

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	i
ABSTRACT	iii
TABLE OF CONTENTS	v
LIST OF FIGURES.....	x
LIST OF TABLES.....	xiii
LIST OF ABBREVIATIONS	xvi
 CHAPTER 1 : INTRODUCTION	 1
1.1 Definition of the Title	1
1.2 Problem Domain.....	2
1.3 Objectives of the Project.....	3
1.4 Sequence of Tasks	4
1.5 Research Methodology	5
1.6 Contents of Dissertation	6
 CHAPTER 2 : REVIEW OF LITERATURE.....	 8
2.1 Introduction.....	8
2.2 Definition of Terms	8
2.3 General Review on Medical Expertise	10
2.3.1 Roles of Medical Expertise	10
2.3.2 Facts on Medical Expertise.....	11
2.3.3 Primary Health Care Model.....	11
2.4 Medical Organizations.....	13
2.4.1 Malaysian Medical Association (MMA).....	13
2.4.2 American Medical Association (AMA)	14

2.5	Reviews on Existing Systems.....	14
2.5.1	AMA Physician Select - On-Line Doctor Finder	14
2.5.2	Find A PM&R Physician.....	16
2.5.3	Doctors On Call.....	17
2.5.4	Find A Surgeon.....	17
2.5.5	Find An Ophthalmologist.....	18
2.5.6	Summary of Findings	19
2.6	Proposed Tools for Development.....	21
2.6.1	Microsoft Visual Basic 6.0 Professional Edition	21
2.6.2	Microsoft Access 97	23
2.6.3	Seagate Crystal Reports 6.0.....	24
2.6.4	Intercooled Stata 6.0.....	25
2.6.5	Macromedia Flash 3.0	27
2.7	A Proposed System.....	27
2.7.1	Client/Server Model	28
2.7.2	Using Visual Basic in a 3-tier design	29
2.8	Summary.....	29
CHAPTER 3 : RESEARCH ACTIVITIES.....		31
3.1	Introduction.....	31
3.2	Survey (Questionnaire).....	31
3.2.1	Data Gathering.....	32
3.2.2	Questionnaire Design.....	32
3.2.3	Pilot Test.....	34
3.2.4	Administration and Processing of Questionnaire	35
3.2.5	Results Analysis	36
3.2.6	Summary of Findings	44
3.3	Interview: Face to face.....	45
3.3.1	Steps Taken for the Interview.....	45
3.3.2	Results from the Interview	46
3.4	Summary.....	48

CHAPTER 4 : SYSTEM DEVELOPMENT.....	49
4.1 Introduction.....	49
4.2 Requirements Specification and Analysis	49
4.2.1 Functional Requirements.....	50
4.2.1.1 Administration Section.....	50
4.2.1.2 User Section	53
4.2.2 Non-Functional Requirements.....	53
4.2.2.1 Administration and User Sections.....	54
4.3 System Design	55
4.3.1 Architectural Design.....	55
4.3.1.1 System Structuring	55
4.3.1.2 Modular Decomposition.....	56
4.3.2 Program Design	57
4.3.2.1 MediX Administration	57
4.3.2.2 MediX User.....	60
4.3.3 User Interface Design	63
4.3.3.1 User Interface Design for MediX Administration.....	64
4.3.3.2 User Interface Design for MediX User	64
4.3.4 Database Design	64
4.4 System Implementation	69
4.4.1 System Development Tools.....	69
4.4.1.1 Operating System	70
4.4.1.2 Program Coding	70
4.4.1.3 Database Implementation	72
4.4.1.4 Report Generation	72
4.4.1.5 Statistical Package.....	73
4.4.1.6 Interface Design	78
4.4.2 Integration of Tools	78
4.4.2.1 Integration of Microsoft Access 97.....	78
4.4.2.2 Integration of Seagate Crystal Reports 6.0.....	79
4.4.2.3 Integration of Stata 6.0.....	79
4.4.2.4 Integration of Macromedia Flash 3.0	79

