Anna Luusua

EXPERIENCING AND EVALUATING DIGITAL AUGMENTATION OF PUBLIC URBAN SPACES
ANNA LUUSUA

EXPERIENCING AND EVALUATING DIGITAL AUGMENTATION OF PUBLIC URBAN PLACES

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Abstract

The integration of digital technologies into urban life and environments has accelerated rapidly over the past few decades. It has been well established that this digital augmentation is changing the way we use and experience urban places; however, more studies, especially at the micro-level and from an architectural point of view, must be conducted in order to increase our understanding of the phenomenon.

In this thesis, I examine the experience and evaluation of digitally augmented public urban places through four case studies, analysing participants’ experiences of adaptive lighting pilots and urban displays deployed in real world settings. Digital augmentations were found to be able to alter the genius loci significantly; furthermore, findings from these case studies demonstrate and explain how co-design, existing use patterns and user groups in urban places, climate and weather, and sense of place affect digital augmentations.

The thesis makes a methodological contribution in the form of evaluation probes. This method was developed by modifying the cultural probes method for the purposes of evaluative research of design artefacts. The proposed method allows for the emic evaluation of design artefacts without direct researcher presence. In other case studies, I have used ethnographically inspired methods to gather research materials.

In analysing research materials I make a theoretical contribution by introducing the concept of emplacement into architectural research. This concept highlights the importance of place in our experience as embodied individuals. Based on my empirical results, I argue for the design of meaningful emplaced experiences through digital augmentation. I also chart the design challenges that have emerged from my studies, utilising them to develop a holistic model that aims to describe experiences of digital augmentation in public urban places.

Overall, the thesis proposes participatory design evaluation as a new approach in the field of architecture. It refers to the examination and utilisation of research participants’ intersubjective accounts in the evaluation of design artefacts from an experiential point of view. I argue for the benefits of this approach for the further inclusion of research knowledge in design and planning processes.

Keywords: experience, evaluation, public urban places, urban design, digital augmentation, urban computing, ubiquitous computing, public displays, adaptive lighting, evaluation probes, embodiment, emplacement.
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Tiivistelmä

Viimeisten vuosikymmenen aikana digitaaliset teknologiat ovat asettuneet osaksi kaupunkielämää ja kaupunkipaikkoja. Tämä ilmiö, joka on helposti havaittavissa jokapäiväisissä elämässä, on tunnistettu myös tutkimuskirjallisuudessa, missä ilmiöön on kutsuttu nimellä kaupunkipaikkojen digitaalinen augmentointi. Tähän mennessä ilmiön on todettu muuttavan kokemuksiamme kaupunkipaikoista. Lisäksi on tunnistettu, että aihetta tulisi tarkastella myös erityisesti mikrotasolla sekä arkkitehtuurin alan näkökulmasta.

Tässä väitöskirjassa tarkastelen julkisten kaupunkipaikkojen digitaalista augmentointia tapaustutkimusten avulla. Analysoin tätä varten osallistujien digitaalisen augmentaation kokemuksia, mitkä ovat tapahtuneet tutkimushankkeiden sisällä tuotettujen, aidoissa kaupunkiympäristöissä tehtyjen pilottien ja konstruktien yhteydessä. Lähestymistavaltaan työni on mikrotason evaluatiivista laadullista suunnittelututkimusta.


Kokonaisuudessaan kehitän väitöskirjassa osallistavaa suunnitteluevaluatia (engl. participatory design evaluation) lähestymistapana. Tällä tarkoitan useiden intersubjektiivisten ja kokemuksettaamien näkökulmien tuomista ja käyttämistä suunnittelututkimuksessa. Väitöksessäni puollan tämän lähestymistavan hyödyllisyyttä arkkitehtuurisuunnittelussa ja -tutkimuksessa.

Asiasanat: kokemus, evaluointi, kaupunkipaikka, kaupunkitila, digitaalinen augmentaatio, kaupunkiteknologia, julkinen näyttö, mukautuva valaistus, kaupunkisuunnittelu, arkkitehtuuri, ubiki tietojenkäsittely, menetelmä, evaluatioluoitain, ruumiillisuus, paikantuneisuus.
Perheelleni
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30.9.2016

Anna Luusua
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This thesis is based on the following publications, which are referred throughout the text by their Roman numerals:


Author’s contributions

In article I, research materials were collected collaboratively with myself, first author and third author. I provided an interdisciplinary literary review of participation in various fields. The first author provided a review of the history of urban lighting. Fourth and fifth co-authors provided quantitative analysis of the research data for the article, as well as commentary. The first and third authors were the responsible designers of the pilot.

In article II, I was the overall responsible author. I conducted most of the analysis independently, with helpful commentary received from second and third authors. The research materials used in the interview were collected collaboratively, although I was responsible for devising the overall ethnographically inspired data collection strategy, employing semi-structured interviews and walking interviews. The second author was the lead designer of the pilot that was being studied.

In article III, I was the responsible author, providing a review of the probes approaches together with the second co-author. The second, third and sixth co-authors provided helpful commentary on the article. The second author provided the data and its analysis for the first case study presented in the article. I led the data collection in the second presented study, which was conducted together with the second author. I was also the leader of data collection in the third presented case study, in which the fourth and fifth co-authors were also involved. The fourth and fifth authors were also responsible for the design of the pilot that was being studied.

In article IV, I was the responsible author, conducting most of the analysis independently, but receiving helpful advice from all other authors. I led the data collection in the evaluation probes study, which was conducted together with the second author. Furthermore, for article IV, I analysed a set of observation data, collected by three students of cultural anthropology Outi Kulusjärvi, Elina Roininen and Mirja Syrjälä.

In article V, the first author had overall responsibility, and we conducted collaborative analysis of the research materials from our viewpoints as an architect and as a cultural anthropologist. I provided a literary review of the role of climate and weather in architecture and urban planning, and the first author conducted a similar review in her own field, i.e. cultural anthropology. In the last part of the analysis, two sections are distinctly written by the first author and myself; I devised the design framework on public urban displays presented in the paper. The section written by the first author is not utilised in this thesis. Third and fourth authors provided commentary from their viewpoints as ubiquitous computing researchers.
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1 Introduction

Within the past few decades, a wealth of digital technologies has been introduced into cities, affecting our experiences of urban places in fundamental ways (Willis 2015; Aurigi & De Cindio 2008; McCullough 2004). This phenomenon can be felt quite easily while we are conducting our everyday lives in contemporary cities. Urban displays and media facades, for example, have altered the visual cityscape by having rendered some of the basic material elements in urban spaces into dynamic and interactive surfaces (Struppek 2006, Kostakos & Ojala 2013). For their part, mobiles and wireless networks have impacted the way we behave in and utilise public urban places, introducing novel functions, rhythms and states of presence (e.g. Willis & Aurigi 2011; Coyne 2010). Indeed, many urban places can now be construed as being ‘digitally augmented’ (Aurigi & De Cindio 2008). Furthermore, digitality has introduced the possibility for a new kind of interactivity in public urban places. Not only do we use digital technologies to interact with other human beings, we now also have the option of being reacted to, and even interact with, the urban environment itself through, e.g. movement or touch-based devices. This type of rapid and digital interactivity is a remarkable shift in urban surroundings.

This permeation of computing into our daily lives, however, is not occurring all by itself in a deterministic manner. Indeed, there are large research and design communities devoted to investigating how this can be made possible. One vision underlying this phenomenon is called ubiquitous computing (ubicomp). Weiser (1991) introduced the vision and coined the term “ubiquitous computing” in his seminal article The Computer for the 21st Century, published in the Scientific American. This article still informs imaginations especially in the human-computer interaction (HCI) research community. Importantly, the article outlined a whole new computing paradigm. Centrally, the ubicomp paradigm aims to bring into being an age of “calm technology”. In this approach, computing will recede into the background of people’s daily lives while still serving them tirelessly. (Weiser 1991; Weiser & Seely Brown 1997) It is quite remarkable that one has to only briefly observe any public place to understand that, to a large extent, Weiser’s vision has been realised. Smartphones, tablets and public displays seem to be the exact equivalents of Weiser’s “pads, tabs and boards” (Weiser 1991). Complementing these, processors and sensors are embedded everywhere, in both vehicles and buildings, in agreement with the ubicomp ideal.

Further research and design work, however, are continually being carried out by the ubicomp community, which also has large subfields. One of these is urban computing (urbancomp; Kindberg et al. 2007), which has been defined as “the integration of computing, sensing, and actuation technologies into everyday urban settings and lifestyles” (Kindberg et al. 2007). An even more recent field, originally emerging from the design-oriented communities of HCI, is urban interaction design (UIxD; Brynskov et al. 2014), the focus of which is on designing and researching people’s interactions with digital technologies in cities. Furthermore, the recently emerging field of media architecture (McQuire et al. 2009, Dalsgaard & Halskov 2010) is another design research community that has been gathered around these issues, conducting both design and research work on the subject (e.g. MAB 2016). Several architects do operate in this field, but they are by no means an overriding majority. Rather, the field is very multidisciplinary. UIxD and media architecture, then, align closely with the focus of my research. Indeed, there seems to be a gradation between these various fields, some of which are on the more engineering side of the continuum, and others on the more designerly
Fig. 1. Some of the research and design communities relevant to the research subject of this thesis, organised according to their closeness to the computing and designerly communities.

end. This can be readily seen from the illustration in figure 1.

Additionally, numerous cities globally have adopted various kinds of smart city initiatives (Hollands 2008), one of which is the Open UBIOfu programme (Ojala et al. 2010) in Finland, which has also served as the context of my research. The smart city agenda is not the same as the ubicomp paradigm. They are, however, arguably interconnected, and both part of the megatrend of digitalization and information and communication technologies (ICT) permeating our society (Webster 1995, Castells 2004). We can conclude thus, that these technological visions have had a profound effect on the lives of millions, if not billions, of people who live in cities.

Thus, there is a proliferation of fields at work, attempting to both create and understand the digitalisation of cities. Yet, there is little empirical knowledge of how we experience digital augmentations in public urban places, as the majority of the research in the various fields has focused on devising and implementing more new applications and constructs (Aurigi & De Cindio 2008; Kitchin 2014). These implementations have not been adequately studied holistically, as experiential entities from a qualitative and empirical point of view; even more crucially, there is a dearth of such knowledge produced from the point of view of architecture. Prior to further implementation of urban technologies on a larger scale, more knowledge is required to gain understandings of their effect on our experience of them and the urban places that have been augmented with them. Specifically, we need to acquire more knowledge of how urban technologies are seen by various kinds of individuals and groups (e.g. Williams et al. 2009). A central goal for architecture is arguably the creation of better places for people. As interactive technologies move into operating within this realm, they must be integrated in responsible, informed and inspiring ways. To achieve this, there must be an in-depth understanding of what public places are like, individually and as a phenomenon. However, architects are still not adequately aware of the situation, nor do they really take these novel phenomena into account in their designs (Willis 2015; McCullough 2004). Suitable theoretical concepts and empirical research therefore are necessary.

1.1 Objectives and scope

This thesis focuses on the empirical and experiential evaluation of digital augmentations of urban places. It aims to gain understandings of this relatively recent phenomenon from an experiential point of view. In fulfilling this goal, however, this thesis also engages in methodological and theoretical discussion, aiming to develop and discuss productive ways of informing design through research. Thus, we can visualise the focus area of my research as follows (figure 2):
The first of these focus areas, the digital augmentation of public urban places, engages with a highly multidisciplinary research and design area, as explained above. Originally, the impetus to incorporate digital technologies into urban places comes from many viewpoints and fields. Thus, much research has been conducted on the issue from non-architectural points of view, especially within HCI. An extensive literature review into the various subfields of HCI, however, is outside of the scope of this architectural thesis. I will limit the discussion to discussing the background of this phenomenon mostly through existing architectural viewpoints in literature, accompanied by a very brief sojourn into a more historical perspective.

The second focus area, evaluation, connects to the established approaches of conducting evaluative research in the larger architectural field. Evaluation as a whole is a vast topic spanning over various fields, such as education, management and HCI, and it is not within the scope of this research to engage in an extensive multidisciplinary review of evaluation literature. However, over the course of my research the concept of participatory evaluation emerged as being of specific value, and thus, I will touch upon this approach briefly.

The third focus area, experience, is a large theoretical theme that occupies a fundamental role in architectural research and scholarship. In order to retain a relevance to my own research, within this thesis I am mainly interested in the philosophical background and utilisation of the theory of \emph{embodiment}, in order to discuss my use of the concept of emplacement in my case studies and in the theoretical results of this thesis. As this subject immediately goes into quite a deep level of knowledge, it has been a touchstone between several fields. Thus, I will also discuss the use of embodiment from a more interdisciplinary perspective, referencing, for the most part, the embodiment tradition that is found in the social sciences and HCI.

There are, then, also at least two dimensions to this thesis which reach toward other disciplines; most importantly, the field of HCI and the social sciences. Concerning the digital augmentation aspect, the thematic focus of my research is in connection with recent developments in HCI. In the realm of studying human experiences, I reach for recent advances in theory, especially concerning a novel conceptualisation relating to the phenomenological theory of embodiment. Methodologically, I have employed methods developed both in the field of interaction design and the social sciences, adopting generally an ethnographically inspired approach. Thus, I have captured individuals’ views through qualitative research methods, and conducted analysis on the acquired research materials. However, rather than to investigate phenomena for the purposes of fundamental research, these qualitative findings have served an evaluative purpose, intended to inform design, and the field of architecture especially.

This somewhat mixed approach is not uncommon for architectural research, as numerous paradigms, methods and theories are employed in the field of architectural research (e.g Groat & Wang 2013), according to what type of research is being carried out. My personal background and identity as an architect naturally positions my viewpoint within the architectural realm, and this is an important point, as the researcher is the main research instrument in qualitative approaches (Denzin & Lincoln 2005). The collection and analysis of research materials, then, is necessarily conducted from the viewpoint of an architect. It is not my intention here to try and occupy the position of an HCI researcher or a social scientist. Thus, the contributions, which are empirical, methodological and theoretical, are contributions to architectural knowledge, methodology and theory, and are also discussed in these contexts for the most part.

My research is located within architecture, and more specifically, under the field of urban design. In Finland, the architectural field and education comprises of architectural (i.e. building) design, urban design and urban planning. Therefore, when I refer to the architectural field, I am referring to this whole field, and when necessary, I refer to architectural design, and urban design and planning separately. Within the realm of urban design, I focus on the study of human experience, thus leaving the examination of urban design and planning procedures, practice and law outside of the scope of my research.
1.2 Research questions

The main aim of this research is to evaluate experiences of digital augmentation in public urban places. Typical to an architectural approach, this aim is very holistic. Thus, the first research question has been divided into three further questions, which adopt more specific viewpoints in this larger theme. As I discovered in my process, however, there is a dearth of methodological approaches in the architectural field. Thus, a further main question arose concerning suitable method(s) for the purposes of evaluative research conducted from the point of view of experience. Finally, a similar, questioning approach had to be adopted on the level of theoretical concepts, in order to be able to theorise my empirical findings. Thus, I have formulated three main research questions:

Q1. How do people experience digital augmentation in public urban places?
   a. How do the existing features and use patterns of a public place affect experiences of digital augmentation?
   b. How do weather and climate affect participants’ experiences of public urban technologies, and how should it be taken into account in the design of digital augmentations?
   c. Does participation in the design of digital augmentation affect how participants experience the digitally augmented urban place?

Q2. Through what method can we qualitatively evaluate people’s experiences of digital augmentation in public urban places?

Q3. Through what theoretical concept can we understand people’s experiences of digitally augmented public urban places?

These questions are answered in articles I-V in the following manner:

- Article I answers Q1c
- Article II answers Q1 and Q3
- Article III answers Q2
- Article IV answers Q1a
- Article V answers Q1b

1.3 Original articles and dissertation structure

This thesis is based on five peer-reviewed articles (cf. p.11), which are included in the printed version in appendices I-V. These articles form a whole which aim to (1) scrutinise the phenomenon of digital augmentations in public urban places through case studies, (2) develop and introduce a suitable novel method for their evaluation through participants’ experiences, and (3) discuss how these findings can be theorised through the concept of emplacement.

In chapter 2, I will review current literature on the phenomenon of digital augmentation in public urban places. A niche for this research is also discussed.

In chapter 3, I will outline my research approach through first discussing my ontological and epistemological assumptions that have guided my knowledge production efforts. Second, I will briefly review phenomenological literature in architecture, the social sciences and HCI, focusing on the subject of embodiment. I will discuss the use of intersubjective accounts together with a phenomenologically rooted philosophy of experience.

In chapter 4, I will discuss the empirical framework with which I have conducted my research. Firstly, I describe my research setting, i.e. the city of Oulu and the research projects of which I have been a part. Secondly, I explain my overall research approach and the methods which I employed in conducting my research. Finally, I explain every case study, participants and research materials in more detail.

In chapter 5, I will report the results of my research, which have been thematised into three subchapters. In chapter 5.1, then, I account the empirical research results of my research, answering Q1. I also highlight the maturation of my approach in the process. In 5.2, I report the methodological findings of my research, answering Q2, discussing the process of how a novel method for the participatory and experiential evaluation of digital augmentations of urban places was developed. Finally, in 5.3, I discuss the theoretical contribution of my research, namely the concept of emplacement, its role in my research and argue for its usefulness in architectural research.
In chapter 6, I will then discuss these results in the light of the literature reviewed in chapters 2 and 3, focusing on their significance for the design of digital augmentation in public urban places.

Finally, in chapter 7, I will discuss the larger implications of my empirical results, and my theoretical methodological work in city-making and the larger architectural field.
The purpose of this chapter is to present an overview of the research literature on the digital augmentation of urban places, and the specific urban technologies which are the main focus of my case studies. I will accomplish this by first giving a brief overall account of some of the most common urban technologies which are currently deployed in cities. Then, I will discuss the literature that focuses on how people conduct and experience urban life with technologies. Finally, I will position my own research in light of this knowledge.

2.1 Urban technologies

As I briefly explained in the previous chapter, the emergence of a media-enriched environment has been found alter some of the ways in which people live in and use cities (e.g Willis 2015; Aurigi and De Cindio 2008; Forlano 2013). The various technologies that can be found in urban contexts vary from the mobile to the environmental (or infrastructural), and from the personal and private to the public, and from the invisible to the attention-seeking. In the architectural tradition, spaces and places are often discussed in terms of, and organised according to, their nature as mostly private, (semi-private) or public spaces and places (e.g Carmona 2010, 110-114; Kayden 2000). For the purposes of providing a brief account of some of the most prominent and influential technologies integrated into urban life and urban places so far, I will discuss and organise urban technologies similarly on a gradient from the most personal and private, which are most common and familiar to most readers, to the most public. Earlier, McCullough (2004) has presented an overview of embedded technologies from a more system-based view, categorizing these systems into their components, consisting of microprocessors, sensors, networks, tags, actuators, controls, displays, positioning technology, software and tuning or adaptation.

Here, however, I am more interested in the experiential realm; the everyday technologies we meet in the city. In the more personal realm, we find, first and foremost, the mobile phone (especially the smartphone), a device that possesses a relatively long lineage spanning to the earliest telephones in the 19th century. Mobile phones, however, have not really been just ‘mobile telephones’ in the literal sense for decades now. Rather, they are portable and personal microcomputers (de Souza e Silva 2006), with a wide range of technologies integrated into them. Some technologies that used to exist separately, such as computers and cameras, are now contained within them, expanding their capabilities. It can be safely said that while they are still called phones, they are an entirely new assemblage of technologies which offers a very different landscape of possibilities than anything that has come before them. Similarly, tablets contain almost the same range of technologies, but in a different size, which encourages different uses than the smartphone, albeit on the level of specifications, they can seem almost identical. What is common to these highly mobile technologies, however, is that they are intensely personal or intimate, belonging usually to individuals or, alternatively, to families. Indeed, the most intensely personal technology, the smartwatch, is arguably also the most small-scale everyday information and communication (ICT) device.

Wireless networks (WiFi), however, can be conceived of as either public or private and domestic. Similarly, security camera systems (or closed circuit television, CCTV) can be either public, police-controlled systems or belong to private corporations or private homes. These technologies are infrastructural or environmental in nature (cf., and in public places they are mostly integrated almost
invisibly into their surroundings. Surveillance systems especially are often completely ignored when we are conducting our everyday lives in cities. Yet through them, we as users of urban places are exposed. Thus, they pose substantial power-relations issues especially in public urban places (Foth et al. 2014). WiFi is a similarly interesting technology; while its range and availability is usually not visible to the naked eye, they are ‘sensed’ by users of urban places through digital devices. Significantly, the presence of WiFi has introduced new uses into public urban places, such as ‘camping’ with mobile devices in cafés and parks (Ito et al. 2006; Willis & Aurigi 2011). Furthermore, WiFi access points produce sites of informal interaction which do not necessarily adhere to existing physical or architectural boundaries, e.g. walls and public spaces (Forlano 2009). Instead, according to Forlano (2009), WiFi networks map a ‘codescape’ on top of the physical cityscape. WiFi has played an important background role in my research setting as well, due to the presence and popularity of the panOULU wireless network (Ojala et al. 2011; also, chapter 3.1). Furthermore, WiFi access points produce sites of informal interaction which do not necessarily adhere to existing physical or architectural boundaries, e.g. walls and public spaces (Forlano 2009). Instead, according to Forlano (2009), WiFi networks map a ‘codescape’ on top of the physical cityscape. WiFi has played an important background role in my research setting as well, due to the presence and popularity of the panOULU wireless network (Ojala et al. 2011; also, chapter 3.1). In a much more invisible manner, urban environments globally have been augmented with sensors, which monitor movements of vehicles and pedestrians, light levels, rain, and pollution levels, to name just a few uses. These are mostly public in nature; however, we also have many sensors in private and even domestic use, such as temperature sensors, motion sensor controlled lighting, and so forth. Sensors have also been seen as a way to conduct ‘citizen science’ (Foth et al. 2011), wherein everyday people could gather data for scientific uses. A provisional taxonomy is presented in figure 3; however, it should be noted that this is not intended to cover all types of urban technologies that may exist, but rather focus on those which have an effect on our daily lives on an experiential level.

Fig. 3. A provisional taxonomy of digital urban augmentation technologies for the purposes of this thesis, organised on a spectrum from private to public. Their degree of privacy we attach to them seems to align with their nature as either mobile or environmental devices.

The main focus of my research, however, is on those technologies that can be viewed as highly public: urban displays (also ‘public screens’) and urban lighting. Thus, I will now focus on discussing their historical background and contemporary research and uses.

Urban lighting

As I mentioned above, artificial lighting in the cityscape to present visual content was already in extensive use by the 19th century. Urban lighting in general, naturally, has an even longer history: as recounted by Schivelbusch (1988), the history of urban lighting includes candles, oil lamps, and gas lights that were used for centuries prior to the introduction of electrical technologies, such as arc lighting and incandescent bulbs. The proliferation of powerful electric urban lighting in the 19th and 20th century had a fundamental impact on the development of the modern and contemporary society, Schivelbusch (1988) attests, as urban night life, working conditions and domestic life were removed from the natural diurnal rhythms of dark and light. Thus, light can be also used to orchestrate human activities, as argued by Bille & Sørensen (2007). Thus, its significance in the formation of contemporary urban life cannot be overstated. Yet, the design of urban lighting in the 20th century has focused on rather utilitarian goals (Pihlajaniemi 2015); However, there is a recent turn towards a more holistic view of
urban lighting design as a multifaceted issue, including socio-cultural, aesthetic and atmospheric, and political viewpoints alongside commercial and financial aspects (Brandi & Geismar-Brandi 2009; Köhler 2009; Narboni & Haney 2004; van Santen 2006; Schulte-Römer 2011).

The recent introduction of dynamism and adaptation, or even ‘intelligence’, into urban lighting through LED technology, control systems, and sensing and actuating technologies, thus, is impacting a technology which is fundamentally important to human societies. Naturally, this has already led to an emergence of research around the topic of adaptive lighting. However, much of this research focuses on non-experiential aspects, such as energy consumption or technological issues. The experiential aspects of the technology are under-research currently, and most of the relevant literature here is either lab-based, with little relevance to actual urban environments, or employs highly quantitative methods. This might reflect the business interests that are present, as companies rush to develop new products for the market, and conduct research and development which is applicable to their agenda. There is currently a dearth of holistic, experiential research on the subject of adaptive lighting. (Article I; Pihlajaniemi 2015).

Urban displays

In recent decades, digital displays have been integrated into the material fabric of cities, transforming its surfaces into dynamic digital media platforms (Struppke 2006, Ojala et al. 2012, Fatah gen Schieck 2006; McQuire et al. 2009). As they are becoming ever cheaper, these displays are also being introduced into urban environments in growing numbers. Similar to mobile phones, these displays also have predecessors, as recounted by Huhtamo (2009): from the Ancient Roman and Mediaeval symbols hung outside merchants’ and craftsmen’s houses to the absolute proliferation of printed advertising in streets during the centuries following the Gutenbergian revolution, Western cities have been augmented with symbolic and textual information for generations upon generations. This development eventually led to the introduction of commercial placard or billboard advertising, which is often seen as the ancestor of public displays. Yet, poignantly for my research, Huhtamo also draws our attention to the fact that the use and development of various public urban visual mediums was intimately intertwined with the development of electric urban lighting technologies: “The new role of electric lighting in the streets and at mass-events, such as the world’s fairs, led to an ‘electric landscape’ that ‘sprang up in patches’” (Huhtamo 2009, 24; quoting Nye 1992) These were used in conjunction with visuals, for instance, in the form of ‘magic lanterns’, to produce projections first indoors, and later, in urban outdoor environments.

Interestingly, of course, these pre-digital urban projection techniques were already dynamic in nature. Magic lanterns, among other technologies, were creatively utilised by marketing professionals, and commercial projections outdoors became a well-established practice: T.H. McAllister, a magic lantern manufacturer in the United States, listed several modes of using projections in ‘advertising stereopticons’: on walls, on shop windows, mounted on moving horse-drawn carts, and on rooftop screens (illuminated from the front or the back). If we were to replace the horse-drawn buggies with buses and the magic lanterns with digital technologies in McAllister’s description, we would not be too far from the advertising practices we see every day in 21st century cityscapes, which utilise digital displays extensively. Indeed, Huhtamo (2009) even recounts that statistical data from the US election night results, received by telegraph, were projected in such a way in 1896. This type of content re-emerged in the cityscape in 1928, when the ‘Zipper’ was installed on the New York Times building, displaying Herbert Hoover’s victory in the presidential elections via its band-shaped matrix of dynamic pixels (Starr 1998).

After the introduction and relative cheapening of digital display technology, urban screens, of course, have become not only high-resolution, but capable of various functionalities, including interaction with one or multiple users, and running the kinds of applications mobile technologies do (Ojala et al. 2012; Müller et al. 2010). This technological progress has enticed both HCI researchers as well as advertisers to deploy displays of various types in real urban environments. Central concerns revolving around these displays in the HCI community are remarkably similar to pre-digital times: the phenomenon of ‘display blindness’ (Müller et al. 2009) and, relatedly,
the issue of engagement and attention (Brignull & Rogers 2003) have been central concerns for more than a decade now. Spatiality as an issue has interested some urban display researchers as well (Fatah gen Schieck 2009: Fischer & Hornecker 2012) However, in the HCI community, the novel capabilities of digital displays have also introduced some anxiety over the fact that many urban displays in urban environments are one-directional (showing advertising or transport information). Bi-directional displays in turn can suffer from ‘display blindness’ so that users do not necessarily understand the interactive affordances of such displays (Ojala et al. 2012).

To illustrate, in the 2015 ACM conference on Pervasive Displays, the contributions were thematised around several subgroups, the first of which was “engagement and attention”, among such more generic themes as “devices and gestures”, and “implementation concerns”; media facades, similarly, merited their own theme in the conference (Proc. PerDis 2015). In the 2016 proceedings of the ACM conference on Human Factors in Computing Systems (CHI 2015), further themes included shared interaction and visual design principles, as well as unconventional displays, for example shape-changing displays. The size of the screens were also allotted two other thematic tracts (‘small’ and ‘large’), marking the ‘form factor’ (in architectural speak, simply ‘form’) of the displays as another major interest in the community. (Proc. CHI 2016) Thus, we can say that engagement, interaction modalities and the actual physical shape of the devices are topics of interest in the urban displays’ design and engineering community. However, historical perspectives, including the history of pre-digital urban projections and visuals, are rare.

The above review, albeit brief, allows us to see what an important role the long cultural lineage of these technologies play in their everyday use and design. The research community around public displays continually laments the phenomenon of display blindness and the lack of truly interactive content on displays, since most urban displays show either advertising or information, such as transport timetables. Yet, Huhtamo’s archaeology shows that these existed well before the advent of digital technology: “Most accounts about public projections emphasise the relative passivity of the onlookers as recipients” (Huhtamo 2009, 25) he observes. However, Huhtamo does conclude that he is in no way deterministic about the possible uses of digital displays: they are, and I agree, products of the socio-cultural, economic, and political developments of their time, but were also simultaneously the subject of intensive debate. None of these happen by chance or by necessity; we have great agency over them as a society. Thus, there is a great need to understand the effects of these technologies in order to inform designers and policy-makers, as well as everyday citizens as democratic decision-makers.

2.2 The effect of technologies on cities and urban life

Yet, how exactly these technologies are changing urban life and environments is not adequately understood at this point (Aurigi & De Cindio 2008; McCullough 2004). However, current literature does offer some viewpoints ranging from the large, more abstract theorisations to micro-level studies of grassroots technology use in the city. Concerning these large-scale theorisations, two decades ago, Castells (1996) offered a large-scale view of the effect of information technology on cities by arguing that we had entered an era of ‘space of flows’, in which the flow of people and capital achieved primacy over the ‘space of places’ which had been the organising principle of the past (Hubbard 2010). Additionally, this globalizing principle places importance of the role of cities as gathering sites of wealthy professionals, for whom mutual spatial proximity is important. This is tendency that has also emerged in the smart city critiques, concerning the power imbalances that the smart city ideology helps to recreate and maintain (Hollands 2008). For his part, Mitchell (1999) has argued that cities will be entirely altered into what he has termed ‘e-topias’, representing a view in which the very morphology of cities will be reformed. Yet, Parker (2003), Graham (1999) and Castells (1989) have rather suggested that value of traditional urban centres has, and will continue to be, increased due to ICTs. Indeed, the physical construction of information networks has followed the existing organising patterns of urban centers (Parker 2003), increasing the power of world cities (Hall 1966). If we were to examine these arguments through the lens of the various
computing paradigms (mainframe, personal computing, and ubicomp), Mitchell’s e-topias can be seen as belonging into the second paradigm, i.e. personal computing. This paradigm emphasizes people’s interactions with desktop computers, underscoring the importance of cyberspace, which then seemed to lessen the role of the material world. The ubicomp paradigm has actively strived to disassemble this duality, both on the level of vision as well as in practice. However, even in the age of ubicomp, Brynskov et al. have very recently attested that software is organising urban life in a manner that is as influential and far-reaching as the programmes of urban designers (Brynskov et al. 2014, 4). Thus, it would appear that even though the importance of urban centres is increasing, the role of various technologies is similarly heightened. Thus, as I concluded in article IV, it would seem that urbanisation and technologisation are interwoven phenomena, affecting each other in many complex ways.

In order to achieve understandings of these various digital augmentations, however, Aurigi and De Cindio (2008, 2) argue that we need to look at “the ‘micro’, local but real and significant aspects of the articulation of physical and digital, and that in doing this, a truly cross-disciplinary approach is needed.” Indeed, many useful findings have already been discovered by examining the micro level by scholars from various disciplines. Gergen (2002) has identified the phenomenon of ‘absent presence’, the simultaneous physical existence with co-present people while being sociable with absent parties. This is congruent with Katz and Aakhus’ (2002) observation of the ‘perpetual contact’ we have and, to an extent, have come to expect of our friends and family through digital means, a finding elaborated upon by Ito and Okabe (2005). The practice of walking around aimlessly in public urban places, mentally detached from our surroundings, while being engaged in a phone call (Höflich 2006) and ‘camping’ in public urban places with digital devices (Urry 2003) similarly reflect changing norms of behaving and experiencing public urban places.

According to de Souza e Silva (2006), this intertwining of people, public urban places and new mobile technologies has produced hybrid spaces. These hybrid spaces, de Souza e Silva attests, are unlike mixed reality (MR) and augmented reality (AR), as the “possibility of ‘always on’ connection when one moves through the city transforms our experience of space”. Therefore, there is no disconnect between digital and physical space, but an amalgamation. De Souza e Silva (2006) links this notion especially with mobile technologies that are used in public places. More recently, Willis (2015) has proposed the concept of ‘netspaces’ to denote the spaces that emerge at the interchange between the built world and the space of the network. Aurigi and De Cindio (2008) also make a distinction between spontaneous and designed augmentations, which both create new meanings and functions in urban places. This distinction between top-down deployed and grassroots initiated urban technology use is an important point for my research.

