



## **Non-Refereed Proceedings of the 2nd Media Architecture Biennale Conference: World Cities**

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# Digital Media Supported Intercultural Interactions as a Means of Networking and Transforming Spatially Separated Communities and Places

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## ABSTRACT

Public large-scale digital media such as media façades and big screens are becoming more and more frequent in the urban space of many major cities such as Berlin, Melbourne, Tokyo or Madrid. With new interfaces and applications, as well as innovative content they offer diverse possibilities for interaction and additional uses of public space (See Figure 1). This research project looks at these developments and investigates how such media impact on the constitution of public space and on urban atmospheres [1]. It explores how media façades and urban big screens, conceived as formative spatial elements, act on people's behavior in diverse spatial settings. Also, it is studied how the impacts vary according to the setting and with different media content. In order to obtain a broad knowledge about the relation between public space, such media, their content and various features of public life four public media spaces in four different large cities are being observed, analyzed and compared in this work. For the analysis and the comparison a micro- and macro-level location study of these four urban public spaces is being conducted. In the second stage video data of these spaces is being evaluated through an interpretative video analysis.

## Author Keywords

Media façades; urban screens; urban public space; media space; public large-scale digital media; interactive public media; collaborative public media; participatory public media; networked events; digital media supported interaction; digital media supported connections between physically separated spaces; community building; place making; social cohesion; Connecting Cities; Collegium Hungaricum Berlin; Medialab Prado Madrid; The Digital Art Gallery - SESI-SP; Federation Square Melbourne;

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## INTRODUCTION

If space is understood as being partially constituted by the interplay of action and structures [8], it can be crucial to take into account both the growing amount of media in urban public space [5, 10] and the diverse types of their uses when contemporary city space is studied. The research project 'Digital Media Supported Intercultural Interactions as a Means of Networking and Transforming Spatially Separated Communities and Places' approaches these topics, focusing predominantly on large-scale digital media such as media façades and urban big screens in public space. Although the majority of these media is usually displaying commercial content like advertising spots etc., the project deals almost exclusively with media that is also described as 'community screens', 'community façades' or even as 'social media' [6] and which most of the time is used for the transmission of noncommercial content like new media art etc. This is because the research project aims to identify new content and alternative uses of these media, as well as their social and cultural potentials [4, 8, 12]. Also it is studied how media façades and urban big screens could contribute to measures of a sustainable urban development e.g. promoting participation, constructive exchange, social cohesion and social responsibility [15]. In this context the research project assesses how media façades and urban big screens affect the constitution of the public spaces that surround them under certain circumstances and how these media can coin urban atmospheres [1].



**Figure 1.** Connecting Cities event, September 2013, Collegium Hungaricum Berlin. Media content: Binoculars to... Binoculars from... by Varvara Guljajeva & Mar Canet Sola. The installation included real-time windows to Riga, Liverpool and Linz i.a.

Furthermore the project investigates how these media impact on people's behavior (e.g. specific individual or collective uses of space, or the interactions between individuals and groups) (See Figure 2 & Figure 3) in different urban settings and how the impacts vary with different media content such as non-interactive video art, interactive games etc.

So as to gain an extensive insight into the interdependencies between media façades or urban big screens, urban public space and different features of public life the following four public media spaces are being observed, analyzed and compared:

1. Collegium Hungaricum Berlin, Germany.
2. Medialab Prado, Plaza de las Letras, Madrid, Spain.
3. Centro Cultural Fiesp – The Digital Art Gallery - SESI-SP, Avenida Paulista, São Paulo, Brazil.
4. Federation Square – Big Screen, Melbourne, Australia.

All of these public media spaces have certain characteristics in common as they are all located in centers of megacities and near to vivid public spaces (e.g. 'Unter den Linden', 'Paseo del Prado', 'Avenida Paulista' and 'Flinders Street'). However, they also differ in some aspects (e.g. accessibility, spatial use, size of medium, frequency of screenings etc.) and without a doubt offer different conditions for the functioning of public large-scale digital media. That is why they have been chosen for the analysis.

