Contents

Foreword			хi	
Pre	Preface to the second edition x			
Preface to the first edition				
Int	roduct	ion	1	
Pa	rt I F	oundations	9	
1	The	human		
	1.1	Introduction	12	
	1.2	Input-output channels	13	
		Design Focus: Getting noticed	16	
	1.3	Human memory	26	
		Design Focus: Cashing in	29	
	1.4	Thinking: reasoning and problem solving	36	
		Design Focus: Whose error?	47	
	1.5		48	
	1.6	Psychology and the design of interactive		
		systems	48	
	1.7	Summary	51	
		Exercises	51	
		Recommended reading	51	
2	The	computer		
	2.1	Introduction	54	
		Text entry devices	56	
	2.3	Positioning and pointing devices	63	
	2.4		72	
	2.5	Paper: printing and scanning	79	
		Design Focus: Readability of text	83	
	2.6	Memory	89	
	2.7	Processing	96	

		Design Focus: The myth of the infinitely fast	97
	- 0	machine	101
	2.8	Summary	101
		Recommended reading	102
3	The	interaction	
	3.1	Introduction	103
	3.2	Models of interaction	104
		Design Focus: VCR	109
	3.3	Frameworks and HCI	109
	3.4	Ergonomics	110
		Design Focus: Industrial interfaces	112
	3.5	Interaction styles	115
	3.6	Elements of the WIMP interface	123
		Design Focus: Learning toolbars	129
	3.7	Screen design and layout	131
		Design Focus: Checking screen colours	132
	3.8	Interactivity	136
	3.9	The context of the interaction	137
	3.10	Summary	138
		Exercises	139
		Recommended reading	139
Pa	ırt II	Design practice	141
4	Usal	bility paradigms and principles	
	4.1	Introduction	143
	4.2	Paradigms for interaction	144
	4.3	Principles to support usability	162
	4.4	Summary	177
		Exercises	177
		Recommended reading	177
5	The	design process	
-	5.1	Introduction	179
	5.2	The software life cycle	179
	5.3		190
	5.4		199
		Itarativa dagine and meataturing	

CONTENTS

294

vii

		Design Focus: Prototyping in practice	209
	5.6	Design rationale	212
	5.7	Summary	220
		Exercises	220
		Recommended reading	221
6	Mod	els of the user in design	
	6.1	Introduction	223
	6.2	User requirements modelling	223
	6.3	Socio-technical models	224
	6.4	Soft systems methodology	227
	6.5	Participatory design	229
	6.6	Cognitive models	230
	6.7	Goal and task hierarchies	231
		Design Focus: GOMS saves money	234
	6.8	Linguistic models	241
	6.9	The challenge of display-based systems	245
	6.10	Physical and device models	246
	6.11	Cognitive architectures	254
	6.12	Summary	257
		Exercises	258
		Recommended reading	259
7	Task	analysis	
	7.1	Introduction	260
	7.2	Differences between task analysis and other	
		techniques	261
	7.3	Task decomposition	262
	7.4	Knowledge-based analysis	268
	7.5	Entity-relationship-based techniques	274
	7.6	Sources of information and data collection	280
	7.7	Uses of task analysis	287
	7.8	Summary	290
		Exercises	291
		Recommended reading	291
8	Dialo	og notations and design	
	8.1	What is dialog?	292