It seems reasonable to state, then, that the experience of urban life is subtly changing due to extensive digitalisation, and thus, the subject merits further inquiry. From an architectural point of view, it remains an important aim to try to incorporate relevant understandings into the architectural field, both on the level of practice and research, as has been advocated by McCullough (2004) and Willis (2015). However, there is much hyperbole surrounding these technologies. Thus, we should aim to take a sober view of the situation.

Indeed, the development of contemporary cities is based on the introduction of several important, if nowadays mundane technologies. The relationship between cities and technologies is fundamental in nature. Urbanists’ utopias and plans have certainly been inspired by the introduction of technologies: the structure of Howard’s Garden City was actually a railroad network; similarly, Cerda’s Barcelona introduced chamfered corners to city blocks to accommodate for a steam-powered public automobile transport system (Aibar & Bijker 1997, 14). Wright’s Broadacre City certainly depended upon the automobile; and Le Corbusier’s towers in his Radiant City would not have been functional without elevators (e.g. Fishman 1982). While these plans were not all realised, the influence of the technologies that they addressed on contemporary cities is easy to see. McCullough (2004) has also drawn our attention towards the great changes that have taken place in our cities due to the introduction of electrical lighting, rail
transport and telephones. In a similar vein, Aurigi and De Cindio (2008) have pointed out that cities are already augmented, and in a way, they have been “incrementally augmented throughout history, and we are still adding features” (Aurigi & De Cindio 2008, 333), a point elaborated in more depth by Huhtamo (2009) as well as Willis (2015). This was certainly known to Weiser (1991; Weiser & Seely Brown 1997) as he was conceptualising ubicomp; his comparison of ubiquitous computing with writing, a technology which is continually in the background of daily urban life and environments, reflects such an attitude.

Yet some of the alterations taking place currently are decisively digital in nature, as we learned from the literature examining the use of mobiles in cities. While this digitality arguably has distinguishing and interesting features, these developments do not imply a complete upheaval of our notions of space and place. For these reasons, I have chosen a theoretical grounding which, as far as it is possible in my regard, addresses these fundamental issues of what it means to be an embodied, emplaced person. I will go into more detail about this grounding in chapter 3. These new digital augmentations are indeed weaving themselves within our experiences of urban contexts, creating different new meanings for different people. Aurigi and De Cindio (2008) dub this “an augmented genius loci”. On the very highest level, then, I strive to understand this augmented sense of place through micro-level empirical case studies. Next, I will discuss my own research position in light of this literature review.

**Positioning my research**

In summary, the urban landscape has been augmented with various digital technologies. Numerous disciplines and viewpoints have approached the issue from their perspectives, for example, architecture, the social sciences, and various design fields, as well as engineering and computing. All these meet within multidisciplinary research communities, such as media architecture, ubiquitous and urban computing, urban interaction design and urban studies, among others.

I have opted to examine two of these technologies, namely urban displays and adaptive urban lighting, in the micro scale in the city; that is, focusing on individuals conducting their everyday lives in the city. This approach aligns with the view of Aurigi & De Cindio (2008), as I recounted earlier. An interdisciplinary sensibility has been of the essence in achieving this aim, both on the level of theory and methodology, as well as in the organisation and practical conducting of the appropriate case studies. This approach is lacking especially in the research of adaptive urban lighting, but also in urban display research.

The decision to research these particular technologies has emerged out of two reasons. Firstly, as I have recounted briefly above, there is an extant literature on the use of mobiles and other personal, bottom-up style technologies, and while it is still developing, many interesting discoveries have already been made by accomplished scholars for decades now. However, the study of displays as a public, environmental and ‘designed’ (top-down) technology is still mostly lacking a holistic, place-based point of view, despite some efforts to the contrary (Fischer & Hornecker 2012). A similar gap exists in the research of adaptive urban lighting as experiential, integral part of real urban places. Design-wise, these larger-scale technologies are conceptually situated at an interesting pivot point between large-scale visions and everyday life in cities, as they are intended for everyone who uses urban spaces. Unlike most environmental computing infrastructures, urban displays and urban lighting are highly visible in the cityscape. Yet there is very little knowledge of how they are viewed, used or unused by people in urban spaces.

These gaps in knowledge are significant not only because of the need to produce fundamental knowledge on phenomena (an important goal in itself), but also because, as Huhtamo (2009) stated, as societies, we are in a position to determine our own futures. There are many parties involved in the making of these novel technologies. Both architects and urban planners as well as interaction designers and computing researchers must be involved, and thus, they will benefit from research knowledge. However, the question of agency and technological determinism spans the whole of society. Thus, the people using these environments must be an integral part of this work.
At the core of this thesis are two important terms, which I regard as its starting points: experience and evaluation. The purpose of this chapter, then, is to both provide a review of the relevant literature pertaining to these two large concepts, and in light of that review, to position my research.

By “experience” I refer to that specific philosophical and theoretical literature on human experience which I have employed in my research, namely the phenomenological tradition of embodiment theory, and the concept of emplacement, which I see as a recent advancement belonging to the larger, older tradition of embodiment. I will briefly trace the origins of embodiment into its philosophical roots in the phenomenological movement. I will also comment upon the use of phenomenology and embodiment in architecture, the social sciences and in HC. I aim to discuss the subject in an interdisciplinary spirit in order to establish my own research position.

By “evaluation” I mean the literature and current status of evaluative research in the field of architecture, and urban design and planning. While my research has been conducted in an interdisciplinary setting, my thesis is architectural in nature. Therefore, for the most part, I must limit the scope of this review to my own field, a task which in itself poses a considerable challenge due to the fragmentary nature of the field. Thus, the very large tradition of evaluation in HCI and education, for example, will not be included in this review.

In order to be able to discuss this literature and the positioning of my research within it, however, I will first provide a very brief account of the ontological and epistemological underpinnings of my work.

3.1 Ontological and epistemological foundations

It is generally accepted that researchers’ choices of research design reflect their own assumptions about the nature of reality (ontology), and how we can come to understand and gain knowledge of it (epistemology). (e.g Groat & Wang 2013, 21; Denzin & Lincoln 2005). Therefore, it is crucially important that researchers openly reflect on their position concerning these issues for the benefit of both themselves and their readers. Thus, the purpose of this section is to trace further the ontological and epistemological origins which underpin the theoretical and methodological approach which I have utilised in my work. As outlined above, my research revolves around experience and evaluative research. Having chosen to conduct evaluative research from a qualitative, experiential point of view, my approach necessitates that I align myself with certain ontological and epistemological groundings.

In the very traditional view, research is usually divided into two main paradigms, namely the quantitative and qualitative, which have differing ontological assumptions, i.e. postpositivism and naturalism respectively (Groat & Wang 2013, 21; Denzin & Lincoln 2005). While postpositivism (and its earlier form, positivism) assumes that there is one reality, naturalism assumes that reality is socially constructed, and thus, there are multiple realities. Epistemologically, this means that the former posits that there are objective truths which are knowable through scientific methods, and the latter maintains that we can only achieve subjective understandings of the various realities. This division is very rough, and has received much criticism. (Groat & Wang 2013, 25-33). The latter position also can be seen as aligning with the paradigm of social constructivism (e.g.
Hacking (1999), which, at its most extreme, posits that there is no external reality; rather, reality is created by the mind. However, there are several gradations and viewpoints under the larger rubric of constructivism. As Hacking (1999) attests, as a term, social constructivism is somewhat nebulous, due to the various and differing interpretations that scholars have made of it. Alvesson and Sköldberg define, for their part, social constructivism as a view in which “society is in some sense produced and reproduced by shared meanings and conventions and thus socially constructed” (Alvesson and Sköldberg 2009, 35). I find their definition easy to align with. However, strong social constructivism is not reasonable to my research in many ways, most importantly due to the fact that the technology I have chosen to study does imply that there must be an external reality. After all, our ability to construct such technology depends on the reasonable validity of knowledge gained through the natural sciences. The fact that these technologies are able to operate in predictable ways according to our understanding of the world does to me suggest that there indeed is a world outside of ourselves, and that we can gain understandings of it. However, the meanings we attach to that world, in all its socio-material complexity, are indeed subjective.

Importantly for my research, this seems to be in line with the thinking of Merleau-Ponty, argued by Dillon (1997): “For Merleau-Ponty, the significance of the world in which we live is attributable to the world itself, but the significance of this world is generated by all its denizens, ourselves (as significantly speaking animals) included: Merleau-Ponty’s ontology is an ecological ontology.” Thus, Merleau-Ponty in his philosophy attempts to reconcile the seemingly opposite viewpoints which I described above. As Dillon (1997, xii) argues further, the “epistemological consequences of Merleau-Ponty’s standpoint are unique and benign: it opens a third alternative between absolutism and skepticism (…) it succeeds (…) in grounding the affinity between categories of understanding and the things we seek to understand”. The ontological assumptions I have held while conducting my research align with this overall positioning. In all likelihood, this is no coincidence, but a result of my use of Merleau-Ponty’s influential philosophy of embodiment, which I have utilised as my theoretical foundation for understanding human experiences in my research. Indeed, the acceptance of the theory of embodiment does suggest in itself a reliance on the material reality of human bodies.

Since a lengthy discussion of various ontologies and epistemologies are far outside the scope of this thesis, I have not brought these two viewpoints forward to launch a philosophical inquiry into their mutual relationship, or to attempt to demonstrate their truthfulness. Rather, they represent two substantially argued foundations for the simultaneous existence of material and social reality, and our ability to derive knowledge of it, that describe my attitude in approaching this research, i.e. to account for my own position. Next, I will discuss my theoretical foundation in more depth, tracing its origins within the phenomenological tradition.

3.2 Experience: phenomenology, embodiment and emplacement

The phenomenological tradition of embodiment underpins this research due to my extensive use of the more recent concept of emplacement, which will be discussed in detail in section 4.2, in conjunction with other results. Thus, it is necessary here to briefly trace this concept to its intellectual roots, and discuss the concept of embodiment. Due to the thematic focus of my research, I will discuss embodiment in the social sciences, the general architectural field, and HCI.

Phenomenology and embodiment

The current understanding of ‘phenomenology’ comes from Husserl (2012 [orig. 1900]), who was aiming to find a way into the world of “things-in-themselves”. This he undertook in response to the mind-body philosophy of Kant, who claimed that the mind was incapable of truly accessing the world as it is. Husserl’s response was to abandon all previous knowledge, and get back to things-in-themselves through what he termed eidetic reduction; the methodical contemplation of an object. Hale attests that by “reducing the cultural world to the ‘life world’, or the realm of immediate experience, Husserl hoped to achieve an unobstructed view of reality” (Hale 2000, 96). Eidetic reduction, then, also required a process of ‘transcendental reduction’, which assumes that this
individual experience can be universally applied to other humans’ experience.

During and after Husserl’s time, phenomenology was developed further by his student Heidegger (1996; [orig 1927]), who in his earlier works directed his attention especially towards lived experience in order to study the nature of being. Thus, he also examined the philosophical implications of concrete experience of everyday lived reality. This focus had a tremendous influence across disciplines, and architecture was no exception. He strived to overcome Western philosophy, and especially its insistence to see a split between the body and the mind, or the subject and the object. According to Hale (2000, 98), the “first hints at phenomenology as a ‘philosophy of bodily experience’ are contained in the first part of Heidegger’s major book, *Being and Time* (1996 [orig. 1927])”. His focus here is on everyday experience. He refused the idea of things having ‘essences’, as Husserl had assumed, and instead argued that being cannot be detached from time and place. Furthermore, there is no essence prior to action; rather, the self reaches out towards the world. This became fundamental in overcoming the subject-object divide that had reigned in Western philosophy for over 2000 years.

**Embodiment across relevant fields of study**

The importance of the body and bodily experience, thus, was established in phenomenology, opening new ground for Western philosophy. This enabled the concept of embodiment to emerge. Embodiment has been most famously philosophised by Maurice Merleau-Ponty (1945), a student of Heidegger and Husserl. Merleau-Ponty’s works established the importance of action in our embodied relationship towards the world, suggesting a continuity between the self and the world, where the body is the interface between the perceiving mind and the world (Hale 2000). To illustrate the manifold uses of the term, Dreyfus (1996), for example, has identified various meanings for the term in Merleau-Ponty’s own works. These include (1) human beings’ physical embodiment with material qualities, and with its embodied capacities which also have limitations, (2) embodiment as the array of embodied skills and responses that we develop as a response to our natural environment, (3) the cultural skills that are similarly developed in response to cultural environments. Crucially, however, the concept of embodiment does not view these to be in juxtaposition, but considers them in a holistic manner. As a concept and as an intellectual tradition, embodiment is very broad. Across the various fields and studies, the core of the theory remains to be its rejection of the duality of mind and body. Importantly, the body is not seen as an object, but as the locus of perception: for instance, when I am writing or drawing, I do not consider my hands and arms as merely separate objects, but as parts of myself. Thus, the body is the site of my presence, my perception and my mode of engagement with the world. The strength of the theory of embodiment, as I see it, lies in its roots in the phenomenological project which aimed its efforts at philosophising ordinary everyday experience. Thus, it aligns with our own lived experiences.

The concept of embodiment, then, was quickly adopted into the social sciences, in which it has enjoyed substantial and continued popularity, introducing novel material perspectives (Crossley 2001). Early on, the sociologist Schutz (1967) discussed phenomenology and embodiment from the point of *intersubjectivity* (e.g. Crossley 1996), the notion that experiences can be shared among individuals, developing the argument that phenomenology is not in opposition with it. Indeed, intersubjectivity was an important but often neglected part of Husserl’s philosophy as well according to Heinämaa (2007) and Miettinen (2010). Furthermore, according to Taipale (2010), for Merleau-Ponty, intersubjectivity occurred essentially between bodies. For the social sciences, this has been a crucial starting point, as intersubjectivity forms the foundation of knowledge production within these fields. Thus, there has been a great proliferation of research conducted from embodied perspectives in the social sciences, and the concept remains to be widely used. In sociology, for instance, Wacquant (2015) has recently discussed a “carnal sociology”, and argues that it would be a productive point of view to move from observing phenomena to actually enacting them in order to understand them; a method that is much utilised in educating professional practitioners, such as architects (Schön 1983). Coupled with the ‘spatial turn’ (Warf & Arias 2008) in the social sciences, these
fields now wish to examine, understand, and theoretically explain spatial experiences, designerly knowing and learning-by-doing, which are central to the experience, practice, theory and education of architecture. Importantly, in cultural anthropology, Czordas (1990; 1994) has further elaborated upon embodiment as a paradigm, explaining that studies conducted within the paradigm of embodiment are not “about” the body; rather, they are about human culture and human experience from the fundamental standpoint of an embodied way of being-in-the-world.

Thus, conducting research from this standpoint is not necessarily a way to study anything specific or new, but address topics from a specific standpoint. As the tradition around embodiment does not predetermine any topics, neither does it require any specific way of collecting data. Instead, it necessitates a methodological attitude that pays attention to a bodily subjectivity, even in verbal research materials. (Csordas 1990, 1994)

In the architectural field, embodiment has enjoyed popularity among a diverse group of designers and scholars, such as Dalibor Vesely (2002), Norberg-Schultz (1980), Perez-Gomez (1992), and Kenneth Frampton (1983; 1995), and practitioners such as Steven Holl (1996), Juhani Pallasmaa (2012) and Peter Zumthor (2006). It is beyond the scope of this thesis to go into detail concerning the work of these theoreticians and practitioners, which have been thoroughly discussed and critiqued elsewhere in architectural scholarship. An important observation for the purposes of my work here is to note two aspects of the works of all these notable phenomenologists in architecture. Firstly, that they are, not entirely, but mostly focused on architectural design rather than urban design and planning. Norberg-Schultz (1980) here makes a departure from the rest, as his works often examine Italian cities. A second, more important observation, is the fact that these architectural phenomenologists employ phenomenology as a method. Thus, phenomenological theories of experience in architecture often come part and parcel of a research approach which is inherently hermeneutic. While the hermeneutic approach is valid in itself (e.g. Gadamer 1989 [orig. 1960]; Ricoeur 1976), it is not the entire story, as we learned from the social sciences’ approach to phenomenology and embodiment.

Thus, the architectural phenomenological tradition deviates from the use of the phenomenological tradition and the embodiment tradition in the social sciences. As I recounted earlier, intersubjective perspectives, through empirical means, have been foundational to utilising the concept in these fields. Therefore, as so much of the fundamental literature on architectural theory seems to largely ignore the well-established coupling of phenomenology and intersubjective empiricism, I must identify here a major gap in architectural scholarship and research. I will hypothesise here that this lack of focus on intersubjectivity may exist because architects and architectural researchers are not usually methodologically equipped to utilise qualitative empirical methods. While the hermeneutic approach is a worthy pursuit, approaches which aim for the intersubjective are similarly valid, established ways to produce knowledge. Importantly, a different kind of knowledge production method may also produce different kinds of results; a powerful motivator for employing it in architectural research. Nevertheless, the phenomenological tradition in architecture, both on the level of scholarship and practice, has explored and highlighted the role of, and the relationship between, place and space with a keener focus than, for example, the social scientists have (up until the spatial turn). In this respect, my work is influenced by architectural phenomenology.

Within the field of HCI, issues relating to embodiment have arrived primarily via two differing traditions. Embodiment of the phenomenological tradition was formally first introduced by Winograd and Flores (1986) and Suchman (1987). Winograd and Flores drew extensively from the thinking of Heidegger, arguing against the cognitivist approach to consider and study thinking separately from its context. Instead, Winograd and Flores argue for a new view of technology use that is inherently material, historical, and social (Marshall & Hornecker 2013). This was based largely on Heidegger’s notion of Dasein, or being-in-the-world, and the concepts of
thrownness and ready-to-hand. The first of these, thrownness, describes the experiences of being immersed in skillfully coping within a context, without any assured knowledge of what exactly is going to happen, and, indeed, what is really happening. This very situated and dynamic view, then, is naturally in direct opposition to the cognitivist view, which aims to observe and consider thinking as abstract processes. Readiness-to-hand, then, describes a related notion: that while acting in the world, we do not think about the tools that we work with—not even our own bodies—unless they break down and stop working. This idea I already alluded to in conjunction with my discussion of embodiment. These, in effect, disappear from our sight as we focus on completing tasks. If we pay specific attention and reflect upon these tools, they lose this quality of ready-to-hand and become present-at-hand instead, as argued by Heidegger. In this view, then, learning is an engaged practice, attained through cycling through these states of ready-to-hand and present-at-hand. For my research, this is a point worth stressing, as my research uses participant accounts that are a result of such actions. Thus, any insistence on totally naturalistic research settings, unaffected by researchers, can be considered unreasonable, as this is the nature of gaining knowledge within phenomenological epistemology. (Winograd & Flores 1986; Marshall & Hornecker 2013)

Suchman presented another critique of the cognitivist view in HCI, and argued through the evidence gained in her empirical research of technology-use that behaviour actually comes into being as situated action. Plans, however well made, are merely representations of action that may guide actions, but they are only one aspect in the complex and messy real-life technology use situations. Thus, any insistence on totally naturalistic research settings, unaffected by researchers, can be considered unreasonable, as this is the nature of gaining knowledge within phenomenological epistemology. (Winograd & Flores 1986; Marshall & Hornecker 2013)

Dourish (2004) then developed these ideas further in HCI, suggesting that embodiment should be a foundational concept in the field. He discusses several important aspects of embodiment in relation to HCI, naming this approach embodied interaction. One issue of central importance here concerns meaning-making, and more specifically, three aspects of it: ontology, intersubjectivity and intentionality. The concept of embodied interaction highlights how ontology emerges through interactions in the world, as opposed to being objectively defined. Thus, designers may (and necessarily do) code certain ontologies in their designs, but users might not share them, as their ontology may differ. This discussion relates to the notion of intersubjectivity. For designers, naturally, it is important to be able to communicate to users the ways in which they have envisaged the design to be used; however, Dourish also suggests that it is also relevant to enable various technology users to develop shared practices through and around the design. Most importantly, though, Dourish discusses Heidegger’s notion of intentionality, or the idea that we as humans are always directed towards the world, which we necessarily inhabit from which we gain our knowledge. Here, coupling is an important term. This means the building and dismantling of relationships between things in the world for our purposes. For Dourish, those technologies that are clear about how they relate to the world, or which can be flexible about how they relate to the world, are well designed from this point of view. (Dourish 2004)

According to Marshall and Hornecker (2013), other approaches in HCI have also drawn from the critique of cognitivism. However, rather than being based on the phenomenological tradition of embodiment, these approaches have been influenced by it in a less direct manner, and have also been influenced by other traditions and viewpoints. Marshall and Hornecker (2013) collect these under the rubric of embodied cognition, an emerging field of research that has been also introduced into HCI by, for example, Hutchins (1995).

Indeed, looking at the field of embodied cognition, we can see that embodiment has become something of a touchstone between the various fundamental research paradigms. We can illustrate these through some recent developments: for example, the philosopher Dennett (1993) has examined the embodied foundations of human cognition and phenomenological experience by utilising examples from post-positivist laboratory experiments; for their part, Lakoff and Johnson have made the case for
embodied cognition in linguistics (Lakoff & Johnson 1999); and furthermore, cognitive scientists Ward and Stapleton (2012) have discussed a 4e model of human cognition, wherein the e’s stand for “enacted, embodied, embedded and extended”. While these ideas are not central to my work, they demonstrate that embodiment has gained vast interest in research communities, crossing not only disciplinary boundaries, but also different ontological and epistemological viewpoints. This makes it a highly interesting concept especially for interdisciplinary scholarship.

However, overall it seems to be a difficult feat for all these fields to recount for the embodied mind with its environment, and to deal with this in a balanced manner. Architectural scholars are quite happy to highlight the role of place, and within the social sciences, the focus has been to a large extent on the body aspect of embodiment. Due in great part to this latter point, the concept of *emplacement*, then, has been introduced in the realm of the social sciences. While this might seem counterintuitive to begin with, it is, as Pink (2011; 2009) has attested, an attempt to complement the body-centric viewpoint into embodiment that has become so well established in the social sciences. Utilising this concept for architectural research, and introducing it into the realm of architectural scholarship was one of the results of my research; thus, it is discussed in more depth in chapter 5. The above account was meant to briefly trace the lineage of the various aspects of my research approach in regards to human experience. Next, I will summarise my position in regards to this literature.

**Positioning my research: Examining emplaced intersubjective experiences**

While my approach also differs from it, this research can be seen as a part of the well-established tradition of architectural phenomenology. This is due not only to the actual philosophical roots of my work, but also to more specifically by virtue of my focus on experiences of and in places and spaces. While the works of the founders of phenomenology, Husserl and Heidegger, are, in my experience, far more frequently cited and discussed in the architectural literature, my research builds primarily on the works of Merleau-Ponty on the subject of embodiment. The reason for this is the positioning of my research, perhaps not within, but at least next to the social sciences, both on the level of theory and method. In the social sciences, Merleau-Ponty and the theory of embodiment are frequently employed in empirical research; however, as I will explain in the next section, I am differentiated from most works conducted in the social sciences by virtue of my evaluative research approach.

Furthermore, and fittingly for my research, HCI researchers have very recently also adopted the concept and tradition of embodiment in their quest for understanding and designing interactions with digital technologies. Therefore, embodiment offers common theoretical ground among these fields in my work. However, I will take this further by employing the concept of emplacement, developed by the anthropologists Howes (2005) and Pink (2011; 2009). The introduction of this concept, I hope, marks a contribution to the literature on architectural theory. Another crucial difference between my work here and that of the central figures of architectural phenomenology, though, lies in my utilisation of intersubjective perspectives, coupled with a phenomenological attitude. With this, I hope not only to produce useful research results, but to begin addressing this issue in architectural research.

### 3.3 Evaluation in architecture and urban planning

As my research focuses on what could be described as post-implementation research of research pilots and constructs, it can be construed as evaluative research. Thus, to further ground this PhD thesis in existing literature, I will review how evaluation, especially from an experiential and empirical point of view, has been conducted in the past in the field of architecture and urban planning. The purpose of this chapter, then, is to first briefly review literature in this field, and then position my research in light of this knowledge. Indeed, many individual architects have integrated research methods into their own private practice and design process. One example of such an approach is the successful practice of Jan Gehl who has also written extensively on his practices of studying and enhancing the quality of urban places (Gehl 2011). However, I will limit the scope of this review to
slightly larger movements, where a number of architects have advanced a research-based agenda in design and planning.

**Post-Occupancy Evaluation**

One approach focusing on evaluative research in architecture is *post-occupancy evaluation* (POE), which has been defined in numerous ways (Hadjri and Crozier 2009). For the purposes of our brief review here, we can utilise Zimring and Reizenstein’s (1980) definition of POE as the “examination of the effectiveness for human users of occupied designed environments”, and complement this with Friedmann et al.’s (1978) older definition of POE as “an appraisal of the degree to which a designed setting satisfies and supports explicit and implicitly (sic) human needs and values of those for whom a building is designed”. These two statements demonstrate the breadth of differing viewpoints into the subject; while one employs the language of effectiveness and precision, the other highlights the role of values and those aspects which are implicit, and thus, harder to pinpoint and reduce into simple statements or measurements. Nevertheless, both are concerned with people, and furthermore, those specific people who actually use the designed building.

According to Zimring (2002), POE “grew out of the extraordinary confluence of interests among social scientists, designers, and planners in the 1960s and 1970s”. It has been somewhat influential in the United States and the United Kingdom. Initially, POE developed rapidly due to the sudden expansion of environment and behaviour research, a field that was pursued by scholars from various backgrounds. These researchers were interested in understanding the experiences of those who actually use buildings (“the non-paying clients” of design). These early studies were conducted in settings that were easily accessible to them, such as university dormitories and residential institutions (Zimring 2002). Moving into the 1980’s some large public agencies in the US and Canada, including many governmental organisations, adopted POE into their standard procedures (Zimring 2002). Adopting was much slower in the UK, where POE was never introduced into professional curricula (Hajdri and Crozier 2009; Zimring 2002).

In 1980, Zimring and Reizenstein (1980) published a review, in which they described several characteristics of POE projects thus far. They reported that post-occupancy evaluations ranged from short-term projects by students all the way to well-supported longitudinal studies. However, evaluative studies usually focused their efforts on a singular type of setting. Evaluations were also conducted by individuals coming from a wide array of backgrounds. Importantly, Zimring and Reizenstein recount that post-occupancy evaluators generally study settings which have been altered by other individuals or groups. Thus, they frequently lack control of the setting under scrutiny. This, then, requires the use of the various nonexperimental or quasi-experimental research designs and approaches. Unsurprisingly then, POE is also marked by methodological confusion, as do many emerging fields. However, unlike basic research, POE is aimed at application. Thus, the focus is on researching in order to improve designed environments. (Zimring and Reizenstein 1980)

Zimring and Reizenstein also argue that three major aspects, each functioning on a continuum, can be used to describe POE’s. These three main features are generality, breadth of focus and timing of application. In other words, POE projects can be described in three ways. Firstly, whether their focus is towards knowledge that is very general or very specific. Secondly, is the knowledge and approach more concerned with holistic or singular attributes of a setting? Thirdly, are the findings to be used immediately or more concerned with long-term compilation of data and knowledge that will be used at some future date? (Zimring and Reizenstein 1980)

Furthermore, POE has a tendency to be supported by various contracts, which often in and of themselves suggest aims, methods and a specific use of the acquired results for the POE. This contrasts heavily with basic research, in which there is much leeway and freedom for the researcher to utilise their existing skills, knowledge and interests to shape the project into a suitable form which produces results in the long term. These contracts and financial concerns also mean that professional responsibilities and ethical principles frequently come into conflict. Amusingly, Zimring and Reizenstein also note that as the evaluators leave the site and hibernate while analysing the data, those who have engaged these researchers to
POE has met with many challenges; these are related to both the conditions in which the studies are conducted, as well as to the internal logic, ethos and aims of the studies. There is a special need in every POE study to employ multiple methods, to consider multiple issues and also to have a special consideration to the design process. One should understand it in some way prior to designing an evaluation approach. Yet the most appropriate type of study useful for generalization is the most expensive and most rare: the one which studies the phenomenon in multiple settings and longitudinally. Furthermore, the underlying heuristics of POE researchers differ: some work with loose conceptual frameworks, while others opt for more elaborate theoretical foundations. Finally, Zimring and Reizenstein also identify a feature which is also heavily debated in HCI: the need to make recommendations, or in HCI terms, to identify and list ‘implications for design’. (Zimring and Reizenstein 1980)

Thus, despite its focus on occupied environments, and buildings especially, the field of POE is nevertheless quite applicable to my own research. In fact, Zimring and Reizenstein’s literary review recounts numerous aspects relating to the skill and practice of conducting POE which are strikingly familiar to me from my own case studies. My case studies bore striking similarities to most of these identified features, even though almost 40 years had passed between Zimring and Reizenstein’s article and my own research. (Zimring and Reizenstein 1980)

However, the fact that POE, by definition and name, focuses its efforts on situations occurring after the actual design phase is a central characteristic of the approach that, I argue, hinders its integration into the discipline of architecture. Furthermore, it is not a part of the international curriculum of architectural schools, which are still very much adherent to their Bauhausian roots and its studio culture (Salama 1995; Lerner 2005; Hamilton & Watkins 2009). Thus, POE remains culturally separated from the usual realm of architects. It also attempts to both integrate a whole new phase into building processes, as well as methods in which designers have not been trained. A closer integration of such knowledge production into the culture, education and processes of designers might yield better results. Sure enough, a fairly recent approach called evidence based design, aims to do just that. I will review this approach next.

Evidence Based Design

Evidence based design (EBD) is an approach that aims to introduce the use of research evidence into the discipline of architecture and urban planning. The origins of this approach lie in the design of hospitals and other healthcare facilities (Sailer et al. 2008; Sailer et al. 2007). In fact, the whole approach utilises the modern medical field and profession as a point of comparison for architecture. Indeed, EBD has even been named after evidence-based medicine (EBM), which is the basis of current sound medical practice (Sackett et al. 1996). Indeed, the triumph of EBM is astounding; in a little over a century, evidence-based modern medicine has prolonged our lives considerably by enabling us to fight diseases that had not even been discovered in the previous century. It would be impossible now to even think of a contemporary medical practice that would not operate within EBM. Utilising the current definition of EBM by Sackett et al. (1996) as inspiration, then, Hamilton and Watkins define EBD as “a process of conscientious, explicit, and judicious use of current best evidence from research and practice in making critical decisions, together with an informed client, about the design of each individual and unique project.”

Those advocating for EBD, then, must have ambitions for architecture and design that would be comparable to the effect of EBM in medicine. Indeed, UCL researchers Sailer et al. (2007) argue for a large shift in the profession. Their criticism focuses on the relationship between the client and the architect and the role of the user in the design process, and proposes a new professional practice based on these ethical concerns. Ethics, indeed, are a large driving force behind EBD, as illustrated by a favourite quotation of Sailer et al. (2007, 2008):

“The question whether architecture has a social function is totally irrelevant, because socially indifferent solutions simply do not exist; in other words, every intervention in people’s surroundings, regardless of the architect’s specific aim, has a social implication. So we are not in fact free to go ahead and design exactly what we please – everything we do has
consequences for people and their relationships. (...) The art of architecture is not only to make things beautiful – nor is it only to make useful things, it is to do both at once – like a tailor who makes clothes that look good and fit well.” (Hertzberger 1991, 174)

The argument of Watkins and Hamilton (2009) in their book, Evidence-Based Design for Multiple Building Types, also employs ethics and professional responsibility as important justifications for their advocacy of EBD. However, overall the book is more focused on discussing the utilitarian aspects of knowledge production for design. Additionally, their work in general has very practice-based origins, a feature which distinguishes their approach somewhat from the more research-oriented POE community as well. In brief, Hamilton and Watkins argue that the age-old image of the architect as a lone, artistic genius is hurting the profession, especially private practice, and contributing to the rise of various types of building consultancies that have emerged in the recent decades and firmly wedged themselves between architects and their large client companies and institutions:

“Many clients have begun to organize their projects in ways that limit the architect’s role. They have asked other professionals to take on roles that prepare programs of space requirements, project budgets, assemble teams, control the schedule, and make important decisions about scope reductions and proposed changes. (...) The typical architect finds it difficult to challenge the expertise and the database of specialized consultants”. (Hamilton & Watkins 2009)

In other words, they find that the credibility and influence of the profession is diminishing rapidly due to architects’ inability to present evidence to support their proposals, thus unnerving their clients. Hamilton and Watkins’ answer to this problem is to instill a new level of “rigour” and explicit logic into the professional practice of architects. What is interesting about their argument is that they argue for scientific rigour from the point of view of architectural practice, with a business slant. In the usual coffee table discussions of architects, research is often seen as an esoteric, intellectual pursuit of lonely scholars, and studio practice is framed as the socially engaged activity of architects. Hamilton and Watkins present an unusual positioning in this, arguing that architectural practice needs more evidence and explicit knowledge to support the artistic and humane pursuits of architects, and to help architectural firms compete and succeed in a business sense. (Hamilton & Watkins 2009)

However, Hamilton and Watkins (2009) fail to underscore the fact that their idea of research seems to be informed from a rather positivist viewpoint, demonstrated by their language, which makes ample use of such terminology as “rigour”, “measure the results”, “evidence” and “validity”, which are commonplace within the natural sciences. This might have two underlying reasons: Firstly, the EBD movement was originally inspired by the medical profession’s successful development of EBM, and thus, might wish to employ similar language. Furthermore, Hamilton has a background in organisation development, and he recounts his studies in that field as having given him the impetus to pursue “more rigour” in the practice of architecture. Secondly, in the book EBD is framed as a possible antidote to consultancies, which make use of metrics and the language of exactness to sell their services to clients. In order to compete with consultancies, EBD may have adopted such language.

