.</i></p> <p><i>08 Research should have clinical or educational practice applicability. All research should attempt to include both genders in the study population and outcome analysis.</i></p> <p><i>10 Scientific themes can also be selected based on local and regional needs that may be unique.</i></p> <p>14 The training and skill-set of the research team/group and ability to develop strong collaborations to</p>	
b.	Do you have any further comments regarding the strategic planning of a research framework?	
	<p>08 Research should include an advisory or steering committee to ensure that all needs are being represented.</p> <p>10 Also consider what do you want to be known and recognized for?</p> <p>14 Goals/objectives need to be aligned with national/regional/local sustainable funding opportunities.</p>	

SECTION B: THE ROLE, PLACE AND CHARACTER OF RESEARCH IN SPORT AND EXERCISE MEDICINE [SEM] AT A UNIVERSITY		
	This section deals with the role, place and character of a research programme in sport and exercise medicine at a university.	
B1	THE EDUCATIONAL AND ACADEMIC ROLE OF RESEARCH IN SPORT AND EXERCISE MEDICINE	
	STATEMENTS	COMMENTS
a.	Research in SEM plays an important <i>educational</i> role in:	
	<ul style="list-style-type: none"> Basic grounding for undergraduate teaching 	14 Informs teaching – clinical and general. <i>08 This tends to be concluded established research information.</i> <i>14 In-house research should be informing teaching.</i>
	<ul style="list-style-type: none"> Basic grounding for postgraduate teaching 	14 ditto Consensus Round 1 SL1
	<ul style="list-style-type: none"> Defining SEM as academic discipline at the university in which it is housed 	08 SEM is by its definition multidisciplinary among medical specialities and interprofessional in its application. Therefore, it may be grounded in other disciplines versus being defined as its own discipline. 14 A Key step in obtaining recognition Consensus Round 1 SL1
	<ul style="list-style-type: none"> A postgraduate Sport and Exercise Medicine programme 	14 a must to demonstrate SEM as a serious discipline in the Uni Consensus Round 1 SL1
b.	Research in SEM plays an important role in the <i>development of SEM</i> as an academic discipline regarding:	
	<ul style="list-style-type: none"> The development of the discipline of Sport and Exercise medicine 	Consensus Round 1
	<ul style="list-style-type: none"> Establishing best practice in clinical Sport and Exercise Medicine 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> The development of sport 	14 I am not sure I understand the question. LH Comment: The development of sport refers to the improvement of performance at the level where it is directed, as well as broader participation. 14 -But not limited to sport.

c.	Regarding the role of SEM research in society:	
	<ul style="list-style-type: none"> • Sport and Exercise Medicine research can lead the way in mainstream medicine research 	<p>01 In certain areas, such as chronic disease prevention and management.</p> <p>10 Particularly in health promotion and disease prevention.</p> <p>14 Public health and activity areas.</p> <p><i>08 Within this decade and the next, I see it as a supporting area of research, and a lens of research. I do not see it a leader in mainstream medicine.</i></p> <p><i>10 Not always but in some areas the answer is yes.</i></p>
	<ul style="list-style-type: none"> • Research on elite athletes can often be applied to broader communities 	<p>10 Lessons learned from elite athletes may be useful with other populations just like lessons learned from space research have been useful in the practice of medicine.</p> <p>14 depends on research and transfer of knowledge</p> <p>14 generally too specific -- but may have some applications</p>
	<ul style="list-style-type: none"> • The development of new knowledge in Sport and Exercise Medicine can make a meaningful contribution to public health care 	<p>14 absolutely -- and this needs to be highlighted in any SEM research framework documents</p> <p>Consensus Round 1 SL1</p>
	<ul style="list-style-type: none"> • SEM research plays an important role in addressing the scientific needs of the athletic population 	<p>Consensus Round 1 SL1</p>
d.	Sport plays an important role in:	
	<ul style="list-style-type: none"> • Society 	<p>08 The word "sport" versus exercise reduces the applicability of this question.</p> <p>Consensus Round 1 SL1</p>
	<ul style="list-style-type: none"> • Community wellness 	<p>Consensus Round 1 SL1</p>
	<ul style="list-style-type: none"> • Politics 	<p>01 This may be so, but how does this question tie in with SEM research?</p> <p>LH Comment: If true it may have an effect on the direction of research focus in SEM, funding opportunities and more.</p> <p>10 Not always positive.</p> <p>14 -good of the nation concept -- filter down as encouraging participation?</p>
B2	THE ACADEMIC PLACE (POSITIONING) OF A RESEARCH PROGRAMME IN SPORT AND EXERCISE MEDICINE AT A UNIVERSITY	
a.	Regarding the place of an SEM research programme in a university:	
	<ul style="list-style-type: none"> • An SEM research programme is best positioned in a Faculty of Health Sciences 	<p>08 This will vary from university to university. In a health science faculty, it may flourish or be overshadowed. In a health and physical education</p>

		faculty, it may be a practical and needed application. 14 - but as an equal contributor not "little" brother/sister" and starved of realistic core funding Consensus Round 1 SL1
	<ul style="list-style-type: none"> Research should be an essential part of a structured Master's programme in SEM 	10 Or any other degree Consensus Round 1 SL1
	<ul style="list-style-type: none"> An SEM department should engage in collaborative research partnerships with other disciplines within the institution 	Consensus Round 1 SL1
b.	The following groupings are relevant partners in an SEM research programme:	
	<ul style="list-style-type: none"> Other academic health care institutions 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Primary health care institutions 	14 both for research and programme delivery Consensus Round 3 SL1
	<ul style="list-style-type: none"> Sport federations 	12 Not in Germany. <i>14 It should not be the focus.</i> 14 possibly - but not a focus
c.	The following fields of study are relevant in an interdisciplinary SEM research programme:	
	<ul style="list-style-type: none"> Health promotion 	08 The operative word "relevant" makes all statements true as there are non that unrelated.
	<ul style="list-style-type: none"> Public wellness 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Prevention of chronic disease 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Prevention of exercise related illness 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Management of exercise related illness 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Prevention of exercise related injuries 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Management of exercise related injuries 	Consensus Round 1 SL1
d.	SEM is a particularly suitable discipline for:	
	<ul style="list-style-type: none"> applied research 	Consensus Round 1 SL1

