

Contents

1 Introduction.....	1
Barbara Flügge	
 Part I Mobility is Everywhere	
2 Reflecting the Status Quo.....	7
Barbara Flügge	
2.1 Mobility – Change for the Good	9
2.2 How to Measure and Compare Mobility	14
2.3 Traffic Volume in Passenger Traffic.....	15
2.4 Buying and Consumer Behavior of Individual Travelers	17
2.5 Travel Business as a Key Contributor to Economic Growth	20
2.6 Freight Transport Stimulating Economic Growth	24
2.7 Mobility as a Guarantor for Successful Supply Chain Management.....	26
2.8 Mobility Creation and Preservation, Traffic Safety and Sustainability	31
2.8.1 Mobility Creation.....	31
2.8.2 Mobility Preservation.....	33
2.8.3 Traffic Safety and Sustainability	36
2.9 Traffic Management Systems and IT Trends.....	37
2.9.1 Intelligent Transport Systems	37
2.9.2 A Global Study About Mobility in 20 Cities.....	42
2.9.3 Industry 4.0 and the Internet of Things	43
3 The Mobility Ecosystem.....	47
Barbara Flügge	
3.1 Driving Mobility Through Smart Mobility Design	48
3.2 Introducing Ecosystems.....	49
3.2.1 Habitats in Nature	49
3.2.2 Economic Constructs and Other Ecosystems	50
3.3 The Digital Ecosystem.....	54

3.4	About Users, Consumers and Personae	55
3.4.1	Targeting and Designing an Ecosystem Through Consumer Behavior	55
3.4.2	The Digital Consumer	57
3.5	Servitization and Interactions	58
3.5.1	Services, the Commodity for Intelligent Applications and Things	58
3.5.2	The Internet of Services Role Model	61
3.6	Depicting Reality in Scenarios and Use Cases	67
4	The Digital Economy and the Promise of a New Mobility	69
	Heinrich Pfriemer	
4.1	The Term Digital Economy	70
4.2	Strategic Innovation as a Key Enabler in the Digital Economy	71
5	The Smart Mobility Ecosystem	75
	Barbara Flügge	
5.1	The Role Play	76
5.2	Smart Mobility Role Model	85
5.2.1	Impact of Smart Mobility on Existing Sectors	85
5.2.2	Transformation into the Digital Era	86
5.3	Service Enablement and Service Enrichment	88
5.4	The Smart Mobility Ecosystem	95
6	Focus of this Publication	97
	Barbara Flügge	
 Part II Smart Mobility hits the Road		
7	Smart Mobility Usage Scenarios I	105
	Stefanie Baumann and Michael Püschner	
7.1	Smart Services	107
7.1.1	Mobility Platforms for Route Optimization and Intermodal Ticketing in Transportation	107
7.1.2	Smart Parking Solutions	108
7.1.3	Automated Logistics	109
7.1.4	New Flexibility in Public Transport	109
7.2	Smart Data	110
7.3	Smart Products	111
7.4	Smart Spaces	111
7.5	New Concepts and Roles	112

8 Smart Mobility Usage Scenarios II	113
Barbara Flügge	
8.1 Personae on the Road.	114
8.1.1 Medical Tourism and Travel-In-Company.	114
8.1.2 The Personal Mobility Account.	119
8.1.3 Deployable End-To-End Ride- and Interest Sharing.	121
8.1.4 Mobility Management for Facility and Asset Management	123
8.2 Intermodality	127
8.2.1 Setting the Stage	127
8.2.2 A Matter of Interest	129
8.2.3 Where Is Intermodal Mobility Heading?	131
8.2.4 Connecting Everyone – Intermodality in Rural Areas, Small and Medium-size Communities.	133
8.3 Business and Social Needs in the Age of IoT, Industry 4.0, and the Circular Economy	135
8.3.1 Autonomous Driving	135
8.3.2 Continuous Business Process Enablement	138
8.3.3 Business and Social Arguments.	141
9 Indoor and Outdoor Navigation in Smart Mobility Usage Scenarios	147
Carsten Günther and Matthias Jöst	
9.1 Introduction	148
9.2 Indoor-Outdoor Navigation – Requirements and Benefits	149
9.3 Technical Requirements.	150
9.3.1 Spatial Data Management	151
9.3.2 Indoor Positioning	152
9.3.3 Map Visualization	154
9.3.4 Turn-by-Turn Navigation – Landmark-Based Guidance.	154
9.4 Indoor Navigation and Business Models.	156
10 Smart Ticketing	159
Senta Belay	
10.1 Trajectory of Ticketing.	160
10.1.1 The Ticket as Design Element of Smart Mobility Offerings.	160
10.1.2 Usage-Based, Hence Subscription-Based Billing	165
10.2 Enhancing Smart Ticketing	166
11 Mobility Diagnostics	171
Barbara Flügge	
11.1 Traffic Data Management	171
11.2 Service Driven Analytics	174
11.3 Intersection Analysis and Relevant Action Items	174

Part III The Future of Mobility

12 Building Blocks of Intelligent Mobility	183
Barbara Flügge	
12.1 Smart Mobility Program Management	184
12.2 Smart Services	189
12.3 Smart Data	194
12.4 Smart Products	195
12.5 Smart Spaces	196
13 The Smart Mobility Procedure Model	199
Barbara Flügge	
13.1 Explorative Phase	201
13.2 Sound Check Phase	202
13.3 Initiation Phase and Kick-Off	203
13.4 Fitness Check	210
13.5 Market Access Check	213
13.6 Context Check	217
14 Reference Architecture: Smart Mobility	221
Nicolas Liebau	
14.1 Architecture Overview	221
14.2 Network Layer	223
14.3 Cloud Layer	223
14.3.1 Infrastructure Layer	223
14.3.2 Platform Layer	224
14.3.3 Application Layer	226
14.3.4 Digital Composition Layer	226
14.4 Smart Mobility Access and Smart Mobility Front End Layer	227
14.5 Conclusion	227

Part IV Recommended Actions and Future Directions

15 Getting Started!	231
Barbara Flügge	
16 Making Use of Innovation Wisely	235
Katrin Redmann	
17 A New Service Paradigm	243
Barbara Flügge	
17.1 Mobility-as-a-Service (MaaS) from UbiGo's Point of View	244
17.2 Business Modeling MaaS	248

18 A Holistic View of New Concepts and Roles 255
Barbara Flügge
18.1 Targeting Smart Mobility to Connect Everyone 256
18.2 Prerequisites for the Digital Mobility Ecosystem 261
18.3 About the Political Framework and the Degree of Freedom for
Smart Mobility 262

19 Organizational Transformation Maturity 267
Heinrich Pfriemer
19.1 Conducting Maturity Assessments Based on BIM 267
19.2 Proficiencies of Digital Maturity 273

Concluding Remarks 275

Glossary and Acronyms 277

References 281

Index 291