

**From Smart City
to Smartphone City:
Towards a Telematic Digital Strategy
In Urban Environments**

Elmar Trefz

University of Technology Sydney

Submitted to the Faculty of Design Architecture and Building in Partial Fulfilment of
the Requirements for the Degree of Doctor of Philosophy

2017

Certificate of Authorship / Originality

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree. I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

Elmar Trefz October, 2017

Production Note:

Signature removed prior to publication.

Table of Contents

			Page
		ABSTRACT	6
		PREFACE	6
1		INTRODUCTION	8
	1.1	The Telematic Digital Age: Beyond a dystopia of misunderstanding	8
	1.2	Focus	12
	1.3	Objectives	13
	1.4	Methodology	13
	1.5	Chapter Overview	15
	1.6	Motivation	16
	1.7	Preliminary Studies: Defining Spatial Interaction Design (SID)	17
		1.7.1 SID: Interactive Brand Experiences	17
		1.7.2 SID: Interactive Exhibition Design	18
		1.7.3 SID: Interactive Media Architecture	20
		1.7.4 SID: Interactive Art	21
		1.7.5 SID: Urban Context	23
	1.8	Preliminary Studies: Defining Rapid Probing	24
		1.8.1 Generative Methods versus Observational Methods. 1.8.1.1 Rapid Probing 1.8.1.2 Defining Rapid Probing 1.8.1.3 Steps and Evaluation 1.8.1.4 From Probe to prototype 1.8.1.5 Summary 1.8.1.6 Ph.D Context.	26-31
2		LITERATURE REVIEW	32
	2.1	Urban Informatics	35
		2.1.1 The Urban Anatomy	35
	2.2	Smart Cities	36
	2.3	Public Life Studies	39
	2.4	Contextual Inquiry	42
		2.4.1 Rationale for Contextual Inquiry	52
	2.5	Telematics	54
		2.5.1 Why Telematics	54
		2.5.2 Telematic Literature within this Research	56
	2.6	Performativity	57
	2.7	Performative Urban Design	58
	2.8	Literature Review: Conclusion	59

3			URBAN CONTEXTUAL INQUIRY	62
	3.1		Introduction	62
		3.1.1	Understanding the User Experience	62
	3.2		Conducting the Research	64
	3.3		Transcribing and Modelling the Data	64
		3.3.1	Sequence Model	65
		3.3.2	Flow Model	66
		3.3.3	Physical Model	70
	3.4		Participant Demographic	73
	3.5		Conclusion	77
4			RESULTING DATA MODELS	78
	4.1		Individual Models	78
	4.2		Consolidated Models (CM) and Personas	78
		4.2.1	CM: Persona 1: (Agathe, Laurene, Peter)	80
		4.2.2	CM: Persona 2: (Matt, Sebastian)	89
		4.2.3	CM: Persona 3: (Liya, Kay)	107
		4.2.4	CM: Persona 4: (Bea, Heidi, Ralph)	120
		4.2.5	CM: Conclusion	141
	4.3		Model Analysis (MA)	141
		4.3.1	MA: Persona 1	142
		4.3.2	MA: Persona 2	142
		4.3.3	MA: Persona 3	143
		4.3.4	MA: Persona 4	144
		4.3.5	MA: by Use Case	145
		4.3.6	Analysis of all Consolidated Models	147
		4.3.7	MA: Conclusion	147
	4.4		Smartphone Interaction Patterns in Public Space	148
		4.4.1	Smartphone Payments	148
		4.4.2	Public Transport: Information-Entertainment-Messaging	149
		4.4.3	The Car Commute	153
		4.4.4	Waiting	155
		4.4.5	Physical Tasks and Commuting	156
		4.4.6	Smart Parking	157
		4.4.7	Photo Sharing	158
		4.4.8	Email and Commuting	159
		4.4.9	Public Chats	159
		4.4.10	Traffic Light Easy	159
		4.4.11	The Time in Public	161
		4.4.12	Mobile Weather	161
		4.4.13	Opening Doors	162
		4.4.14	Music and the Commute	163
		4.4.15	Public Wi-Fi	164
		4.4.16	Walking Liability	164
		4.4.17	Interaction Patterns: Conclusion	165