	<ul style="list-style-type: none"> pure scientific research 	<p>01 There is a role for pure scientific research, but I would not say "particularly suitable".</p> <p>10 Some degree of interaction is possible and desirable.</p> <p>12 we have broad range from applied to pure scientific research (Germany).</p> <p><i>14 Exercise has been used to understand basic biochemical and physiological phenomena.</i></p> <p>14 blue sky research is important --if funding available</p>
B3	THE POSITIONING OF A MULTIDISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME WITHIN EXISTING RESEARCH FOCUS AREAS AT THE UNIVERSITY OF THE FREE STATE	
	This section deals with the existing strategic interdisciplinary research clusters [focus areas] at the University of the Free State. These clusters have been selected predominantly on the basis of regional need and existing expertise and research. The clusters are intended to enhance the strategic research focus of the university, as well as interdisciplinary/collaborative research. They get preferential university funding and support before research that is not included in a cluster. It is therefore beneficial for any research programme to find common ground within one of the clusters.	
a.	<i>Cluster 1: Enabling technologies/technologies for the future [Suggested constituent focus areas: High throughput biology, nanotechnology [solid state lighting], chemical and allied technologies]</i>	<p>10 Nanotechnology</p>
b.	<i>Cluster 2: Food production, quality and safety for Africa [Suggested constituent focus areas: Animal production and protection, plant production and protection, human nutrition, food quality and safety]</i>	<p>08 Human nutrition and performance</p> <p>10 Human nutrition in the context of high-caloric demands</p> <p><i>01 Human nutrition perhaps, for example in relation to communities with high energy expenditure like farm and mine labourers etc; but the others do not fit.</i></p> <p><i>10 Given the important interaction between physical activity and nutrition.</i></p> <p><i>12 You know, I am a German.</i></p> <p><i>LH Comment: If you refer to the importance of quality and safety of food production, I understand. If you are indicating that the question is not relevant to a German, I also concur – which is why many of the questions in this section have been removed from the main questionnaire.</i></p>
c.	<i>Cluster 3: Regional community development and alleviation of poverty [Suggested constituent focus areas: Urban development, rural development: sustainable livelihoods in the QwaQwa region [a rural region where a satellite campus of the University of the Free State is</i>	<p>08 Role of exercise in healthy communities</p> <p>10 Chronic diseases</p> <p>Consensus Round 1 – SL2</p>

	situated], resource management and development [tourism, small business development, local government], healthy communities [communicable diseases, chronic diseases of lifestyle, children with disabilities]	
d.	<i>Cluster 4:</i> Social transformation [citizenship and identity, diverse histories, globalisation and governance, human rights and social equity]	08 Gender, age, racism and sport <i>01 Politically with sport and exercise participation.</i> <i>03 Right to be healthy?</i>
e.	<i>Cluster 5:</i> Water resources and ecosystem management [freshwater ecology, environmental change, water resource management, sustainable utilisation of terrestrial ecosystems]	Consensus Round 1 SL3
f.	<i>Cluster 6:</i> Towards a competitive chemical industry [new drug manufacturing, petrochemicals, natural product development, polymers]	<i>10 In the case of drugs for the treatment of sports-related injuries</i>
g.	Interdisciplinary SEM research at the UFS will not develop optimally if accommodated in one or more of the above existing strategic clusters	03 Aspects can fit into some of the existing clusters but new cluster should be created 08 Although not the core areas of SEM, these clusters and their integration with SEM are aimed as sustainable changes in health. 10 Some areas noted above related directly to research in SEM 14 SEM does not appear to logically fit into any of these clusters. Surprisingly there is not a stronger "health" cluster. <i>03 Needs a better fitting cluster. Where is number 5?</i> <i>LH Comment: Number 5 (or e) has been removed because consensus has already been reached on that statement in Round 1.</i> <i>14 None of these are a logical fit for a fruitful and productive development of a SEM research programme.</i>
B4	THE MULTIDISCIPLINARY CHARACTER OF SPORT AND EXERCISE MEDICINE	
a.	The following statements are true regarding SEM:	
	<ul style="list-style-type: none"> SEM is a multidisciplinary field of study 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> A SEM research programme should have an multidisciplinary character 	14 This is fundamental and critical to the development of generating collaborations and addressing funding opportunities Consensus Round 1 SL1
	<ul style="list-style-type: none"> An interdisciplinary SEM research programme should be managed independent of academic departments 	10 This is equivalent to the creation of yet another department. 14 Really depend on politics/structures and funding. <i>08 Departmental collaboration is essential.</i>

		<p><i>10 The management model may depend on the institutional culture. In our University, SEM has been successful and is housed within an academic department with collaborations with other departments.</i></p> <p><i>14 SEM is a stand-alone discipline and will not flourish buried in an irrelevant Department.</i></p> <p><i>14 will always fight for acceptance, a serious voice and funding</i></p>
B5	ADDITIONAL RELEVANT INPUT FROM EXPERT PANELLISTS REGARDING THE ROLE, POSITIONING AND CHARACTER OF A SEM RESEARCH PROGRAMME	
a.	<p>In your opinion, are there additional relevant statements regarding the role, place and character of research in SEM to be considered in determining a strategic research framework?</p>	
	<p><i>10 Research in SEM can be very broad and interdisciplinary; great area for clinical and translational research.</i></p> <p><i>14 The forcing of SEM into pre-developed clusters will impede the development and growth of research.</i></p> <p><i>08 It would be relevant to consider population health trends and their integration with exercise and sport. In addition, lifecycle and lifestyle integration.</i></p> <p><i>14 SEM is built on interdisciplinary interactions with a clear focus on research/clinical objectives.</i></p> <p><i>SEM will never obtain a status equal to established academic units if it is buried in a larger established unit.</i></p> <p><i>Internationally SEM is well a recognised academic discipline and should control its own academic destiny.</i></p> <p><i>SEM is as much about public health as it is about sports and thus must be treated and supported as serious academic discipline.</i></p>	

b.	Do you have any further comments regarding the role, place and character of SEM research in the planning of a strategic research framework?	
	08 The opportunity to enhance evidence based rehabilitation through SEM is key since much funding is spent by governments without good evidence of proven benefit or treatment consensus.	
SECTION C: INPUTS THAT ARE REQUIRED BY A RESEARCH PROGRAMME IN SPORT AND EXERCISE MEDICINE		
	This section deals with different inputs required for the successful operation of a multidisciplinary research programme, and the activities within such a programme	
C1: RESOURCES		
	STATEMENTS	COMMENTS
C1.1	HUMAN RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:	
a.	The following staff components are important for the successful operation of a SEM research programme:	
	<ul style="list-style-type: none"> Competent academic staff 	<p>14 Clinical staff may not have a PhD</p> <p>Consensus Round 1 SL1</p>
	<ul style="list-style-type: none"> Competent departmental support staff 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Faculty research support staff 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> University research support staff 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Post-magister degree fellows 	<p>14 a must</p> <p>Consensus Round 2 SL1</p>
	<ul style="list-style-type: none"> Post-doctoral fellows 	<p>14 an absolute strength of a productive programme</p> <p>Consensus Round 2 SL1</p>
b.	The following statements are true regarding the academic staff in a SEM research programme:	
	<ul style="list-style-type: none"> All academic staff in SEM must obtain PhD degrees 	<p>01 Some may be clinicians, or research assistants.</p> <p>14 Or the medical equivalent.</p> <p><i>08 Should be 2 out of 3 from MD, Masters, and PHD. Experience should be taken into consideration.</i></p> <p><i>14 Only staff with PhDs should be recruited in the future.</i></p> <p>14 need balance to meet research objectives</p>
	<ul style="list-style-type: none"> All academic SEM staff must supervise PhD students research 	<p><i>03; 08 If they have PhD themselves.</i></p> <p><i>08 Should have a PhD to supervise PhD, so it is linked to previous question.</i></p> <p><i>10 It is possible to have an excellent faculty researcher who is not supervising students.</i></p> <p>14 really depends on qualification -- strongly support the co-supervision of PhD students --roles for PhD and clinically qualified. Avoid prima donna researchers.</p>
	<ul style="list-style-type: none"> All academic SEM staff must supervise Master's students research 	Consensus Round 1 SL1