4.5	Testing	79
4.5.1	Unit testing	80
4.5.2	Module testing	81
4.5.3	Integration testing	81
4.5.4	System testing	82
4.6	Summary	82
CHAPTER 5 : SYSTEM EVALUATION		83
5.1	Introduction	83
5.2	Evaluation Methodology	83
5.3	Form Design	84
5.4	Pilot Test	87
5.5	Administration and Processing of Evaluation Forms	87
5.6	Analysis of Survey Outcomes	88
5.6.1	MediX Evaluation Form (Administrator)	89
5.6.2	User Feedback Form	98
5.7	Evaluation Aspects on Maintenance	104
5.8	Summary	104
CHAPTER 6 : DISCUSSION AND CONCLUSION		105
6.1	Introduction	105
6.2	Problems Encountered	105
6.2.1	During the Research Study	105
6.2.2	During the System Development	107
6.3	Features of the System	108
6.4	Limitations and Weaknesses	109
6.4.1	Limitations	109
6.4.2	Weaknesses	110
6.5	Future Enhancements and Further Research	111
6.5.1	Future Enhancements	111
6.5.2	Areas of Further Research	112

6.6 Contributions to Society	112
6.7 Conclusion	114
REFERENCES	117
BIBLIOGRAPHY.....	123
GLOSSARY	126
APPENDIX A : QUESTIONNAIRE FORM	
– REQUIREMENTS GATHERING FORM	
APPENDIX B : EVALUATION FORMS	
– MEDIX EVALUATION FORM (ADMINISTRATOR)	
– USER FEEDBACK FORM	
APPENDIX C : SAMPLE SCREENS OF THE MEDIX SYSTEM	
APPENDIX D : SAMPLE REPORTS	

LIST OF FIGURES

Fig. 2.1	A Sample Screen of Search By Specialty	16
Fig. 2.2	A Sample Screen of Search By Name.....	16
Fig. 2.3	Search Results for Find A Surgeon	18
Fig. 2.4	Search Results for Find An Ophthalmologist.....	19
Fig. 2.5	A Sketch of the Proposed System	28
Fig. 3.1	Computer Usage For All 15 Medical Centres in Percentage	36
Fig. 3.2	Computer Usage at 3 GHs, 4 PHs and 8 PCs in Percentage	36
Fig. 3.3	Current Practices of Keeping Track of Medical Expertise at 15 Medical Centres in Percentage	37
Fig. 3.4	Current Practices of Keeping Track of Medical Expertise at Each Medical Centre in Percentage.....	37
Fig. 3.5	Feedback on Incorporating A Statistical Package in the System	42
Fig. 3.6	Feedback on the Benefits of Using Such A System.....	42
Fig. 3.7	Feedback on the System to be Accessed By Patients.....	43
Fig. 3.8	Steps Taken for the Interview	46
Fig. 4.1	MediX Structure Chart	56
Fig. 4.2	MediX Administration Structure Chart.....	58
Fig. 4.3	MediX User Structure Chart.....	61
Fig. 4.4	E-R Model of the MediX Database	66

Fig. 4.5	A Sample Screen for Tabulation Of Job	74
Fig. 4.6	A Sample Screen for Tabulation Of Job with Plot.....	74
Fig. 4.7	A Sample Screen for Cross-Tabulation of Job and Gender	75
Fig. 4.8	A Sample Screen for Cross-Tabulation of Hospital and Gender with Row Percentages.....	75
Fig. 4.9	A Sample Screen for Three-way by Group of Job.....	76
Fig. 4.10	A Sample Screen for Three-way by Group of Place.....	76
Fig. 4.11	A Sample Graph of the Ratio of Medical Expertise at Rural and Urban Areas (shown in Histogram).....	77
Fig. 4.12	A Sample Graph of the Ratio of Medical Expertise by Gender at Each Medical Centre (shown in Histogram).....	77
Fig. 5.1	Feedback on the Ease of Use of The Statistical Package.....	93
Fig. 5.2	Feedback on the Training in Stata.....	93
Fig. 5.3	Ratings on the User Interface of the MediX Administration Section	95
Fig. 5.4	Ratings on the Ease of Use of MediX by Administrators	96
Fig. 5.5	Ratings on the Satisfaction of MediX by Administrators	96
Fig. 5.6	Ratings on the Usefulness of MediX for the Medical Community by Administrators.....	97
Fig. 5.7	Ratings on the Usefulness of MediX for the General Population by Administrators.....	97
Fig. 5.8	Ratings on the Ability to Identify the Desired Medical Expertise	101
Fig. 5.9	Ratings on the Ease of Use of the Search Function	101

Fig. 5.10 Ratings on the Usefulness of MediX by Users.....	102
Fig. 5.11 Ratings on the Satisfaction of MediX by Users	102
Fig. 5.12 Overall Impression of MediX by Users	102