The research project contains a location study of the four public media spaces. With this study their differences shall be revealed. All spaces are analyzed according to criteria such as size, proportion and accessibility etc.



**Figure 2.** Attention and smart phone use during the screening. Connecting Cities event, September 2013, Collegium Hungaricum Berlin. Although alternating content was displayed during the event (here non-interactive video art), a considerable part of the audience started looking at its smart phones or turned away from the display after a short while.

In addition the spaces are studied in four different situations while the screen/ media façade:

- a.) is turned off
- b.) is broadcasting linear non-commercial moving image content
- c.) is offering interactive non-commercial moving image content
- d.) is connected (visual or audiovisual connection) with another screen or media façade located in a different, physically separated public space.

The research project aims to generate knowledge about the relation between public space, public large-scale digital media, their content and public life.

The main research questions are:

How media façades and urban big screens affect the constitution of public spaces?

How media façades and urban big screens impact on the uses of public spaces?

How the connection of physically separated public spaces through media façades and urban big screens impact on the uses of these spaces?

How these impacts vary according to the spatial settings and with different media content?

One of the work's objectives is to produce results that show in what kind of public spaces and under which conditions these public large-scale digital media can positively influence public life, contribution e.g. to the dialogue between different social and cultural groups and enhancing bridging social capital, social cohesion, social responsibility and community building.



**Figure 3.** Connecting Cities event September 2014, Medialab Prado, Madrid. Media content: Organic Cinema by World Wilder Lab. The group of young people (right) frequently uses this public space (Plaza de las Letras) for meetings when no screenings takes place. They were not too interested in the event and hardly interacted with the other audience.

## PREVIOUS WORK

The following authors have substantially influenced the field of this work with recent publications:

Daniel Michelis with the research about motivation and large interactive screens in public space [11]

Ava Fatah gen. Schieck with the research project 'Screens in the Wild' [3,4]

Scott McQuire with the research project 'Large Screens and the Transnational Public Sphere' and publications on the potentials of media spaces and networked events. [9]

Andrew Vande Moere & Niels Wouters with their publication about the role of context in media architecture. [14]

## SIGNIFICANCE AND INNOVATION

Large scale digital media are becoming more and more visible in contemporary urban public space. With this new and increased presence many questions have to be answered such as those stated in this paper or e.g. about light pollution etc. It will be important in the future to know where and under which conditions large scale public moving image media with alternative noncommercial content work best in urban public space and how to tap their full potentials. The research project 'Digital Media Supported Intercultural Interactions as a Means of Networking and Transforming Spatially Separated Communities and Places' will help answering some of these questions and will also reveal the potentials of digital media supported interaction between physically separated urban public spaces.

## METHODOLOGY

A micro- and macro-level location study of all four urban public spaces is taken as a basis for the research. In this study these spaces are analyzed according to criteria such as population density, accessibility, leisure time facilities, educational facilities, commercial activities, unique features, size and proportion etc.

Among other things it is explored how many shops and theaters can be found in the surroundings and how many people live in the area. With that certain characteristics of the public spaces will be revealed.

In the second stage, the chosen public spaces are being examined in the four different situations listed above. For this analysis video data is being evaluated through an interpretative video analysis as described by the sociologist Hubert Knoblauch [7]. In this analysis it is looked at criteria such as flows of people, duration of stay and uses of the space, as well as number and type of interactions. The analysis of these criteria will show the type of public life taking place in the location in the named four situations, as well as reactions to the content. To date, various data have been collected (with two video cameras filming from two opposite perspectives) (See Figure 4 & Figure 5) and partially evaluated, consisting mainly of video material recorded in Berlin and Madrid during public screening events in September 2013 and September 2014. Further video data of public screenings in São Paulo and Melbourne will soon be selected and used for the study. The location study will be completed by the end of November 2014. The interpretative video analysis will be conducted from December on. It is planned to finish the doctoral thesis by the end of September 2015.

## BIO

Alexander Jan Albrecht is a doctoral candidate at the Institute of Urban and Cultural Area Research of Leuphana University Lüneburg, Germany and deals with topics like urban public space, media façades and urban big screens, urban development and renewal, cultural heritage and community development. While studying Applied Cultural Sciences (M.A.) he also worked and researched in Latin American countries like Brazil, Ecuador and Bolivia.