	<ul style="list-style-type: none"> • Researchers in a research programme should be assimilated by retaining the best postgraduate students 	<p>01 It is difficult to determine what 'assimilate' means and also what defines "best postgraduate students" - there are many aspect that make that up and the 'best' may not be most productive, conducive, cooperative etc.</p> <p>10 This is one of the many strategies.</p> <p>14 A programme needs to recruit students from other programmes to maintain growth and development.</p> <p><i>08 Not sure exactly what you mean by assimilated. If you mean consistent and uniform, than I have answered the question with that understanding.</i></p> <p><i>10 This is one strategy to recruit faculty, but not the only one.</i></p> <p><i>14 True, but also recruit Postgraduate students from other institutions to increase research vitality.</i></p>
	<ul style="list-style-type: none"> • Continuous staff development is relevant to the success of an SEM research programme 	<p>14 as per any other Department/discipline in the University</p> <p>Consensus Round 1 SL1</p>
	<ul style="list-style-type: none"> • The staff profile of a successful SEM research programme should reflect a balance between experienced and young researchers 	<p>Consensus Round 1 SL1</p>
	<ul style="list-style-type: none"> • At least 25% of time of academic staff in an SEM department must be devoted to research supervision 	<p>14 Required to make sure.</p> <p><i>08 There are sliding scale models from 10-25%.</i></p> <p><i>10 For productive researchers I suggest >50%.</i></p> <p><i>14 Agree - but it could be more depending on funding situation and may vary with individual depending on opportunities.</i></p> <p>14 certainly --also depends on the relative funding model for postgraduate students</p>
	<ul style="list-style-type: none"> • There must be minimum requirements for national publications for all staff members in a department of SEM 	<p>08 This leaves open the type of publication and that is appropriate for national</p> <p>14 -but on a rolling basis - with a strong/fast move to international level publications</p> <p>Consensus Round 1 SL1</p>
	<ul style="list-style-type: none"> • There must be minimum requirements for international publications for all staff members in a department of SEM 	<p>08 There should be a minimum requirement for Scholarship work as defined in the educational literature. This would include publication but not limited to.</p> <p>Consensus Round 1 SL1</p>

c.	Critical characteristics required to be a <i>successful researcher</i> in SEM include:	
	• Disciplinary knowledge	Consensus Round 1 SL1
	• Disciplinary insight	Consensus Round 1 SL1
	• Writing skills	Consensus Round 1 SL1
	• Experience on ground level	12 Not clear what ground level is? LH Comment: Ground level refers to experience at junior level, from the level of research assistant, data capturing and other junior functions in the research team, up to more senior positions. 14 -- a productive researcher will have worked their way through the system
	• Knowledge of the industry	
	• Previous exposure to the discipline	14 not if they are bringing new knowledge and skills to the team/unit
	• Knowledge of research methodology	14 a must to be able to produce quality research Consensus Round 1 SL1
	• Knowledge of funding opportunities	
	• Expertise in certain focus areas	Consensus Round 2 SL1
	• Knowledge of research supervision	Consensus Round 1 SL1
	• Knowledge of research ethics	Consensus Round 1 SL1
	• The ability to apply general research principles into SEM research	Consensus Round 1 SL1

	<ul style="list-style-type: none"> Have status [respect] among peers in the discipline 	<p>12 Of course, I mean one must have the skills to get the respect of other researchers.</p> <p><i>14 Publications count.</i></p> <p>14 outputs rather than esteem (old boys' network or a good talker!</p>
	<ul style="list-style-type: none"> Experience in publication of research 	Consensus Round 1 SL1
d.	The following <i>leadership characteristics</i> are required by leaders in research programmes:	
	<ul style="list-style-type: none"> Motivational leadership 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Passion for the discipline 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Stature in the discipline 	<p>14 Competent scientists, not "old boys' network".</p> <p><i>14 Published research is more powerful than "gurus".</i></p> <p>14 agree with these comments</p> <p>Consensus Round 3 SL1</p>
	<ul style="list-style-type: none"> Ability to see the bigger picture [vision] 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Inspirational leadership 	<p>08 I think that motivational leadership is more critical</p> <p>Consensus Round 1 SL1</p>
	<ul style="list-style-type: none"> Skills to work with different levels of knowledge and experience 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Not too critical 	<p><i>08 Can't really answer this question as it does not detail a characteristic but more a behaviour. There is a need for critical thinking and constructive criticism. "Not too critical" is not defined enough to answer.</i></p> <p>LH Comment: The term refers to allowing freedom for growth within the team and makes mistakes or produce less than perfect work in the process.</p>
	<ul style="list-style-type: none"> Delegating skills 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Leadership in daily life 	<p>14 Leadership in the research environment is key.</p> <p><i>10 Not always transferable to the laboratory.</i></p> <p>14 what goes on at work is the key here</p>
	<ul style="list-style-type: none"> Listening skills 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Co-ordinating [organisational] 	Consensus Round 1 SL1

	skills	
	• Autocratic leadership skills	Consensus Round 1 SL3
	• Interpersonal skills	Consensus Round 1 SL1
	• Communication skills	Consensus Round 1 SL1
	• Ability to take responsibility in success	Consensus Round 1 SL1
	• Ability to take responsibility in failure	Consensus Round 1 SL1
	• Integrity	Consensus Round 1 SL1
	• Sensitivity	Consensus Round 1 SL1
	• Bravery	14 if this is a risk management characteristic -- then moderate risk taking is acceptable
	• Trust	Consensus Round 1 SL1
	• Honesty	Consensus Round 1 SL1
	• Wisdom [good judgement]	Consensus Round 1 SL1
e.	The following <i>management skills</i> are required by research programme managers:	
	• Financial management skills	Consensus Round 2 SL1
	• Project management skills	Consensus Round 1 SL1
	• People management skills	Consensus Round 1 SL1
	• Process management skills	Consensus Round 1 SL1
	• Goal setting skills	Consensus Round 1 SL1
	• Planning skills	Consensus Round 1 SL1
	• Conflict management skills	Consensus Round 2 SL1
	• Administrative skills	Consensus Round 2 SL1
	• Stress management skills	
	• Interpersonal relationship skills	Consensus Round 1 SL1
	• Fundraising skills	
	• Skill to implement a plan	Consensus Round 1 SL1
	• Technical skills	14 Other can provide these. 14 ditto
f.	Additional information on human resources in a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> • In your opinion, are there additional relevant statements regarding the human resources relevant to a successful research programme in SEM to be considered in determining a strategic research framework? 	
	<p>10 The administrative team should have some knowledge of the science.</p> <p>12 The management skills should include motivating and discussing with the members of a research group.</p> <p>14 The ability to work in a team is critical. There may be a team hierarchy/team vision – Researchers/adjunct researchers/research physicians.</p> <p><i>08 Research and Ethics Certificate.</i></p> <p><i>08 Attention To detail.</i></p> <p><i>08 Organized.</i></p>	