This is where my own research is fundamentally different. I have adopted a language more typical to qualitative approaches, and in particular, ethnographies, which hope to provide, through writing and other means, rich accounts of phenomena and settings. Furthermore, my research is not business-focused, since these design projects were meant as research projects to begin with. They might well be applicable in private practice (in fact, I hope so) but they themselves were not commercial projects, and thus operated within a different logic. However, EBD as a term is certainly a wide umbrella under which many types of approaches might be gathered, and I share with it a desire to actually study the effects of implemented designs in order to inform future designs, and to do so through research evidence. Furthermore, the inclusion of research knowledge throughout the design process makes EBD a more attractive conceptualisation in regards to POE, which merely seems to be happy to observe and analyse the results of traditional design processes. Thus, EBD is clearly the more radical approach.
Evaluation in urban planning and design

Whilst EBD includes urban planning within its sphere (as can be seen from, e.g. Krizek et al. 2009) there are also other, uniquely urban planning focused communities of evaluative research, inspired to a large degree by the work of Lichfield (Lichfield et al. 1975). The disciples of Lichfield include, for example, Alexander (2006) who attests that while evaluation is nothing new, as it is normal human activity, it is not a self-evident part of urban planning. This, he argues, is due to the fact that urban planning has been done for millennia, and this traditional mode did not include evaluation in the contemporary sense. Urban planning has roots in various fields, such as in architecture, military and civil engineering (Balsas 2012). In Finland, it is understood to be an integral part of the architectural field. In other Western countries, it is somewhat more segregated, but its identity is nevertheless quite similar, with a strong emphasis on design work (Balsas 2012).

Thus, evaluation has been, as it is in the various design disciplines, a part of the design process: a method of relatively intuitive assessment based on one’s professional experience which addresses options and issues as they arise in the design process (Alexander 2006). It is a part of an abductive design process (Kolko 2010). While methods of planning were quite systemised in Ancient Rome and Greece, as well as in the Renaissance, it was not until Patrick Geddes that some kind of systemic knowledge production became a part of process, as Geddes introduced the “survey, analyse, plan” method of planning (Alexander 2006). In the rationalist era before the 1980’s, evaluations in urban planning were very much about cost-benefit analysis, as championed by Lichfield (1971).

Yet, as Balsas (2012) states, urban planning has been mostly conceptualized within the social sciences. Several turns have given character to the field. According to Balsas, these have included a “historical turn, social turn, pragmatic turn, political turn, ethical turn [and an] aesthetical turn”. Forsyth (2007) also argues for the recognising of a research turn. Importantly for our review here, Balsas (2012), Alexander (2006), and Oliveira and Pinho (2010) would like to recognise an evaluation turn. This is because lately there has been a great increase in the number of evaluation-focused literature. This might be tied with the emergence of evidence-based planning (Krizek et al. 2009), as hypothesised by Balsas (2012).

In urban planning, three types of evaluation are commonly recognised: a priori, in process (in itinere), and ex post facto. The first refers to evaluation prior to implementation, the second to evaluations conducted throughout the process, and the last to post-implementation evaluations. According to Alexander (2006, 7), a priori evaluation is “our prime concern in considering evaluation in planning.” Indeed, in Finland as well, urban and land use planning are required by law to be based on adequate research and reporting so that the effect of the plan can be properly evaluated. Thus, in Finland, the evaluation is based on an a priori model (MRL 1999). However, the basis of knowledge upon which a priori evaluation of plans must logically rely on is hermeneutics and professional intuition; thus, I will argue that results gained from ex post facto studies are able to importantly inform a priori evaluation as well. As Alexander (2006, 8) rightfully states, the “purpose of ex post evaluation is to learn from experience, and of special interest here is plan evaluation, “the assessment of completed plans”. Alexander also offers some critique of the evaluation community in urban planning as well, arguing that rather than debating methods endlessly, we should focus our efforts as a community to the development of useful modes of application, i.e. methods; arguably, a reasonable and pragmatic request.

Yet this evaluation community is small, and apparently has very little sway over the practice of urban planning. According to Talen (1997, 573) there is no “empirical knowledge of when planning has succeeded and there is not method for measuring plan success”. Thus, the general lack of evaluation is seen by many as a problem in urban planning. One reason for this lack might be found in the education of urban planners, which has been addressed by Balsas (2012). Studio courses are the main method of teaching in urban regional planning pedagogy (Friedmann 1996, Frank 2006, Higgins et al. 2009), and in every respect, the larger architectural pedagogical paradigm is relatively unified across the larger architectural field. Balsas argues for the integration of plan evaluation to amend the great number of plan making courses in the
education of urban planners. This “can help students to obtain higher order skills, literacies and competencies, than the ones obtained in typical plan making studios.” (Balsas 2012, 478) They also offer a forum for practitioners, educators and students to “reflect on long held professional assumptions, their continuation or abandonment” (Balsas 2012, 478).

**Informing design through ethnographic means**

However, as I briefly alluded to before, none of the aforementioned approaches place a strong emphasis on qualitative means of acquiring knowledge about designs. Indeed, they do occupy a role in these approaches, but both POE and EBD seem to be quite concerned with the quantitative aspects of building. Especially EBD seems to be after an approach wherein design decisions could be easily made through the introduction of evidence and resulting best practices everywhere; and the main reason for doing this, in the light of Hamilton and Watkins (2009) especially, is to combat the influence of building consultants and their large information databases. Similarly, in urban planning, we saw that evaluation in planning has been much influenced by cost-benefit analysis from its origins.

However, to conduct evaluative research from an experiential point of view, qualitative approaches are necessary. Yet, as I positioned my research previously, I am interested in gaining insights through, and into, intersubjective perspectives. As such, ethnographically derived methods are able to produce the kind of knowledge I am interested in this thesis. Ethnography as a method was first developed within anthropology (Atkinson & Hammersley 1998), and it can be described as the “comparative study of societies and cultures, based on detailed empirical research in concrete social contexts” (Gunn et al. 2013, 2). The core of the method is participant observation, developed during the 20th century, conducted through long-term immersion of the researcher. Another core method is the research interview in its various formats (e.g. cf. chapter 4). Ethnographic methods, however, have long since been adopted by other fields, especially in the social sciences.

Ethnographies conducted by architects have a short, but relatively well-known history. Groat and Wang (2013) recount three influential ethnographies in their book on architectural research methods: Cuff’s (1992) classic study on conducting architectural practice, Wheatley’s investigation of workplaces and corporate identities through examining stakeholders’ views, and Groat and Ahrentzen’s (1997) study of faculty women in architectural education. The first and last of these represent studies which focused on how architecture is practiced and taught; however, Wheatley’s study adopted a focus on studying designed projects and also incorporated users’ perspectives, thus having a closer resemblance to my work. Furthermore, the work of Pavlides and Cranz (2012) in utilising ethnographic methods to gain layperson perspectives into building design closely aligns with my research attitude. However, none of these ethnographers explicitly consider their work as “evaluative” although, for example, Pavlides & Cranz (2012) argue that ethnography will inform and benefit design through (1) confirming existing design assumptions, thus validating design work, and through (2) helping to discover anomalies that challenge existing design assumptions.

The use of ethnographies in architecture is somewhat similar to the very recently emerged paradigm of research called design anthropology (DA), which “combines elements from design and anthropology” (Gunn et al. 2013, 1). DA considers design as a process of thought which is a universal human capacity, which is even said to separate humans from other animals (e.g Cross 2006) this process, however, is carried out in different ways across cultures and societies. DA, of course, is a subfield of cultural anthropology, and thus, has been conducted within that realm by anthropologists. Thus, it is not my intention here to adopt the position of a cultural anthropologist.

**Positioning my research**

The above literature review confirms my prior understanding that evaluation is not an important part of the contemporary practice of architects, whether in the design of buildings or cities. Indeed, after having begun my research, it soon became quite obvious that evaluation in the architectural research field was a somewhat rare occurrence, and it did not receive much attention during my own studies either. Fortified by the above literature review, it is now my
understanding evaluation is a phenomenon that has persisted in the margins but which has never quite received the necessary momentum to become a universally accepted part of architectural field or education; a fact that is quite perplexing since architecture has such a profound influence in people’s wellbeing and happiness, as argued by, e.g. Hertzberger (1991).

As such, the subject of evaluation seemed opaque and difficult to permeate at the beginning of my research. Even putting such a label as ‘evaluation’ on my work seemed to instantly marginalise and perhaps even devalue it in the eyes of the profession, and I avoided using the term for some time, opting to use the more accepted and general term “participation”, a subject I will discuss in length in later chapters. Nevertheless, clearly what was being requested of me in these case studies was not design work in the traditional sense, but the production of knowledge to benefit design: in other words, evaluation, and furthermore, ex post facto evaluation.

Thus, POE and EBD as concepts and fields clearly resonate with my research, as both attempt to evaluate architects’ works in order to produce empirical knowledge that will inform and support design. Yet, the practice of EBD actually aims to integrate research knowledge into the very essence of design practice; an aim with which I can concur. EBD aims to encompass all of design, and thus, POE and even the urban planning evaluation community, could be construed as fitting underneath the larger umbrella of EBD. It is, however, another matter whether or not members of those research communities wish to do so, and I do not propose this as a universal definition. It does, however, inform my own positioning. This is illustrated in figure 4.

However, what separates my thesis from the POE, EBD and urban planning evaluation communities is my commitment to the phenomenological tradition and thus, my focus on evaluating design works quite singularly through experience, as I have elaborated in the previous subchapter, and the fact that I have achieved this through adopting both a theory (embodiment/emplacement) and methods (ethnography) which are integral to the field of cultural anthropology. Nevertheless, it is not my intention or wish to attempt to assume the identity or disciplinary grounding of an anthropologist, whose education comprises of a wealth of humanistic theories, and the more traditionally anthropological use of ethnographic methods. Thus, my research bears many hallmarks and intentions of design anthropology as well, but my disciplinary background is nevertheless within the realm of architecture.

Fig. 4. Positioning my thesis in relation to EBD and architectural ethnographies. I see the aspects placed within the circles as characteristic of this thesis. Aspects positioned outside of the two circles arguably do not characterise my thesis research.
In the following chapter, I will explain the empirical apparatus which I employed to collect and analyse research materials. First, I will explain my general research approach, which was characterised by evaluative aims, interdisciplinary collaboration, and the various research projects of which I was a part. Second, I will describe in more detail the case studies, which took place within the abovementioned research projects, including my methods, participants and analysis approach.

4.1 Research approach in an interdisciplinary environment

I conducted my research in collaboration with two different research projects. Adaptive Urban Lighting -- algorithm aided lighting design (AUL) was a three-year project funded by the Academy of Finland, and it was located at the University of Oulu School of Architecture. It was led and conducted by a core team of three architects, and assisted by a student of architecture. However, the team did collaborate with two cultural anthropologists as well. Additional assistance was received from students of computer science and engineering, and from a professional programmer. Thus, there was an architectural core, complemented by interdisciplinary collaborations. A similarly architectural research team was present in the SparkSpace project, which the Oulu School of Architecture conducted in collaboration with the VTT Technical Research Centre of Finland. The Open UBI Oulu research programme, however, was led by computer scientists at the University of Oulu. I collaborated extensively with this research programme, being a part of UBI Metrics, a four-year project funded by the Academy of Finland, which included computer scientists, cultural anthropologists, economists and architects.

These projects formed the core of the research environment wherein my research was designed and implemented. As is evident, the environment was highly interdisciplinary, and this was also reflected in our everyday work, which was typical of multi- and interdisciplinary work, in which central concepts and underlying assumptions do not always align easily (e.g. MacMynowski 2007). A wealth of discussions had to be held in order to be able to agree on the aims, concepts, theories, methods and writing conventions to be able to produce any results at all—and the word ‘result’ had a different meaning for different disciplines as well. Thus, here too, before I explain my case studies, I will have to discuss the research paradigms and approaches of the projects within which these case studies were conducted.

The first of these paradigms is research by design (RbD; also research through design, RtD), which has been proposed and discussed within several design fields, including architecture and HCI (Verbeke 2013; Downton 2003; Zimmerman et al. 2007). The crux of this approach is the use of design as a form of research inquiry. Importantly, it claims the validity of designerly knowledge (Cross 1982), accumulated through reflective practice (Schön 1983). Interestingly, Aura et al. (2001) make a distinction between two different RbD approaches. In the practice-based approach, the focus is on how design is conducted in general, i.e., the interest lies in scrutinising the design practice. Ethnographic means can be used for this end. In the design-based approach, however, design work is employed as a tool for research knowledge production (Aura et al. 2001). I am not entirely convinced that the former constitutes anything like a novel approach. As I recounted in the earlier chapter, ethnographies in architecture have been used for examining design practices for a long time; in fact, these are actually the most well-known ethnographies conducted in the field (e.g. Cuff 1991, Groat &
Ahrentzen 1996, 1997). Claiming this well-established approach into a whole new research paradigm, in my opinion, ignores the contributions of Cuff, Groat, Ahrentzen and others who have laboured to utilise ethnography within architecture. However, the latter approach does indeed constitute a novel and productive addition to the architects’ methodological toolbox. Indeed, in these case studies wherein the RbD paradigm was employed, i.e. LightStories, Urban Echoes and SparkSpace, design and designerly reflection were central components of knowledge production, and the case studies revolved around making pilots, as the preferred term was, i.e. actual designs which were built and left to operate in genuine urban places for some months. However, this work was complemented by an evaluative phase that employed non-design based methods. It is the results gained through these methods that were the subject of my analysis. For these purposes, I familiarised myself with traditional qualitative research approaches as well as the cultural probes (Gaver et al. 1999, 2004) approach. Thus, while I did work within RbD projects and utilised RbD pilots for knowledge production, I do not consider my own approach to be RbD.

Secondly, the in-the-wild research approach (Rogers 2011) was a strong influence on the UBI Oulu research programme and thus, the technologies were designed and implemented intentionally within this approach. What sets this approach apart from very traditional HCI research is that the research has been done in everyday environments rather than within a laboratory. However, these technologies were also called ‘constructs’ by the researchers in the UBI Oulu programme. This terminology refers to the constructive research approach. According to Piirainen and Gonzalez (2013) the “constructive research approach (CRA) has been a dominant design-oriented framework in Finnish and to some extent Scandinavian management literature”, quoting Jönsson and Lukka (2006). It has also garnered some attention in the information systems community (Gregor & Jones 2007). However, CRA actually originated in management science research in the 1980’s (Kasanen et al. 1993). Drawing a clear distinction between the RD and constructivist paradigms is quite difficult, and they have been even re-imagined as an amalgamated approach (Koskinen et al. 2011).

What was of importance for my research was to be mindful of the differing backgrounds and interrelationships of these paradigms and approaches while working with the pilots and constructs and analysing the research materials. For the purposes of my research, however, I will refer to the pilots and constructs in my case studies as ‘digital augmentations’, due to not adhering fully to neither one of these paradigms or approaches. Rather, the nomenclature I choose here has to do with the architectural research literature on technologies in urban places. It does not imply a specific research approach.
Thus, my research consisted of several evaluative case studies, specifically designed for and within different types of research projects. I designed and conducted the experiential evaluation of these case studies in a close interdisciplinary collaboration with colleagues from architecture, cultural anthropology and computer science. It is precisely the evaluation of these digital augmentations that is the focus of this doctoral thesis, as illustrated in figure 5.

In order to properly study participants’ experiences of these various digital augmentations, each of the case studies required a different research process to be designed and applied. These approaches can be roughly characterised as originating from two differing disciplinary traditions: the more traditional, ethnographically inspired studies involving different types of interviews and a survey, complemented by an observation study conducted by Master’s level students of cultural anthropology, as well as a large set of ethnographic materials collected by a doctoral student of cultural anthropology (cf. Table 1); and a more recent, design-oriented methodology based on the cultural probes (Gaver et al. 1999). An overview of these case projects, their corresponding evaluative methods and the articles in which they were presented (I-V) are presented in table 1.

In the first part of this chapter, I will describe the overall research setting in the city of Oulu, in which all of these projects took place. This is intended to help readers to understand the very specific requirements of the general physical and cultural environment in which both researchers and participants operated. Then, I will describe the methods that were used and the materials that were obtained case by case. I have specifically seen it important not to separate the description of the case projects from their corresponding methods and participants, as one cannot be understood without the other. This fact
emphasises the very creative manner in which evaluative studies must be conducted. There are no one size fits all solutions to evaluative studies. Thus, it also follows that in order to be able to use methods in such a creative manner, the researcher must have an adequate level of practical skills and a fundamental understanding of the methods and their corresponding ontological and epistemological underpinnings, as also argued in article III.

4.2 Overall research setting: Urban technologies in the north

All case studies presented in this thesis were located in the city of Oulu in Northern Finland. As a country, Finland is relatively sparsely populated; the overall population of little under 5.5 million people occupy a land area of 338,145 km², i.e. approximately 16 persons per square kilometre (OSF 2015a). Oulu is the sixth largest city in the country with its 200,000 inhabitants (City of Oulu 2015). The ever-changing northern climate makes the city a somewhat unusual site for technology research. Average temperatures range between +16.5°C in July and -9.6°C in January, and precipitation is 450 mm on average annually (Pirinen et al. 2012). Snow covers the ground usually from early December to early April. The amount of sunlight during the day also varies significantly over the course of the year. The longest day at midsummer is approximately 22 hours long and the shortest day in the winter lasts for approximately 3 hours.

As other Nordic countries, Finland is a country that is technologically highly developed. We can illustrate this by referring to national statistics, which state that 85% of citizens between ages 16–89 used the Internet (broadband Internet access has been declared a citizen right in the country; FINLEX 2009), and well over a half of all Finns between the ages of 16–60 have their own smartphone (OSF 2015b). Information networks span the length of the country, covering much of the inhabited areas, and ICT development is one of the most important branches of industry. The city of Oulu especially has been known as an important seat for the ICT industry in the country. As a result, the city has also hosted a number of smart city initiatives, one of which was the Open Ubiquitous Oulu initiative, which was one of the objects of study in my thesis.

4.3 LightStories

The overall objective of the LightStories pilot was to explore ways of enabling urban inhabitants to participate in the design of public urban lighting, as well as to provide opportunities for interaction and communication. The research aims of LightStories were threefold. Firstly, the pilot attempted to gain an understanding of the design process of participatory and interactive methods from a RbD point of view. Secondly, the aim was to explore algorithm-aided design methods in the design process. Finally, and importantly for my own research, the objective was to study participants’ experiences with participatory and interactive lighting as digital augmentation in a real-world setting. This latter aspect was examined in article I.
4.3.1 Co-design

The design idea behind LightStories was to appropriate a section of the urban lighting on a pedestrian-oriented street as a forum for people’s personal dynamic lighting designs and verbal messages (figure 6). Thus, the central design idea was based on participation, or more specifically, on co-design (Sanders & Stappers 2008). Lighting was re-imagined as a kind of an urban social media: an experiential, social and interactive way to augment a public urban place. In practice, this meant that our participants were able to use an online design tool to devise their own colourful and dynamic lighting designs for prototype RGB-LED luminaires which were distributed along the length of one block in the city centre of Oulu. Participants also wrote a piece of text to accompany the lighting design, and reserved a time slot for these to be displayed simultaneously. At the designated time, the text was displayed online on the LightStories website and the lighting design was displayed in the street. All designs were displayed for one hour. Basic functional lighting was provided by metal halide lamp luminaires which were not affected by participant activities to ensure adequate lighting conditions. After finishing with their designs, the participants were also required to fill in a survey. They were also invited to take part in semi-structured interviews, if they so wished. Data concerning the designs and the story texts were also collected. Overall, 105 designs were created and displayed in the street.
Thus, participants were recruited through the actual online tool, which was advertised to some degree by being featured in local newspapers, and through mailing lists. Those who completed a design were invited for a further interview, and asked to extend the invitation to their friends, if they so wished. This so-called snowballing of the invitation was intended to help us meet different kinds of participants (with and without the co-design experience), increase the number of participants, and also help some individuals muster the courage to come and meet us. We interviewed seven participants who had completed a LightStory, and three of their friends.

4.3.2 Survey

We received responses to the survey from 83 users (we removed the 11 entries which were made by our research group members for testing purposes). Furthermore, 23 participants had created a LightStory without responding to the survey. These results demonstrated that LightStories was equally interesting to females and males (with respondents at 54.2% and 45.8% respectively). A majority of these respondents were within the young adult age group, i.e. 20–29 years (39.8%); however, there was a sizable portion of those between 30–39 years of age (21.7%) and those between 40–49 years old (19.3%). Education-wise, a third of the respondents (32.5%) had taken their A-level equivalents and another third of them (36.1%) had either a Master’s degree or a Doctorate. 18.1% of the respondents had a Bachelor’s degree, and 10.8% had passed elementary or middle school. Thus, most of our participants had had some sort of higher education. Unsurprisingly, LightStories garnered interest primarily locally, as most of our participants were from the city of Oulu (71.1%) or from the larger Oulu region (8.4%). However, some respondents were from other areas of Finland (16.7%) and some were even from international locations (3.6%). More than half of all respondents (57.8%) had been residents of the city of Oulu for 5 years or more. A fifth (22.9%), however, had never lived in the city. This survey informed the results of my analysis; however, the main focus of my research was on the semi-structured interviews.

4.3.3 Semi-structured interviews

Our semi-structured interview had three different sections and it lasted approximately for 1–2½ hours. Overall, we interviewed seven co-designers and three of their accompanying friends. Two of the interviews (those with the accompanying friends) were group interviews; here we especially strived to enable fruitful discussion on the subject of urban lighting between the co-designers and non-co-designers. In the first section of the interview we queried our participants about their attitudes and opinions towards the general subject of urban lighting, adaptive and interactive urban lighting, and participation. In the second part of the interview we asked them about their actual experiences concerning LightStories. The third and final section concerned the usability of the online design tool. Additionally, we collected participants’ development ideas and further wishes.

For the analysis of the interview materials, we used a collaborative method in which the video recorded interviews and their transcriptions were observed and analysed together among the research group members. The emerging topics were discussed and documented accordingly. Results from different methods were reflected against each other. All interviews were conducted in Finnish. Our analysis approach was inductive; i.e. we did not have any theoretical concepts guiding this exploratory research, which served as our first real-world evaluative study. We wanted to remain open to all experiences, opinions and ideas that our participants might wish to recount. This was reflected in the wide, holistic manner in which results were reported in article I. The main focus of article I was on the insights which we gained from LightStories with an emphasis on participation and communication, as these emerged as central themes.

4.4 Urban Echoes

Urban Echoes was a short-term pilot project into a real urban park in the city of Oulu in Northern Finland. The study took place in wintertime, in the sub-zero conditions that are typical to the area.

The Otto Karhi park, where Urban Echoes took place, is the size of exactly one city block (approx. 90m by 90m). A small, narrow channel runs through it
diagonally. Furthermore, it is quartered by footpaths. The rest of the area consists of grass, birch trees, and flower arrangements. However, in the wintry conditions these were covered in a thick layer of snow. On its southeastern side, the park is flanked by a two-lane street with heavy traffic. However, on the southwestern and northwestern sides the amount of traffic is reduced. On its northeastern side, taxis gather in line to collect patrons. These streets are lined with retail spaces, many of which are restaurants, bars or fast food places. What is more, the park is located halfway between the railway station and the pedestrian centre of the city, and thus the park sees many passers-by during both day and night.

The adaptive urban lighting pilot reacted to the movements of passers-by in real time, and offered information about what was happening in the city through colourful lighting. This was enabled by personal mobile devices and situated motion detection sensors, and implemented with LED luminaires, which were both hung above a footpath that ran through the park and along the channel, and positioned on the ground near trees and bushes. The array of luminaires included RGB-LED spotlights and natural white light (3000K) LED luminaires. These were then designed as an adaptable system able to produce both even and uneven distributions of light. The latter consisted of light patches of varying sizes on the footpath. The lighting system reacted to people’s movements through a network of motion detection sensors. These were attached to the birch trees which flanked the footpath. (Figure 7)

With the mobile services, people could inquire Urban Echoes about events (the Events service) in the city and the current activity levels of different areas within the city centre (the Activity service). The answer, based on real-time data, was visualised by the luminaires as colour-coded light which fell on the path and on the trees. The same information was simultaneously presented as graphics and text on the mobile device that sent the query. One service also gave users real-time data in the form of graphs and maps about the current status of the Urban Echoes lighting in the park as well as the amount of energy it was consuming. This information was only displayed on the mobile device that sent the query. These mobile services were in the form of websites, which were accessible also through printed and laminated QR codes situated on-site in the park.

In the movement-adaptive lighting scenarios, Urban Echoes reacted by altering its lighting patterns to people’s movements, which were detected with motion detection sensors. For the purposes of our interviews, a protocol with various lighting scenarios was designed. Over the course of these scenarios, the expression level gradually intensified; the first ones were exceedingly calm with just white light, whereas the last scenarios were very expressive with an array of different colours and fast changes.

The research aims of the UE pilot study were manyfold. Herein, I will focus on our study of participants’ experiences through the analysis of our research materials presented in article II. Besides studying participant experiences, the pilot’s scenario design process was utilized to develop a novel algorithmic design tool called VirtuAUL, and a methodology for designing adaptive lighting. These have been discussed in Pihlajaniemi et al. (2014) and Pihlajaniemi (2015), and in Österlund & Pihlajaniemi (2015).

Fig. 7. The UrbanEchoes design and research site, a park within the urban grid. © Adaptive Urban Lighting project.
Fig. 8 Urban Echoes in action, displaying a dynamic and responsive lighting design utilizing both spot lights and tree lights. © Henrika Pihlajaniemi
In collaboration with the larger research team, I was responsible for designing an evaluation methodology which could be carried out by the team to gain knowledge from the study. Two cultural anthropologists, Johanna Ylipulli and Tiina Suopajärvi commented on these preliminary plans and participated in the collection of materials. Lead designer Pihlajaniemi played an important part in the evaluation design process, and was present and active during the walking interviews. We must bear in mind that both the interdisciplinary nature of the process and the presence of the designer in the interviews had an effect on the results that were gained.

Due to the highly context-driven and dynamic nature of the study setting, I deemed it sensible to employ walking in-situ interviews as the main method of gaining insight into our participants’ experiences. These were complemented with semi-structured theme interviews conducted in the nearby café and in the park prior the walks and before any adaptive lighting installations had been made. Thus, to a substantial extent, our study was inspired by ethnographic methodology. The study bears resemblance especially to “short-term ethnography”, as termed by Pink and Morgan (2013). These authors argue that their approach should not be conceptualised as a “quick and dirty” way of conducting qualitative research, but rather as a more purpose-driven and interventional way of doing ethnography. This short-term ethnography, then, is characterized by various levels of intensity that lead to differing, but deep ways of knowing. For example, video recording can serve as a useful tool here, as it leaves rich research material of the relatively short encounters with participants. Our study was precisely an intervention which was intended to stimulate novel experiences in participants. Additionally, a relatively high level of intensity characterizes these encounters. Furthermore, though, encounters did not take place in our participants’ everyday life situations. Rather, we augmented an everyday site in their city with extraordinary and impermanent elements.

We recruited two groups of participants: one consisting of young adults (11 participants 20–29 years old; 6 females, 5 males) and one consisting of seniors (5 participants over 65 years old; 3 females and 2 males). One of the young adults only participated in the preliminary interview. These groups were chosen initially because we wanted to question some essentialist everyday notions that are usually associated with these groups, where the youngsters are tech-savvy and the seniors technophobic. The in-depth manner in which these interviews were conducted in resulted in dozens of hours of intensely rich video material and audio transcripts. Due to the chosen method being highly work-intensive both on the field as well as in the analysis phase, this overall number of participants was deemed sensible. We recruited our participants mostly through email lists – e.g. hobby groups, as well as professionals’ and students’ organisations – and by making a visit to a senior citizens’ activity centre. The participants came from an array of various backgrounds concerning their education, personal history and employment. Each participant also had a unique relationship to the urban park – some were regular visitors or at least passers by, and some hardly ever went there. Yet, we must acknowledge that there is naturally a bias that is present when recruiting participants: those who volunteer were in all likelihood more active people and they may also have some prior interest in the subject. However, our participants came from various walks of life, with differing educational and professional backgrounds, e.g. the arts and humanities, technical professions and medical fields. These backgrounds had a role in how they formed their perceptions, attitudes, and ideas. Our participants’ experiences, then, prompted reflexive accounts, which have been created in a spirit of mutual knowledge-production with us as their interpreters and researchers. It is an inherent aspect of using such methodology that we did not aim to gather utterly naturalistic, observation-based materials, since we were specifically interested in emic accounts. By emic, I refer to the participants own explanations and categorisations of their internal knowledge. This is in opposition to etic knowledge, which refers to researchers own interpretations and categorisations of others’ behavior (Bodley 2011).

As the interviews were highly work-intensive, consisting of two rounds of data collection between design and implementation work, and the amount of weeks that could be spent in fieldwork was limited by the dark season, this number of participants was deemed the maximum amount of participants that was feasible.
4.4.1 Semi-structured interviews

The purpose of these preliminary interviews was to collect background information about our participants and knowledge about their views in situ. This was meant to gain a general sense of place, a characterisation of the genius loci that would inform the design of UE and the subsequent analysis of the walking interviews. However, it also gave our participants a chance to reflect on their personal relationship with the park, and their views and experiences of urban lighting, preparing them for the walking interviews. The first part of the interview happened in a café that was next to the park, and it consisted of more general questions regarding their personal background, experiences with lighting and related technology, as well as possible ideas for how lighting could be interactive. The café proved a suitably informal setting for the interviews. The information that was shared was not of a highly sensitive nature, and thus, the café was deemed acceptable in that regard.

The second part of the interview actually occurred in the park. This was done so that both participants and ourselves could gain a full embodied experience of the park while we were discussing it. This was meant to elicit more in-depth, situational responses as well as more general attitudes. Questions touched upon how our participants used the park, which paths they moved on, what time of the day they used it the most, and so forth. Views, opinions and attitudes concerning the park, its atmosphere and aesthetics, as well as personal experiences with the park were also prompted. After the interview, our participants had been acquainted with us as the researchers, and the park as the setting.

4.4.2 Walking in-situ interviews

As suggested by the name, the term ‘walking interviews’ refers to a set of qualitative research techniques where researchers walk with participants (e.g Evans & Jones 2011). The benefits of the approach lie in its assumed ability to gain an access into participants’ attitudes, knowledge and perceptions concerning the immediately surrounding environment. Therefore, it can aid the researcher to understand aspects of immediate contexts and the social aspects associated with them (Kusenbach 2003). According to Evans & Jones (2011), these methods range from “natural go-alongs” to “guided walks”. The first of these refers to studies where the researcher walks along a route which is completely determined by the participant; the latter is an interview where the route is determined by the researcher. These different approaches will then yield different types of insights: for example, guided walks cannot reveal anything about the manner in which a participant would normally navigate in their surroundings.

Due to the fact that Urban Echoes was designed for and implemented within a very limited space, our choice was to employ guided walks. In practice this meant that we walked back and forth along a determined route. The light sources had been installed along a singular footpath in the park, and this resulted in the relatively strict choreography for the interviews. Another reason for orchestrating these walking interviews to such an extent was the rather extensive number of studied scenarios and the designerly wish to present each of them to every participant in an identical manner.

Thus, it must be stated that our walking interviews were characterized to a degree by restricted movements of participants’ and researchers’ bodies, even though we specifically advised every participant that all kinds of movements and actions, such as pausing, looking around, changing direction, etcetera, are naturally allowed. Some of the participants took advantage of this instruction but, consciously or unconsciously, at least some did appear to adjust their movements to those of the interviewers. The questions we asked this time revolved around the different scenarios, contributing a different type of knowledge in comparison to the semi-structured interviews. However, after the scenario work had been completed, participants were also questioned about the experience as a whole on-site. These interviews were recorded both with a video camera and an audio recorder for better sound quality.
Four persons in total took part in each interview: one researcher was responsible for interviewing the participant (walking side by side), the designer was participating in these discussions and operating the lighting system and controlling the scenarios with a smartphone, and a third person was mostly using the video camera, keeping a more low-key role while walking behind (figure 9). Not including the designers, these roles were dealt on a revolving basis so that the interviews were lead by different researchers.