**Figure 4.** Connecting Cities event September 2014, Medialab Prado, Madrid. Screenings content: Telepuppet.tv by Ali Momeni, Stephanie Sherman and Nima Dehghani. Perspective 1: looking to the screen.



**Figure 5.** Connecting Cities event September 2014, Medialab Prado, Madrid. Screenings content: Telepuppet.tv by Ali Momeni, Stephanie Sherman and Nima Dehghani. Perspective 2: looking to the audience.

## REFERENCES

1. Böhme, G. *Architektur und Atmosphäre*. München: Wilhelm Fink, 2013.
2. English Heritage, CABE. *Large Digital Screens in Public Space*. 2009.  
<http://webarchive.nationalarchives.gov.uk/20110118095356/http://www.cabe.org.uk/files/large-digital-screens-in-public-spaces.pdf> (22.06.2014, 18:12).
3. Fatah gen. Schieck, A., Fan, S. *Connected Urban Spaces: Exploring Interactions Mediated Through Situated Networked Screens*. PAPER REF # 8201 -SHORT PAPER Proceedings: Eighth International Space Syntax Symposium Edited by M. Greene, J. Reyes and A. Castro. Santiago de Chile: PUC, 2012.
4. Fatah gen. Schieck, A. [et al.]. *The Urban Screen as a Socialising Platform: Exploring the Role of Place within the Urban Space*. 2008  
<http://discovery.ucl.ac.uk/7867/1/7867.pdf> (25.06.2014, 16:52).
5. Haeusler, M. H. [et al.] (Eds.). *New Media Facades: A Global Survey*. Ludwigsburg: avedition, 2012.
6. Hochschule Luzern, Wirtschaft, Urban Media. *Digitale Out-of-Home Medien: Mediale Infrastrukturen und Inszenierungen im öffentlichen Raum*.<http://blog.hslu.ch/outofhomedisplays/digital-out-of-home-media/>, (20.05.2014, 14:24)
7. Knoblauch, H. [et al.] (Eds.). *Video Analysis: Methodology and Methods. Qualitative Audiovisual Data Analysis in Sociology*. Frankfurt am Main [i.a.]: Lang, 2012.
8. Löw, M. *Raumsoziologie*. Frankfurt a.M.:Suhrkamp, 2001.
9. McQuire, S. *Pedestrians and screens: Large video screens as a site for transnational cultural exchange*. 2011.  
<http://spatialaesthetics.unimelb.edu.au/projects/large-screens-and-the-transnational-public-sphere/project-blog/post/passanten-und-projektionen-2011/> (17.09.2013, 17:41)
10. McQuire, S. [et al.] (Eds.). *Urban Screens Reader*. Amsterdam: Institute of Network Cultures, 2009.
11. Michelis, D. *Interaktive Großbildschirme im öffentlichen Raum - Eine motivationstheoretische Analyse intrinsisch motivierender Gestaltungselemente*. Dissertation der Universität St. Gallen, Hochschule für Wirtschafts-, Rechts- und Sozialwissenschaften (HSG) zur Erlangung der Würde eines Doktors der Wirtschaftswissenschaften, 2009.
12. Struppek, M. *The social potential of Urban Screens*. In: *Visual Communication*, June 2006 5: pp. 73-188. London [i.a.]: SAGE, 2006.  
Publications.<http://vcj.sagepub.com/content/5/2/173.full.pdf+html> (06.08.2013, 10:35)
13. Townsend, A. *Digitally Mediated Urban Space: New Lessons for Design*. 2004.  
<http://urban.blogs.com/research/townsend.pdf> (27.05.2014, 15:42)
14. Vande Moere, A., Wouters, N. *The role of context in media architecture*. 2012.  
<http://infoscape.org/publications/perdis12.pdf> (24.06.2014, 16:28)
15. Yue, A. *Urban Screens, Spatial Regeneration and Cultural Citizenship: The Embodied Interaction of Cultural Participation*. In: McQuire, Scott [et al.] (Eds.) (2009). *Urban Screens Reader*. Amsterdam: Institute of Network Cultures 261-278.