	<p><i>10 The above list is very inclusive.</i></p> <p>14 strong communication and advocacy skills politically savvy in institutional politics</p>
	<ul style="list-style-type: none"> Do you have any further comments regarding the human resources in the planning of a strategic research framework?
	<p>14 Don't forget that most research is conducted in team situations and there is the need for persons filling different defined roles.</p> <p><i>08 Probably appropriate for associate staff to have presentation skills.</i></p>
C1.2	FINANCIAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF AN SEM RESEARCH PROGRAMME:
a.	An SEM research programme should be funded by:
	<ul style="list-style-type: none"> Commercialisation of research <p>01 Sometimes for some research this may be true and relevant, but not the primary determining factor.</p> <p><i>10 Some commercial sources may be acceptable.</i></p>
	<ul style="list-style-type: none"> Commercialisation of clinical services <p>01 I would say 'could', not 'should'.</p> <p>14 But with a clearly defined goal – access to cases – income generation.</p> <p><i>10 Revenue from clinical practice may be used to support research.</i></p> <p><i>14 Agree, if it's also a platform for research and learning opportunities.</i></p>
	<ul style="list-style-type: none"> The university in which it is housed <p><i>14 Agree and it must be sustained during the start-up phase.</i></p> <p>14 programme has to be competitive also</p>
	<ul style="list-style-type: none"> Government subsidy <p>10 Funding should not be from the government only.</p> <p><i>10 It is an obligation of the government (and good policy too).</i></p> <p>14 really depends on funding models</p>

	<ul style="list-style-type: none"> Research funding agencies, such as the National Research Foundation or Medical Research Council of South Africa 	14 on a competitive basis
	<ul style="list-style-type: none"> Partnerships between the research programme and private corporations 	<p>10 <i>As long as potential conflicts of interest are managed.</i></p> <p>14 <i>Agree-if managed well.</i></p> <p>14 ditto</p>
b.	A newly established research programme should receive initial start-up funding (seed capital) from the university in which it is housed	<p>01 Depends on factors that may have contributed to setting up the unit, the university support, etc.</p> <p>14 Absolutely – as this institutional support is important for other sources of funding.</p> <p>14 <i>Agree and it must be sustained during the start-up phase.</i></p> <p>Consensus Round 2 SL1</p>
c.	There is a risk of losing academic autonomy of a research programme due to interference from funders	<p>01 This should not happen unless there are 'funny' deals, which should not be the case in good research programmes with good governance etc.</p> <p>10 The agreement between the donor and the researcher should be very clear.</p> <p>14 Universities should be monitoring this.</p> <p>14 <i>Should be covered in the negotiated contract.</i></p> <p>14 not if well managed and contract savvy</p>
d.	Additional information on human resources in a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> In your opinion, are there additional relevant statements regarding the financial resources relevant to a successful research programme in SEM to be considered in determining a strategic research framework? 	
	<p>10 Collaborate with colleagues that may have solid funding.</p> <p>12 Funding is necessary, but researchers should always be independent.</p> <p>14 Initial programme plans should be based on sustainability and subsequent growth.</p> <p>03 <i>proper funding (not partial or under-funding) of clinical academic posts should be a priority.</i></p> <p>10 <i>Given the global financial crisis, multiple sources must be considered.</i></p> <p>14 <i>The need for a variety of funding streams.</i></p> <p>14 <i>Guaranteed base funding during the establishment period (say 5 years).</i></p> <p>14 <i>External competitive funding will not happen immediately.</i></p>	

	<p>14 <i>There is a need to balance outputs with the seeking of external funding.</i></p> <p>14 <i>Quality outputs will provide the base for external funding.</i></p> <p>14 distinguishing between shared infrastructure funding and operations funding</p>
	<ul style="list-style-type: none"> Do you have any further comments regarding the financial resources in the planning of a strategic research framework?
	14 Long term view is needed to allow research growth.
C1.3	INTERNAL INSTITUTIONAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF AN SEM RESEARCH PROGRAMME:
	This section deals with the <i>internal (institutional) resources of the university</i> relevant to the successful operation of a SEM research programme. The following statements are true in this regard:
a.	The following institutional resources at a university are relevant role players in an SEM research programme:
	<ul style="list-style-type: none"> The institutional research directorate
	Consensus Round 1 SL1
	<ul style="list-style-type: none"> The post-graduate school
	Consensus Round 2 SL1
	<ul style="list-style-type: none"> The finance department
	10 Contributes but does not make final decisions
	<ul style="list-style-type: none"> The human resources department
	10 Contributes but does not make final decisions
	<ul style="list-style-type: none"> The Faculty of Health Sciences executive
	Consensus Round 2 SL1
	<ul style="list-style-type: none"> The university sport department
	10 <i>Good resource but not essential.</i>
	<ul style="list-style-type: none"> The university health and wellness centre
	<ul style="list-style-type: none"> The department of biostatistics
	<ul style="list-style-type: none"> The institutional marketing/fundraising department
	<ul style="list-style-type: none"> Academic writers
	<ul style="list-style-type: none"> Research grant application experts
	Consensus Round 2 SL1
	<ul style="list-style-type: none"> The university Alumni association
b.	Additional information on internal university (institutional) resources in a Sport and Exercise Medicine research programme that panellists wish to include:
	<ul style="list-style-type: none"> In your opinion, are there additional relevant statements regarding the institutional resources relevant to a successful research programme in SEM to be considered in determining a strategic research framework?
	<ul style="list-style-type: none"> Do you have any further comments regarding the financial resources in the planning of a strategic research framework?
	10 <i>Funds should come from diverse sources.</i>
	14 <i>A well informed University President's office</i>
C1.4	EXTERNAL ORGANISATIONAL RESOURCES REQUIRED FOR THE SUCCESSFUL OPERATION OF A SEM RESEARCH PROGRAMME:
	This section deals with the <i>external resources</i> relevant to the successful operation of a multidisciplinary SEM research programme.
a.	The following organisations outside of the university are relevant role players in the

	successful operation of an SEM research programme:	
	<ul style="list-style-type: none"> Research funding agencies [National Research Foundation of South Africa; Medical Research Council of South Africa] 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Research foundations 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Professional associations, e.g. the South African Sports Medicine Association [SASMA]; the International Sports Medicine Federation [FIMS]; the International Olympic Committee [IOC] medical committee 	<p>08 These institutions may be part of the network that provides a vehicle for knowledge transfer of research findings but generally do not provide significant funding.</p> <p><i>10 Useful but not essential.</i></p> <p><i>12 Not all of them.</i></p>
	<ul style="list-style-type: none"> The private healthcare industry 	<p>08 The issue with the next four partners is that although they may be sources of funding, they should not be seen partners as their reason for research would be bias to the process.</p> <p>10 Contributes but does not make final decisions</p>
	<ul style="list-style-type: none"> The pharmaceutical industry 	<p>10 Contributes but does not make final decisions</p> <p>14 only if there is research potential/contracts</p>
	<ul style="list-style-type: none"> The nutritional supplement industry 	<p>10 Contributes but does not make final decisions</p> <p><i>10 May be a partner.</i></p>
	<ul style="list-style-type: none"> Anti doping agencies [e.g. the South African Institute for Drugs in Sport [SAIDS], the World Anti-doping agency [WADA] 	<p>14 only if these lead to research opportunities</p>