Thus, the overall study setup was very complex, with a live, real-world pilot installation being employed for the walking interviews. Thus, often the interviews were suddenly interrupted by an unknown user who had made a query to one of the services, which then was visible to us as one of the informative lighting scenarios. This gave both a highly realistic tone to our interviews, but also added an element of surprise which provoked one of our participants to exclaim: “This gave me a shock!” Sometimes the unfinished nature of the technology gave rise to unforeseen issues, but these were readily tackled by the designer. Indeed, the designer’s presence was another major factor in the interviews. On the one hand, accurate information could be instantly conveyed to our participants about the installation: why or how it operated in the way that it did. On the other hand, however, those interviewees who were shy or very polite by nature may have been overly lenient with criticisms. However, we underscored the fact that we truly did appreciate and value all of their opinions, and that all comments, critical, positive, or otherwise, were useful to us. Additionally, over the course of the rather long interview process many of our participants became clearly more talkative and open about their opinions as they got more comfortable in the situation. Furthermore, we had already met them a month prior to the walking interviews.

Selecting the set of scenarios used in the interviews was quite challenging. Firstly, the number of scenarios had to be limited in order to not exhaust the interviewees, especially in the harsh wintry conditions. Secondly, the various characteristics of the presented scenarios, as well as the order in which they were presented, could influence the answers. Additionally, over the course of five weeks of interviewing, a few more scenario variations were added, as we realised that in some cases the distaste towards even the chosen secondary effect colour dominated some participants’ opinion to such an extent that it largely overwhelmed their experience of some other features. Thus we were then prepared to show another variation if this seemed to be the case. Also, some of the interviewees’ comments or ideas inspired further developments for some of the
scenarios. We then presented some of these during the following interviews.

4.5 UBI hotspots

The research setting of the UBI Hotspots was significantly different from the ones I have described thus far. Importantly, UBI Hotspots were a longitudinally deployed technology which had already existed for years in the city before I began my doctoral studies (cf. figure 10). The technology was adequately mature and permanent, and the local people had had a long exposure to them. Thus, different methods could be used, and I opted for those that were slightly more naturalistic. While no research setting is totally naturalistic, I deemed it more interesting to not interview people directly. For this purpose, a traditional etic method could be used. However, in order to study people’s emic viewpoints of the technology, a novel method was developed.

4.5.1 Observation study

The objective of the observation study was to study what activities actually took place in the two chosen urban spaces, the Mannerheim Park and the Rotuaari Square in Oulu, Finland. Thus, the objective was to study what these spaces were like in a material and functional sense, instead of focusing on the individual, emic experiences and opinions of people inhabiting the space. The observation was conducted by three students of cultural anthropology who were able to conduct parallel observations in these places over the course of one summer. As such, it must be noted that the results would have been strikingly different in the winter, when these types of spaces are generally not used as much in the harsh winter weather. The two spaces under scrutiny were a busy square in the main pedestrian area (43 observation hours) and a small urban park next to the city centre (29 hours). Over the course of the summer, an understanding was formed of how life unfolded in these two public places. As the study was purely based on observing all park goers who happened to be present, no participants were recruited. The analysis of these observations served as the second set of research materials for article IV, to complement the Evaluation Probe materials concerning the UBI hotspots and the ICT Diaries.

Thus, the observation study formed the only set of qualitative etic research materials employed in my dissertation research. The results of the observation study were presented in article IV.
4.5.2 ICT diary study

The ICT diary study was a large data set that was an object of collaborative analysis in the co-authored articles III and V. The study concentrated on studying young adult city dwellers’ perspectives and ICT practices in the city of Oulu. The materials were entirely collected by cultural anthropologist Johanna Ylipulli in an ethnographic manner, which aims at gaining holistic understandings of phenomena. The study covered a wide range of themes that have been analysed in separate articles from different theoretical perspectives. The overall aim of this data collection was to gain a thorough yet broad outlook on the experiences, perceptions, attitudes and values related to ICT and everyday life, within this particular age group living in this particular city. The study involved 48 participants; 37 women and 11 men. First, the participants performed self-documentation about their mobile phone and computer use with a notebook that resembled a small, colorful scrapbook; it was designed in the spirit of the cultural probes approach (Gaver et al. 1999). Later, the young adults involved were invited to participate in semi-structured group interviews where they elaborated on the themes of the diary.

Thus, the material consists of written ‘ICT diaries’, accompanied by drawings and clippings, and hundreds of pages of transcribed interviews. These materials were analysed in conjunction with the evaluation probes materials in article V, and discussed from the point of view of methodology in article III.

4.5.3 Evaluation probes

All the methods described in these prior studies served an important purpose in understanding our participants’ experiences, attitudes and ideas. While the emic methods (interviews), inspired by traditional ethnographic methodology, gave us insights into our participants’ inner worlds, the observation study enabled us to let people behave in a much more unaffected manner (although the presence of the researchers was not hidden in any way). After all, interviews are complex social situations. Yet, I felt the need to find a method which would enable access into participants’ inner thoughts while giving them more space, privacy and a chance to think and express themselves in a more self-paced manner. The traditional survey does indeed remove the researcher from the participants’ personal space, but the results obtained do not have as much depth as interviews. What was necessary was a middle method; something that would engage participants deeply while giving them more time and privacy. For this purpose, the cultural probes method (Gaver et al. 1999) seemed eminently suitable despite its original focus on gaining design inspiration rather than evaluative knowledge. I conducted this study in collaboration with cultural anthropologist Johanna Ylipulli. Analyses of these materials have been presented in articles II, III, IV and V.
In the resultant study, we examined participants’ experiences with the UBI hotspots, the urban displays in the city of Oulu, used individually and independently. We employed a simple, yet carefully crafted evaluation probe (cf. figure 11) to capture the experiences and attitudes of young adults concerning the public displays in the city. This approach marked a new adaptation and expansion of the cultural probes method (Gaver et al. 1999). This novel method proved successful in providing us with a valuable set of research materials that truly captured participants’ situated experiences of the technology. All the material and cultural aspects pertaining to the situations in which these displays were used by our participants were necessarily present in their experience. It must be noted, however, that the method has some inherent limitations as well. As the researchers are not present and they do not control the situation in any way (outside of giving the assignment and the probe materials) they are unable to ask their participants any further questions, to elaborate more on their answers, or provide additional explanation of the assignment. For our purposes, this was no hindrance as the desired end result was to obtain data about independent use situations and overall experience. Accordingly, the assignments and questions we gave to our participants were quite simple, and we explained them to our participants individually as they received their materials. Data collection was conducted twice: over a period of two weeks in the winter (in outdoor temperatures between -5.5°C and -7°C) and again in the autumn (+4°C–6°C). The first round included 20 participants overall (12 females, 8 males); and the second round included 21 participants (12 females, 9 males).

The participants of the study were 20–30 years old, and most of them were studying in, or had graduated from various institutions of higher education. They represented a wide array of differing disciplines, ranging from construction engineering to visual communication. Most of them had lived in the city for a few years, having moved there in conjunction with starting their studies. We targeted young adults originally because they are often viewed as the early adopters and archetypal users of novel technologies. Within the field of ubiquitous computing they have frequently been cast in the role of the typical, and sometimes even ideal, city dweller and user (Suopajärvi et al. 2012). For example, according to Williams et al. (2009) urban computing designs often focus on “young, affluent, cosmopolitan and technologically savvy” individuals, even though only a minority of urban inhabitants can be characterised as such. Indeed, a person’s age is not the singular category that defines them. Due to these
essentialist notions attached to young adults, we found it important to critically study this age group in conjunction with digitally augmented urban places. Naturally, some limitations pertain: to obtain broader views into urban inhabitants’ experiences, we would need to study different kinds of people.

4.6 SparkSpace

The aim of the study was to evaluate an adaptive lighting installation in an indoor commercial space through participants’ experiences. For these purposes, my goal was to produce rich data on people’s individual and independent use experiences for in-depth analysis. Thus, the goals of this case study were highly suitable for a second iteration of testing and developing the evaluation probes method, which had already been undertaken in the previously described UBI hotspots case study. However, as outlined in the introduction to this PhD thesis, the contextual focus of my dissertation is outdoor public urban places. Thus, only the methodology of the study, presented originally in article III, is discussed in this thesis.

The research setting presented numerous challenges from an evaluation point of view. The pilot’s design objective was to attract customers to the area where it was deployed, and to entice them to spend more time there looking at the products; in other words, to affect their shopping behaviour. The installation was set up in a relatively small area of the women’s clothing section. Within this area, the overall illumination was reduced compared to its surroundings. The installation was able to produce three different lighting scenarios in which the products and specific focal points, such as mannequins and background panels, were accentuated by either spotlights of static white light (Scenario 1), adaptive white light (Scenario 2), and adaptive coloured and white light (Scenario 3). The pilot installation functioned from October to January, during which time it ran continuously on a three-day loop of Scenario 1, Scenario 2 and Scenario 3, which participants visited in the respective order. The evaluation probe study occurred during approximately one month in October and November.

4.6.1 Second iteration of evaluation probes

The Adaptive lighting study was the second iteration of the evaluation probes method initially created for the UBI hotspots case study. The materials we gained through the SparkSpace study reaffirmed the usefulness of the method in a different research setting, and with a different participant group.

The evaluation probe materials consisted of three notebooks and a calendar. Participants could use these to plan and mark three visits to the digitally augmented research site. This physical format was again useful, this time to make the three visits distinguishable, as well as being convenient to carry. Loose items in a box, as with the original cultural probes, would have been far less portable. Again, we encouraged participants to express themselves in any number of ways; i.e., by writing, sketching, or even pasting in pictures from elsewhere, such as from magazines. Each one of these three notebooks, then, was sealed, and participants were instructed to break these seals only after they had finished the previous notebook. This created not only suspense but a way to maintain the intended arch of experience for our participants. Each participant, thus, filled three notebooks: one for each visit they made to the department store and the SparkSpace augmentation. On each of these occasions, a differing lighting scenario was on. The various lighting scenarios, then, rotated over the course of three days. Additionally, we gave the participants colour-coded calendars, where each day corresponded with a notebook and a lighting scenario. The notebooks’ general colour scheme was also matched to the calendar’s colour coding.

All of our 19 participants this time were female, ranging from 35 to 55 years in age. The all-female recruitment was deemed sensible, since the site in the department store contained only clothing intended for women. To couple women participants with an experiment focused on commercial shopping space is, admittedly very conservative. This choice was largely made by the department store that we collaborated with, as they were not satisfied with their sales numbers in regards to women’s’ clothing. Thus, they were eager to develop the women’s’ clothing section. These outside constraints are not unusual in evaluative research, as I explained in the previous chapter. However, from my personal point of view as a
researcher, I saw an opportunity to perhaps challenge the everyday notions of women as eager shoppers.

As explained above, the evaluation probe study consisted of three site visits, complemented with a package containing the three notebooks and a calendar. Yet, this time the evaluation probe study was also amended with a preliminary interview. This interview was semistructured, and lasted approximately 30 minutes. I conducted all of the interviews personally. It aimed to elicit participants’ views, attitudes, opinions and experiences on themes relating to commercial spaces, their own personal shopping behavior, lighting in general as well as in commercial spaces, and the concept of adaptive lighting. These interviews offered invaluable insights into the participants’ personal backgrounds and their thoughts concerning their own experiences in commercial spaces. During the preliminary interview, many participants remarked on the prevalence of questions relating to lighting. I did not consider it necessary to hide this fact from the participants, as I did not consider them to be mere test subjects, but active co-producers of knowledge in the study. At the end of their participation process, the participants were given a small gift of cosmetic products, worth approximately 20 euros in value. These were provided by the department store.

An overall summary of the research materials used in this thesis is presented in table 1.

<table>
<thead>
<tr>
<th>LightStories</th>
<th>participants (n)</th>
<th>type of material</th>
<th>Year of collection</th>
<th>Collectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey respondents</td>
<td>83</td>
<td>online survey</td>
<td>2012</td>
<td>Pihlajaniemi, H. &amp; Luusua, A. &amp;</td>
</tr>
<tr>
<td>Co-designer interviewees</td>
<td>7</td>
<td>audio, video, transcripts</td>
<td>&quot;</td>
<td>Teirilä, M.</td>
</tr>
<tr>
<td>Interviewees combined</td>
<td>10</td>
<td>&quot;</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>Urban Echoes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking Interview young adults</td>
<td>10</td>
<td>&quot;</td>
<td>&quot;</td>
<td>Ylipulli, J.</td>
</tr>
<tr>
<td>Pre-deployment interview seniors</td>
<td>5</td>
<td>&quot;</td>
<td>&quot;</td>
<td>Suopajärvi, T.</td>
</tr>
<tr>
<td>Walking interview seniors</td>
<td>5</td>
<td>&quot;</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>UBI hotspots</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluation probes</td>
<td>41</td>
<td>probe materials</td>
<td>2013</td>
<td>Luusua, A &amp; Ylipulli, J.</td>
</tr>
<tr>
<td>Observation study</td>
<td>n/a</td>
<td>observation report</td>
<td>2014</td>
<td>Kulusjärvi, O. &amp; Roininen, E. &amp; Syrjälä, M.</td>
</tr>
<tr>
<td>ICT diaries</td>
<td>48</td>
<td>diaries, audio, transcripts</td>
<td>2011–2012</td>
<td>Ylipulli, J.</td>
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<tr>
<td>SparkSpace</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semi-structured interviews</td>
<td>19</td>
<td>audio, video, transcripts</td>
<td></td>
<td>Luusua, A.</td>
</tr>
</tbody>
</table>
5 Results

In the following chapter, I will present the main research results contained in the appended articles I–V. These results have been divided into three sections, thematically organised under my three main research questions. Each section of the chapter first indicates the main research question it aims to answer, and then presents the central results, then discusses briefly the significance of these results for my personal research process.

The first part of this chapter focuses on presenting the empirical findings of my research, published in articles I, II, IV and V. Overall, it answers research questions Q1, a, b and c.

The second part of the chapter presents the research results which pertain to the methodological contributions of this PhD thesis. The focus is on evaluation probes, the novel method published in article III. Thus, the second part answers Q2.

Finally, I will present the research results which concern the theoretical contribution of this PhD thesis, namely, the introduction of the concept of emplacement into the research of digitally augmented urban places. Thus, the third section answers Q3.

5.1 How do we experience digitally augmented urban places?

Next, I will present the empirical findings of my case studies. These findings aim to answer research questions Q1, a, b and c.

5.1.1 Participation in digital augmentation: LightStories

Article I provided an answer to Q1c: “Does participation in the design of digital augmentation affect how participants experience the digitally augmented urban place?” It achieved this through presenting an analysis of the LightStories case study research materials and the subsequent findings. These included findings that were gained through various methods; however, herein I will focus on the two main types of results: the literary review on participation as it pertained to Case LightStories, and the empirical results of the participant materials, i.e. the survey and the semi-structured interviews, as detailed in chapter 3.

These research materials were used for a grounded theory analysis of participants’ experiences. This analysis approach was prudent, since during the LightStories case study, my research was highly exploratory in nature. As such, it made sense to simply scrutinize our participants’ experiences from a highly open-ended position. In hindsight, this strategy served me well, as it enabled an important insight to appear: that my empirical and evaluative research of participant experiences could be construed as a form of participation. A flexible attitude enabled me to delve deeper into participation and consider its relationship to experiential evaluation, and thus, its importance for my research.

Indeed, it must be stated that through the introduction of an online co-design tool, the very design of LightStories had participatory aims, and this inspired me to research the issue slightly further than was required for article I. As I did so, I realized that while participation and co-design (through various means) prior to implementation are established approaches, these very same participants who acted as co-designers also helped us to evaluate the LightStories pilot from an empirical and experiential viewpoint. Thus, this kind of experiential evaluative research bore the hallmarks of participatory design (in the field of HCI this is usually referred to as Participatory Design, with capital letters, or PD in short; however, to my knowledge no such branding exists in the architectural field). During the process, then, participation emerged as an important aspect of
the research, and for this reason, the paper presented a brief overview of participation in HCI and urban planning to inform our analysis of participant materials.

*Conceptualising LightStories at the intersection of interdisciplinary participation approaches*

An important part of article I was a brief interdisciplinary overview of participation within urban planning, HCI and art, discussed in the context of LightStories. Its purpose at the time was to inform the analysis of the research materials. Overall, the literary review showed that the origins of PD in HCI and participation in these fields are somewhat different, but are moving into similar directions. Furthermore, it enabled me to view experiential empirical evaluation as a form of participation, thus affecting my perspective on all following case study results. I will also complement this overview with results from the field of architectural building design.

In urban planning, the notion of participation appeared very early on; as a matter of fact, it was one of the first design professions to be influenced by it (Albrecht 1988). Participation in urban planning emerged as an approach that was in opposition to the *rational-comprehensive planning theory*, which had been the dominant approach in Western city planning practices in the 20th century; this approach, which can be traced back to August Comte (Mäntysalo 2005), was consistent with the classical scientific method. The aim was to obtain all the objective knowledge that could be gained in order to reveal the singular truth or reality as the basis from which to proceed. Therefore, the approach placed much importance on the knowledge of experts. Within this approach, then, it was logical that non-expert participation or the inclusion of different viewpoints was simply not necessary.

Paul Davidoff (1965) and Charles E. Lindblom (1959) were early critics of this theory, and they went on to suggest a practical solution in the form of the *partisan mutual adjustment* approach. A central tenet of this was that stakeholders should be involved in the decision-making process. However, these stakeholders were seen as holding adversarial positions, and the participation process was a process of bargaining between them. No mutual understanding between them was expected to be established. This theory of participation was later on criticised by a group of theorists who based their ideas of participation on Habermasian ideas. This became known as *communicative planning theory* (Healey 1992). Herein, communication and consensus-building between different stakeholders was seen as central to the participation process. This approach was then developed further by Foucauldian planning theorists, e.g. Forester (1988) and Innes (1995), who maintain that power relations are not merely an "outer distortion" (Mäntysalo 2005) on the life-world, but a part of it. Thus, during the 20th century, urban planning as a discipline has been moving from a positivist paradigm towards a more critical or emancipatory tradition. However, urban planning is a discipline in which change occurs almost at a glacial speed, as it often takes years and decades for planning processes to reach fruition.

Against these timelines, it is very interesting that recently the concept of crowdsourcing has also been used in urban design and planning. Invented by Howe (2008), the term crowdsourcing "represents the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call." Brabham (2009) contends that on the Internet "where anonymity for users is available and where body language, identity politics, and interpersonal power dynamics are absent or changed, we can begin to ameliorate the several pitfalls of public participation". Recently, games have also been used in participatory planning (Lerner 2013). These notions change the tempo of citizen participation in planning, and also make it possible to consult participants before any design work has been done, and thus, become co-designers. Within article I, we employed the concept of crowdsourcing by arguing that LightStories could also be seen as having characteristics of this new kind of urban design and planning participation, as participation in LightStories occurred necessarily online and contained an element of crowdsourcing in regards to content-creation.

We can now complement this overview further to include the field of architecture in general. In architecture, the seminal text on participation remains “Architecture’s Public” by Di Carlo (2013 [orig. 1969]). It is a highly critical and political essay which
has managed to stay contemporary and relevant despite being firmly contextualized in the societal turmoil of the 1960s. The essay criticises the elitist positioning and lack of subversive practices in architecture; of those who would side with the people instead of the elites, and a lack of those who would ask ‘why’ instead of merely ‘how’ things could be done. Di Carlo argues, seemingly paradoxically, that architecture is just too important to be left to architects alone. He demands that “all barriers between builders and users should be abolished, so that building and using become two different parts of the same planning process” (Di Carlo 2013, 13). Importantly for my research, one of the underlying reasons for this demand is the fact that “[w]hile human activities multiply, becoming diversified and omnipresent, decisions about where and how they should take place are increasingly concentrated in the spheres of economic, bureaucratic and technological power. The role of architecture could be to contribute to the freezing or thawing out of this paradox […] on the side of the power structure or on the side of those overwhelmed and excluded by it.” (Di Carlo 2013, 13)

It seems that Di Carlo describes the situation of 21st century cities with remarkable acumen.

In the realm of architectural practice, participation in architecture was also developed and carried forward by, e.g., Ralph Erskine, Lucien Kroll and Charles Moore (Albrecht 1988). By the late 1980’s, participation had been accepted as a more or less legitimate way to practice architecture (Albrecht 1988). I will, however, argue that it can in no way be construed as an everyday occurrence within architectural practice, which tends to be rather conservative in nature (e.g Awan et al. 2013, p. 33). Rather, it is associated with various types of research and development projects, where funding for such activities exists. A selection of these kinds of projects have been collected and presented in, for example, Awan et al. (2013).

Much of the academic work on participation has been carried forward by the AGENCY research group, which originated at the University of Sheffield, UK. Architects associated with this group have produced such recent works as “Architecture and Participation” (Blundell Jones, Petrescu & Till 2013) and “Agency: working with uncertain architectures” (Kossak, Petrescu, Tyszczuk & Walker 2009).

“The potential of agency might first be understood as the power and freedom to act for oneself, but for the architectural and architectural research community it also involves the ability to act on behalf of others, bringing responsibility.” (Kossak et al. 2009, 3)

Within the field of HCI, participation emerged within the Nordic countries through the efforts to democratize work practices. During the widespread adoption of computers into workplaces in the 1970’s and ‘80’s, advocates of participation introduced Participatory Design (N.B, with capital letters; Bödker et al. 2000; Ehn 2008) into the vocabulary of HCI. They saw PD as being crucial to designing computing systems successfully. Lately, during the shift into the third paradigm of computing, i.e. ubicomp, information technologies are no longer considered as being limited to any particular place or device. The introduction of heterogeneous user (sic) groups and locales both challenges and presents new opportunities for applying PD methods in the design of computing systems. This situated approach in general brings HCI into the traditional contexts of architecture and urban planning (Luusua 2013). Thus, LightStories addressed also the HCI community through combining the architectural design approach with the implementation and testing of novel urban technology. Thus, LightStories could be understood as PD project.

Within contemporary art, the desire to use participation emerges from the wish (1) to empower and activate audiences, (2) to pursue a more egalitarian form of art by conceding a part of the authorship, and (3) to address what is perceived as the crisis in community in the contemporary Western world (Bishop 2006, 12). Importantly for LightStories, Muller and Loke (2010) have argued that there is a phenomenological emphasis on these participatory art projects; this emphasis stresses the importance of participant experiences. In a similar vein, we were not merely interested in creating new designs for enjoyment and consumption, but also in exploring what we could learn from our participants’ experiences as co-designers of digital augmentation. LightStories was eminently suitable for this purpose, as all participants were required to consider the designated street space from the point of view of a designer. For everyday people visiting the street,
LighthStories also served as environmental art. Against this background, LighthStories could be conceptualized as a participatory art project.

Overall, then, in the existing literature in urban planning, architectural design, HCI and art, participation is usually understood as having two underlying rationales: First, an ethical-political argument and second, a pragmatic argument. From the point of view of the first argument, participation facilitates the empowerment and activation of individuals of groups who are in weaker positions of power in society. According to the second argument, participation is a way to utilise the latent knowledge of non-experts who are affected by the design, thus expanding the base of available viewpoints and information. This point of view is of special interest to the design fields. We witnessed both of these aspects in the conception, implementation, and evaluation of LighthStories, although the themes relating to empowerment seemed more obvious to our participants.

This literature review, then, inform my whole mode of working, from data collection to methodology, and from participant recruitment to analysis, as I realised that these interests align perfectly with the aims of my research.

LighthStories, participation and the experience of place

In the following section, I will delve into the empirical results of article I. The article contained many results pertaining to the analysis of the participant research materials; however, the most pertinent results for the purposes of this dissertation lie in answering the reasons why our participants wished to participate in L.S, how they experienced LS, and what consequences it had for them.

According to our survey, our participants were motivated by at least six prominent reasons: the pleasure of being able to play with light and colour; the pleasure of writing and publishing a story; the curiosity to find out how they could make a LightStory; the ability to send a message to others; the ability to enhance the space visually; and the possibility to have an influence on their environment. Personal background played a part here: two interviewees with design backgrounds stressed the importance of light and colour, while a social worker and a retired healthcare worker recounted that they enjoy writing, and thus the stories were important for them. Thus, digital augmentation can enable various ways of artistic self-expression, due to its highly dynamic and malleable nature. Overall, the possibility to have an effect on one’s environment was found appealing: “That I can actually have an effect on my living environment, that’s really interesting and fun” (male social worker, 20–29). This sentiment was echoed by the male electrical engineer, aged 20–29, who stated “the street is mine for an hour.” The subversive effects of co-design on the usual power relations of managing and creating public places were intensely felt by these participants, and seen by them as being highly motivating and rewarding. Furthermore, we can argue that the specific nature of LighthStories as digital augmentation complemented the subversive and democratic aims of the project. The situating of a dynamic, malleable feature into the daily environment of our participants made the participatory aims of the project possible, and its accessibility through online means made it enticing and accessible to our participants. Accessibility is absolutely vital to co-design projects; without it, there is no co-design. Thus, through examining our participants’ reasons for participating, we can argue that digital augmentation can be a potent tool for co-design and participation in general, and it can support artistic, communicative and democratic aims.

Participating in LighthStories, then, had supported our interviewees’ creativity in general, but it also increased their environmental ability and sense of control in a specific place. This raised the question of whether they felt they had noticed a difference in their attitudes towards the place in question. When questioned directly, those interviewees who had been familiar with the street prior to LighthStories had indeed noticed a difference, and they considered the change as positive. For example, a female architecture student (aged 20–29) recounted that for her, the street in question appeared now as more enjoyable. A male electrical engineer (aged 20–29) stated that, due to participation, his attitude towards the place had become more positive. However, four interviewees had not been familiar with the particular street before L.S. Thus, when questioned directly, these interviewees did not think that LS had changed their
attitude towards the place in question. However, they did report that LightStories did introduce the street into their awareness; it became a real place for them. Thus, despite its ephemeral, short-lived character, participation through digital augmentation was able to alter our participant’s relationship to a place in various ways, even rendering the previously meaningless space into a place.

We were also interested in exploring how our interviewees viewed participation in general. As we are obligated to remind ourselves that they had indeed already expressed interest towards participation through the very act of creating a LightStory, it was not surprising that most of our interviewees expressed a positive outlook towards participation. Only a single participant (biologist, male, 40–49 yrs) had a largely negative view of participation. Those interviewees who were most enthusiastic about participation considered it a natural aspect and extension of their citizenship. Overall, then, participation was considered as being something new and enjoyable. Several participants were keen to know whether LightStories would continue after the study, and asked whether similar projects had been done elsewhere (publisher, female, 30–39 yrs). Participation was seen as most meaningful when it was related to the participants’ everyday environment, such as their neighbourhood, or some other, generally important location in their city. This implies that digital augmentation of public urban places, which takes place in our everyday realm, is potentially a powerful concept, for good and ill, as changes in the everyday environment have such an impact on the lives of individuals.

Yet many of those who voiced a generally positive outlook towards participation also harboured hesitations. As a rule, those who had doubts also stated that they had difficulty in envisioning how citizen participation could really be accomplished in practice. Some also had a somewhat cynical attitude towards organised participation, as they did not trust that citizens’ ideas and views would really be taken into consideration in decision-making processes. Interestingly, our interviewees did not express clear or emphatic attitudes about whether they themselves possessed any special knowledge that would have been especially useful for designers. Even more remarkably, no-one voiced any doubts concerning professionals’ abilities. I remain cautious with this observation, and interpret it as a product of the circumstance they were in; i.e. they were interviewed by designers in general, and the designer of LightStories in particular.

Partaking in the immersive task of designing a LightStory had nevertheless enabled our participants to spend a good amount of time pondering about the kind of a lighting design they themselves would prefer, and to see their work come to life in the street. For us as researchers, this meant that more profound, informed and well-formulated responses could be received from interviewed participants. This development of layperson expertise was an insight that found its way into the case studies that followed.

The significance of LightStories

Discussed in the light of existing literature, we can argue that LightStories represents the usual fare in research on participatory design. We found that the central hallmarks of participation, viewed through the lens of existing multidisciplinary literature, were indeed present—participation through an online co-design tool truly worked in LightStories. However, I argue that what is unusual about LightStories were the existence of such a technology, and the actual evaluative aims of the case study. Firstly, our participants were quite amazed that the technology enabled such a direct experience of being able to control the cityscape, if for only an hour at a time. Until now, such a thing has been unfeasible. This is bound to have major effects on city-making in the near future. Furthermore, it is still not common for architects to carry out these types of research. The very ambition behind the pilot was unusual, as it was architecturally-led and thus, utterly affected by the architectural design approach, which can be described as holistic, experience-driven and place-based. Secondly, the modus operandi of evaluative participation, the central ethos which informs all these case studies work, emerged. This to me appeared as something quite novel, as both are usually seen as somewhat separate in existing literature. After all, participation is usually seen as occurring prior to or during design work — not afterwards.

From the point of view of my own research, LightStories served as the “baptism by fire” as it
began at an early phase of my PhD studies. Consequently, I was obligated to put my methodological reading work into practice rapidly. I was able to meet and interview real participants and hear their viewpoints as layperson experts (Epstein 1995). Thirdly, I was able to witness and experience being part of one iteration of a research-by-design project which aimed to digitally augment an existing urban place. As a recent architectural graduate, I had absolutely no experience in any of these new issues. Thus, these aspects of the project proved to be challenges, but certainly not insurmountable ones, and they yielded perspectives that were instrumental in forming a basis from which the remainder of my studies were conducted.

The power of digital augmentation as a dynamic, malleable, artistic, and expressive situated medium was highlighted in LightStories. This affirmed my own expectations; thus, it was much more surprising to notice that through LightStories, the importance of participation for experiential evaluative studies became quite apparent to me, and I slowly began to view my work as being part of a new professional role for architecture and urban design: as an interpreter of various voices and as a designer of participation processes. Indeed, this has already been recognized as an important part of such work (Awan et al. 2013). This re-examination of my role was not only found through internal introspection, but also through an externally designated role in the LightStories project as ‘the evaluator’ of a research-by-design project, and the personal sense-making process through fieldwork and reflection that followed this appointment.

However, during LightStories I also found a new urgency to find a way to analyse, understand and communicate participants’ experiences of place, and for a way to connect these to a larger body of theoretical literature. The motivation for this latter purpose was to serve as a bridge-builder between the several disciplines with which I was collaborating every day. While the very open-ended positioning within a grounded theory approach had certainly served its purpose in this early study, I now set out to seek for a theoretical concept that would be compatible with my position as an architect conducting research in multidisciplinary and interdisciplinary media architecture and urban computing projects; and to render the implicit explicit by discover a conceptual gathering place around which architectural research in interdisciplinary work could become possible. This work continued in the empirical work that followed. The below sections detailing the results of my other case studies were informed by the theoretical concept of emplacement, which was briefly introduced in chapter 2.1.

5.1.2 Emplaced experiences of adaptive urban lighting: Urban Echoes

In article II, the aim was to answer Q1: “How do people experience digital augmentation in public urban places?” as holistically as possible through participant experiences of Urban Echoes, a real-world adaptive urban lighting pilot, which I viewed as digital augmentation of a public urban place. This was accomplished through analysing the research materials which were gathered in-situ in the urban park prior to and during the deployment of the pilot, as recounted previously in Chapter 3. I utilised the concept of emplacement as a theoretical lens in conducting the analysis.

In the following chapter, I will focus on presenting the empirical findings of the Urban Echoes case study. The analysis of the research materials in article II consisted of two main segments. The first of these aimed to aid us in understanding the park in its usual condition, analysing our participants’ perceptions of it through the interviews conducted prior to the installation. These served both as a locational starting point for situating the whole study for ourselves and our participants, and as a temporal point of reference for the change that was introduced later.

Investigating the genius loci through semi-structured interviews

One major thematic point that emerged in the first participant interviews was the dual nature of the park. By day, it was perceived as quite an attractive place, especially during the summer and autumn months. The natural elements, like the water in the channel and the flowers were admired by many, especially elderly participants, and the birch trees were interpreted as conveying a sense of Finnishness. Yet the place was functionally a pass-through park due to its location,
which offered a pleasant and diagonal shortcut amid the squat urban bocks, but also due to the heavy traffic that was almost always present on one side of the park. Many walked or bicycled across the park very frequently in their everyday life.

By night, the park was somewhat shunned, and seen as a slightly dangerous thoroughfare from one end of the city centre to the other. In the winter, the park considered quite dull in its normal condition. The lighting was considered insufficient and uninteresting by many, due to the 1980’s spherical luminaires that were placed along the footpaths. These were considered as being ugly and wasteful, as they cast their light in every direction in an indiscriminate manner. These opinions were held by many without regard to age or gender. However, the most striking comment was voiced by a young adult female participant. “They warned us freshman year that all kinds of stuff has happened here, people call this the rape park”. With this she referred to the series of three incidents which had been covered by the local newspaper (Kaleva 2006), and which had shook the city to its core. At the time of the study, the park was also known for its late-night grill kiosk and its sometimes intoxicated clientele. Many participants also noted that there were often intoxicated people in the park during the day as well. These problems seem to persist in parks all over the world, as documented in the studies on ‘geographies of fear’ (e.g Madge 1997). These incidents do have an effect on their sense of place, as was evident also the Otto Karhi park. These attitudes were reflected in our participants’ attitudes across the board, regardless of age. However, a young adult man did not admit that he would be afraid of the park, all the while he was telling us how he had, on occasion, considered going around it late at night.

