

Contents

Abstract	xi
Überblick	xiii
1 Introduction	1
1.1 (Global) Demographic Change and its Consequences for Modern Societies	2
1.2 Technological Development and its Potential for Graying Societies . .	11
1.2.1 Brief History of Technology Development	11
1.2.2 The Consequences of Technology Development	13
1.3 Integrative Approaches to Assist Humans in Their Environments . .	15
1.3.1 Ambient Assisted Living	16
1.3.2 Ubiquitous Computing / Pervasive Computing	17
1.3.3 Ambient Intelligence	18
1.3.4 Telemedicine	22
1.4 Varying Levels of Technology Access and Usage	25
1.4.1 Current Needs of an Aging Society	27
1.4.2 Age: A Critical Factor for Use of Technology?	27
1.4.3 Technology Generations	29
1.5 Consequences for a User-Centered Research	31
1.5.1 Overall Summary	31
1.5.2 Need for a User-Centered Research	34
1.5.3 Objectives	35
2 Technology Acceptance	37
2.1 Existing Technology Acceptance Models	38
2.1.1 Innovation Diffusion Theory	38
2.1.2 Theory of Reasoned Action and Theory of Planned Behavior .	40
2.1.3 Technology Acceptance Model	43
2.1.4 Unified Theory of Acceptance and Use of Technology	45
2.2 New Acceptance Patterns for Health-Related Technologies?	49

2.2.1	Privacy and Data Security	53
2.2.2	Trust	55
2.3	Individual Differences and Technology Acceptance	58
2.3.1	Age	59
2.3.2	Gender	61
2.3.3	Technical Expertise	63
2.3.4	Attitudes Towards Use of Technology (Technical Anxiety, Technical Self-efficacy and Technical Self-confidence)	66
2.3.5	Socio-economic Factors, Health Condition, and Cultural Influ- ences	69
2.4	Usability as a Part of Acceptance	71
2.4.1	International Standards on Usability	72
2.4.2	Usability and Technology Acceptance	74
3	Research Intention and Realization	77
3.1	Multidisciplinary Scientific Approach	78
3.1.1	Psychology	78
3.1.2	Medical Engineering	81
3.1.3	Computer Science	82
3.1.4	Communication Science	83
3.1.5	Architecture	85
3.2	Realization in the Future Care Lab®	86
3.2.1	Smart Wall	88
3.2.2	Smart Floor	89
3.2.3	Monitoring Vital Data	89
3.3	Overall Research Goals	92
4	Research Approach	95
4.1	Research Methods	95
4.1.1	Qualitative Methods	96
4.1.2	Quantitative Methods	99
4.2	Overview of the Implemented Studies	104
4.2.1	Individual Interviews	104
4.2.2	Focus groups	106
4.2.3	Questionnaires	111
4.2.4	Experimental Studies	120
4.3	Research Model	126
	User characteristics	128

System Requirements and Expectations	130
Formation of Opinion and the Resulting System Adoption . .	131
4.4 Hypotheses and Research Questions	132
4.5 Note About the Analyses of the Results	134
5 User Diversity and the Use of Technology	139
5.1 Attitudes Towards Use of Technology	140
5.1.1 Technology Generations: Young and Old Technology Users . .	140
5.1.2 The Role of Gender in the Use of Technology	143
5.2 Technical Experience and Subjective Technical Self-Confidence	146
5.3 Attitudes Towards Aging	148
5.3.1 Quality of Life in Old Age	149
5.3.2 Concerns in Old Age	150
5.3.3 Active and Passive Lifestyle in Old Age	150
5.4 Attitudes Towards (Chronic) Diseases	152
6 Trust, Privacy, and Security in the Use of eHealth Technology	159
6.1 Trust in the System's Reliability	159
6.1.1 Trust Properties	160
6.1.2 Trust Conditions	161
6.2 Perceptions of Privacy	164
6.2.1 Privacy in General	165
6.2.2 Privacy in Selected Areas in the Home Environment	167
6.3 Perceptions of Security	170
6.4 Control vs. Surveillance	177
7 Acceptance of eHealth Technology in the Home Environment	189
7.1 Meta-Analysis for the Acceptance of eHealth Technology	190
7.2 Motivation to Use Health-Supporting Ambient Technology	193
7.2.1 Perceived Benefits of Using eHealth Technology	193
7.2.2 Perceived Barriers for the Use of eHealth Technology	194
7.3 Impact of Culture on the Acceptance of eHealth Technology	196
7.4 Perceived Ease of Use and Usefulness of eHealth Technology	198
7.4.1 Perceived Ease of Use	198
7.4.2 Perceived Usefulness	199
7.5 How Are User Characteristics Associated with the Acceptance of eHealth?	202
8 Usability of Medical Assistive Technology	211

8.1	Experiment I: Vital Data Monitoring and the Usability of eHealth . .	212
8.1.1	Preliminary Outcomes	213
8.1.2	Impact of User Diversity on Privacy, Trust, and Security	214
	Privacy	214
	Trust in the System's Reliability	216
	Data Security	217
8.2	Experiment II: Expanding Traditional Usability Criteria in the Context of Health-Related Technology	219
8.2.1	Impact of User Diversity on Usability and Acceptability of eHealth	221
	Usability	222
	Learnability	223
	System Complexity, Perceived Usefulness, and User Satisfaction	224
	Privacy	224
	Trust and Security	225
8.2.2	The Best Predictors for the Adoption of eHealth Technology .	225
	Suitability for Use	226
	Operationality	227
	Usefulness	227
9	Conclusions and Future Research Directions	233
9.1	Evaluation of the Results	235
9.1.1	User Diversity	235
9.1.2	Dynamic Character of Acceptance	239
9.1.3	Additional System Requirements	241
9.1.4	The Power of the Usability	243
9.2	Final Conclusions and Recommendations	244
9.3	Limitations	251
9.3.1	Critical Consideration of the Methodology	252
9.3.2	Further Points of Criticism	253
9.4	Future (Research) Directions	254
	Bibliography	257