Dialog design notations

8.2

CONTENTS

viii

0 ^	Diagrammatic notations	206
8.3	-	296
	, , , , ,	299
	•	311
ο,	•	212
•	•	313
_	•	324
		330
0./	•	337
		338
	Recommended reading	339
Mode	els of the system	
9.1	Introduction	341
9.2	Standard formalisms	341
9.3	Interaction models	354
9.4	Status/event analysis	365
9.5	Summary	373
	Exercises	374
	Recommended reading	375
Impl	ementation support	
10.1	Introduction	378
10.2	Elements of windowing systems	379
10.3	Programming the application	384
	Design Focus: Going with the grain	389
10.4	Using toolkits	390
	Design Focus: Java and AWT	392
10.5	User interface management systems	395
10.6	Summary	402
	Exercises	403
	Recommended reading	403
Eval	uation techniques	
11.1	What is evaluation?	406
11.2	Goals of evaluation	406
11.3	Styles of evaluation	407
_		408
	8.6 8.7 Mode 9.1 9.2 9.3 9.4 9.5 Impl 10.1 10.2 10.3 10.4 10.5 10.6	Design Focus: Using STNs in prototyping Design Focus: Digital watch – documentation and analysis 8.4 Textual dialog notations 8.5 Dialog semantics 8.6 Dialog analysis and design 8.7 Summary Exercises Recommended reading Models of the system 9.1 Introduction 9.2 Standard formalisms 9.3 Interaction models 9.4 Status/event analysis 9.5 Summary Exercises Recommended reading Implementation support 10.1 Introduction 10.2 Elements of windowing systems 10.3 Programming the application Design Focus: Going with the grain 10.4 Using toolkits Design Focus: Java and AWT 10.5 User interface management systems 10.6 Summary Exercises Recommended reading Evaluation techniques 11.1 What is evaluation? 11.2 Goals of evaluation 11.3 Styles of evaluation

11.5 Evaluating the implementation

415

	11.6	Choosing an evaluation method	436
	11.7	Summary	440
		Exercises	441
		Recommended reading	441
12	Help	and documentation	
	12.1		444
	12.2	Requirements of user support	445
	12.3	Approaches to user support	446
	12.4	Adaptive help systems	450
	12.5	Designing user support systems	457
	_	Summary	459
		Exercises	459
		Recommended reading	460
Day	4 III	Application areas	461
		Application areas	401
13		pware Introduction	463
	-	Groupware systems	464
	_	Computer-mediated communication	467
		Meeting and decision support systems	476
		Shared applications and artefacts	481
		Frameworks for groupware	488
		Implementing synchronous groupware	496
		Summary	506
	13.0	Exercises	507
		Recommended reading	507
14		N and social issues	F10
		Introduction	510
	-	Face-to-face communication	511
	14.3	Conversation	516
		Text-based communication	528
		Group working	537
	14.6	Organizational issues	544
		Design Focus: Implementing workflow in Lotus	549
		Notes	

Index

14.7	Cummany	
	Summary	550
	Exercises	551
	Recommended reading	552
Out o	of the glass box	
15.1	Introduction	554
15.2	Multi-modal and multimedia systems	555
15.3	Speech in the interface	556
	Design Focus: Mathematics for the blind	559
	Design Focus: Choosing the right kind of speech	561
15.4	Non-speech sound	562
15.5	Handwriting recognition	567
	Design Focus: Apple Newton	567
15.6	Gesture recognition	569
15.7	Computer vision	569
15.8	Ubiquitous computing applications research	570
15.9	Interfaces for users with special needs	576
15.10	Virtual reality	578
	Design Focus: Applications of augmented reality	582
15.11	. Information and data visualization	583
15.12	2 Summary	590
	Exercises	591
	Recommended reading	591
Нурс	ertext, multimedia and the World Wide Web	
16.1	Introduction	593
16.2	Text, hypertext and multimedia	593
16.3	The World Wide Web	596
16.4	Animation	598
_	_	599
	<u> </u>	600
16.7	Design focus: designing for the World Wide Web	602
16.8	•	609
	Exercises	610
	Recommended reading	610
Refe	rences	611
	15.1 15.2 15.3 15.4 15.5 15.6 15.7 15.8 15.9 15.10 15.11 15.12 Hype 16.1 16.2 16.3 16.4 16.5 16.6 16.7 16.8	Out of the glass box 15.1 Introduction 15.2 Multi-modal and multimedia systems 15.3 Speech in the interface Design Focus: Mathematics for the blind Design Focus: Choosing the right kind of speech 15.4 Non-speech sound 15.5 Handwriting recognition Design Focus: Apple Newton 15.6 Gesture recognition 15.7 Computer vision 15.8 Ubiquitous computing applications research 15.9 Interfaces for users with special needs 15.10 Virtual reality Design Focus: Applications of augmented reality 15.11 Information and data visualization 15.12 Summary Exercises Recommended reading Hypertext, multimedia and the World Wide Web 16.1 Introduction 16.2 Text, hypertext and multimedia 16.3 The World Wide Web 16.4 Animation 16.5 Video and digital video 16.6 Educational technology 16.7 Design focus: designing for the World Wide Web 16.8 Summary Exercises

628