The sense of place in the park was captured in our interviews at a time of a sea-change in the park’s history. At the time of the study, the bus stop (where the rape incidents took place) had already been moved away in accordance with the re-routing of public transport, and the kiosk was waiting to be dismantled. These changes were remarked upon with approval by our participants. Soon after the UE study, a new, high-end café replaced the grill kiosk and the small plaza adjoining it was similarly revamped with natural stone and a new light sculpture. It would be interesting to conduct a further participant study at the location to gauge reactions to these changes, and whether they have had any effect on the perceived safety of the park.

The effect of place on digital augmentation

We conducted the second set of interviews while Urban Echoes was in full operation in the park. Thus, they aimed to both evaluate the installation and inspire participants to discuss adaptive urban lighting further. Through the analysis of these materials, it became obvious that the participants embodied experiences, the place and the media architecture installation had a multifaceted relationship.

For example, the participants’ own bodily capabilities played a part in how they experienced UE. Very mobile participants seemed to underscore issues of what we might term as adaptation rhythm: how rapidly and in what way Urban Echoes adapted to park-goers movements. To illustrate, one participant was worried about whether the lights would be able to detect fast movement, to keep up with people. However, for another, the worry was whether she would be left in the dark if she wanted to remain in one place and the sensors would not detect her. The overall concern here seemed to be was whether their movements would be controlled by the technology, or vice versa, with the latter being the desired state of affairs.

Despite these worries, participants were of the opinion that the ability of the light to ‘follow’ them was a decisively positive feature. The reasoning behind this varied significantly, however. For some, it was environmental reasons, for some, economical aspects that justified these aspects. Remarkably, surveillance aspects worried no one, even when asked specifically. In the first interview, some had not considered adaption feasible for public urban lighting, but these individuals had no negative opinions about it when experiencing it. Intelligent adaptation was widely approved of by our participants. This was probably affected by the fact that some participants already had motion-sensor lighting at home, in their own driveways. Therefore, in addition to the experiential, economic and environmental aspects, we can conclude that this type of technology had already been domesticated in a crude form by our participants. This forms a continuum of prior experience (e.g.
in which a technology that is familiarised in the home is introduced into a public place.

Overall, though, Urban Echoes clearly induced change in the urban park’s sense of place. It achieved this through adaptation, colour, rhythm, interactivity, as well as ambient and more explicit informativity. One major change was the introduction of a certain intimacy into our participants’ opinion of the place. We can illustrate this effect through three participants’ views: for a young female participant, the colourful spots of light on the snowy pathway evoked the metaphor of a rag rug, a traditional-style rug made of recycled clothing which usually has a vivid mixture of different colours. A rag rug is usually only found in people’s homes, and therefore it belongs within the realm of very private spaces. Furthermore, a young adult male participant stated that a particular scenario would be very suitable for a romantic walk in the park with his girlfriend. It is highly unlikely that this would have occurred to him at all had the somewhat ill-reputed park been in its usual state. Finally, a retired male technician expressed a similar feeling, although with a certain indignation: he associated the use of colour in the park as very intimate by stating: “These are bedroom colours!”

The final scenario we presented to our participants, which was extremely busy with rapidly flashing colours, was unanimously called a “disco” by the participants. Actually, this was intended to be indicative of undesirable things that could be done with such a technology. Even to ourselves, it felt somewhat unpleasant to look at. While this did not constitute any danger to healthy participants, prior to the interview, we verified that none of our participants were suffering from epilepsy, severe migraines or a similar condition. Although they were unaware of this design intention, most of our participants rejected the flashy scenario instantly. Yet some participants also noted that even though the scenario was somewhat ‘epileptic’, in their opinion it might have been suitable for an event. The hectic rhythm of the lights was often associated with the idea that there could be music playing in the background. Indeed, while we were conducting an interview, we did actually witness a group of young people dancing right in the middle of the park pathway during this ‘disco’ scenario. We observed also other novel ways of using the urban park. These included such diverse activities as taking selfies and other photographs, staging a costume play (cosplay), having a picnic, and just sitting on the park benches, all in below-freezing wintery conditions.

Yet, sense of place also heavily affected what our participants considered appropriate for Urban Echoes. A senior female participant stated that she did not think the colour red was appropriate for illuminating the trees because it reminded her of a forest fire, and thus, it was an unfortunate mental image to associate with a park. The retired male technician expressed some disagreement of the overall aesthetic sensibility of Urban Echoes, especially the use of colour for urban lighting. This view was based on a rather utilitarian opinion: “Unnecessary, totally unnecessary for a park!” For him, the use of colour for lighting a public place was overly intimate and even wasteful. A kind of locational appropriateness which pertained to cyclical and seasonal variation also emerged from participant accounts. Participants were of the opinion that Urban Echoes should indeed adapt itself to surrounding conditions, but overall, they had two opposing ways for achieving this, and these also differed according to the time of the year. While some were of the opinion that the coldness of winter should not be underscored by using more cold colours, others thought that cold colours and cool hues were absolutely appropriate for winter, and thus should be used. However, warm colours and hues were unanimously considered appropriate in the autumn. Furthermore, it was commonly felt that the amount of lighting, or lighting levels, should be higher in the autumn when there is no snow to reflect what little light there is in the evenings. It can be said, then, that the aesthetics desired for the digital augmentation were influenced by the locational context.

Overall, then, there is a reciprocal relationship between the sense of place and the digital augmentation: the interplay between the place, its own cyclical and linear change of materiality and history, and the dynamic change introduced by the digital augmentation produced an array of experiences, and these were clearly reflected in participants’ accounts. Remarkably, one participant speculated that the augmentation, if it were made permanent, might alter
the entire identity of the park. All in all, the influence of Urban Echoes on the park was significant.

Locational appropriateness was a significant factor in regards to the information services of Urban Echoes as well. Most of our participants considered the use of Urban Echoes as an ambient display to be a fascinating concept. However, opinions varied substantially in regards to the more deliberate and sophisticated information services. One young adult participant who enjoyed going to various events had no doubt he would use Urban Echoes to discover what was on offer in the city through the ambient and mobile Events service. However, many others thought that even though the service was decisively an entertaining idea, they were not likely to use it themselves.

The Activity service illustrated where people were currently in the city via mapping discoverable Bluetooth connections as a heatmap in the park, employing the Urban Echoes luminaires as the ambient medium. This feature of Urban Echoes was considered interesting by many participants, and especially so if it were to run uninterrupted as the sole scenario, as was suggested by a young adult female participant. She argued, quite sensibly, that this would have made the feature more legible to the city inhabitants. However, quite bizarrely for us as researchers, one senior male participant was of the opinion that this feature would increase public fights (since it enabled people to congregate more easily), echoing many of our senior participants’ preoccupation with safety, both in regards to violence and environmental hazards.

The energy consumption monitoring service, which enabled citizens to view how much energy was being consumed by Urban Echoes, was seen as being very interesting by those participants, and by no means by all of them. Thus, personal backgrounds informed our participants’ views to a large degree. This also had the effect that, compared against people in the same age bracket, both young adult and senior groups were heterogeneous, especially in regards to what types of information they considered as interesting. Importantly, though, all participants expressed that there should be a high degree of legibility in regards to the ambient information that was being offered; it should be quite clear what information was being offered and how it could be interpreted. Thus, many suggested that some sort of signs or placards should be added to the park to explain this.

Importantly, through these ambient informative services, anyone with a mobile device could change the whole atmosphere in the park for a few minutes, a feature which was reminiscent of LightStories, although to a much lesser degree. This aspect was seen as a generally positive feature, and not a single participant considered it detrimental that someone other than themselves might do this at any moment. When participants were asked whether they would like to use ambient lighting for some other communicative purpose, an array of ideas emerged: some of them were related to raising awareness and ideological purposes, such as staging a demonstration, and some had more to do with personal expression. Some of the ideas were even related to advertising purposes. Participants were also interested in producing their own unique content. It can be said, then, that the participatory and interactive aspects of Urban Echoes were met with curiosity and enthusiasm.

Meaningful emplaced experiences

However, our participants were most unanimously excited about the simplest service that was on offer. This service was a colourful outdoor temperature visualisation: participants were informed that in that particular scenario, the accent colour of the lights adapted according to the prevailing temperature. For example, they were told that since that day it was cold outside, with temperatures well below the freezing point, the colour of the accent light was deep blue. When the temperature was closer to zero degrees Celsius, pink or red were seen as accent colours. In actual fact, though, this feature did not truly function on its own. Instead, a suitably coloured pre-programmed scenario was turned on by the designer according to current temperature; however, participants were not aware of this, and experienced the feature as if fully functioning. As a result, all participants were greatly enthused about this ‘ambient thermometer’ feature. Even though the popularity of this stunningly simple technological service might be rather perplexing for designers, it is a fascinating
phenomenon, and one we must try to explain for future reference.

However, I was not able to appreciate, and thus explain, this phenomenon until I saw a similar occurrence in research materials I had collected on participant experiences of UBI hotspots. There, too, a strikingly simple service was hugely popular. In both research material sets, then, I found that those applications that offered what we might term meaningful emplaced experiences are the most popular ones. By this I mean chiefly, that the application is somehow inherently connected with its immediate surroundings, the place where it is located; furthermore, that it is related to or takes into consideration the entire bodies of its potential users; and finally, that it creates a continuum with their prior experiences which then makes it understandable. Here, this aspect was outdoor temperature, a locational and dynamic feature of place that fundamentally affects all beings, and which also connects with potential users’ experiences with outdoor thermometers. In regards to the UBI hotspots, the UBI Postcard application offered an emplaced experience which made sense in a similar manner; I will provide a full account of the UBI postcard in the context of Case UBI hotspots 1.

**The significance of Urban Echoes**

Against the broader scope of existing literature, Urban Echoes constituted an anomaly in many ways. It continued the architecturally-led digital augmentation projects, begun in Oulu through LightStories. However, I would argue that the most remarkable feature was the spirit in which the case study was conducted. The Urban Echoes case study was evaluative, participatory and interdisciplinary, all at the same time. This attitude resulted in rich results both on the experiential level as well as on the level of research materials and results.

From the point of view of my own research, case Urban Echoes resulted in a process in which traditional ethnographically-inspired methodology was used for the purposes of participatory evaluative design research. This marked a change in my attitude as well: I now realised that the use of methodology required not only a thorough understanding of existing methods, but creativity was necessary to truly apply them in useful ways. However, I also realised that a deep sense of agency about those methods is necessary to be able to see them as malleable, and here, the thorough understanding of existing methods through readings and practical work was necessary. I had achieved something of this agency by the time Urban Echoes was to be evaluated. As a result, my approach to the design of experiential evaluation in Urban Echoes was problem-based: I concentrated on the needs of the case study and, importantly, the people who were about to become a part of it. This flexible attitude enabled a custom-tailored approach to emerge. However, I was also forced to adapt to the needs of a large scale design project and accept that a purist’s approach to methodology was quite impossible in such a research environment. Ethics, resources, concepts and aims had to be constantly negotiated between people in team of interdisciplinary researchers and designers. Thus, the Urban Echoes case study also deepened my interdisciplinary collaboration with the two cultural anthropologists, Ylipulli and Suopajärvi, who were so important to the case study in many ways. Most importantly for my research, I was able to observe, consciously and unconsciously, their manner of conducting field work with participants, and come to a style of my own as an architect doing similar (but not the same) type of work. The value of this education was instrumental to the case studies that followed.

Most importantly, I wish to underscore the significance of two results from Case Urban Echoes, which had a major role in my PhD thesis. Firstly, the analysis and the results that were gained demonstrated the usefulness and power of the concept of emplacement as a tool for the analysis of participant materials. We will delve into this aspect of article II later, in chapter 5.3. Secondly, the results showed the importance of meaningful emplaced experiences for the design of media architecture installations; a result which emerged clearly also in the empirical results of Case UBI hotspots 1, which I will recount next.

**5.1.3 Emplaced experiences of public urban displays: UBI hotspots 1**

Article IV answered Q1a, “How do the existing features and use patterns of a public place affect experiences of digital augmentation?” It achieved this through examining the engineer-led (Suopajärvi et al.
large-scale longitudinal deployment of public urban displays, the *UBI hotspots*. However, the Open UBI Oulu programme, which most notably provides the panOulu free wireless internet, and the everyday technology usage of the city inhabitants served as the larger context of the UBI hotspots case study. Thus, within the city, inhabitants were able to choose from a vast selection of urban technologies ranging from the almost-immaterial and free wifi to the heavy-duty display installation, in addition to their personal devices and commercial services. Thus, the research setting in the city was rather complex. For this reason, a multimethod approach was used.

The research materials that were analysed in article IV were gained from an *observation study* cf. section 4.5.1) in two locations in the city, and two participant studies, the *display evaluation probe study* (4.5.3) and the *ICT diary study* (4.5.2). These materials were then analysed abductively, employing the theoretical concept of emplacement. The analysis of these materials demonstrated the powerful effect of the unique and existing functionality and user groups of a public urban place on the design of digital augmentation. Herein, I will draw further conclusions as to what design issues and challenges these findings might constitute for the design of digital augmentation, with a special focus on public displays as the technology.

Thus, as with the Urban Echoes case study, I will begin by establishing the locational scene in which the UBI hotspots are situated in. However, this description is different from that of Urban Echoes, as I am employing etic information gained through observation of urban places. On a general level though, these insights will be complemented with emic knowledge which was gained from the ICT diary study and the display evaluation probe study. Thus, in the following analysis, I will first describe some prominent user groups that were observed in the two urban places in question; then, some emergent practices which were both observed and reported by participants, with a specific focus on technology use in the city of Oulu. Only then can we begin to draw some conclusions concerning the participant experiences of the UBI hotspots in these places and in the city of Oulu at large.

**Spending time in public urban places**

Through examining the *observation study* materials, some key groups of individuals and practices emerged in the two chosen locations. Importantly, the presence and play activities of young people and children were very prominent. Even though the pedestrian square and the park that were under observation were busy and centrally located sites, children and young people were regularly present in different sorts of play activities. Furthermore, these activities employed the physical features of the urban places, such as the surfaces and edges of fountains and stonework. Yet, our display evaluation probe materials indicate that the public displays passively preclude users who are not adult-sized. Even several of our young adult participants in the display evaluation probe materials remarked that the touch screens were too high for children. Similarly, the displays’ gray, massive appearance might well send the message that these objects are meant for serious business, and thus, that they are uninteresting grown-up things. Thus, instead of serving this group – who are already present and explore their surroundings in a highly tactile manner, and who clearly have time to spend in these locations – the displays do not seem to try to entice these users in any way, and even actively shut them out.

In a similar fashion, the prevalence of senior citizens in these public spaces emerged in the *observation study*. Their presence and activities were frequently connected with daily chores and errand running, such as sitting down for a moment to have a rest when carrying the shopping. However, while elderly people were observed to sometimes briefly look at the screens, they were not seen touching them. There seems to be no features or services in the public displays that would appeal to elderly citizens. Overall then, the observation study confirms that specific user groups, such as young people and seniors, were not taken into account in the design of these displays; an observation which agrees with the findings of Ylipulli & Suopajärvi (2013) and Ylipulli et al. (2014a).
Fig. 11. The “no bicycles” sticker, and bicycles parked directly in front of the display. A participant photograph from the display evaluation study.

decreases the popularity of the displays by narrowing down the technologies’ uses and user groups. Furthermore, this raises concerns over who has the “right to the city” (e.g. Harvey 2003) and who can access urban life if public urban places are increasingly being digitally augmented and urban life is being mediated through technologies. As these findings clearly emerged in the observation materials, it also demonstrates that preliminary fieldwork should be a central method of work in the design of digitally augmented urban places, as it is in architecture and urban design.

Concerning emplaced practices, there was one that emerged as very prevalent in the observation study, namely the frequent and varied use of bicycles. Even when they were engaged in conversation with another person, people held on to their bicycles. And even while sat down on a bench or other piece of urban furniture, many parked their bicycles next to themselves. Thus, bicycles were important not only as vehicles for arriving to these places, but also when simply being there. This is in keeping with the city of Oulu’s long-held identity as ‘cyclist city’: since the 1980’s and 1990’s, inhabitants of the city have been served by a large network of separated bicycle paths. Indeed, cyclists are a normal part of the cityscape and urban life in the city even during the cold and snowy winters. Yet it was clear in the analysis of the display evaluation probe study materials that this was not factored in in the design of the urban displays. Instead of catering to cyclists’ needs, bicycles have become something of a perennial challenge for the displays, as can readily be seen in participant photographs from the display evaluation study, figure 12 being an example of several similar photographs and sketches. Thus, the public displays were unable to connect with this existing emplaced practice.

Places, then, have concrete consequences for designs, whether they are taken into account or not. Thus, if place is not studied prior to design and implementation, we risk that what might otherwise serve as opportunities, or even inspiration, in these locations, may in fact become nuisances. Combined with our findings concerning user groups in these urban places, we can conclude that designing a generic purpose object for a generic audience, instead of specific users and specific circumstances, can be tantamount to designing nothing in particular to nobody in particular. Thus, networked digital augmentation technology, which needs to function well in many circumstances, is particularly challenging to design.
Using technology in public urban places

After examining the people and their activities in general, we can turn our attention to how participants use technologies to experience the city and urban life. In the display evaluation probe materials, most of the participants conveyed that they used those applications which offered real-time information about what events and services were available in the city: what is being shown at the local cinema, what were the menus like at local restaurants, and when public transport was coming in and going out of the city centre. As we used the evaluation probe method, participants chose these applications freely. Thus, they represent services that were somehow appealing in this specific type of situated medium. Indeed, some participants in the ICT diary study remarked that they did not consider reading news items outdoors an attractive option; yet this did not emerge in connection with applications that were more popular. This indicates a wish to gain information that is locationally relevant; a finding which was also present in the Urban Echoes case study. Thus, we can state that urban displays, and other digital augmentations are, unsurprisingly perhaps, assumed and even required to offer information that is inherently related to urban life and urban places. This practice has been observed and termed ‘informational navigation’ (Kukka et al. 2014). This is in connection with, and may be described as being similar to, the practice of ‘social navigation’ (Ylipulli & Suopajärvi 2013, 547) a term that was coined by one of the participants in the ICT diary study materials. By this, the participant meant the ability to coordinate one’s movements with friends while living and spending time in the city; an ability that most of the participants in the study deemed as one of the most important uses of mobile devices. This connection between mobility, locational context and various types of information and communication technologies has been examined by various researchers, for example Strandell (2014).

Interactive public urban displays as an example of a new urban technology

Against this background it is easy to understand that one of the most popular applications on the UBI hotspots is based on public photography. With the UBI Postcard, as the application is called, willing users can take a snapshot of themselves and their companions using the internally installed camera in the UBI hotspot, write a short message to accompany it, and then email it to someone. Not only does this service employ the metaphor of the postcard; it employs and blends this with an important emplaced urban practice, namely urban photography. Despite being a simple application, it constituted an important example which for the first time demonstrated empirically the importance of meaningful emplaced experiences in digital augmentation in my research materials. It also highlights the importance of understanding place for both the design and analysis of digital augmentation. From this point of view, we can commence with a more detailed analysis of the UBI hotspots, through
insights that emerged primarily from the display evaluation probe study, but also from the previously cited observation study and ICT diary study.

The UBI hotspots had been deployed in the city for a number of years when the observation study was conducted. While these displays did not seem to play any significant part in the daily life of the city in our observation study, many participants nevertheless had an overall positive attitude towards the concept of having these urban displays in the city, as emerged in the display evaluation probe and diary studies. Yet the city’s marketplace by the sea, a site surrounded by colourful historical buildings constructed with stone and wood, emerged as a problematic place for the UBI hotspots. The very technological essence of public displays clashed with some of our participant’s sense of place. To illustrate, a young adult female participant expressed amazement and disbelief towards the fact that the world she was living in could be so very technologised that “even the marketplace”, clearly a special site, should have a public display. However, some of our participants were of the opinion that the UBI hotspots’ contemporary, minimalist form was adequately “neutral” looking, and thus appropriate for various locations, including the marketplace. We can see here that urban displays become a part of the ever-persisting architectural issue of how to design within and for the existing cityscape, which usually is quite heterogeneous and historically layered. Additionally, compared to architectural design as it is usually practiced, UBI hotspots were met with an extra challenge: how can we design a whole network of interactive and dynamic objects that would be appropriate for an array of different urban places? The UBI hotspots answer this question by presenting a middle-of-the-road design option: simple shape, simple colour. For some of our participants and places this strategy worked well; for others, less so.

Considered from this highly visual viewpoint, the panOULU public wireless internet has constituted a more discreet way to digitally augment the city. Wireless internet constitutes a practically invisible urban technology where the only material installations are the access points, tiny devices that easily disguise themselves amongst the technological miscellania that exist in the cityscape and that already escape our attention. In fact, when one begins to look for them in the first place, it can be even slightly bewildering to first notice all these various sensors, antennae and access points that are distributed in lamp posts and buildings. According to Forlano (2009), wireless internet coverage actually can be conducive to certain kinds of place-making in cities. These kinds of places are sites of informal interaction where people flock to use the internet with their devices, constituting a ‘codescape’ mapped top of the city, which do not adhere to built boundaries (Forlano 2009). I agree with this argument; however, taking into account what we have learned from both the UBI hotspots and Urban Echoes case studies, I will amend this by stating that these codescapes emerge when they coincide with other emplaced amenities, and thus constitute holistically meaningful emplaced experiences. These amenities, such as coffee shops or park lawns, offer shelter, sunlight, nourishment, and other pleasant and necessary experiences for people’s bodies, as well as sociality. This is often possible with wifi, as people are free to roam around and pick a spot that most appeals to them as a whole. Yet while public urban displays form codescapes, these devices frequently are unable to take into account the entire body-mind-environment system, or are at least considerably more inflexible in this aspect than mobiles. When this is the case, urban inhabitants are much less willing to use them. Poignantly, in Oulu, the wireless network panOULU has been growing in popularity, whereas the UBI hotspots draw a lessening number of users (Ylipulli et al. 2014a).

Overall, in the display evaluation probe, participants seemed to evaluate their experience of the UBI hotspots from three distinct viewpoints:

1) In the large scale: as objects as part of the cityscape, seen from some distance
2) In the medium scale: as objects in themselves, not necessarily as a part of their surroundings and not necessarily as interactive objects
3) In the small scale: as interactive objects in use, in close proximity

It must be noted here that this distinction was not made in the evaluation probe materials. Rather, this categorisation emerged when analysing the materials. Importantly, this underlying division of experiences seemed to have profound effects on some participants, as their responses suggested curiously that to them,
the UBI hotspot was more pleasant from an immediate
distance but less pleasant when viewed from afar, in
the context of the cityscape at large.

In the large scale, our participants expressed
varying opinions concerning the appearance of the
UBI hotspots in the urban environment. Many of them
thought that the devices fit their environment, but
nevertheless, the appearance was somehow dull. An
explanation for this curious duality of opinion might
be that the urban spaces in themselves were rather
dull-looking, as was expressed by several participants.
It also seemed important to be able to easily see and
recognise the public displays in their environment: to
illustrate, one participant remarked that the devices
are “hidden although they are located in the middle of
the street”. For many, a more playful and unique
looking appearance would have been preferable.

On the other hand, a young adult female
participant stated that in the evenings the bright screen
of a public display was too aggressive visually, and
that this was especially so in the historically important
marketplace.

This last point also highlights the fact that public
urban displays also introduce an element of novel
dynamic and continuous change in the cityscape. This
was not possible with existing elements of the
cityscape, such as urban lighting or billboards that
could also be seen as predecessors of public displays.
Indeed, the latter was a common descriptor or
metaphor for the UBI hotspots in the display
evaluation probe. Thus, the urban furniture itself has
sprung to life in contemporary cities, and is trying to
capture our attention. Perhaps it is somewhat
surprising then, that our participants did not appear to
be taken aback by this, but focused on coolly
analysing and recounting their views and experiences
to us. We must take into account here that they saw
themselves as co-evaluators, and that the displays had
been implemented in their city for some years at that
time, and as such, any novelty effect that might have

Fig. 12. A participant’s photograph from the autumn set
of materials in the display evaluation probe study,
demonstrating the relatively low-key manner in which the
displays exist in the cityscape.

![Image of a city street with a public display](image-url)
been present at first would have worn off considerably. However, many of our participants also merely explained that since they were unaware of what these objects were, they quite simply had chosen to ignore them prior to the evaluation probe assignment.

Against this background it is somewhat surprising that in the ICT diary study, when participants were asked whether they would wish to remove the displays from the city, most of them did not want to do so. For them, the public urban displays had enmeshed into the identity of Oulu, a city where ICT industry and research had been, and continues to be, a major player (Äikäs 2001). We can compare this situation to that in New York, where the largest urban display in the world at the time was introduced into Times Square. When a survey concerning the display was conducted, it became apparent that the enormous display was considered to strengthen the sense of place and identity of the location (Steel 2014). Digital augmentation, then, can be seen as a way to compete globally with other cities. When world cities (Hall 1966) engage in this battle, mid-sized and small cities gladly follow suit.

In the large scale, then, aspects relating to visuality and identity, both personal and locational, emerged as specifically important. Participants expected that such devices would be both respectful of their surroundings, but also bring fresh aspects, such as playfulness, into the streetscape, and wished that using such a device would not compromise their personal public image. Overall, the displays were seen to harbour a possibility to improve and strengthen the technological image of the city: participants did not want to do away with public displays, but they wished to alter their design.

We can now examine the medium scale, i.e the displays as interactive and material objects in themselves. Many interesting metaphors were used to describe their form: such descriptors included the terms ‘large Lego block’, ‘monolith’, ‘tombstone’, and ‘large mobile phone’. Yet, by far the most usual descriptions were ‘large-screen television’ and ‘billboard’ or ‘advert’. I will argue that this has much to do with the choice of a horizontal screen for the displays, a shape which is reminiscent of these existing, common items. Interestingly, one of these is essentially quite domestic, and the other, largely public in essence. This might contribute to the issue mentioned above, where participants had not necessarily understood what exactly these items were. Furthermore, what is common to both metaphors is that they are non-interactive items. Indeed, usually interactive screens are very small: tablets, smartphones, and even cash machines would all belong in this category. The design intention with these objects seems to be, in addition to convenient portability, that of privacy, an aspect that arose as significant to our participants in the ICT diary study. Thus, consciously or unconsciously, participants might have inferred from the actual appearance of the devices that these were not interactive objects, and that this might be a device that was just trying to sell them something by displaying adverts. This affirms that emplaced experiences are necessarily interwoven with individual’s previous experiences. If these are not taken into account in the design of an artefact, people are not able to read what the object means. This issue of appropriation in connection to UBI hotspots was addressed also in an earlier work (Ylipulli et al. 2014a).

In the display evaluation probe, some participants presented us with the idea that some kind of a sign, saying “Information” or “Touch me!”, should be added to the displays. This idea might have been inspired by the existing no-bicycles symbols which were already on the displays. As did our participants in Case Urban Echoes, these wishes indicated that our participants considered the legibility of the design very important: they wished to know what these items are offering, and how they could interact with the devices. This desire, I argue, was also behind one of our participant’s humorous but heartfelt contribution: a haiku in which a UBI hotspot “stands proudly alone” in the rain, longing for someone’s touch. I will hypothesise further here, that the very interactive nature of the displays, of which the participant was well aware of, might have made the display even more susceptible to this kind of anthropomorphising. These findings, I argue, urge designers to consider with great care how their designs communicate with their potential users.

Lastly, we can scrutinise how participants experienced the UBI hotspots from an immediate distance, in what I have termed here the small scale. Significantly, it was obvious from the display evaluation probe materials that the role of the body is
underscored in this perspective. One manner in which this was highlighted in the research materials was the significance of protecting the body, which is a fundamental need for all. Several participants in the display evaluation probe study materials expressed a fear of obstructing other people’s passage, and thus being hit by, for example, cyclists, while using the UBI hotspot. Many remarked that fortunately this had not happened, while some drew sketches demonstrating that the public display was located in a busy area in the urban space. These passers-by constitute a physical threat, but also a social one: some participants of the ICT diary study noted that using these public displays in plain view of other people was highly embarrassing for them. They were fearful of making mistakes with them in public (Ylipulli et al. 2014a), and they also found it unsettling that the public display might show an embarrassing advert while they were being seen interacting with it. While to some extent these feelings might be culturally specific, it is an established notion that using or doing anything in a public place can have an effect on our impression management: people are habitually aware of others in public places, and they want to give those others a certain perception of themselves (Goffman 1959).

Continuing with the theme of protecting the body, cleanliness and general upkeep also emerged as vitally important aspects of public display use. Several participants remarked that visible dirt on the displays was especially off-putting. The reason why this might be so important for a touch-based device is quite obvious. Currently, most of the touch-based devices in our everyday lives, such as smartphones and tablets, are quite personal. We keep them in our own pockets and bags, and they are used only by those few that we as owners permit. Also, we usually wipe them clean of excessive dirt. While cleanliness might seem a humdrum aspect of technology use, we can clearly see that the successful upkeep of situated urban technology is equally important as that of bus stops and parks. Digitality or technological novelty does not render public displays any purer. Rather, touch-based interactivity places more demands on its level of, at least perceived, hygiene. Dirt, as well as decay and patina, are an inevitable aspect of the material and temporal properties of public urban places, as has been shown before by architectural scholars (e.g. Lynch 1972). This imposes challenges on digital augmentation as well. To illustrate this further from another viewpoint, several participants also remarked that they had not been able to use one of the two sides of the display due to snow, which had formed piles in front of it. One display evaluation probe participant even sketched an anthropomorphised UBI hotspot that was calling for help from behind a heap of snow, and waving its arms in distress. These aspects relating to seasonal variation, in fact, emerged so strongly in the research materials, that article V was subsequently focused around them.

Through this discussion, then, the viewpoint of linear and cyclical temporality emerges. The notion of temporality is a fundamental aspect of emplacement, but it has not been substantially dealt with in the literature dealing with ubiquitous and urban computing. In general, technology is not designed to be used for a long time. However, the kind of a heavy infrastructure that a public urban display network is does not necessarily allow for this. Furthermore, many of the UBI hotspots were affected by alterations in the streetscape even while I was conducting my study. Thus, I will argue that the rhythms of city-making and technology-making differ to a considerable extent. Whereas new technology products are released annually, and the very same devices or applications might be disposed of only a year later, cities must be planned with the next decades and centuries in mind. Implementation might take 5, 10 or 50 years and the results of this work may well be used for generations to come. This temporal design discrepancy must be addressed by those who intend to design urban technologies.

Through this discussion, we might begin to chart some of the design challenges that are associated with public urban displays. Firstly, three scales emerged in the participant evaluations of the UBI hotspots, namely the large, medium and small scale. Within these, specific aspects – place, metaphors and body, respectively – were emphasised. It is crucial to note here that this model is simplified, and that the purpose is not to claim that, for instance, issues of the body would not be relevant to metaphors; rather, these were
especially emphasised in these different scales. I will now further argue that from these emphases we can induce three specific design challenges for public urban displays. In the small scale, the body and how it interacts with the device, introduces important design decisions: whether the mode of interaction it employs is touch, movement or other method, we must interact by using the body. In the medium scale, metaphors to a large degree influence how urban inhabitants read the meaning of these objects, and whether to approach and engage with them, or not. In the largest scale, the relationship between the public urban displays and their surroundings, or place, was underscored. This emphasis presents us with the design challenge that we might term here as ‘connection’ – whether the objects are accordant with the sense of place and with the uses and practices associated with it, and whether they were noticeable in their own right, and whether a balance could be attained between these two. All these are made substantially more difficult if a network of objects is to be designed.

Further, cyclical and linear rhythms posed design challenges for the design of public urban displays. The rhythms of the interactive, dynamic device may either conflict with, or take advantage of, the temporal aspects of place, such as lighting levels. With Urban Echoes and LightStories, the technologies actually showed themselves only after sunset. A special challenge is to attempt to devise a way to augment a place digitally 24 hours a day, seven days a week, as was the case with UBI hotspots. Furthermore, UBI hotspots also challenged the rhythms of city-making, as they have been deployed for many years; an adequately substantial amount of time to witness, manage and collide with numerous linear (e.g. construction sites) and cyclical (e.g. winter) occurrences in the city. All these constitute design challenges for a public urban display which is always on.