	<ul style="list-style-type: none"> The fitness industry 	<p>10 As long as potential conflicts of interest are managed correctly</p> <p><i>10 May be a good partner for some types of research.</i></p>
	<ul style="list-style-type: none"> National sport federations 	
	<ul style="list-style-type: none"> The South African Sports Confederation and Olympic Committee [SASCOC] 	<p><i>10 Usually, very difficult to work with NOC's.</i></p>
	<ul style="list-style-type: none"> Underemphasised sport codes in South Africa [e.g. gymnastics, karate, boxing] 	<p>14 these create unique/opportunist activities</p>
	<ul style="list-style-type: none"> Government departments [Department of Health, Department of Sport and Recreation, Department of Education, Department of Science and Technology] 	
	<ul style="list-style-type: none"> Government departments of other countries in Africa or internationally 	<p>Consensus Round 1 SL2</p>
	<ul style="list-style-type: none"> The College of Sport and Exercise Medicine of Medicine of South Africa [CSEM(SA)] 	
	<ul style="list-style-type: none"> The College of Medicine of Medicine of South Africa [CMSA] 	
	<ul style="list-style-type: none"> The community in which the research programme is located 	
b.	Additional information on external resources in a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> In your opinion, are there other organisations that may be relevant to an SEM research programme? 	
	<p>03 Difficult to differentiate between what exists in reality (at present) and what should exist in an ideal world. Local politics within organizations unfortunately can direct attitude towards research.</p> <p>08 I think you may want to consider some of the other professional organizations like the Physiotherapy association etc.</p> <p>10 Similar organizations in universities in other countries</p>	
	<ul style="list-style-type: none"> Do you have any further comments regarding external resources in the planning of a strategic research framework in SEM? 	
	<p><i>14 The relevance depends on whether it is funding, collaborations, cases, sharing of risk, etc</i></p>	
C1.5	ACADEMIC ROLEPLAYERS AND STAKEHOLDERS IN A MULTIDISCIPLINARY SPORT AND EXERCISE MEDICINE RESEARCH PROGRAMME	
	This section attempts to identify the most relevant potential academic role players in a	

	multidisciplinary SEM research programme:	
a.	The following academic disciplines are relevant role players in a multidisciplinary SEM research programme:	
	• Sport and Exercise science/Biokinetics	Consensus Round 1 SL1
	• Human nutrition and dietetics	Consensus Round 1 SL1
	• Physiology	Consensus Round 1 SL1
	• Anatomy and cell biology	
	• Family medicine	
	• Orthopaedics	Consensus Round 1 SL1
	• Pharmacology	
	• Occupational therapy	
	• Psychology	
	• Sport and Exercise Medicine	Consensus Round 1 SL1
	• Internal medicine	
	• Diagnostic radiology	
	• Biochemistry	
	• Haematology	
	• Nursing	
	• Ophthalmology	
	• Paediatrics	
	• Community health	
	• Occupational health	
	• Work wellness/employee assistance	
	• Pathology/biochemistry/haematology laboratory services	
b.	Additional information regarding academic disciplines that may be relevant to an SEM research programme.	
	• In your opinion, are there other academic disciplines that may be relevant role players in a multidisciplinary SEM research programme?	
	08 Rehabilitation/ Physiotherapy 08 Physical Education 08 Coaching and Sport Administration 10 Many of these disciplines may be part of the effort but are not considered core, eg. those listed as "partially agree" 14 Biostatistics 14 Bioethics 14 Public and Community Health 14 Bioengineering 14 Sociology/gender/disability studies <i>14 all good -- but very much depends on synergy</i>	
	• Do you have any further comments regarding identification of academic role	

	players in the planning of a strategic research framework in SEM?	
	01 The above list depends on the focus of research of the unit and of individuals. The logic of my answers is based on generalisation, for example biochemistry and anatomy for most areas of SEM research, therefore agree. Something like Paediatrics may be so in some cases, therefore partially agree.	
	14 Very much depends on research directions and projects.	
C2	PROCESSES RELEVANT TO THE SUCCESSFUL OPERATION OF A MULTIDISCIPLINARY SEM RESEARCH PROGRAMME	
C2.1	STRATEGIC PROCESSES	
	STATEMENTS	COMMENTS
a.	The following are relevant components of a <i>strategic plan</i> for a multidisciplinary SEM research programme:	
	• A vision statement	Consensus Round 1 SL1
	• A mission statement	Consensus Round 1 SL1
	• Clear objectives	Consensus Round 1 SL1
	• Criteria for identification of team members	Consensus Round 1 SL1
	• An implementation plan	Consensus Round 1 SL1
	• A quality assurance plan	08 <i>This should be integrated as part of the ethics approval of the research.</i> Consensus Round 2 SL1
	• A risk management plan	14 and used for managing activities -- such as which activities have the highest potential to deliver
	• A performance measurement plan	Consensus Round 1 SL1
	• An intellectual property plan	Consensus Round 1 SL1
	• Consensus among role players on the strategy and goals of the research programme	01 General agreement may be possible even if consensus would be optimal. 08 <i>Not sure that full consensus is required as some dissent can lead to more creative and collaborative efforts.</i> 14 need a global consensus--cant afford "lone rangers" who may underpin activities in the Institution Consensus Round 2 SL1
	• A policy document to guide the research programme	Consensus Round 1 SL1
	• A financial sustainability plan	08 The word Financial Plan might be too long term and difficult to predict. There has to be some financial stability for the infrastructure and then each grant has to have a viable financial budget. The financial plan should be a framework that is flexible with change.