# Digital Infrastructures and Categories of Spatialization

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## ABSTRACT

This doctoral research deals with the following question: how can we conceptualize and categorize media architectures, in regard to the different kinds of relationship between the immaterial layer of data and the inevitable physical condition of architecture? In order to answer the question, I bring the notion of digital infrastructure as a pivotal concept of reference. Digital infrastructure in the research is essentially regarded as an underlying medium of architecture that has potential to communicate diverse ideas and experiences, rather than the technical or political organization of things. I assume that the phenomena produced by digital infrastructures can be most adequately grasped if it is analyzed as *spatialization* than space itself. The design context of this research focuses on integrating the cognitive level of spatialization and the representational level of physical articulation. The goal is to theorize and differentiate the spatial quality of media architectures. Accordingly, by analyzing 8~12 existing projects in three comparative groups, I will extract different categories of spatialization.

## Author Keywords

Digital infrastructure, media architecture, spatialization

## ACM Classification Keywords

H5.2. Information interfaces and presentation.

## INTRODUCTION

A growing interest has been devoted to how to organize the deeper conceptual and perceptual structure of architecture using ICT [13]. As Saggio outlines, the interactivity incorporated within the physical nature of buildings means working at a new level of architectural complexity, as it is grounded on a profound structuring relationship of information [4]. The point of departure of the research lies in the fact that the means by which the abstract structure actually communicates through the inevitable physical

condition of architecture *differs* in various architectural projects [4]. The relationship between the *soft space* of data and the *hard space* that provides a framework to animate interactions [11] is diverse. In other words, it is not essential that the immaterial have an organically, or naturally, coupled relationship with the material organization of the building. In order to examine a landscape of different relationships, a comprehensive study is needed on a theoretical level.

Therefore I define my research question as follows: How can we conceptualize and categorize media architectures with regard to the different degrees of relationship between the immaterial and the physical? In answering the question, two methodological approaches are proposed as hypotheses: First, the notion of *digital infrastructure* can be used as a pivotal concept to address the question; Second, the phenomenon produced by digital infrastructure can be most adequately grasped if it is analyzed as *spatialization* rather than as space itself. The first hypothesis proactively deals with the structuring relationship that I have highlighted. The second hypothesis supports and merges a couple of existing views on digital infrastructures and neighboring territories, such as Easterling's *infinite* approach [7,8] and Oosterhuis' data-driven methodology [16].

Accordingly, I will extract several categories of spatialization based on the theoretical foundation of digital infrastructures. By doing so, the goal is to provide a deeper understanding on the recent phenomena as well as a vocabulary of how architects and designers can think and cultivate spatialization with digital technologies.

## PREVIOUS WORK

There are several important communities of research and practice around the topic. The names are diverse but rather fuzzily applied: *interactive architecture* [10], *responsive environments* [5], *performative*, *adaptive*, or *intelligent architecture*. An interdisciplinary approach is commonly shared between HCI, computer science, mechanical engineering, virtual reality, architectural design, etc. I particularly observe three groups of interest concerning the strategies of spatialization.

First of all, some prominent bodies of work in *responsive architectures* demonstrate a rather explicitly couple relationship between the dynamic system and the physical

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components of architecture. The link goes back to early cybernetics during the early 1960s with the notion of systematic feedback, and then the term *responsive architecture* given by Nicholas Negroponte in the 1970s [15]. The main idea was to embody computing power into built spaces and structures generally from a functional level. During the latest decades, numerous architects and designers like Daan Roosegaarde [19], Philip Beesley [2], Jason Bruges [3], and Electroland [9] have experimented with more narrative and immediate bonds between the visible body of architecture and the system.