The analysis I have presented above of a longitudinal and technology-led urban computing deployment showed various mismatches between participants’ real use experiences of the implemented technologies in situ in the display evaluation probe, and the observation study of what emplaced activities habitually take place in the same locations. Examining these mismatches critically, some clear gaps emerge between the actual urban life and use of technology in the city we studied, and the design of the deployment. Yet those individual applications offered by the displays that managed to blend the codescapes they create with meaningful emplaced experiences, – creating a link from the software to the socio-physical reality of the place – were nevertheless popular. Although a seemingly simple application, the UBI Postcard enabled people to contact their friends and family in a contextually meaningful way, merging the personalised logic of mobiles with established urban experiences and practices. The situatedness of the display is essential here, as it re-enforces the senders’ message of “I was here”.

Thus, compared to mobile devices, situated computing can, and should, offer also different experiences. This is due to the fact that the movement-based ‘liquidity’ of hybrid spaces – created through mobiles (Galloway 2004) – is in contrast to the situated ‘solidity’ of public urban displays and other environmentally integrated computing technologies. This creates new design challenges that emerged in our research materials. Thus, it would be beneficial to start thinking about the possibility designing for hybrid places, which combine the social and informational aspects of hybrid spaces with meaningful emplaced practices and experiences. In this view, the potential technologies (i.e. whether mobile or situated) are not so important as this underlying principle. For this to happen, though, genuine interactivity must occur between the technology and the potential users, which are also the users of the place in question. Yet the prevalence of advertising as the logic and raison d’être behind making many situated technologies (Kitchin 2014) in the first place may steer urban technologies into an opposing direction, in which we are only assaulted with more broadcast advertising in the streets. While this can have a positive effect on the sense of place of certain highly commercial locations, it will have a desensitizing effect on our experience of most other urban places, as people will consciously and unconsciously try their best to ignore these installations, as was demonstrated in the display evaluation probe study. After all, the city is more than just a place of commerce, as was evident also in our locality in the observation study materials, and the many existing emplaced activities of urban places deserve to be supported.
The significance of Case UBI hotspots 1

For my own research, Case UBI hotspots 1 further underscored the importance of investigating place – this time with a focus on existing users and use patterns. This approach yielded many explanations for our participants’ experiences. As an architect, I was somewhat worried that my background would influence my work to an unreasonable extent; after all, place is among the central concepts in architecture. However, the materials that were gained demonstrated to myself as well that the inclusion and exclusion of place in the design of digital augmentation determined to a large extent the success of the design. Even in initial readings, the emergent aspects relating to participants use experiences all tied in with place; emplacement then enabled me to credibly attach these disparate empirical findings to a theoretical body.

Furthermore, during this case study, the novel methodology of evaluation probes proved to be highly useful, as it offered valuable and colourful layperson-evaluator accounts for how our participants had experienced the UBI hotspots on their own. The depth and heterogeneity of the participant accounts that were thus gained demonstrated the usefulness of the proposed method. Furthermore, after an initial reading of these exciting research materials, I could couple them with the concept of emplacement which constituted a similarly fascinating novel experiment for me. Together, these proved a productive combination which illuminated many aspects of the people–technology–place triad that was present in the city.

A further significant change was the use of etic knowledge to understand the research setting. The observation of street life is a classic method, familiar already from the research of Whyte (1980), and various types of observations usually inform the work of architects in both practice and research. For the research of digital augmentation, this method is equally useful to gain insight about the people using places and the practices that they engage with while there. However, this set of research materials did not enable me to state anything about the general sense of place associated with these two sites. Rather, the focus was on external facts: what actually went on in the place, and not why or what the users of the place thought of it. More emic knowledge, though, was gained through the evaluation probes. However, the in-situ interviews in Case Urban Echoes naturally constituted a much deeper way to gain a grasp of these kinds of more abstract and delicate aspects of place. However, the great strength of the coupling of the etic observation materials with the emic evaluation probe was the attainment of improved efficiency while still preserving essential insights that enabled me to evaluate the UBI hotspots. Efficiency never ceases to be a factor in design processes, which are complex endeavours that are expected to occur on a predetermined timeline.

Article IV, then, began to describe some of the fundamental emplaced design challenges that relate to the digital augmentation of an urban place. Furthermore, it was evident in both emic participant data sets, the display evaluation probe study and the ICT diary study, that weather and climate pose specific design challenges for such highly situated technologies such as the UBI hotspots. These, then, became the subject of article V.

5.1.4 Climate and weather as emplaced design challenges: UBI hotspots 2

Article V answered Q1b: “How do weather and climate affect participants’ experiences of public urban technologies, and how should it be taken into account in the design of digital augmentations?” Once again, we examined the network of public displays, the UBI hotspots, to gain insights.  

Firstly, we gained an interdisciplinary perspective on the issue of weather and climate through an interdisciplinary literature review. In this review, we examined works from both social sciences, as well as from the field of architecture and urban planning. Here, I will also delve into these results first to provide a background for the analysis. Second, I will present the findings which were gained through analysing the ICT diary and the display evaluation probe materials through the lens of emplacement, with a special focus on issues around weather and climate. Once again, I begin with the larger picture by recounting aspects of technology use in a northern city, as was revealed in the ICT diary study. This, then, will inform a narrower focus on analysing participant accounts of the UBI hotspots in the winter and summer evaluation probe studies. It must be noted here that the original article
also employed another theoretical concept. However, I have here omitted these results, as they do not belong within the scope of this thesis. Finally, I will present the resulting discussion that was based on reflecting the issues that emerged in the light of the literature we reviewed. From these issues, then, I devised a model which presented the design challenges that I derived from our participant accounts.

**Issues of climate and weather in HCI and architecture**

Through our literature review, we were able to argue that the use of technologies specifically in northern conditions had not been researched within HCI thus far. On rare occasions, though, cold weather has reportedly informed the design of individual applications or devices (e.g. Zarek et al. 2012). However, these examples are rare, and we can state that weather and climate are usually not viewed as important aspects in technology design. This might be due to the fact that computing research has embraced ‘real-world’ studies and the outdoors very recently. We can also assume that the military industry has conducted at least some research and development work in regards to these themes, but often these studies are beyond the reach of civilian researchers and designers.

Within architecture and urban planning, there might not be specific studies on issues of climate and weather as they pertain to the augmentation of urban places with technology. However, climate and weather is a theme that builders cannot avoid but to grapple with (Rohinton 2005). Therefore a brief glimpse into architectural literature uncovers a number of relevant works. For instance, climate was introduced into architectural literature already in 1963 as “bioclimatic design” (Olgyay & Olgyay 1963). The objective of this viewpoint was to “fashion architecture in harmony with nature while keeping the comfort needs of the human being as its central concern” (Rohinton 2005). However, climate-awareness in architecture declined steeply with the advent of the International Style in the modernist era (Hitchcock & Johnson 1966). The goal of this approach, after all, was to universalise and rationalise architectural design principles with little regard to local conditions and cultures. Yet in the 1980’s this universalising approach was soon relinquished at the introduction of phenomenological thinking and Critical Regionalism, a design approach that underscored local socio-cultural and physical conditions (e.g. Frampton 1983). Climate consciousness, then, once again reclaimed an important place in architectural design and thinking. Recently, Hill (2012) has even offered a re-telling of the history of architecture from the point of view of weather. Importantly, Pressman argues that “our perpetual summer ‘state of mind’ has been a serious impediment to the development of meaningful solutions for winter living” (Pressman 1996). Furthermore, Pressman proposes that we should not view winters solely as something that we must shelter people against, but also as something which has positive aspects that we need to expose in design; thus, viewing climate and weather as a productive starting point for design.

**Examining technology use in a northern city**

The ICT diary study revealed interesting participant experiences, practices and attitudes in regards to technology use, and climate and weather. Only those devices that were deemed absolutely necessary, such as mobile phones, were used outside by our participants in harsh weather, and they reported that they even preferred not to carry laptops during cold or wet seasons. A young adult female commented that even mobile phones had “zero compatibility” with winter. Participants reported enthusiastically how mobile devices, and smartphones especially, slow down or completely freeze in the winter. Furthermore, using these devices, which often must be touched with bare fingers without having any gloves on, had been irritating and even painful. These adversities with winter technology use prompted powerful, indignant reactions in participants, especially since subzero (in Celsius) conditions in their city were perfectly normal for many months of the year. Yet many were acutely aware that the cold Nordic conditions are necessarily challenging to electronics. Participants’ attitudes portrayed either frustration and anger, or submission. Furthermore, mobile technology was uniformly seen as a factor which added security to life in wintry conditions, and for this reason, many also lamented
the fact that the technology could not be fully trusted when they felt they needed it the most.

Yet many participants also gave interesting recounts of practical tactics that they could use to cope with these challenges. For instance, phones were kept close to their own body, under coats or inside mittens, to keep them functional. A young female participant even reported that she sometimes used the touchscreen of her smartphone with her nose in order to avoid frostbitten fingers. The bright light of the screens were mentioned as a useful feature by some: for instance, a young female participant stated that she had a habit of staring at the light from her phone in dark winter mornings in order to wake herself up; another young female participant noted that the light can be helpful in emergencies during the dark and cold winter season. Our participants’ experiences concerning the compatibility of technology brands with climate and weather also strongly informed their perceptions of these brands. Some reminisced in a nostalgic manner about how their old Nokia mobile phones had functioned well in all weather conditions, and were perplexed as to how Nokia had not recently made a phone that would adapt better to Finnish conditions; a 30 year old male who in his everyday life used a smartphone, stated that he took his old Nokia with him to hiking trips, as the battery lasted for a much longer time. The participants also discussed the Apple iPhone and its sensitiveness to cold, an aspect which, at the time the interviews were conducted, had been a subject of discussion in the media. Although it was used by some, the fragility of the device was seen as quite ridiculous. All in all, mobiles and smartphones were seen to be better suited for summer-time use. Yet even in the summer, participants had experienced phones being damaged or ruined by the elements, such as heat, rain, or dirt. One young female participant summarised these experiences by stating: “a phone needs cloudy, windless, rainless and warm weather”.

Through these results, we can learn that urban technology-use is significantly altered during the various seasons. This is due to issues around the technology, such as reliability in adverse circumstances, as well as due to the pace of life that is altered as seasons change. Also the use of urban places is thoroughly affected, even determined, by climate and weather. It then stands to reason that this many-faceted setting affects public urban displays in many ways. Thus, informed by this more general analysis of technology use in the city of Oulu in regards to climate and weather, we can now move towards discussing the public displays specifically.

In the display evaluation probe materials, unsurprisingly, participants remarked on climate-related aspects more often in the winter-time data set. However, there were numerous climate-related issues also to be found in the autumn set. One common issue was keeping hands protected while participants were using the large touch screen of the displays. This finding which was also present in the ICT diary materials. In the display evaluation probes, this emerged both in the winter and autumn sets, even though a significant difference in prevailing temperatures existed at the times the data collections took place. Notably, though, one winter-time young male participant had employed the excess heat emanating through the touch screen to keep his fingers warm in the freezing conditions. Nevertheless, most of our participants had experienced the cold as quite problematic, and some of these participants had opted to use the display with their gloves on, which affected the responsiveness of the touch screen negatively. During episodes of very bad weather, such as rain in the autumn, participants had frequently chosen to use those displays that were more sheltered by structures, especially those located underneath outdoor arcade structures.
Fig. 13. Public urban displays are outside in all conditions, which can be very challenging in a northern city. A participant photograph from the display evaluation probe study. The snow from the marketplace has been piled in front of the display.

Yet even some of those participants who had used the display in more agreeable weather remarked that conditions with snow, sleet, or ice would make using the device more unpleasant. Shelter, thus, can be named as a central challenge for the design of public urban displays. Importantly, this challenge involves the device, body, and the environment, engaged in dynamic and complex emplaced relationships. This indicates also that the location and orientation of public urban displays should be considered carefully. Climate and weather affect their use significantly, and design choices concerning orientation and location can either support or hamper it. These choices also give rise to maintenance issues that were mentioned by several participants, as I also recounted in the previous section. These largely concerned access and cleanliness. A device which is exposed to outdoor, public conditions was seen as hygienically suspicious. However, we can note here further, that this had much to do with climate and weather conditions: merely one single autumn participant had complaints regarding dirtiness, whereas six winter-time participants expressed serious concerns about hygiene. Also, as previously mentioned, snow was an often mentioned issue. This was most memorably illustrated by one female winter-time participant, who sketched a picture of an anthropomorphised UBI Hotspot that was calling for help from behind a huge pile of snow.

Framing central design challenges

Having gained the findings above from participant accounts, I was able to derive some design challenges on their basis. With both types of technologies, cold, glare, wind, rain and snow emerged as challenging issues in technology use in outdoor conditions. These “emplaced challenges”, as we might call them, arise
with seasonal cycles (figure 15). Thus, in article V, I presented a model (figure 16) which attempts to frame these emplaced design challenges, i.e. the relationships that involve the body, the technological device(s), and weather and climate. The model illustrates that climate affects all aspects of technology design. Furthermore, the model then helps design challenges that arise out of these relationships, to be conceptualised: casing, interaction, and shelter.

We can thus visualise what an important and challenging part weather and climate play in the design of digital augmentation, which is our special concern here. Yet, our literature review on the subject of climate and weather in architecture demonstrated that these matters need not be seen solely as negative aspects, but also as a productive starting point for design. For the design of digital augmentation in these conditions, this is a necessary attitude to develop. For example, were we to take rain as one emplaced starting point for the design of a public urban display, we can quite easily produce the design idea that a display that is continually subjected to rain should, naturally, use the rain to clean itself, solving two problems in one fell swoop.

It is easy to see also that the various seasons could be employed as inspiration for producing ever-changing content for urban displays, or for making them mesh more harmoniously with their surroundings by adopting seasonal colour schemes, as we learned in Case Urban Echoes, solving a problem that emerged in Case UBI hotspots part 1. In this spirit of emplacement, I argue that we must think of the design of digital augmentation in public urban places as if we were designing urban furniture, which offers physical comfort and bodily protection with the specific focus is to enable urban inhabitants to spend more time outside. We could then design, for example, an urban display from this novel viewpoint; the whole device might be designed as a place for the elderly to sit down, or as a shelter against winds in a wide open urban square. Or we might integrate the device into existing suitable structures, and spare ourselves the trouble of physical upkeep of yet another public feature.

As a further result of these findings, we proposed that a climate and weather sensitive approach should be an inherent aspect of designing digital augmentation. More specifically, local climate and weather need not be seen merely as obstacles to design and daily life even, but as a productive starting point for designers. These issues posed by climate and weather become ever more relevant as technology accompanies us outdoors in the form of mobiles and digital...
augmentation. Importantly, these issues render it clear that while the third paradigm of computing may be dubbed ‘ubiquitous’ computing, the limitations posed by the emplaced human body also determine technology use.

The significance of Case UBI hotspots

Article V further solidified the significance of emplacement as a valuable tool for my abductive analysis. A second reading, this time with a focus on the specific aspects of climate and weather, could be made with the aid of emplacement. Once again, the concept tied the empirical findings with existing literature, and this time also to the interdisciplinary literature on climate and weather, as well as to my ontological and epistemological basis. Methodologically, the evaluation probes materials proved to have enough depth for iterative readings, and for providing insights from different viewpoints and for a narrowed scope.

I also begun to arrange my results more visually as well, in the form of “central design challenges”. This was intended as a way to distill the complex, interwoven, messy reality of these findings into a format that would be more usable to designers. Designers, after all, were the primary audience of article V, and thus I felt more at ease to present findings in this more generalised form. This approach can, of course, be criticised as being overly simplistic. Perhaps, to the tastes of many scholars, it glosses over the finer aspects of the results I gained. Nevertheless, I argue that there is much to say for the value of effective dissemination of results, especially from the point of view of critical or emancipatory research paradigm which aims for change in the world. For my own part, I most definitely wished to be such an agent of change: the motivation behind my research was evaluative; thus, not to produce knowledge for the sake of knowledge (an admirable and useful goal in general), but for the benefit of practitioners. Thus, this approach was arguably quite natural for me.

5.2 Through what methodology can we experientially evaluate digitally augmented urban places?

This chapter aims to answer Q2 by presenting evaluation probes as a novel method of conducting experiential evaluation of design artefacts without direct researcher presence, as published in article III.

5.2.1 Evaluation probes for evaluation of emplaced design artefacts

The central contribution of article III was to report and discuss the development of a novel methodological tool, the evaluation probe. This was achieved through extending the well-established cultural probes method of Gaver et al. (1999) for the interdisciplinary and evaluative research of emplaced design artefacts, namely the UBI hotspots. Article III, then, answers Q2: “Through what methodology can we experientially evaluate digitally augmented urban places?” through a multi-case examination of the suggested method. These case projects occurred within two different projects, UBI Metrics and SparkSpace, and within interdisciplinary research teams.

In order to be able to extend the probes methodology into evaluative research in an informed manner, I will first provide a literature review concerning the method. The cultural probes have been a hotly debated topic for a number of years. Thus, great care must be taken to understand the relevant aspects of this debate in order to make the case for evaluation probes. On the basis of this literature review, I will then provide a working definition and framework for understanding probes. Then, I will recount the three different case studies through which the evaluation probes method was developed. Finally, I will discuss the significance of evaluation probes for my research.

Framework for understanding probes

Originally introduced by Gaver et al. (1999), cultural probes were a carefully designed and assembled collection of objects that were personally given to participants. These objects were meant to foster and gather participant reflection. Notably, the idea and execution of cultural probes was fundamentally based
on Gaver et al.’s viewpoint as artist-designers. Cultural probes, then, might be described as design research (e.g. Downton 2003) and design by/through research, an emerging research approach in the design fields.

The fundamental goal of cultural probes was to inspire designers’ work by establishing a creative exchange between the relevant parties: the elderly people, or the intended user group, and the designers themselves. The probes were meant as interventions, provoking novel thinking and stimulating the imaginations of both groups. The idea, then, was to distance participants from routine, linear patterns of thinking. In place of analysing participants’ daily lives in order to supply them with tools to directly fulfill needs, the creators of cultural probes were interested in attempting to discover and expand into novel design spaces, and thus create new pleasures for their participants. Remarkably, Gaver et al. quite plainly stated that their cultural probes were not intended to be subjected to any analysis. While perhaps bewildering from the point of view of traditional fundamental research, this attitude is perfectly understandable in the design fields, and especially in the design by research paradigm (cf. chapter 4; Downton 2003), in which the very act of conducting design work is seen as a tool for the production of knowledge. All in all, the approach and attitude of Gaver et al. can be described as slightly rebellious, subversive, reflexive and critical.

Since their introduction, cultural probes have been applied in numerous ways. Their applicability has raised much enthusiasm, but also severe concerns over potential misuse (Boehner et al. 2007). The name ‘cultural probes’, or just ‘probes’ has been attached to all manner of studies and design processes which are similar to the original method: there are ‘design probes’ (Mattelmäki 2006; Mattelmäki & Battarbee 2002), ‘technology probes’ (Hutchinson et al. 2003) as well as ‘urban probes’ (Paulos & Jenkins 2005), to mention some notable ones. Consequently, and probably due to the fact that the creators of the approach did not personally discuss their ontological and epistemological base in detail, some confusion has arisen over the correct use of the method. Graham et al. (2007), for example, have noted that various kinds of probes have been employed within various communities of practice, and that these have differing traditions and standards of practice, terminology, and rigour. Furthermore, they remarked that these varying communities also have differing notions in regards to the interpretation of collected materials. This remark may also offer an explanation as to their own distaste at the very designerly attitude of the original cultural probes. Graham et al. argued that the literature and discussion of probes enthrined ‘design’ in mystery; it did not recognise the importance of any manner of accountability; and failed to acknowledge the importance of interdisciplinarity in design. Similarly, Hemmings et al. (2002) noted that Gaver et al.’s “inspiration” for design was to a large extent a misnomer for ethnographic understandings about participants. I found these remarks useful, but also problematic, as to some extent, they did not understand and, therefore, failed to empathise with the nature of designerly thinking (Cross 1982), which was so central to the whole methodology. Yet I must acknowledge that the knowledge and practices within design can very well appear opaque or enthralled in mystery to those who are not themselves experientially familiar with doing design. After all, designers themselves keep calling attention to the fact that design knowledge is to a large extent tacit (Polanyi 1966), gained through reflexive practice (Schö 1983) and involves a great deal of lateral thinking (de Bono 1992). However, it was this type of thinking that was behind the cultural probes method. Additionally, in many of these review papers (e.g. Graham et al. 2007; Wallace et al. 2013), an underlying rationale seemed to be that we must explain fully how these probes work. Insofar as this requirement calls for more thoughtful descriptions of how knowledge is actually gained from collected materials, it is very reasonable, and thus, must be taken seriously by the design and research community. I will maintain, though, that rather than passively accept the cultural probes simply as an unalterable recipe, we must actively decide the manner in which we wish them to work, and experiment with them thoughtfully.

However, I agree with Boehner et al. (2007) when they state that methods which are based on the concept of cultural probes, but nevertheless alter some of their more essential features “cannot rest on the common acceptance of cultural probes for their validity.” Therefore, “adaptations of the original cultural probes
should be grounded in an awareness of which essential aspects of those probes are being adopted and which are not, and should justify those decisions.” This is precisely what that article III attempted to accomplish. Employing methods without due attention to their larger philosophical and methodological underpinnings can indeed be hazardous. I consider it important, then, that when we explicitly reflect on what aspects of the original methodology remain and what is being left out, what this implies; and what kind of epistemological premises the methodology has, and whether or not they match with one’s own epistemological commitments. Thus, it is crucial to explicitly reflect on the epistemological consistency of the study. Therefore, in order to be able to make a methodological contribution, article III presented an analysis of the original cultural probes (Gaver et al. 1999) method, and its subsequent variations. The idea was to tease out a working understanding of what is essential about probes to support our creative methodological work.

Others have also attempted to formulate such understandings. Boehner et al. (2007) have named four ways in which probes have been seen in HCI. In their view, probes have been seen as packets; as data collection; as participatory; and as a sensibility. For their part, Graham et al. (2007) detailed five functions of probes which they saw as being common to most probe studies: to capture artifacts, to make the invisible visible, to yield (auto)biographical accounts, to frame participants as experts, and to invite and engage participants in dialogue with researchers and designers. These descriptions seem apt, and offer valuable viewpoints into probes. To further these understandings, article III identified six features of probes that, I argue, are vital to their success.

(1) The metaphor of the “probe”

Through our analysis, we concluded that at the very core of the popularity of the probes methodology is the powerful metaphor of the “probe”. Remarkably, this simple but important facet had been overlooked by others who had drafted review papers. Yet it is the metaphor of the probe that effectively conveys the basic idea of how the research is carried out. A probe, usually found in the natural sciences, is an artefact that is sent into inaccessible places and situations in the real world to advance a researcher’s understanding of that place, usually by collecting data. Importantly, the cultural probe employed this quantitative metaphor in a qualitative and designerly pursuit of understanding and inspiration.

(2) Aesthetically pleasing and playful presentation

Gaver et al. specifically mentioned that they wanted to make the probe package look like a gift, given to the participants as a gesture of appreciation in order to entice them to truly engage with it. This I deem highly important, but I also maintain that this could take many forms, depending on the task at hand. Indeed, the needs of our outdoor studies necessitated a simpler format, as discussed later.

(3) Critical participant reflection

The tasks and questions in the probe are meant to help participants “think outside the box”, for example through the use of exciting and unusual exercises or materials. This supporting of open-minded or even critical thinking is intended to yield better, more ethical and socially sustainable design ideas. Thus, it is important that researchers truly accept and internalise this general attitude in their study when employing probes.

(4) Developing an adequate rapport with the participants

It is necessary to also develop a good rapport with the participants in order to avoid the development of a complacent, bored attitude, which will lead to uninteresting research results, and low return rates. Great care must be taken to treat the participants as interesting individuals with thoughts, feelings and agency. Good social skills, and even performance skills, are a necessary tool for the researcher.
Sometimes, the researcher must reformulate or even abandon a question or a task in order to not violate this rapport. It is important to remember in these cases, that the results are only as good as the participation process.

(5) **Mutual learning/knowledge-production**

Furthermore, participants must be viewed as layperson experts. After all, the purpose of the entire method is to yield these types of accounts. Thus, the researcher must be entirely comfortable in a non-authoritarian position, while still maintaining accountability as a professional. It is not always easy to assure participants that also critical input is desired.

(6) **Open reflection and a critical attitude in both their design and their analysis.**

Finally, it is important to remain constantly critical, and also open to new alternatives and outside criticism. The design of the probe materials and the participation process are very important, but also the analysis, when conducted, must be done from this position.

Overall, through a careful reading of existing literature on probes, and through our own analysis, we were able to identify that most of the aspects that are usually attributed to probes in our own analysis and in review papers fall under three major terms. Either they describe the (1) **physical probe artefact**, the (2) **participation** that is inherent to them, or they point to the (3) **aims** of the probe (for example, to gain design inspiration, as was the case with the original cultural probes). These principles are illustrated in figure 17. Thus, it is important to understand that while the **aims** of the probe might differ, the method does not simply stop functioning. Indeed, our central contribution in article III is based on this argument. While the original cultural probes’ aim was to obtain “design inspiration” (Gaver et al. 1999), our intent was to “evaluate”, and the methodology allows for this. This is due to the fact that there is an underlying critical and reflexive attitude present in cultural probes. Our evaluation probes work in this very same paradigm.

**Fig. 16. Framework for understanding probes**

Thus, we were able to state that “a probe is an artefact or a collection of artefacts that is intended to both help research participants generate experiential data through reflective assignments, and to collect this data as various kinds of empirical research materials from participants” (article III). Therefore, while we respect the principle of Gaver et al. (1999) to not strictly define probes, we deemed it necessary to present our own working definition for the sake of openness and criticality in our endeavor to expand the methodology into the realm of evaluative research. Thus, the intention is not to say that this should remain the definitive way to describe probes.

**5.2.2 Developing evaluation probes**

In the following I will describe how the novel concept of evaluation probes evolved through practical research work. A preliminary step in this work was the ICT diary study, the objective of which was to seek insights into young adults’ experiences, thoughts, and attitudes concerning information and communication technologies and their usage. Thus, the general aim of the study was to gather information.

This ICT diary was conceptualised as a hybrid; an evolutionary point that occupied a place between the cultural probe method, an interview and a diary (e.g Elliott 1997). After realizing that the approach might
be suitable for evaluation, it was developed further, and thus, in two successive studies, it evolved into the form that was dubbed as ‘evaluation probes’. These successive studies were what we might describe as ‘pure’ evaluation probes, as in these studies, enticing probe materials were linked with the evaluative study of designed artefacts. The first of these studies, described also in section 5.4.3, was an evaluation of UBI hotspots (display evaluation probe). The second study, described in subchapter 4.6.1, was an evaluation of a short-term adaptive lighting installation in the SparkSpace project (adaptive lighting probe). These experimental studies constitute a fascinating mixture of research aims and contexts. The results of these have been utilised in articles IV and V.

In the subsequent three sections, I will describe these studies by utilising the framework that I provided earlier on. Thus, I will first describe the aims of each study. Second, I will provide an account of the physical probe materials that were designed for each of them. Third, I will describe the manner of participation that was involved in these studies.

(1) ICT diary as a probe-diary hybrid

The ICT diary study had a broad scope and its aims were chiefly ethnographic. Thus, we described this probe as an ‘information probe’, in accordance with its aims. The overall purpose of the study was to chart young adults’ everyday life with information and communication technologies on a general level, gaining insights into their technology-related perceptions, experiences, skills and even dreams. The reasoning for employing a probe in place of a traditional ethnographic method was the all-encompassing nature of these technologies in the everyday life: they are in use in almost all situations and places, including the home, which is a highly private and sensitive site for research. Thus, a conventional ethnographic approach, which usually combines participatory observation with interviews, was considered overly intrusive for this study.

Prior to designing the physical ICT diary probe materials, four group discussions among 20 young adults were held by the responsible researcher. This was done in order to gain some preliminary insight into their current information and communication technology. These discussions were informal and open-ended, and they took place in cafés. These discussions yielded new perspectives, and thus had an effect on the ICT diary probes’ design. Furthermore, prior to recruiting the remainder of the participants, the ICT diary probe was given to five persons for testing, and subsequently refined according to these participants’ comments.

The final product of this development work was a probe material set containing a small, colorful scrapbook along with three pages of printed cut-and-paste images and a return envelope. The scrapbook contained ten small tasks, which required reflection and self-expression by using the cut-and-paste images, drawing and writing. These tasks were intended to gain knowledge of how much and in what manner participants used these technologies; how they are used in various places; what attitudes they had towards their use in general and in regards to particular technologies; and what hopes, dreams and fears they had in relation to these technologies. Importantly, the ICT diary probe also contained an assignment where our participants were prompted to go and try one of the UBI hotspots, situated in various public places around the city, and reflect on this experience. This simple task served as an inspiration for the subsequent development of evaluation probes. In regards to the manner of participation, participants were requested to keep hold of the scrapbooks for a minimum of two weeks, and then return them in the envelope by post. Afterwards, participants were invited to a group interview. These interviews were conducted in a conversational manner, but structured around the themes found in the scrapbooks. The participants discussed and compared views on these themes.

In these discussions, the differences within the age groups emerged as very poignant. The duration of these interviews was approximately 1.5–2.5 hours, and they were audio recorded and subsequently transcribed. 48 participants completed both the scrapbook and the interviews. The return rate among participants was very good, as the ICT diary probe was originally distributed to 56 participants. This high return rate was in all probability affected by the fact that the researcher sent out courteous weekly reminders via email, and was also willing to give extra time for the participants. However, these high return
rates were also present in the latter studies, even without reminders, and participants rarely contacted the researchers for further instructions – yet, the generally respectful and helpful attitude probably did help to establish a level of commitment for these participants.

Yet I find that the most compelling explanation for these high return rates is that a majority of the participants reported that they had found completing the ICT diary probe (and also the latter probes) enjoyable. In regards to the ICT diary probe, some participants had noted that this had not been a traditional diary; a comment which reflected the hybrid nature of the concept. Participants who had completed both the ICT diary probe and the interview were rewarded with two cinema tickets and a chance to win a gift card to a restaurant in a lottery.

Once returned, participants’ scrapbooks contained short notes but also essays, drawings and cartoons, sketched floorplans and collages of images. These were complemented with in-depth interview materials: hundreds of pages of transcription. Thus, this broad and “thick” data have allowed for the examination of young adults’ technological realities from various viewpoints (article V, Ylipulli et al. 2014a, Kukka et al. 2014). However, collecting this amount of material required a lot of time. Nevertheless, conducting several smaller studies might not have been any more efficient.

(2) The display evaluation probe study

The display evaluation probe was the first ‘pure’ evaluation probe: it was specifically designed in order to gain evaluative knowledge of participants’ experiences of a design artefact, namely, the network of UBI hotspots, the public urban displays deployed at important locations in the city. This study focused on the displays that were installed outdoors in and around the city center, mostly in the pedestrian area and the marketplace in its vicinity. At the time of the data collection, the displays had been deployed for a few years, thus mitigating any novelty effect to a substantial degree. As detailed in earlier, these collections took place both in the winter and in the autumn.

The aim of the display evaluation probes study was to examine local young adults’ experiences with and perceptions of the public displays. Thus, this probe could be comprehended as an evaluation probe, as its specific aim was to evaluate a particular design artefact from the point of view or participants’ experiences. Importantly, the artifact that was being evaluated was conceptualized as an inherent part of the probe package, as it was a necessary feature of the study. This further differentiated the concept from that of cultural probes. Furthermore, this had an effect on the other important aspects of the probe as well: the designed form of the physical probe and the style of participation. The evaluation probe was not intended to inspire design ideas in a direct fashion; rather, it was meant to enable us to delve into participant’ experiences deeply. Consequently, from their inception, these probes were meant to be subjected to a qualitative analysis.

Our participants had to be able to easily transport the probe materials outdoors with them in winter and autumn conditions. This we considered necessary even though we did not require participants to write down their thoughts on the spot, but to seek out a cafe or go home to write down their reflections if they felt the weather was too severe. This is why we decided once again to bind all the material in the form of a booklet or a notebook; this emerged as a matter of necessary practicality. The tasks and questions contained in the notebooks were designed with great care to accommodate participants’ thoughts in a very open-ended way. Participants were encouraged to express themselves according to their own preference through drawing, writing and photography. It was especially mentioned that unusual modes of writing like poetry, as well as drawings or cut-and-paste pictures were completely acceptable. One task specifically required for visual input, either in the form of a digital photograph or a sketch. The use of such instruction and assignments proved to be very useful, as some participants clearly favoured visuals to writing, producing much less of the latter. Furthermore, these participants’ sketches expressed thoughts that differed markedly from their writing. Remarkably, the sketches as well as the single poem that we received all seemed to convey much more
Fig. 17. Participant’s sketch of the various issues concerning her experience with the display. It is an impressive visual analysis, probably affected by her background in landscaping.
emotion (figures 18, 19); the displays are anthropomorphized, or the participant is voicing the display’s emotions. Thus it would seem that the methodology not only enables and supports various styles of communication, but also that the differing methods of communication yield differing types of knowledge. For the purposes of my research, this made the probes methodology much more desirable and suitable than some of the more established methods, such as the diary method. I argue, then, that the more expansive and accommodating method of the probe can enable more creative responses from participants.