LIST OF TABLES

Table 2.1	Partial List of the Roles of Medical Expertise	11
Table 3.1	Title and Purpose of the Questionnaire	33
Table 3.2	The Section Name, Question Type and The Total Number of Questions for the Requirements Gathering Form	34
Table 3.3	Overall Responses from 15 Participants of Section A of the Requirements Gathering Form	38
Table 3.4	Detailed Responses from Each Medical Centre of Section A of the Requirements Gathering Form	39
Table 3.5	Overall Responses from 15 Participants of Section B of the Requirements Gathering Form	39
Table 3.6	Detailed Responses from Each Medical Centre of Section B of the Requirements Gathering Form	41
Table 4.1	General Profile for MediX Database	65
Table 4.2	Doctor Table in MediX Database	67
Table 4.3	Hospital Table in MediX Database	67
Table 4.4	Job Table in MediX Database	68
Table 4.5	Works Table in MediX Database	68
Table 4.6	At Table in MediX Database	68
Table 4.7	Admin Table in MediX Database	69
Table 4.8	Tools for System Development	69

Table 4.9	Name of Forms and Descriptions for MediX Administration.....	71
Table 4.10	Name of Forms and Descriptions for MediX User.....	72
Table 4.11	Modules and Descriptions for MediX Administration and MediX User	72
Table 4.12	Names of Reports and Descriptions for MediX Administration and User	73
Table 5.1	Title and Purpose of the Two Evaluation Forms.....	84
Table 5.2	Section Titles, Question Types and the Total Number of Questions for the MediX Evaluation Form (Administrator).....	86
Table 5.3	Section Titles, Question Types and the Total Number of Questions for the User Feedback Form	86
Table 5.4	Responses from 4 Individual Evaluators for the Section A in the MediX Evaluation Form	89
Table 5.5	Responses from 4 Individual Evaluators for the Section B in the MediX Evaluation Form	90
Table 5.6	Overall Responses from 4 Evaluators in Percentage for the Section C in the MediX Evaluation Form	91
Table 5.7	Overall Responses from 4 Evaluators in Percentage for the Section D in the MediX Evaluation Form	92
Table 5.8	Overall Responses from 4 Evaluators in Percentage for the Section E in the MediX Evaluation Form	94
Table 5.9	Ratings on the User Interface of the MediX Administration Section.....	95
Table 5.10	Ratings on the Ease of Use of MediX by Administrators	96
Table 5.11	Ratings on the Satisfaction of MediX by Administrators.....	96

Table 5.12 Ratings on the Usefulness of MediX for the Medical Community by Administrators.....97

Table 5.13 Ratings on the Usefulness of MediX for the General Population by Administrators97

Table 5.14 The 9 Users for the User Feedback Forms98

Table 5.15 Responses from 9 Users for the Section A in the User Feedback Form99

Table 5.16 Ratings on the Ability to Identify the Medical Expertise.....101

Table 5.17 Ratings on the Ease of Use of the Search Function.....101

Table 5.18 Ratings on the Usefulness of MediX by Users.....101

Table 5.19 Ratings on the Satisfaction of MediX by Users101

Table 5.20 Overall Impression of MediX by Users.....102

LIST OF ABBREVIATIONS

AAO	American Academy of Ophthalmology
AAOS	American Association of Orthopedic Surgeons
AAPM & R	American Academy of Physical Medicine & Rehabilitation
ADO	ActiveX Data Objects
AMA	American Medical Association
AuMA	Australian Medical Association
BMA	British Medical Association
COM	Component Object Model
DAO	Data Access Objects
DBMS	DataBase Management System
DLL	Dynamic Link Library
DOC	Doctors On Call
DSN	Data Source Name
E-R	Entity-Relationship
GH	Government Hospital
GP	General Practitioner
GUI	Graphical User Interface
IT	Information Technology
LAN	Local Area Network
MD	Doctors of Medicine
MMA	Malaysian Medical Association
ODBC	Open DataBase Connectivity

OLEDB	Object Link Embedding DataBase
OS	Operating System
PC	Private Clinic
PH	Private Hospital
PM&R	Physical Medicine & Rehabilitation
RAD	Rapid Application Development
RDO	Remote Data Objects
SMA	Singapore Medical Association
SNA	Systems Network Architecture
SPSS	Statistical Package for the Social Sciences
SQL	Structured Query Language
TCP/IP	Transmission Control Protocol/Internet Protocol
US	United States
VB	Visual Basic