		Consensus Round 1 SL1
	• Ethical guidelines	Consensus Round 1 SL1
b.	The following are relevant reference points for strategic <i>goal setting</i> for a multidisciplinary SEM research programme:	
	• Establishment of research teams	14 Teams drive research and must be clearly defined and supported. Teams should be focused Consensus Round 1 SL1
	• Utilisation of new technologies	Consensus Round 1 SL1
	• Establishment of strategic research focus areas	Consensus Round 1 SL1
c.	The following are key strategic <i>activities</i> to ensure success of a multi-disciplinary SEM research programme:	
	• Increase the number of PhDs of staff in the programme	10 <i>Assuming this is a new program.</i> 14 <i>by both internal up skilling recruiting PhDs -- a must.</i>
	• Nurture a new generation of researchers	Consensus Round 1 SL1
	• Attract post-doctoral fellows	Consensus Round 2 SL1
	• Encourage publication of research	4 Highest priority Consensus Round 1 SL1
	• Host international leaders in SEM in the programme	Consensus Round 1 SL1
	• Encourage dissemination of research through public forums	Consensus Round 1 SL1
	• Support conference attendance	14 but only if contributing or targeted Consensus Round 1 SL1
	• Monitoring of activities of other research units	14 need to be generally aware of the environment
	• Research focus areas	Consensus Round 1 SL1
	• Management models	
	• Funding models	Consensus Round 1 SL1
	• Research outputs	Consensus Round 1 SL1
d.	A national SEM research co-ordinating body will make a positive contribution to SEM research in South Africa	14 Really difficult to know the political situation. 14 <i>Agree - but only if it productive driven and not internally reflecting.</i>
e.	Additional information on strategic processes in a Sport and Exercise Medicine research programme that panellists wish to include:	
	• In your opinion, are there other strategic concepts that may be relevant to an SEM research programme?	
	10 Protection of time to do the research. 14 Researcher time commitments. 03 <i>By nature of the activities, there will always be competition for limited resources,</i>	

	<p><i>thus limiting the role of a National research co-ordinating body.</i></p> <p><i>08 Representation of key partners in planning process.</i></p> <p><i>10 Enhancing institutional infrastructure and culture for this type of research.</i></p> <p><i>14 Build strong links with key University academic Departments.</i></p> <p><i>14 Develop a strong and experienced advisory committee (academics/business/community members).</i></p> <p><i>14 Develop a strong SEM team attitude with strong support for development and academic growth.</i></p> <p><i>14 Celebrate all and small successes.</i></p>	
	<ul style="list-style-type: none"> Do you have any further comments regarding strategic processes in the planning of a strategic research framework in SEM? 	
C2.2	MANAGERIAL PROCESSES	
a.	Regarding <i>human resource [people] management</i> , the following aspects are relevant in a multidisciplinary SEM research programme:	
	<ul style="list-style-type: none"> The establishment of a multidisciplinary scientific committee 	<p>12 Might be helpful.</p> <p><i>14 depend on goals - can take away self growth.</i></p>
	<ul style="list-style-type: none"> Building trust among all role players 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Nurture teamwork 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Nurture a shared vision among team members 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Focus on professional development [career planning] of all members of the team 	<p>14 With respect to the Units goals</p> <p>Consensus Round 2 SL1</p>
	<ul style="list-style-type: none"> Nurture creativity of team members 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Align professional fulfilment with personal fulfilment of team members 	<p>14 Important in a tough career promotion environment.</p> <p>Consensus Round 1 SL1</p>
b.	Regarding <i>academic management</i> of research the following aspects are important managerial functions:	
	<ul style="list-style-type: none"> Incentives to researchers for publication 	<p>14 These should be negotiated and averaged over say 3 year time frame.</p> <p><i>08 Should be academic versus monetary incentives.</i></p> <p><i>14 This should be by teams/SEM group -not individual as it can be divisive and see workload inequalities. Must be managed very carefully. SEM must be the winner -not individuals.</i></p> <p>Consensus Round 2 SL1</p>
	<ul style="list-style-type: none"> Pre-arrangement of distribution of credits for interdisciplinary research 	Consensus Round 1 SL1

	<ul style="list-style-type: none"> Focus on results [research outputs] 	Consensus Round 1 SL1
c.	Regarding <i>financial management</i> of research, the following aspects are important managerial functions:	
	<ul style="list-style-type: none"> Following a set budgeting procedure for research projects 	
	<ul style="list-style-type: none"> Fundraising must be a specialised function within the research programme 	<p>14 Also a personal responsibility.</p> <p>14 Fundraising = grants/contracts</p>
	<ul style="list-style-type: none"> Strict financial management principles must apply to all research projects 	Consensus Round 1 SL1
d.	It is important for a research programme to work according to strict <i>time schedules</i>	<p>10 Some flexibility is needed considering the nature of the results and the need to adjust course</p> <p>14 research is a business</p> <p>Consensus Round 1 SL1</p>
e.	Additional information on managerial processes in a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> In your opinion, are there management considerations that may be relevant to a SEM research programme? 	
	<p><i>03 Difficult sometimes within the SEM framework to adhere to strict time schedules.</i></p> <p><i>08 Managing budget and human resources is the key. Time planning is important but often goes astray so project should have a contingency plan and budget.</i></p> <p><i>10 Managers must have experience in research management. Successful managers in clinical operations and other activities need professional training before moving to a research environment.</i></p> <p>14 Activities need to be benchmarked to other comparable units</p>	
	<ul style="list-style-type: none"> Do you have any further comments regarding managerial processes in the planning of a strategic research framework in SEM? 	
C2.3	OPERATIONAL PROCESSES	
a.	<i>Operational processes</i> of a multidisciplinary SEM research programme should include the following	
	<ul style="list-style-type: none"> Clear operational procedures 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Clear programme regulations 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Formal agreements on procedures with researchers 	<p>14 I guess this means an operational code of best practice.</p> <p>LH Comment: Indeed.</p> <p>14 but not to the point of paralysing productive activities</p>

	<ul style="list-style-type: none"> • Formal agreements on expected outcomes with researchers 	<p>10 Room is needed for innovation; do not make it too strict.</p> <p>14 An integral part of goal setting.</p>
	<ul style="list-style-type: none"> • Guidelines for writing protocols 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> • Guidelines for publication 	<p>14 I assume this means number and journals.</p> <p>LH Comment: Agreed.</p> <p><i>14 These are an individual responsibility.</i></p>
	<ul style="list-style-type: none"> • Good clinical practice guidelines in research 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> • Creation of patient databases 	14 If patient groups are going to be an integral part of the research
	<ul style="list-style-type: none"> • Regular research planning meetings 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> • Regular research feedback meetings 	Consensus Round 1 SL1
b.	Additional information on operational processes in a Sport and Exercise Medicine research programme that panellists wish to include:	