5			FINDINGS	166
	5.1		Speculative Design Visions (SDV)	166
		5.1.1	SDV 1: Smart Parking Meters (Personas 2 and 4)	166
		5.1.2	SDV 2: Smart Public Transport Tickets (Personas 1 and 3)	167
		5.1.3	SDV 3: Smart Traffic Lights (for All Personas)	167
		5.1.4	SDV 4: UrbanAPI: Urban Data Sharing Platform	168
	5.2		Synchronisation	171
	5.3		From Smart City to Smartphone City	172
		5.3.1	Example: Real-time Transport Information	173
		5.3.2	Spatial Interaction Design in the Smartphone City	175
		5.3.3	Cost Limitations and Scaleability	177
	5.4		Toward a Telematic Reality through disembodiment, telepresence, Smartphone use	180
	5.5		Evaluation: Contextual Inquiry as an Urban Research Methodology	181
	5.6		Conclusion: Findings	184
6			CONCLUSION	185
7			ENDNOTES	189
8			REFERENCES	199

Abstract

Adam Greenfield has debunked the ‘Smart City’ as an unfeasible modernist vision. However, cities are already complex interactive systems, grown from the bottom up according to a complex combination of static, dynamic and interactive systems.

To represent a city as an interactive system would be as complex as the design of a future ‘Smart City’ itself. This research investigates the user’s experience of the city. It focuses not on individual interactive touch points, but on understanding urban user experience from a macro-perspective in the context of the everyday life of the digital age.

The research positions itself between contextual bases: digital product and service design (Jan Chipchase) and Public Life Studies (Jan Gehl). It spans digital products and services via individual systems in specific environmental contexts, and Public Life Studies from a spatial design perspective. The goal here is to investigate the interplay between the two.

Further, the research investigates the performative and telematic qualities of digital implementations in public space, based on the proliferation of Smartphones and spatial interaction design in the urban environment. It thereby extends the notion of engaging with virtual and mixed realities via digital interfaces, anticipating, with reference to Villem Flusser’s ‘Telematic Society’, the theory of engaging with a telematic reality.

The research findings point to a shift away from a Smart City approach towards a ‘Smartphone City’ approach, arguing for a stronger integration of Smartphones in the urban fabric rather than the deployment of new and expensive infrastructures.

Preface

Laurene leaves her home and walks to the bus stop. Pausing at the traffic lights, she checks the progress of her bus using the NextThere app on her iPhone. She crosses the street to the stop, and waits. The bus duly arrives and she enters, paying with her Opal card. At first she must stand, since there are no seats available. She proceeds to consult her iPhone while standing, reading news from the *Le Monde* news website. After the throng disperses at Bondi Junction she sits, continuing to scan the news. When done with reading, she keeps the phone in her hand for the entire trip. Laurene presently exits the

bus (tapping off her Opal card) and walks to work. There, she enters the building with a swipe card. Laurene then spends nine hours, from 9am to 6pm, in her office - an advertising agency in the central business district of Sydney. We note that she eats her lunch at her desk. After work, she leaves her building and proceeds by foot to the bus stop. She awaits the bus while texting friends on her iPhone. Next, she boards, paying with her Opal card. During the trip she continues texting, then reads Elle Magazine on the Elle Magazine iPhone app. Presently she alights, tapping off the (very convenient) Opal card, crosses the street at the lights and heads home. After a pleasant walk, she arrives at her house.

The digital has transformed how you and I operate in everyday urban life - from convenient payment systems to asynchronous text and image communication, to hyperlinked news reading, to social networking, to location-based services... And yet, these novel digital systems lack integration with the urban systems that we know. Lawsuits against AirBnb and Uber are only the most current instances of such a lack of integration. In the face of high supply and demand, our authorities continue to struggle with the disruptiveness these new systems cause in our accepted urban systems.

Meanwhile, urban developers seek to equip new developments with infrastructure that supports digital systems. However, they struggle to identify use-cases that facilitate meaningful interactions (Greenfield 2013). For example, high-speed wireless internet infrastructures might be implemented, or large-scale screens on top of sensors and actuators. The problem is, integration from a user's use-case perspective is lacking due to poor general understanding of user needs (Kiib 2010).

Location-based services that directly interact with their surroundings like AirBnB, Uber or Tinder show that re-connection of the Smartphone within the urban environment is on the rise, without the need to deploy hardware infrastructure as promoted by urban developers and ICT companies such as IBM, Cisco and Siemens. Smartphones in fact bring the necessary computational power to achieve complex use-cases. What remains then, is the question of what those use-cases actually are, how they address citizens' needs, and how they should be implemented.