(3) Adaptive lighting probe

The aim of the study was to evaluate participant experiences of a digital augmentation in the form of adaptive lighting, which had been deployed in an indoor commercial space. We intended to achieve this by producing rich data for in-depth qualitative analysis. However, the research setting, which included three different lighting scenarios in the women’s clothing section of an actually functioning department store, was challenging.

Fig. 18. A haiku, which conveys both humour as well as empathy for the device: “Proudly the UBI stands / alone in the rain / I long for someone’s touch”.

The physical probe materials included three notebooks and a calendar that participants could use to plan their three visits. Once again, the notebook format was deemed the easiest to carry along, and they were also a useful way to distinguish the three visits from each other: each of the visits had its own designated notebook, with a different design and colour scheme. Furthermore, the notebooks were sealed with stickers, and participants were instructed to break them only after having completed the previous notebook. This enabled the experience to unfold in a certain order, and created additional excitement. During each visit, participants experienced a different lighting scenario. These scenarios had been scheduled to alter on a rotation during three consecutive days. The calendars, then, were colour-coded: the notebooks’ colour scheme matched with the dates. Again, participants were instructed to express themselves according to their own preference; through writing, sketching, or even adding images from other sources, if they so wished. However, no photography was involved this time due to the commercial setting.

Concerning participation, this time the evaluation probe included three site visits, and a package which contained three notebooks and a visitation schedule. Furthermore, the probe materials were also complemented with a preliminary semi-structured interview, with a duration of approximately 30
minutes. The orchestration of the participation process and setting were somewhat difficult for both ourselves and the participants. A couple of participants even visited the site on the wrong day. Two holidays also coincided within the period, and this made the schedule more complex for participants to understand. The practicalities involved with the organising of three visits in a certain order are too much for participants to handle independently. Such a setting could benefit from the addition of, e.g., a mobile application, which would allow participants to launch the scenarios on site.

In spite of these difficulties, the adaptive lighting probe study provided us with a wealth of participant experiences and perceptions, which emerged in the form of drawings, writings, and video as well as audio transcriptions. In addition to our evaluative work, these could be also used as stand-alone materials, e.g., for investigating commercial spaces and shopping practices in general.

With all of the above research materials, qualitative analysis methods were used to gain results. This approach emphasises iterative readings of research materials in order to identify and understand phenomena. This was achieved in several stages. These began with a free-form reading, after which the materials and observations about them were organised into emergent themes in the shape of matrices which then facilitated comparative, horizontal readings between various participants. This thematisation, and the original data, were then analysed through the lens of theoretical concepts. As stated, Gaver et al.’s approach was non-analytic. However, the in-depth analysis of the rich evaluation probe materials is central to their use, as the data collection occurs at the deployment phase, and the purpose is to learn from what has already been done.

5.2.3 Benefits and limitations

Finally, I will briefly summarise those aspects of the probes that can be construed as its benefits and limitations.

(1) Truly “in the wild” with no direct researcher presence

Evaluation probes made it possible to gain experiences that were closest that they could get to a naturalistic setting in an emic study, as participants freely chose the time and the place for using the displays in peace and privacy, with no researchers directly present. Thus, they were able to take whatever time was necessary to observe the place and play with the device. This can produce participant experiences that are more realistic, especially in so-called “in-the-wild” studies (Rogers 2011).

(2) Support for different communication styles

The method also supports various types of communication and learning styles, an aspect which is especially important for studies in which we wish participants to experience the place and the research setting with all their senses. Evaluation probes made room for self-expression through writing, drawing, photography and speech. Furthermore, the probe materials gave everyone the chance to think about their experiences over a longer timespan, accommodating for different rhythms of reflection. The inclusion of an interview with the probe was useful, and further improvements would include the recording and expression of various sensory experiences, as well as further communication styles, through, e.g., participant video recordings.

(3) Critical reflection teases out fresh, unexpected views

Evaluation probes enticed participants to reflect critically upon the technologies, but also upon their own routines. In the process, participants clearly developed their own expertise, which also altered the traditional expert and layperson roles. When returning the display evaluation probes, several participants remarked that their view of the devices had altered due to the fact that they had had an opportunity to use them and to ponder about what the UBI hotspots meant to them. Prior to the probe, most reported that they had not given these items as much thought, although all participants were aware of their existence. Thus, their
worldview had somewhat changed. After the ICT diary probe, some participants noted that they had begun to observe the technology use of other people. In a similar vein, participants of the adaptive lighting probe remarked that they had begun to see and think of lighting differently. Thus, the probe made everyday practices visible for our participants.

The richness of the research material is well suited to evaluative studies, as it provides many detailed real-world perspectives to inform design and research.

Also, the layperson expertise that emerges during an evaluation probe study could be later explored further in a co-design process. As such, evaluation probes occupy a space in between what we termed the information probe and the original cultural probe. By understanding participants’ experiences through evaluation probes we can both gain fundamental knowledge and move towards refining and developing novel design ideas. Thus, it would be fascinating to see a process in which both cultural probes and evaluation probes would be employed at different stages.

(4) Many types of knowledge from a single EP study

An evaluation probe is able to produce various types of knowledge. It often produces practical insights on usability, but also knowledge that relates to, for example, emotional experiences. The emergence of the latter especially occurs at least in part due to the multimodal communication styles that are involved, and is especially useful for evaluation. Therefore it is efficient in conducting open-ended and rich evaluation “in the wild”. Additionally, probes are able to produce more in-depth, fundamental knowledge, and, when theorised further, this can also begin to develop empirically-based design knowledge. This can be compared to ethnography, as both render it possible for us to qualitatively understand people’s experiences. Importantly, Dourish and Bell (2011) have argued that ethnography can produce two types of results for design: Firstly, it can produce design recommendations through the more empirical aspects of ethnography. Secondly, it can offer “profound design guidance” produced through the analytical work involved in ethnography. The first type can provide somewhat direct guidelines on how to proceed with a design challenge. The latter is, according to them, “where the substantive intellectual achievement can be found”, and it tends to open up new design space, instead of narrowing it down towards “the best solution”. On the basis of the argument of Dourish and Bell which resonate with the results we have obtained ourselves, in article III we then called for profound analysis, including the employment of theoretical lenses if necessary, when analysing probe research materials. Although this was not the initial purpose of Gaver et al., such analysis can result in significant insights when applying probes in different ways, thus being also perfectly in line with the original intention behind cultural probes, which was to open up new design spaces.

(5) Efficient and flexible evaluation

Furthermore, evaluation probes render it possible to conduct evaluation efficiently and flexibly. Provided that the probe is thoughtfully designed, participants are able to carry out the assignment relatively independently. Thus, it offers a better alternative to “quick-and-dirty ethnography” or “rapid ethnography” (Millen 2000). Participants are able to spend days or weeks with the task, reflecting upon the experience. The method is also flexible in regards to time. This was especially obvious in the display probe study: in a longitudinal research setting, it was beneficial that the data collection could be integrated and extended over a longer period of time. Furthermore, evaluation probes produced data set which were highly compatible with other data sets, obtained through other means. The UBI hotspots, for instance, have generated a wealth of quantitative use data, and the emic knowledge from the evaluation probe was then able to explain phenomena that could be observed but not explained in the quantitative data (as discussed, e.g., in article V). Additionally, our own studies demonstrate that evaluation probes can accommodate various types of research settings. In evaluative and in-the-wild research, this is especially important, as these research settings are as varied as real life itself.
Most of our participants had liked the overall experience, and they had viewed the playful design of the materials as appealing. Yet some of the participants had found the openness of the questions somewhat confusing, and wished that more specific, easier questions would have been provided. Some participants also felt that they had had to answer a question several times over, due to some overlapping in the themes. To us as researchers, however, this was acceptable, since the questions were intended as a framework for reflection. Overlapping was a technique to prompt participants view similar themes from various angles. The open-ended nature was intended to provide room for individual accounts.

Limitations of evaluation probes

The very fact that evaluation probes produce knowledge through critical reflection also constitutes a limitation, since the method will never produce entirely naturalistic, unreflective, humdrum experiences, although our everyday lives are full of events of such nature. Reflection creates detachment, and thus, the experiences that are gained through the method are those of actively thinking individuals. Naturally, external observation can be employed to try and research the actions and practices of unknowing passers-by; however, their inner thoughts cannot be accessed. Evaluation probes can take us to the limits of human knowledge, but not go beyond them.

Additionally, participants’ work as co-evaluators and the subversion of traditional roles can sometimes complicate the analysis of research materials. In the adaptive lighting probe, a participant remarked that she had not been interested in the clothes in any way; instead, she had been just observing the site for the purposes of evaluation. Some participants made comments about other customers’ behavior, taking the role of an observer quite seriously. These individuals’ views deviated significantly from a regular shopper’s experiences. This must be carefully taken into account and acknowledged when analysing the materials and when interpreting them.

The thickness and richness of the materials in general can make them quite difficult to analyse. There is no limit to the different ways that the various communication modalities can be used within the method. Yet, researchers should ask themselves the question of whether they themselves will be able to make sense of the collected materials, before adding complexity to their evaluation probes. Additionally, more freedom in expression also means that participants must be willing to be creative, and invest their time and attention. The building of a good rapport and the design of enticing probe materials, then, are all the more crucial, making the implementation of evaluation probes a balancing act between research and design skills.

Thus, the evaluation probes method is demanding, since a wide range of skills is required, from writing research questions to both designing and producing materials and the research setting with its design artefact, and from building rapport to interviewing. For this reason, I will argue that the method is at its most useful in heterogeneous but well functioning teams, in which everyone has different expertise, but also a deep understanding of the way in which evaluation probes produce knowledge. A foundational knowledge and practical understanding of how to conduct qualitative research is beneficial, even necessary. Similarly, a good understanding of the design artefact and possibly a tacit understanding of design is useful if not mandatory.

A further requirement is that an evaluation probe needs to be specifically tailored for the participant group in question. Gender, age, and cultural background have an important role here. Fortunately, the flexibility of the approach supports this. The analysis of the collected materials must be similarly conducted with the specifics of the participant group and the research setting in mind.

The lack of researcher presence also logically means that while the participant is completing the assignment, no additional instruction can be given and no questions can be asked. Therefore, the research setting must be carefully considered and designed, as well as taken into account in the analysis of evaluation probes. As I have learned, overly complicated research settings are prone to small failures, causing difficulty for analysis or even loss of research materials. Large miscalculations, I assume, might lead to results being totally worthless. We must bear in mind here that the designed artefact is also a part of the probe; thus, any involved technologies should
function reasonably well to provide a solid experience. If the technology, or other artefact, is at a very early stage of development, using evaluation probes might be unwise. Instead, participant observation might serve the purpose better.

Yet even though researchers are not present, this does not diminish their accountability, nor their subjectivity, from the process. In a way, the evaluation probe is actually a proxy for the researcher. The whole process and the materials are nevertheless designed by the researchers, and the obtained materials are then interpreted by them. Indeed, when employing the method within a larger design process, the designer’s influence must be acknowledged in the design and analysis of evaluation probes.

Article III, then, made the case for the re-conceptualisation and expansion of the cultural probes method into evaluative research. Through a literature review, I claim that the original cultural probes had several important aspects and finely tuned facets. Thus, the method requires careful consideration when it is applied. Epistemological consistency especially, is important in designing, carrying out and analysis of probes. Functional aesthetics, critical reflection, establishing a rapport and mutual knowledge production, and framing the participant as an expert can be identified as central elements of the original probes. The evaluation probes approach, for its part, maintained these, but complemented them with evaluative aims and in-depth abductive analysis. The evaluation probe, then, contained both the design artefact and the package of participant materials. Thus, it was no longer possible to view this new approach as a cultural probe, and thus, the name evaluation probe was warranted.

These evaluation probes, then, were highly useful for evaluating digital augmentation in public urban places from an experiential point of view. This was demonstrated by the empirical results that were gained through this method, and which are also discussed at length in the prior section of this chapter. It was important for these results that participants were able to experience the UBI hotspots and the adaptive lighting pilot by themselves; and for this reason, it was crucial to be able to engage them in a manner that enticed them to commit to the task.

The significance of evaluation probes

The development and application of evaluation probes altered the course of my research process considerably. Suddenly, a whole new world of emplaced experiences without my presence could be captured through various media. This made my work effective (as participants were much more independent), but also more challenging, as the types of research materials I used had increased manyfold. Now there were not only interviews, but drawings and texts, even poetry, to be analysed. Furthermore, the participation process had to be even more carefully designed so that participants would be able to navigate the assignment with ease and retain their good will towards us.

Article III was a methodology article. This meant that new research tactics and writing practices had to be developed in order to make the case for evaluation probes. Firstly, I used a multi-case approach. With articles I and II, singular cases had been reported in the articles. However, this time I deemed a single case approach insufficient due to the fact that I was attempting a methodological contribution, but also because the discussion around probes seemed quite heated. For the same reason, I deemed it necessary to research probes, and make better sense of the discussion so far. Thus, I assembled a visualised framework based on literature and personal research experience. This proved to be an interesting exercise, and a learning process wherein I learned to employ and discuss literature on a higher level than previously. Visualising the results helped to gain clarity into the many perspectives and arguments that had been presented on the subject.

Evaluation probes, then, marked a new phase in my use of methods. With Case LightStories, I had used existing methods in a traditional way to my best ability; with case UE, I designed a more specifically tailored participatory and experiential evaluation process, but remained in the category of established methods. Finally, through evaluation probes, I ventured into unestablished territory. This was not the result of a specific endeavour to make a methodological contribution; rather, it was a continuation of the problem-based design of suitable evaluation methods, which I had begun with case UE. Through this slow process of learning, I had found a way to conduct experiential evaluation of digitally augmented urban
places that suited the longitudinal nature of the UBI hotspots deployment.

5.3 Which concept can we use to understand and communicate experiences of digitally augmented urban places?

Finally, article II aimed to answer Q3 through a discussion and actual application of a theoretical concept, namely that of *emplacement* (Pink 2011, 2009; Howes 2005). Overall, then, article II provided a two-fold contribution by producing both a theoretical discussion and adjoining empirical results through a descriptive analysis. This dual approach was necessary, as to my knowledge, the theoretical concept had been so far unknown to the research of digital augmentation in public urban places, and, on a larger scale, unknown to architectural scholarship. Hence, I strongly believed that the usefulness of the concept, which had originated from the field of cultural anthropology, had to be demonstrated through not only a theoretical discussion concerning its background, but, importantly, through the analysis of an empirical study.

I was the leading author of the article; however, the article was written in close collaboration with the architect-designer of the installation which was under scrutiny, and a cultural anthropologist (Herneoja and Ylipulli, respectively).

5.3.1 ‘Emplacement’ as an analytical lens and interdisciplinary concept

In order to make the case for the usefulness of emplacement in the design and research of digitally augmented urban places, we must first understand the origins of the concepts. Thus, it is vital to highlight the fact that the notion of *emplacement* builds upon the theory of *embodiment*, most famously theorised and advocated by Merleau-Ponty (1945) who in turn was continuing the foundational works of Heidegger (1996 [orig. 1927]) and Husserl (2012 [orig. 1900]). I elaborated on these subjects in chapter 3. Therein, I concluded that embodiment has garnered wide-ranging interest across disciplinary borders, and that these may sometimes be so far apart as to have vastly divergent ontological and epistemological positions.

Embodiment has been, and continues to be, an influential theoretical concept across several fields.

Recently, the cultural anthropologists Howes and Pink have suggested another term to complement the perspective that embodiment had given to their field. This line of development began when David Howes first called for moving from embodiment towards that of *emplacement*, a concept which “suggests the sensuous interrelationship of body–mind–environment” (Howes 2005, 7). To further elaborate on this, Howes explained that he associated this term with the positive feeling of “being at home”, thus juxtaposing it with that of displacement. Furthermore, he used the term to describe a contemporary body of work by various scholars in his field, which, he argued, highlighted the interrelationship between the embodied mind and its environment. Sarah Pink (2009, 2011) then quickly advanced the concept of emplacement; the crucial difference here, I argue, was that Pink did not use emplacement solely as an adjective, to describe a feeling or a body of work, as Howes had. Instead, she employs the concept as a theoretical lens through which she produces analysis of her research materials. It is in exactly this manner that I have chosen to employ the concept. Furthermore, I have employed it as an architect-researcher.

Pink (2009) states in her paper that the specific contribution of embodiment, for the social sciences in particular, is the eradication of the notion of duality of body and mind. In her view, embodiment has brought more carnal views into these fields, and criticises them for the marginal attention that has been paid to the body in place. Emplacement is then offered as an antidote to this. However, I must amend these statements by arguing that I do not think that the theory of embodiment, when understood and applied fully, considers the embodied mind as being in any way isolated from place. This can be simply demonstrated by pointing towards the notion of *being-in-the-world*, which is fundamental to the theory and the phenomenological tradition in general. It then logically follows that *being in a place* is also absolutely essential to embodiment as well, whether or not this is overlooked in the social sciences.

Thus, there seems to be an evident overlap between the notions of embodiment and emplacement, and for this reason they should not be seen as being juxtaposed. Emplacement can be seen as a
chronologically later development, birthed out of the older, more general tradition of embodiment. Therefore emplacement does not, nor does it need to, offer a replacement or an alternative to embodiment. Rather, I argue that these two terms can be used usefully to highlight different viewpoints into being-in-the-world. Thus the newer term underscores to a much larger extent the notion of place, a fact which may appear trivial to begin with. However, concepts wield substantive power. For my research, I consider place as a crucial starting point in striving to understand both individual and intersubjective experiences and lifeworlds. This is due to the fact that I maintain that these lifeworlds constitute of places with similarly individual histories, physical qualities, and which exist in specific cultural and natural contexts themselves. This centrality of place is brought most self-evidently to the fore through the usage of the concept of emplacement. Compared further with the notion of embeddedness of the 4e’s (Ward and Stapleton 2012), the concept of emplacement gives us an advantage in a similar manner.

As the concept of emplacement draws our attention towards the relationship between the embodied mind and place, I argue that the concept of emplacement is a productive point of view especially for architectural thinking, in which place is of central importance. It is very common to speak of the genius loci, the sense of place that each place is considered to have. As can be seen from article IV, and the empirical findings from the UE case study, this line of thinking informed my work as well. These themes were especially important in the works of Norberg-Schultz (1980) in the phenomenological turn of the 1980’s and 1990’s, when architectural thinking once again returned to a more holistic manner of thinking after a brief spell of highly postpositivist experimentation, which reached its peak in the 1960’s and 1970’s. Place-based thinking continues to be very prevalent in architectural practice and research.

Thus, we can see that from an architectural viewpoint, Pink’s (2009) statement that the current social science research community encourages us to “start thinking about bodies as parts of places” appears even as somewhat absurd. It is nearly unthinkable for architectural research and practice to think of anything outside of its actual location. After all, the concept and reality of place, or site, is where the most foundational thinking in architecture departs from; it is where the first-year studio projects commonly begin. In this aspect at least, architectural theory, education and practice walk hand in hand. Yet, even many decades ago architects (Jacobs 1961, Gehl 2011 [1987], Alexander 1965) themselves have faulted their colleagues for having an inadequate understanding of various kinds of people and how they truly use and experience places and spaces.

Thus, by employing the concept of emplacement, I aim to approach lived reality with the understanding that not only do we need to understand places and embodied beings, but that these are inherently entangled. Further, I consider it important to think about the intersensoriality of emplaced experience (Howes 2005). The importance of this was demonstrated many times over during the case studies presented in this thesis. Finally, the concept urges us to be aware of temporality and also personal histories as important aspects of emplacement, as individuals have differing backgrounds and prior lifespans. Additionally, the fact that the concept of emplacement has emerged from cultural anthropology has affected my application of it. Emplacement has been employed in my case studies, as in Pink’s works, as a theoretical lens through which I have examined participants’ experiences. Through the empirical results presented in the first section of this chapter, the concept demonstrates its productive power for evaluative research of digitally augmented urban places.

The significance of emplacement

From the point of view of my research, emplacement gave me a way to conceptualize, and thus more fully understand my own positioning and values as an architect. It also enabled me to communicate my position with others across disciplinary borders in the research teams that I was a part of. This gave me a great advantage in my daily work. Suddenly much of what was deemed ‘tacit architectural knowledge’ by my colleagues and I became, if not tangible, then at least an abstract, communicable reality. Through the writing process that occurred in conjunction with articles II and IV, I was also able to express this to the rest of the research community working with the
digital augmentation of urban places, and ubiquitous computing in general.

Emplacement also provided me with a way to explain what functioned well and why in these real-world designs of digitally augmented urban places that I was investigating, and to connect these findings with a large body of theory relating to human experience, accumulated by philosophers, humanists, social scientists, and even post-positivist scientists.

Thus, such conceptual work enabled me to bridge, at least to some extent, the world of designers and scholars as well. All in all, then, the discovery and use of the term convinced me of the importance of conceptual work in the research and practice of design. Furthermore, on the level of this PhD thesis, it provided me with a stable theoretical basis from which to proceed to further case studies.
6 Discussion

6.1 Architectural considerations on the digital augmentation of urban places

The introduction of novel digital technologies has inspired and intrigued many researchers and designers. Indeed, whole subfields have emerged after the widespread adoption of various mobile and infrastructural urban technologies. To approach this subject, I first presented a literature review which demonstrated the importance of understanding the long histories behind these technologies. For example, the challenges of display blindness and audience engagement were being battled even by those who were deploying pre-digital magic lantern projections in 19th century urban places. From these histories, we can learn not to surrender to hype or novelty, but rather see the importance of examining the effects of these technologies coolly and over the long term. That being said, digitality has brought with it some novel aspects, for instance what I termed the ‘dynamic shift’ in article IV: dynamism has increased in the material reality of urban places, introducing novel visuality and non-human interactivity into the cityscape at a level that was not possible with prior technologies. I adopted the term ‘digital augmentation of public urban places’ for the overall phenomenon.

Thus, to continue my examination, I began by organising some relevant urban technologies into public and private, mobile and environmental; from this viewpoint, we were able to see a tendency wherein mobile technologies are mostly personal and infrastructural technologies are mostly public. In my literature review, the research on the experience of the various mobile technologies surpassed the experiential research conducted on public, infrastructural technologies. This, then, was productive in pinpointing the focus of my research, i.e. two public infrastructural urban technologies: adaptive urban light and public urban displays.

However, even though the focus of my work was not on mobiles, much of the relevant and influential work considering the real experiential effects of digital technologies has been done in regards to mobile technologies. Thus, this scholarship informs my work despite my focus on infrastructural technologies. Phenomena such as codescapes, camping with technologies and the various changes in how we occupy and experience urban places with and through digital technologies have informed my analyses and this discussion. However, this is necessarily just the beginning of such work. Further inquiry and the development of additional technologies will add their own variety to these phenomena.

In conjunction with these aspects, I also discussed and declared a non-determinist position in regards to the development of technology; I consider that we are in a position to design our own futures, and thus we need to understand the phenomenon of technology-enriched urban environments. Therefore, we must continue the investigative work from the point of view of architects in order to address the gaps still present in the current literature on the subject. The gap that I specifically have addressed in my thesis pertains to the open question of what effects these digital augmentations have on our experience of urban places.

I realised there was a dearth of both methods and theoretical concepts in the architectural field in regards to investigating experiences empirically. Thus, two additional major research questions took form. These I formulated in the previous chapter, along with the research results pertaining to these questions. Next, I will discuss these results and their significance, both in light of my personal research process and the literature I reviewed earlier.
6.1.1 Towards a place-based design of urban technologies

The specific focus of my research was to scrutinise experiences of urban technologies from an emplaced point of view. This focus enabled me to gain a view into these case studies wherein the places were not merely the physical background of activity, but actually, through their complexity, played a key part in how the digital augmentations were experienced. In the following, I will discuss the various findings related to this issue across my case studies and the research literature I reviewed.

First, I will briefly discuss the overall effect of these case studies on the genius loci of each site. Secondly, the design challenges of the various digital augmentations are discussed across my case studies, and then thematised into a four-partite framework. Finally, I will discuss the importance of designing meaningful emplaced experiences in the interdisciplinary fields that are involved in designing digital augmentations of and for public urban places.

Digital augmentation can alter or strengthen sense of place

It was especially highlighted in the UE case study that the genius loci of the urban park itself was very much entangled with the digital augmentation. The sense of place of the park strongly affected our participants’ views of what was appropriate for the park, which I called ‘locational appropriateness’. However, UE itself strongly affected the place itself, creating not only novel aesthetic and atmospheric pleasures, but also helping to introduce new ways of using the former pass-through space, transforming it into a place fit for dancing, urban photography and even wintry picnics. The security issues and strong negative feelings associated with the park after dark were lessened to an extent where the place was deemed fit for romantic evening walks. With LightStories, a similar occurrence was observed in our participants’ accounts. Through making their own digital augmentations, the LightStories pilot made a space into a place for them. With LS, this effect seemed to be largely due to the subversive and empowering effects of participation, although self-expression, creativity and aesthetic pleasure were essential parts of the participation process. Thus, participating in the design of digital augmentation can also enable citizen participation. With the UBI hotspots, locational appropriateness also emerged as a major issue in our participants’ experiences; a factor which was highlighted by the fact that the exact same type of display was present in various urban places in the city, and participants used different displays. In general, the devices mostly hid in the cityscape in terms of visual effect; however, they were found to boost the technological image of their city, and people would have been very reluctant to see them removed. Merely having such an object that supported the city’s image strengthened the sense of place.

In producing these effects relating to aesthetics, functionality and social practices, the digital nature of these augmentations played a key part. Indeed, these are essential, lasting goals on most architects’ design agendas. However, technology was a major enabler of these goals in my case studies. The dynamism and adaptive capabilities that were integral to the UBI hotspots, UE and LS were produced by information and communication technology, utilising sensing and actuating technologies, wireless networks, and processing power. Thus, we can conclude that through various means, the digital augmentation of public urban places can have a major effect on the genius loci, and thus, offers interesting possibilities for designers of urban places as well as other professionals who are already involved in interaction design. The term ‘augmented sense of place’ (Aurigi & De Cindio 2008) thus seems to be warranted. Thus, we can say that a careful utilisation of digital augmentation in urban places can potentially have many beneficial effects for urban places. The above findings also suggest that adopting a place-based strategy for designing digitally augmented urban places is wise. However, there are many caveats to the use of digital augmentation in public urban places, and many design challenges that should be taken into consideration in the design and implementation of these technologies. Next, I will discuss the challenges that emerged during my case studies.
6.1.2 Identifying design challenges across the case studies

In the following, I will highlight the high-level results that have emerged from my results. By no means is this discussion meant to be a complete listing of design challenges; rather, they are merely the beginning of such work. I present these findings in manner which highlights their entangled nature. In the end, however, I thematise these high-level findings into four categories, offering a tentative framework of holistic experiences of digitally augmented urban places.

Bodily comfort

A truly emplaced perspective on designing these technologies requires an understanding wherein the codescapes (Forlano 2009) created by urban technologies must also coincide with material qualities of place from the point of view of embodied use. For instance, while ‘camping’ with laptops, we do not place ourselves just anywhere, but choose a comfortable, dry and warm location, possibly with an access to drinks, snacks, and bathrooms as is the case with people who choose to work from cafés, as has also been pointed out by Willis (2015, 43–44). Similarly, bodily comfort emerged as a central concern with the UBI hotspots, underscoring what a major challenge embodied comfort is for infrastructural technologies. Understanding the importance of the body-place relationship is crucial for successful design. Returning to the taxonomy in figure 3 (cf. chapter 2), infrastructural technologies must specifically address for this issue in their design, as users are not able to position themselves freely.

Historicality of place and self

Various aspects relating to temporality also emerged in the empirical materials. These can be understood in many ways. Aspects of historicality relating to place, for instance, played a key part in the sense of place where these technologies were implemented, and affected strongly how they were viewed by participants. The personal histories of our participants also had a major role in their attitudes in regards to the digital augmentations. The historical lineage of the technologies themselves were similarly important, and this agreed with the argument of, e.g., Huhtamo (2009) and the empirical findings from previous case studies on UBI Oulu (Ylipulli 2014a).

Natural cycles

Natural cycles, i.e. diurnal and seasonal rhythms also emerged as very important to urban technology use in general. In the case of infrastructural technologies, such as urban displays, these challenges are multiplied, as was demonstrated in article V. The device itself as a material object, and the people opting to use them as embodied beings can both be subjected to intense seasonal and diurnal changes in weather and climate, and these should be taken into consideration. Similarly, the diurnal rhythms of light and dark were seen as potential threats in urban places with a history of night-time violence. Perhaps for this reason, the use of light as the medium for digital augmentation was a successful choice. Thus, these challenges could well be construed also as inspiration for design.

Rhythms of experiencing

The personal embodied rhythms of participants and the suitability of the digital augmentation is necessarily an important aspect due to the dynamism inherent to such technologies, and some participants worried that their rhythm would be too slow or too fast for the sensors to keep up with. Most were satisfied when we demonstrated that the augmentation would adapt to their rhythm. Thus, it is important to adopt a sensitive approach to embodied rhythms; however, this could also be an interesting aspect for a designer to play with: for instance, a dance game wherein the user adjusts her own rhythm to spots of light, trying to step on them, would probably be a delightful addition to an urban place, provided that conditions are safe for such an activity to be encouraged.

Legibility: reading place, reading technology

If people do not know what the digital augmentation is meant to do, they simply ignore it. Thus, many participants wished that there would have been traditional signs to explain what UE did and what it was for. This unwilling ignorance of the digital
augmentation may lead people willingly ignoring it, as this tactic seems to be utilised when participants consider the digital augmentation to be somehow irrelevant to them. This state of affairs leads people to willingly ignore these offerings, resulting in, e.g., display blindness (Müller et al. 2009), as was the case with some UBI hotspots participants. Similarly, people must be able to read the place they are a part of (e.g. Lynch 1972). Thus, when augmenting the place digitally, legibility must be a goal; otherwise, there is a risk that the whole place becomes unintelligible to those who try to use it.

Rhythms of city-making and technology-making

The rhythms of city-making and technology-making also represented an important challenge for long-term viability of digital augmentations. While UE and LS escaped this dilemma by existing only for the space of a couple of months, the UBI hotspots engaged fully with this aspect over the many years they had been deployed at the time of my study. The rhythms of design and planning, construction and repair in urban places is vastly different to the rhythms of the technology industry, which expects to produce and sell new devices more and more during every economic quartal. Thus, the durability of digital technologies as well as the enormity and indifference of the city-making complex, which operates on plans devised years and decades before, pose a significant challenge for long-term digital augmentations.

Managing image

Another perspective into the design of digital augmentations is the relationship of the user to other people, as discussed by Ylipulli (2014a, article V). In the articles, this emerged in several ways. For instance, it was deemed important that whilst associating themselves with the digital augmentation, the person using the technology should not feel that their impression management (Goffman 1959) is endangered in any way. There should be no embarrassment in regards to its content, and it should be so easy to use that there is no fear of failure in using it.

Protecting privacy, enhancing safety

Furthermore, the technology should not reveal, even potentially, anything private to others in the public urban place. A large screen, then, might be threatening from this point of view, if the person wishing to use it is unsure of what it does and what it displays. In this aspect, the very abstract lighting augmentations may seem like a much safer thing to associate with, as they are not able to reveal anything private in the way public displays are. Thus, returning to the provisional taxonomy I presented in figure 3 (cf. chapter 2), privacy issues are a much greater challenge to infrastructural technologies, as the sheer visibility of these technologies may give a feeling of vulnerability to their users.

Furthermore, bodily safety is important, and devices should be placed so that potential users’ bodies are protected from traffic. However, digital augmentation can also enhance a feeling of safety through changing the atmosphere of an urban place. Yet, there might also be some threats associated with this. Surely there are times and places when it is wise sometimes to be on one’s guard in the city.

Networked objects versus individual designs

The design artefacts, however, seemed to also harbour some inherent challenges which were obvious whilst comparing the various case studies. Most importantly, the UBI hotspots were a network of interactive devices that were integrated into real public urban places. This is a brave and difficult aim, as was evident in our participants’ accounts. On the level of aesthetics, placement in the urban environment, and the content offered, challenges abound when designers attempt to tackle a number of urban places of various kinds in one fell swoop. LS and UE avoided this challenge by being one-off designs, which made it feasible to customise each to a singular location. This, however, does not, in my opinion, mean that networked technologies are not possible to design; but it does mean that there is an extra challenge to be tackled if the technology is very material. A more customised approach, in regards to both form and function, might serve urban display networks well.
Invisible versus visible technology

The above aspect is also related to the materiality or visibility of the technologies. WiFi, such as panOULU, maps very easily upon the existing urban physical structures, as Forlano (2009) has discussed. Thus, for the most part, the problems of integrating a novel material object into the cityscape is avoided. Furthermore, potential users are allowed to position themselves and their devices as they see fit within the place. Visibility, however, can also be an image-booster, as was evident with the UBI hotspots. Participants were glad to have the displays in the city, since they reinforced their city’s image and identity.