	<ul style="list-style-type: none"> In your opinion, are there other operational processes that may be relevant to an SEM research programme?
	<p>14 Negotiation of research time – on long term basis.</p> <p><i>10 Frequent and formal evaluation of outcomes and performance.</i></p>
	<ul style="list-style-type: none"> Do you have any further comments regarding operational processes in the planning of a strategic research framework in SEM?
SECTION D: CHALLENGES IN MULTIDISCIPLINARY RESEARCH IN SPORT AND EXERCISE MEDICINE	
	This section deals with challenges in multi-disciplinary research in general, but also in sport and exercise medicine at a university.
	STATEMENTS
	COMMENTS
D1	ACADEMIC CHALLENGES IN MULTIDISCIPLINARY SEM RESEARCH
a.	The following are relevant <i>academic</i> challenges in the establishment and management of a multidisciplinary SEM research programme:
	<ul style="list-style-type: none"> To establish SEM as a multidisciplinary research discipline in medicine
	Consensus Round 1 SL1
	<ul style="list-style-type: none"> To obtain support from university management for interdisciplinary SEM research
	10 This is true for all disciplines
	Consensus Round 1 SL1
	<ul style="list-style-type: none"> To motivate people from different academic backgrounds to listen [want to understand] each other 's points of view
	<i>10 This is true in any field and not limited to SEM.</i>
	<ul style="list-style-type: none"> Fair distribution of research credits
	10 Disagree, but This is not limited to SEM research
	Consensus Round 2 SL1
	<ul style="list-style-type: none"> Lack of trust among multi-disciplinary team members
	10 Disagree, but This is not limited to SEM research
	<i>10 The typical SEM unit is multidisciplinary by nature.</i>
	<i>12 Important point</i>
	<ul style="list-style-type: none"> To become nationally recognised by peers
	<ul style="list-style-type: none"> To become internationally recognised by peers
	Consensus Round 1 SL1
	<ul style="list-style-type: none"> To compete with institutions with ample human and financial resources [such as the IOC]
	14 this is a different world
	<i>10 The IOC is not a good research model!!!</i>
	<ul style="list-style-type: none"> To form professional networks
	<ul style="list-style-type: none"> To become part of existing professional networks
	<ul style="list-style-type: none"> Potential interdisciplinary stakeholders may fail to

	recognise the merit/importance of the “bigger picture” or vision	
	<ul style="list-style-type: none"> It may be difficult for interdisciplinary research stakeholders to distinguish between research output [current drive] and impact [vision] 	
	<ul style="list-style-type: none"> Lack of creativity of primary researchers may have a negative impact on interdisciplinary research 	10 This is true for all types of research
	<ul style="list-style-type: none"> SEM is a small, young discipline that finds it difficult to make an impact in a broader interdisciplinary medical context 	10 The field has grown significantly in the last 20-30 years as the importance of physical activity as a public health intervention has been recognized 14 Quality and relevant publications talk <i>10 This was true many years ago.</i>
	<ul style="list-style-type: none"> Optimal placement of research focus areas in an interdisciplinary grouping is an important consideration in interdisciplinary research 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Different disciplines have different points of view/paradigms that are challenging to blend and to find a common “language” 	
	<ul style="list-style-type: none"> To identify specialists to collaborate with 	
	<ul style="list-style-type: none"> To find good research ideas 	12 <i>Always a challenge and not specific to SEM.</i>
	<ul style="list-style-type: none"> To find good students 	
D2	MANAGEMENT CHALLENGES IN MULTIDISCIPLINARY SEM RESEARCH	
a.	The following are <i>management</i> challenges in the successful operation of a multidisciplinary SEM research programme:	
	<ul style="list-style-type: none"> The establishment of a management/ leadership hierarchy in interdisciplinary research 	12 <i>The hierarchy should be very falt (sic).</i> LH Comment: The meaning of this statement is unclear. Will the respondent please explain in different words? 14 <i>Depends on the structure.</i>

	<ul style="list-style-type: none"> • Departmental interest above interdisciplinary research interest 	<i>14 Depends on the higher level goals and whether just research or teaching also.</i>
	<ul style="list-style-type: none"> • Personal research interest above interdisciplinary research interest 	<i>14 Depends on a higher strategy.</i>
	<ul style="list-style-type: none"> • Maintenance of effective interdisciplinary communication 	
	<ul style="list-style-type: none"> • Maintenance of effective interdisciplinary co-ordination 	Consensus Round 2 SL1
	<ul style="list-style-type: none"> • Interdisciplinary funding of resources 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> • To obtain initial funding for a new research programme 	Consensus Round 2 SL1
	<ul style="list-style-type: none"> • Time allocation/prioritising for interdisciplinary work versus own departmental work 	<i>12 This depends of the priority in the single case.</i>
	<ul style="list-style-type: none"> • Quality control and minimum standard setting in an interdisciplinary research environment 	
	<ul style="list-style-type: none"> • To attract full-time researchers 	
D3	ADDITIONAL INFORMATION REGARDING CHALLENGES IN MULTIDISCIPLINARY SEM RESEARCH	
a.	Additional information on external resources in a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> • In your opinion, are there other challenges that may be relevant to an SEM research programme? 	
	<p>10 The challenges listed above, in my opinion, apply to many fields of inquiry and are not specific to SEM. In fact, the nature of SEM may simplify some of the challenges typical of interdisciplinary activities.</p> <p>14 SEM researchers need to have the belief that their research is important and publish in quality peer-reviewed journals. This is the key step in obtaining recognition from more colleagues in more established research areas.</p>	
	<ul style="list-style-type: none"> • Do you have any further comments regarding challenges in the planning of a strategic research framework in SEM? 	
	<p><i>14 Many of the above points are clearly dependent on the over goal setting and role of the individuals – whether they are seconded for research purposes to the SEM research programme. In some instances teach in adept but develop a major/or all of their research in a specialised research unit (sic).</i></p> <p><i>LH Comment: The meaning of the above statement is unclear. Will the respondent please explain in different words?</i></p> <p>14 A tremendous effort to identify and check all these organisational variables. Let's not forget there is a certain amount of "luck and opportunity" which will come into play here...</p>	
SECTION E: OUTPUTS [PRODUCTS] OF A MULTIDISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME		
	This section deals with types, levels and targets of outputs of a multidisciplinary SEM research programme.	

	STATEMENTS	COMMENTS
E1	TYPES OF OUTPUTS FROM A MULTIDISCIPLINARY RESEARCH PROGRAMME	
a.	The following are essential academic products of a multidisciplinary SEM research programme:	
	<ul style="list-style-type: none"> Non-scientific informational publications 	<p>12 Not excluding scientific publications!</p> <p><i>10 An essential but non-academic product that may help the community in general.</i></p>
	<ul style="list-style-type: none"> Non-peer reviewed scientific publications 	<p>12 Not excluding peer-reviewed publications.</p> <p>14 are of value - but not a focus</p>
	<ul style="list-style-type: none"> National peer-reviewed scientific publications 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> International peer-reviewed scientific publications 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Citation of publications 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Citation with high impact factor of publications 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Master's degrees 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> PhD degrees 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Registered patents 	14 why spend research time on these
	<ul style="list-style-type: none"> National conference presentations 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> International conference presentations 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Chapters in books 	
	<ul style="list-style-type: none"> Scholarly books 	
	<ul style="list-style-type: none"> Textbooks and published guidelines 	
	<ul style="list-style-type: none"> Short learning courses 	
	<ul style="list-style-type: none"> Increased academic stature among peers 	Consensus Round 3 SL1
	<ul style="list-style-type: none"> Invitations for collaboration from research units of high standing 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> A network of research partners [collaborators] 	Consensus Round 1 SL1
b.	The following are desired human outcomes of a multidisciplinary SEM research programme:	
	<ul style="list-style-type: none"> Promotion of staff within the university 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Appointment of staff members on university research structures 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Appointment of staff members on national research structures 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Appointment of staff members on national governmental 	

	scientific bodies	
	<ul style="list-style-type: none"> Appointment of staff members on international research structures 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Appointment of staff members on international scientific forums 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Increased levels of academic expertise within the programme 	Consensus Round 1 SL1
c.	The following objectives deal with desired financial outcomes within a multidisciplinary SEM research programme at a university. Select your level of agreement with each objective:	
	<ul style="list-style-type: none"> Financial self-sustainability 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Profitability 	<i>10 Not for an academic program.</i> 14 accountability and ...
	<ul style="list-style-type: none"> Commercialisation of research by contract research 	10 If it happens it should be accepted but it is not the goal. 12 If possible
	<ul style="list-style-type: none"> Commercialisation of research by selling new knowledge 	12 If possible
	<ul style="list-style-type: none"> Commercialisation of research by registering patents 	12 If possible 14 only if there is a clear commercial direction/market
	<ul style="list-style-type: none"> Growth of the programme by obtaining increasing amounts of research funding 	Consensus Round 1 SL1
E2	LEVELS OF FOCUS OF MULTIDISCIPLINARY SEM RESEARCH PROGRAMME	
a.	The following are important levels at which research outputs should be focused:	
	<ul style="list-style-type: none"> Community [regional] 	
	<ul style="list-style-type: none"> National 	Consensus Round 2 SL1
	<ul style="list-style-type: none"> International 	Consensus Round 2 SL1

	<ul style="list-style-type: none"> Specific publications 	<p>14 Don't really understand this point. 12 What does it mean?</p> <p>LH Comment: To focus on research preferable to a certain publication.</p> <p>14 Ok -- but a journal with a high impact factor</p> <p>Consensus Round 2 SL1</p>
	<ul style="list-style-type: none"> Specific industries 	
b.	The following are important persons and bodies at which research outputs should be focused [who should be pleased with the outcome?]:	
	<ul style="list-style-type: none"> University faculty 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> University management 	<p>14 They will be impressed with quality outputs.</p> <p>Consensus Round 3 SL1</p>
	<ul style="list-style-type: none"> National peers 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> International peers 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Funding agencies [MRC, NRF] 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Organised sport 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Government departments [sport, education, health etc] 	
	<ul style="list-style-type: none"> The public 	
	<ul style="list-style-type: none"> The healthcare industry 	
	<ul style="list-style-type: none"> The fitness industry 	Consensus Round 2 SL2
E3	ADDITIONAL INFORMATION REGARDING OUTPUTS OF A MULTIDISCIPLINARY SEM RESEARCH PROGRAMME	
a.	Additional information on outputs of a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> In your opinion, are there other significant outputs that may be relevant to a SEM research programme? 	
	<p>10 It is difficult to please all constituents. The important thing is to do good science.</p> <p>14 Unless I missed it – peer reviewed outputs in Journals with high Impact Factors – should be the primary output.</p>	
	<ul style="list-style-type: none"> Do you have any further comments regarding outputs in the planning of a strategic research framework in SEM? 	
	<p>12 SEM is important for high-level scientific research but it is also important to spread out the knowledge to those who might have a benefit. That includes all kind of publications.</p> <p>14 Peer reviewed outputs in high Impact Factor journals should clearly be the focus – other formats of publication should be seen as supporting and not a primary focus.</p>	
SECTION F: OUTCOMES [IMPACT] OF A MULTIDISCIPLINARY SPORT AND EXERCISE RESEARCH PROGRAMME		
	This section deals with longer term outcomes [impact] and significance of a multidisciplinary SEM research programme.	
	STATEMENTS	COMMENTS
F1	TYPES OF OUTCOMES FROM A MULTIDISCIPLINARY RESEARCH	

	PROGRAMME	
a.	The following are significant <i>academic outcomes</i> of a multidisciplinary SEM research programme:	
	<ul style="list-style-type: none"> Increased quantity of academic manuscripts 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Increased quality of academic manuscripts 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Increased funding of the research programme 	Consensus Round 1 SL1
b.	The following are significant <i>internal effects</i> [changes] that may indicate outcomes of the research programme:	
	<ul style="list-style-type: none"> Changes in number of researchers in the programme 	14 Agree – stability and growth. Consensus Round 2 SL1
	<ul style="list-style-type: none"> Changes in behaviour of researchers 	14 Agree – more from individual to team oriented. <i>14 Assume the development of a research output culture.</i> Consensus Round 2 SL1
	<ul style="list-style-type: none"> Changes in stature of researchers 	Consensus Round 1 SL1
	<ul style="list-style-type: none"> Changes in stature of the research programme 	Consensus Round 1 SL1
c.	The following are significant <i>external effects</i> [changes] that may indicate outcomes [significance] of the research programme:	
	<ul style="list-style-type: none"> Changes in the university [e.g. attitude, placement of the programme] 	Consensus Round 2 SL1
	<ul style="list-style-type: none"> Implementation of research findings in communities 	
	<ul style="list-style-type: none"> Changes in the community 	
	<ul style="list-style-type: none"> Changes in the profile of sport and exercise medicine 	Consensus Round 1 SL1
F2	MEASUREMENT OF OUTCOMES FROM A MULTIDISCIPLINARY RESEARCH PROGRAMME	
a.	In order to measure progress [success], specific outcomes of a research programme should be:	
	<ul style="list-style-type: none"> pre-planned [short-, medium- and long-term goals] 	Consensus Round 1 SL1

	<ul style="list-style-type: none"> quantified 	<p>10 There is a need to develop qualitative assessment tools.</p> <p>12 Quality is more important than quantity.</p> <p>Consensus Round 2 SL1</p>
	<ul style="list-style-type: none"> monitored 	Consensus Round 1 SL1
b.	The outcomes of a research programme should be monitored, but not necessarily planned and quantified	<p>14 <i>Too much monitoring can lead to process -not output focus.</i></p> <p>14 outputs need to be planned and resources allocated accordingly</p>
F3	ADDITIONAL INFORMATION REGARDING OUTCOMES [IMPACT] OF A MULTIDISCIPLINARY SEM RESEARCH PROGRAMME	
a.	Additional information on the outcomes [impact] of a Sport and Exercise Medicine research programme that panellists wish to include:	
	<ul style="list-style-type: none"> In your opinion, are there other significant outcomes [impact] that may be relevant to a SEM research programme? 	
	12 No	
	<ul style="list-style-type: none"> Do you have any further comments regarding outcomes [impact] in the planning of a strategic research framework in SEM? 	
	<p>12 <i>Scientific work needs a certain degree of freedom and cannot be planned in detail.</i></p> <p><i>Sometimes one should be able to follow uncertain or abstruse ways.</i></p>	
SECTION G: EXPERT PANELLISTS FINAL COMMENTS		
G1	Are there other aspects that, according to your knowledge and experience, should be included in planning a strategic framework for SEM research?	
	<p>12 Currently no, not everything can be planned. Researchers must have enough space for trial and error. A lot of good scientific ideas are a product of chance. Thank you.</p> <p>12 <i>No, the most important points are mentioned.</i></p> <p>14 <i>Thank you for providing me with the opportunity of sharing my experiences with you via completing this survey.</i></p>	