Summarising framework

I presented the above findings in a list-like, individual format in order to highlight the multifaceted and intertwined nature of these phenomena. Indeed, everything relates to everything. However, we can also thematise them further to render them more usable. In my experience, the drafting of schemata is an especially designerly way of organising knowledge. It can also be easily criticised; after all, to think that a rigid model can fully capture the many relationships between things cannot be sustained, and matters are essentially simplified in such a format. Yet, it can as easily be defended by stating that the purpose of such frameworks and models, indeed, is not to prescribe or describe fully, but to produce useful ways for designers and planners to cope with the messiness of reality. Actually, performing analysis, verbally or otherwise, is a similar assault on reality: to understand phenomena, we interpret, categorise and describe, losing much in the process, but also gaining knowledge. As my research ontology does not assume that the nature of reality would be somehow inherently categorised (and these categories then simply to be discovered by us) the use of models, schemata, and so forth, is only a further condensation of knowledge in my view. Additionally, the purpose of my thesis is to produce knowledge to inform design. Thus, the making of schemata becomes permissible, even imperative to ensure that the conversation I am presenting is legible within a larger professional culture where practice and research are entangled.

With the above caveat, I will summarise the above findings in the form of a framework (figure 21) that is intended to describe the multifaceted nature of the phenomenon of digital augmentation of urban places.

![Fig. 19. Organising findings elicited from participants’ accounts into four thematic areas. Thus, this model represents a holistic view of participant experiences.](image-url)
The inherent design challenge of public urban displays is to take into account the body-mind-environment complex. In this manner, the above findings are thematised into four major categories: the self as an embodied individual and the locus of perception; others as similarly embodied beings who share our places and spaces in many synchronous and non-synchronous ways; the relevance and legibility of the digital augmentation technology; and naturally, the functions and materiality associated with the urban place. In this model, another thematisation between temporal aspects and spatio-materially focused aspects have been made for added clarity. Importantly, it should be noted that this framework views the situation from the point of view of experiencers, rather than that of the designer. Yet, it has many implications for designers.

6.1.3 Meaningful emplaced experiences through digital augmentation

What the above empirical findings indicate is that we must design meaningful emplaced experiences. This was especially highlighted with the UBI Postcards and the UE thermometer function. Overall, it calls for digital augmentations that are sensitive to its potential users as embodied beings that are parts of places. The place and the people sharing the place have a complex relationship which unfolds over time. The technology must position itself intelligently and sensitively into this complex and messy reality. Thus, I advocated for an ‘emplaced interaction design’ in article II.

The role of architects in the interdisciplinary production of digitally augmented urban places

The potential role of architects in this should be quite evident from this formulation. It is not my intention here to suggest that all architects should suddenly render themselves into interaction designers or learn programming skills. Rather, the situation calls for a better collaboration between architects as designers and researchers of urban spaces and places, and computing professionals as designers and researchers of digital technologies. However, this collaboration must be genuine and deep, wherein both take each others positions seriously. Yet, novel conceptualisations and even the wild fantasies of science fiction have always been an important source of goals and aims for engineering fields (e.g. Kukka et al. 2014), and thus, it would be highly beneficial for architects to simply start investigating and imagining the unimaginable. Rendering these fantasies deployable, however, requires a thoughtful process, which must be highly sensitive to the socio-cultural reality of the context that they are intended to be a part of. Thus, a tight collaboration between social scientists, as was a principle of this thesis, will serve both architects and computing professionals well. It is in that field that time can be devoted to carrying out very substantial ethnographies and in-depth theoretical work, all conducted from disciplinary perspectives that are substantially different from the highly application-oriented design and engineering fields.

6.2 Methodological considerations

In the following section, I will first reflect on my personal maturation as a researcher during this process. Then, I will discuss the lessons that were learned through the process in light of the research literature on evaluation I reviewed in chapter 3.

6.2.1 From a student of methods to a developer of methods

Considering my educational background in architecture, there was no self-evident evaluative methodology upon which to build. My personal attitude, and thus, research approach revolved around the central idea of investigating people’s (other than myself) experiences with the technologies that had been deployed in real urban settings. Thus, a qualitative and empirical approach was warranted.

Therefore I decided to lean quite heavily upon ethnography as a general research strategy. However, I must point out here that my purpose was not to create full ethnographic accounts of phenomena, but to produce in-depth knowledge to inform design. Thus, an evaluative approach was also established, and also, to a large extent, was dictated by my role within the research projects with which I was involved. Indeed, as I recounted in chapter 3, there are a number of similarities between my approach and, for example, the DA carried out by social scientists.
On the level of research tactics, a creative approach was also necessitated due to the practical constraints of the case studies, which occurred within constructive and RbD projects. As was especially the case with the adaptive lighting projects, a strict, fast and direct tactic was absolutely crucial. Indeed, with short-term installations these terms are often non-negotiable. With LightStories, we only met the interviewees after they had devised their designs. Thus, it made sense to use the opportunity to meet them face to face to interview them. The task, and time between the task and the interview, had given them ample time to consider their experiences with LS. Thus, very traditional semi-structured and group interviews served our interests well. It also gave me a small enough group of people to begin working with. I quickly realised that group interviews were not ideal; the social dynamics of the situation, albeit interesting in themselves, made the situation difficult to handle, and risked skewing the analysis, giving confident, loud persons more say in the matter.

However, during LightStories, we had not interviewed or seen our participants in-situ (although the LightStories street was actually visible from the interview room). I pondered whether even better responses could be elicited while participants were actually on-site; after all, I was interested in digital augmentation of public urban places. Thus, when it was time for a second round of evaluation, this time with UE, I suggested an approach wherein we would go along with our participants as they walked on the path where UE was installed. I was not aware of the large literature on walking interviews at the time; this approach emerged out of the actual need for such a method and my knowledge interest. Soon, however, I learned that although considered still something of a novelty, such methods were already in use in the field of cultural anthropology.

Thus, I was introduced to advancing methodological developments, and became more confident that methodology is indeed something to be thoughtfully creative with – provided one is adequately skilled in using them in the first place, and understands the research paradigm within which they operate. Earlier, during LS, I had wished to use existing methods quite squarely as I found them in the literature, due to my inexperience. This strategy worked well at the time. However, a wealth of useful materials emerged in the UE case study, including a large amount of information pertaining to the situated nature of the UE augmentation, and the urban place itself. Importantly, this time I was also collaborating with two cultural anthropologists, co-authors Ylipulli and Suopajärvi, to comment upon the interview structure and conducting the interviews collaboratively with us. This gave me many experiential lessons into the art and skill of such work, and the required confidence to proceed with this modified walking interview approach. While the method should certainly be developed further (especially due to the excessive use of scenarios and too many interviewers in the situation), it served my research very well, and marked a shift in my attitude as well: I was now modifying methods to suit my own purposes, and seeking the resources, collaborations and literature, solving issues as they emerged within the RbD process.

However, the UBI hotspots had been designed and deployed as a long-term installation, and were already a relatively permanent part of the cityscape. Thus, I had more time to muse upon my tactic. I decided that in this case I did not wish to be present as participants evaluated their experience with the display, in order to retain the relatively naturalistic research setting (with the short term lighting installations, the situation was much more event-like in nature). This required a way to capture experiences in some way. Thus, as has been detailed previously, I decided to experiment with the probes method, and see whether we would gain interesting results. The probes method was appropriate and intriguing, as it was meant to be fun, creative and visual, and thus suited with a designerly sensibility. It also treated the participants with a high degree of respect. It suited my ethics, and participants were able to do their tasks at a time that was convenient for them.

Although I did not realise it at first, this study marked a substantive shift in my work from an applier of methods into a developer of methods. It became clear that this method was no longer the same as the cultural probes of Gaver et al. (1999); thus, a proper introduction of the method was necessary. This I accomplished after a further iteration of the approach in the SparkSpace project, in which I amended the probe materials with a 30–45 minute interviews prior to the task. After this further iteration, the process was
published in article III, under the title of evaluation probes. This completed the maturing process in regards to method development.

Overall, this line of development reflects, to a large extent, my own designerly background, which helped me adopt a typically problem-based approach. In this view, the formulation of research questions was not dictated by the methods or concepts I already knew, but instead, I was forced to search for and develop the tools I needed to conduct my work. This enabled me to view the research subjects from a very open-ended and holistic position.

6.2.2 Lessons learned from evaluation processes

An arguably useful feature of gathering empirical, intersubjective knowledge from participants is that while it enables the analysis of those materials from the point of view of in-depth theory to gain fundamental understandings, very specific and pragmatic issues also arise from these accounts, enabling a very pragmatic evaluative research approach simultaneously. Thus, the results gained through the above process indicate that empirical, intersubjective (i.e. various individuals’) experiences, gained and analysed through careful research can help inform designers. Next, I will discuss some practical lessons that were learned in the process.

The role of research paradigms: RbD and constructive research

The paradigms of RbD and constructive research also had a significant influence on the case studies. Both involve constraints regarding the timeline of research, which is directly related to the resources that can be allotted to maintaining the research site, as well as the permissions that have been granted by the authorities or private owners of the site.

The pilots and constructs themselves play a major part in what can and should be researched in RbD and constructive research projects. It is of primary importance to openly through can be researched through the particular pilot or construct. It should also be noted by designers and implementors that RbD and constructive research projects are not simply traditional design projects; their important purpose should be to produce knowledge. Thus, the design process must thoughtfully accommodate knowledge-production through various methods, taking care not to, e.g., impose their own views upon participants.

Time constraints place significant pressure to design of the construct or pilot in such a way that evaluation is possible. Thus, the collection of data must be incorporated into the research design from the very beginning. Further, the general timeline associated with the research site places much importance on performing the evaluation successfully the first time. If this does not occur, there is a risk that much of the research findings are actually lost. Additionally, in regards to experiential evaluation, these time constraints should not impact participant experience negatively.

These tight constraints often lead to short term deployments, in which a novelty effect, i.e. the fascination of newness, may play a considerable part when digital augmentations are introduced into everyday settings. This I have tackled in two ways; the short-term deployments have been approached through interviews, utilizing participants’ reflective faculties. In the case of the UBI hotspots, more distanced approaches have been adopted, including the evaluation probes method, and a classic etic observation study on how people use two public places.

Similarly, the size and nature of the deployment affects the research process and results. Gaining research materials on a multi-site construct is challenging. Herein, mixed methods and a custom-tailored approach can help. However, to study a single-setting or small construct or pilot may not be any simpler, as there is no other point of comparison for a unique site. Thus, the researcher should use the possibility to study the site itself with a much keener eye, as was done with UE and the interviews concerning the sense of place.

A need for epistemological awareness and consistency in evaluation

Due to the often mixed approach in design evaluation, especially in interdisciplinary circumstances, careful methodological work is even more central. As we argued in article V, there is a need for epistemological awareness and consistency. This means that all
researchers who are heavily involved in the evaluation should, ideally, be very knowledgeable of the ontological and epistemological frameworks within which their methods operate. If there is no common awareness of the quality standards, theories, aims and practices that are associated with the chosen methodology, there is little hope in achieving results that are credible within the right research paradigm.

Temporal aspects of data collection

During the first evaluation probes study concerning the UBI hotspots, the data collection was purposefully conducted in late winter and early autumn conditions. These two iterations produced differing but very complementary results, which made it possible to view these experiences from two different viewpoints, and compare them. This is, however, not always possible. Often materials have to be gathered within the space of a few weeks. It should be taken into consideration that data collection during different seasons in the urban environments yields different results. This is a highly important point of view to take into consideration when performing analysis of the gained research materials.

Etic and emic accounts in investigating genius loci

While most of my research aimed to gain emic accounts, I also employed the results of an observation study to understand the UBI hotspots in Oulu. These etic accounts provided me with knowledge of existing user groups and use patterns in a broader sense. Young people and seniors emerged as especially significant groups, and having this knowledge would have been a valuable aid in designing the UBI hotspots. Similarly, emplaced functions and practices emerged as an important aspect of designing digital augmentations; our ability as designers rests in a fundamental way on the ability to gain knowledge of existing users and use patterns in-place. Designers are often in a position to gather only emic knowledge concerning the site. While this proved highly useful in my research as well, there is no denying that emic accounts enable a researcher or a designer to access more in-depth views into people’s experiences.

The role of the researcher and the participants

Due to the endless variety of differing research settings, a customised approach seems to serve researchers best; and thus, in many ways, every project requires a journey into the unknown. This requires a rather uninhibited and enthusiastic attitude; however, I cannot stress enough that this attitude must be coupled with a strong sense of ethics, especially towards participants. A good rapport can only be built on a foundation of mutual respect. Indeed, the results can only be as good as this rapport. Participants must be treated as equals, bringing in their experiential expertise, while the researcher and/or designer must simultaneously play the part of a courted host, a professional, and a fellow human being. Furthermore, in every case, I observed a great amount of personal growth in my participants; they often said they had started paying more attention to lighting or technology-use, and thus, had developed more to say on the subject; thus, a lay expertise was born. The researcher will do wisely to try and nurture this process by giving participants enough time and space to reflect, and various ways to express themselves.

6.2.3 A call for participatory design evaluation

As we learned from the literature review, evaluation has been marginal in the larger architectural field. However, as my research demonstrates, there are many benefits to conducting such work. Thus, I will next discuss the implications of my work and the approach I developed in order to conduct my research.

Towards participatory design evaluation

During the very first case study, I was struck by how my work was in complete agreement with the premises, goals and methods of participatory design. Thus, I begun to view my work as a mode of conducting participatory design. I shared the attitude of those conducting their work through the participatory approach, namely the ethical-political goal of democratising design, as well as the more pragmatic goal of harnessing experiential and layperson knowledge to inform design. However, as
the literature of POE and EBD shows, practitioners and researchers arguing for evaluative approaches in architecture largely base their argument on an ethical and on pragmatic argument, similar to those arguing for participation.

As a result, I began to view my case studies in experiential evaluation (as I initially termed it) also as post-hoc participation. Thus, a central argument in my thesis is that experiential evaluation can be viewed as participation, and thus, a part of the paradigm of participatory design. My approach could be termed as participatory design evaluation, which, I argue, can be an important vehicle and approach to conducting participatory design in the larger architectural field. I must note here, that the notion of ‘participatory evaluation’ is already established in the field of educational and organisational evaluation, but with a very different meaning. It refers to a practice wherein the stakeholders in an organisation are active participants in planning their organisations’ evaluation process (Cousins & Earl 1992). In my studies, this kind of an approach was not necessary or even feasible, as the participants are not familiar with the design artefacts that they would be evaluating.

Thus, I use ‘participatory design evaluation’ here to mean the use of multiple, intersubjective and experiential viewpoints of research participants for the evaluation of design artefacts, in my case, digital augmentation of public urban places. A somewhat similar principle has been suggested in the field of HCI in regards to system design (Kusunoki & Sarcevic 2012); however, to my knowledge, nothing similar has been suggested within the field of architecture.

A call for methodological work in the architectural field

As the conceptualisation of participatory design evaluation is novel, it is no wonder that there is a dearth of methods with which to conduct such work, as I discovered during my research process. After all, the constraints of the projects did not enable an approach that was entirely in keeping with traditional ethnography. However, I did learn many lessons from that field, and adapted methods to fit the constructs and pilots we were examining. However, I found it useful to reach into another design field, namely interaction design, for an approach that in my consideration occupied an optimal amount of depth and efficiency to conduct such dynamic research.

However, this is necessarily only the beginning; and while all constructive and RbD projects require a somewhat customised approach, I argue that there is a need to develop more and better methods to conduct participatory design evaluation in the larger architectural field. Evaluation probes, represents my contribution towards this work.

There is also a lack of experiential empirical research work done in architecture. While design work is most decisively carried out in real settings, with a context-driven approach, most architects, by virtue of their education, are unaware of the various ways in which basic qualitative research can be carried out. Therefore, they are not equipped to produce or necessarily even utilise such knowledge. Thus, there is an enormous lack of post-hoc evaluation knowledge. This, I argue, has led to a favoring of a priori knowledge in general, as was perhaps visible in the urban planning evaluation literature I reviewed. These a priori insights emerge either from high philosophy or strong personal insight. Often, these are then delivered as a manifesto; indeed, the literature is littered with such manifestoes (e.g. Le Corbusier 1931, Jacobs & Appleyard 1987, The Congress for New Urbanism 2013, Koolhaas 2014.). These can certainly serve as declarations of intent for one’s personal work, or for a group. What, then, happens post hoc? As the POE and EBD communities have argued, nothing much. The implemented results are not evaluated, in order to see whether the advocated principles emerged intact. In fact, the feedback loop of the built environment is unconscionably long. This renders us vulnerable to repeating work which has been done on erroneous principles. From an experiential, user-centered point of view, there is a wealth of ethnographically oriented design research that still largely remains undone in the larger architectural field.

6.3 Theoretical considerations

Finally, I will now discuss the role of theory in architectural research, contrasting the results of my literature review through my own usage of the concept of emplacement. I will argue for the importance of conducting more conceptual work in order to render
the tacit knowledge of architecture more understandable within and outside of our field.

### 6.3.1 Using theory for empirical architectural research

Architectural research and scholarship employs theory in an extremely in-depth manner, and this is, in many ways, a tremendous strength, as work is conducted in a thorough manner. In the literature review, this was illustrative in the results that pertained to architects’ use of phenomenology. The phenomenological approach in architecture not only adopts, discusses and utilises the existential philosophies of the fundamental phenomenological scholars, but couples them consistently with the phenomenological method. This seems logical enough, and thus, it seemed to me something of a violation when I decided to couple the phenomenological philosophy of experience, with an emphasis on Merleau-Ponty’s embodiment with a methodology that relied on intersubjective participant accounts. However, this approach is entirely commonplace in the social sciences, and thus, rests on a well-established foundation.

Coupled with my research experiences of actually conducting this kind of research, I advocate for the usefulness of this approach, and especially so for architects. I argue that this approach can begin to build a stronger bridge between research and practice. It accomplishes this by staying rooted in empirical, experienced everyday reality, while simultaneously being able to reach for a pool of theoretical knowledge that can help turn what might seem to be even trivially localised findings into a body of communicable knowledge through a higher-level theoretical discussion.

To begin with, there seemed to be no significant tradition of conducting this type of research that I could have leaned on, either on the level of architectural education or, really, in architectural research. Thus, there seems to be a lack of a certain kind of a theoretical work done in the larger architectural field, and thus, in the theoretical understandings held by individual architects. In other words, there is a lack of concepts with which we can communicate architectural understandings. Similarly, there is a lack of discussion on the application of theory and methods, as discussed in conjunction with urban planning evaluation (Alexander 2006).

### 6.3.2 A call for conceptual work by architects

There is an enormous need for what might be called ‘middle theories’, which would occupy a space between the very fundamental work of philosophy and deep theoretical scholarship and design work, whether that design work is done for the sake of research or practice. While it is entirely reasonable to say that the professions harbour a significant amount of tacit knowledge gained through experience (Schön 1983, Polanyi 1966), it is not adequate in my opinion to simply leave matters there. On the level of society, it is even imperative to be able to communicate with concepts. The language of decision-making continues to be the spoken and written word. It is important to be able to explain understandings relating to experiential quality within political and economic decision-making processes.

However, this issue also relates to the position architects hold among other professionals, i.e. in interdisciplinary settings. My experiences in daily interdisciplinary work have required me to be able to explain what the general architectural worldview, aims and methods are like. Often, I was not able to elucidate on the ‘why’, merely ‘how’ we conduct design. In a way, this thesis is also a way for me to explain what I was not able to explain before. Many of the findings were not really surprising to me; as explained by Pavlides and Cranz (2012), the purpose of ethnographies in architecture is to both affirm existing understandings and values as well as subvert them. This ensures that the professions’ understandings, aims and methods are based on credible knowledge. Furthermore, I cannot expect to have much credibility among interdisciplinary colleagues until I am able to express design-related understandings verbally and found those understandings on a solid ground. A combination of theory and empirical knowledge is an efficient combination here.

However, we must concede that the number of theoreticians is necessarily quite low in such a practice-oriented field as architecture; thus, theoretical work in architecture cannot be built as
rapidly as in some other fields. Thus, it is sensible to investigate relevant theories from outside of architecture, and to engage scholars from other disciplines in theoretical debate. After all, the spatial turn in the social sciences, coupled with an increasing interest towards visuality on the level of methods and even dissemination demonstrate that we have much to offer others as well.

6.3.3 The usefulness of ‘emplacement’

The introduction of the concept of emplacement, originally from the field of cultural anthropology, is my contribution to the problem that I described above. Emplacement can help us theorise and communicate crucially important understandings and values. It aided me in investigating participant accounts from a perspective that I found consistent with an architectural worldview.

Granted, I have been immersed in the embodiment/emplacement theory for some years now, and thus, to a degree, the theory guides my view of the world, research settings and research materials. However, it is important to note here that this was not so until about halfway into my research. Thus, the concept was used in an abductive manner (Magnani 2001): readings into the research materials were initially conducted without the conceptual lens, and the participants’ various delights, critiques and other experiential issues pertaining to use patterns, use problems, weather, the materiality of the displays, and the rhythm of the lights, for instance, emerged in the research materials quite clearly also from an open-ended position. Thus, my search for theory was initially inspired by a wish to make sense of these empirical findings.

Emplacement, thus, served as ‘conceptual glue’ that bound these seemingly disparate findings together, as well as a part of a larger theoretical framework of knowledge. The holistic nature of emplacement seemed to me a way to explain matters in a way that was highly congruent with design and design knowledge, which tends towards the holistic. Thus, I believe the concept has much utility for both researchers and designers of digital augmentations in urban places, as well as for architects in general.

6.4 Limitations

While the research I have conducted for this thesis has been carried out to the best of my ability as a researcher, some limitations do apply in regards to the overall approach.

Firstly, the short-term nature of some of the research sites included in this research may impact the results of these case studies, as no naturalistic use culture can develop in over the course of only a few months in a public place. Indeed, longitudinal studies are, arguably, very desirable in evaluative research. However, this limitation has been combatted by adopting a research position which treats participants not as test subjects, but as co-producers of knowledge who are able to reflect on what is presented to them.

Similarly, the relatively low numbers of participants in these case studies, resulting from the high number of different research sites and projects, in some studies may lessen the transferability (Guba 1981) of these results. In traditional ethnographic approaches, the aim is often to collect a one or two fairly large sets of materials. However, this limitation has been combatted with the use of adequately ‘thick’ description (Geertz 1973), an important strategy to achieve an adequate level of transferability. Furthermore, I consider it important to highlight and investigate individuals’ experiences.

Overall, the results contained in this thesis are highly situated in their urban context in a Nordic country. Thus, their applicability to other cultural and climatic contexts must be carefully considered. This limitation has been addressed with the use of well established theory to discuss the empirical, situational findings on a higher, more generalised level.

This highly contextual nature of the research has also influenced the choice of utilising an ethnographically inspired approach. This has resulted in a style of analysis and results that are to a large extent typical to ethnographic research in general. However, some central results have then been lifted from the analysis in order to make the results more readily understandable and perhaps even operationalisable for architects and designers. This places the style of the analysis and the results in a territory that is yet again between established disciplines. Thus, the holistic and rather narrative format may not be as familiar to some architects or
designers who are used to more schematised and operationalised results; and on the other hand, habitual ethnographers may find the further production of ‘lessons learned’, schemata and bullet points out of the analysis as overly reductionist. However, this positioning also enables readers from both worlds to hopefully gain fresh perspectives into the subject matter, and also, into their preferred mode of conducting qualitative research. Nevertheless, adopting this stance certainly served me well as a way of conducting multidisciplinary research that is relevant to the practice of design, which benefits greatly from gaining holistic understandings of phenomena.

Furthermore, the limitations of this work include all the usual considerations and caveats associated with qualitative approaches. These have been extensively discussed by, e.g. Guba (1981). In his paper, Guba attests that qualitative approaches do not need to adhere to the quality standards of postpositivist works, these being internal and external validity, reliability and objectivity. The standards of qualitative inquiry Guba proposes are credibility, transferability, dependability, and confirmability. Without discussing these in any length, the practice of open reflection of the results and of one’s own position in their creation are central to producing results that adhere to these standards. This research is very much conducted from an architectural point of view. Thus, my notions of experience and my knowledge interests emerge out of this position. Furthermore, all through this thesis, I have strived to rather reveal and discuss my own personal viewpoints explicitly, rather than to discuss them implicitly. This openness is central to the credibility of qualitative research. Furthermore, Guba attests that a holistic approach is absolutely necessary to the credibility of qualitative results. This approach has been maintained on the level of research questions, theory, method and analysis. Similarly, the practice of triangulation through different methods is used in qualitative research to achieve transferability. For the purposes of our case studies, several methods have been used across these case studies to gain various types of understandings of varying research sites. (Guba 1981)

Some of the limitations I have discussed in this section are currently being addressed in my ongoing and future work within some RbD projects.

6.5 Ongoing and future work

A compilation thesis is inherently a rather limited piece of work that should both summarise and expand the results and discussion that have been presented in the original articles. The thesis needs to function as a standalone work, which, in the case of an ethnographically oriented work means ethnographies that have considerable length in word and depth in analysis. I have attempted to preserve the integrity of my earlier articles in this thesis, especially in chapter 5, while producing further, higher level discussion in chapter 6 and 7. However, chapters 6 and 7 mark only the beginning of this work. To illustrate, I consider it important to complement this work by drafting an article which will deal with further schemata that can be drawn from the results of my original articles; this time from the point of view of the designer (as opposed to the model I presented in chapter 6) to further aid in the design of digital augmentation in public urban places. While I consider this the most pressing issue to address, the higher level themes of conceptual and methodological work in architecture outlined in chapters 6 and 7 will also merit further discussion that is outside the scope of this thesis.

Furthermore, I will also address matters related to the research design of case studies. I will have an opportunity to do so in ongoing and future projects. Firstly, SenCity is a project that aims to investigate smart lighting as a service platform infrastructure for cities. It is funded by Tekes – the Finnish Funding Agency for Innovation, and it is led by Dr. Eveliina Juntunen from VTT Technical Research Centre of Finland, and Dr. Henrika Pihlajaniemi from the School of Architecture at the University of Oulu (OSA). The project entails case studies in six cities in Finland. I am currently involved with a case study that is being conducted in the City of Oulu. Within this case study, we have engaged a school community for the participatory design of adaptive and intelligent lighting within their school yard. We have employed, e.g., the cultural probes methods to gain understandings and design inspiration from the school’s staff and faculty. After implementation, evaluation probes will be used to conduct participatory design evaluation of the digital augmentation. This is in compliance with the further
development of the method which I outlined in article III.

Secondly, the InnoStaVa project aims to analyse how spatial and technological architectural features, i.e. lighting and acoustic solutions, create indoor environments and foster innovation and collaborative knowledge production in start-up companies’ work environments. The project is funded by the ERDF Council of Oulu region, and it is led by Dr. Aulikki Herneoja at the University of Oulu’s School of Architecture (OSA); additionally, the project is conducted in close collaboration with the Learning and Educational Technology Unit at the University of Oulu. Within this project, workplace communities will be engaged to study and design workplaces from the point of view of innovation. During this project, a number of pilots will be built. The approaches are still somewhat negotiated, and will be, to a large extent, customised according to the research sites within which we will operate.

From the point of view of furthering my research interests, it is imperative for me to try and engage in a long-term pilot to further deepen my understanding of technologies in inhabited spaces and places. This long-term case study is also intended to feature quite a large number of participants. Also, more triangulation through a mixed methods approach will be used within singular case studies, including tracking through tags within a larger facility. Most importantly, it is my main intention to utilise those participatory methods with which I am already experienced in the service of an overall participatory design framework, which spans from pre-design investigations, to design, to participatory design evaluation. Finally, this project marks at least a temporary shift from public outdoor places to indoor work environments. This shift in focus enables and challenges me to further widen my expertise on the level of literature and methods.
7 Conclusions

Some further conclusions can be drawn from the more specific results and the discussion presented in previous chapters. These concern interdisciplinarity, participation, and architects’ role as informed by the participatory design evaluation suggested in this thesis.

7.1 Need for interdisciplinary collaboration

Within this research process, the importance and necessity of interdisciplinary collaboration has been quite evident. This is no coincidence, as I attest that there are two important factors driving this development.

Firstly, the megatrend of technologisation or digitalisation (Naisbitt & Cracknell 1984), urged onward by the third paradigm of computing, ubicomp, and the miniaturisation and cheapening of various digital technologies clearly poses issues which are beyond the scope of any singular discipline. Especially in regards to urban technologies augmenting public places, interdisciplinary design challenges and research questions abound. For this reason, professionals in related fields, including architects, need to be prepared to conduct more and more interdisciplinary research and practice.

Secondly, the participatory turn that is occurring across various sectors of society (e.g. Saurugger 2010) similarly poses methodological and ethical challenges that many disciplines are not entirely equipped to handle. The design fields especially have embraced participation, at least in research and development projects, but much work still needs to be done to incorporate these viewpoints into knowledge production, design and decision-making. In this work, there is no end to the number of interdisciplinary collaborations of which architects could and should be a part.

7.2 Re-imagining architects’ roles

Owing to the participatory turn which I discussed in the previous section, the role of architects might also be changing rapidly. Within the research process which I have discussed in this thesis, I adopted a position somewhere between scholarship and design practice. Similarly, I positioned myself between being a spokesperson for non-designer stakeholders, and a translator of designers’ intentions.

As has been evident so far, my role had to change from that of a traditional architect conducting design work to a new role. Design so far has been a tacit knowledge discipline (Polanyi 1966), with the aim of producing reflective practitioners (Schön 1983) who can employ their faculties of lateral thinking (de Bono 1992) for the betterment of societies and everyday life. These skills were important to me in designing my approach, understanding the context within which I was working, in asking designerly questions, and finally, in being able to communicate my knowledge in the language of designers. My knowledge interest, however, required more generalizable knowledge that could demonstrate why or why not something in the designs of digital augmentations worked, and in expressing that knowledge explicitly. This role was centered upon critical thinking, logical argumentation, and interpretive knowledge production ability.

However, since I was conducting this work from an experiential point of view, with real participants, I also had to adopt another role, reminiscent of both ethnographers’ and participatory designers’ roles. This role was characterised by a kind of an advocacy, and rested heavily upon my values, social skills and faculties of empathy. Indeed, such work cannot be done from a position wherein the researcher does not fully intend to listen deeply to their participants as sources of experiential knowledge and as individuals.
with agency. These three roles, then, had to combine themselves into a larger whole in order for this research to be carried out. After this transformation, I am quite convinced of the relevancy of this approach for design fields.

While the aim was to make people’s voices heard, this did not mean that people performed my work for me; rather, I had to engage in meta-level design to plan for their participation process, and interpret their responses as a researcher. For these ends, I had to develop new methodological and analytic skills to produce and make sense of the results. Thus, the practice of participatory design evaluation, as I have termed it, places much emphasis on design skills, faculties of critical thinking, as well as social and empathy skills.

Within this thesis, then, I have argued for an approach I have termed participatory design evaluation. Furthermore, I have developed a small increment of this approach through my empirical, methodological and theoretical work. How, then, might this approach be incorporated as a part of the architectural practice? That, I believe, is a subject that deems a substantial amount of further inquiry that is outside the scope of this thesis. More specifically, this questioning must be answered not only through further implementation of the kind of work I have conducted, which has focused on the close study of participant experiences; what is also required is investigation into the design and planning processes in the larger architectural profession, including the specific processes inherent to architectural design and, importantly for the focus of my thesis here, urban design and planning.

7.3 From ideal cities to better city-making processes

If we were to look at the history of urban planning, many well-known ideal cities emerge: Renaissance cities aiming for geometrical perfection, the Garden City diagram of Howard, the Radiant City plan of Le Corbusier, as well as Frank Lloyd Wright’s Broadacre City are familiar examples (Fishman 1982). Even lately, New Urbanism’s return to the physical hallmarks of traditional, densely-built European cities (Congress for the New Urbanism 2013) represent a similar idea: these model cities aim to express the ideal morphology of a city, which then is, if implemented, often literally set in stone for generations to come.

This kind of work is also being carried out in the planning of smart cities, e.g. in Dubai (Mohammed et al. 2014) and China (Zhang & Du 2011). However, all these plans, both the classic ideal cities as well as the new smart city developments, are plans which are firmly situated in their own time and culture. Despite the fact that the technologies that are now being implemented in these cities may well be the latest and greatest, there is no escaping the fact that they will not be very relevant in themselves even in a few years time. Life, and technology, will move on, and the very notion and aim of building of an ‘ideal city’ makes these concepts unlikely to be able to adapt. Thus, it has been suggested that instead of designing ideal cities, we should be designing better city making processes (e.g Awan 2013 at al.). I am in agreement with this view, and I hope that the participatory design evaluation approach which I have adopted in this thesis presents a one small step in the direction of moving towards this goal, by utilising lay expertise to evaluate and inform the design of digital augmentation in public urban place.
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EXPERIENCING AND EVALUATING DIGITAL AUGMENTATION OF PUBLIC URBAN SPACES