Secondly, namely *evolutionary architectures* can be illuminated separately. In a broad sense, one can regard them as responsive architectures. However, as some examples distinctively show a loosely defined, evolving relationship between architecture and information, they differ from the way it becomes a lived space to us. For instance, in *Son-O-House* (NOX; 2002), the feedback of the architecture is not immediate and it only happens through time as a sonic memory scape of visitors. It means that the interaction is not direct, and it involves certain complex circularity. *Trans-port* (Oosterhuis; 2000) can dramatically change spatial configuration while using any data in the world as the source material. The idea of such architectures has a lot to do with Cedric Price's question posed in 1960s, "What if a building or a space could be constantly generated and regenerated?" [17]. The focus is not merely on the evolving and morphing aspect of space, but on the performativity, adaptability, and openness.

Third of all, while the previous two groups have the physical as the main reference for people to orientate, another group of works – tentatively labeled as *immaterial architectures* - can be viewed from a different angle. Architects such as Philippe Rahm define the invisible parameters of temperature and humidity to become the very basis of a new type of architecture [18]. *i-weather* (Rahm;2001) , for example, is downloadable, and it does not require any physical specification of an inhabitant's space. But it transforms any enclosed space into an artificially controlled one. Diller & Scofidio [6] plays with the invisible layer as well, designing the inner dynamic logic, which entirely depends on inhabitant's activity and psychological interplay. In this case, the building simply lends itself for minimal boundaries of interaction. While Banham sought alternative models to better understand the exact nature of what architecture performs rather than to think of architecture as a hard shell [1], immaterial architectures take one step further by carrying atmospheres from here and to there [22] with no pre-defined bodies of functioning.

### **SIGNIFICANCE AND INNOVATION**

This research aims to study in which possible manners the two fundamentally different spaces of the intangible and the sensible are related to each other. Hill argues that architecture, in general, can be conceived and perceived as

one that fuses the immaterial and the material [12]. This might not be essential to architecture, but it strongly applies to the recent architectures based on digital infrastructure. The vital interrelation has been widely recognized, however, theoretical investigations for a more detailed understanding are still lacking.

The importance of the problem is in the fact that the *experience* of media architectures significantly depends on how and what kind of relations are created among the contemporary abundance of data and resources in the world. Digital infrastructure is an abstract organizational model – essentially a network - in its broadest sense concerned only with the structure of relationships between things [20]. To my best observation in the field, what really counts is often the following conditions than the natural context of things: from where, from how far or close, and what kind of data is involved, whether there is a direct interaction between people and data, what sort of channels and protocols are used to embed information, and how abstractly the relations are presented. Yet, it is also clear that one cannot underestimate the physical dimension of materiality, accessibility, visibility, and effect of the space. Both sides are in fact equally important shaping the way in which a space and architecture is communicated. A phenomenon produced by digital infrastructure is therefore characterized by such a multi-dimensional and artificial embodiment, which delivers any distinctive spatial quality.

In order to *differentiate* such qualities, the research suggests approaching the immanent structure as an active *medium* through which we vividly experience the world, than a static composition of hierarchy. Technically speaking, one can hardly classify existing projects in a meaningful way, as the technological setup itself is oftentimes very similar and it only covers a part of how spatialization occurs. This research pays particular attention from a design perspective, investigating the underlying medium that has potential to communicate diverse ideas and experiences. Such is in high contrast with modern physical infrastructures, where the hierarchies of distribution and access have been the main intent in conceptualization of an infrastructure, which essentially anonymizes human desire [14]. Digital infrastructures can be defined not from what it is meant to function, but from what kind of relations can be embodied to support complex human desires into space.

Thus my contribution to the field of knowledge will concentrate on shedding new light on digital infrastructures from such a new approach by re-examining actual projects. The *infinitive* aspect of infrastructure – such as action, activity, and time – rather than the *nominative* [7] comes to play a three-dimensional role to integrate the cognitive level of *spatialization* and the representation level of physical articulation.

### **METHODOLOGY**

This research consists of two parts, according to the main question: how can we 1) conceptualize, and 2) categorize

media architectures, with regard to the different kinds of relationship between the immaterial and the physical? The first part of how to *conceptualize* draws a theoretical framework based on literature review, and the second part of how to *categorize* is designed for case study analysis. The aforementioned two hypotheses are crystallized throughout the first theoretical part, and then will be tested over existing architectural projects.

The first part has again four sections. Section one analyses the historical development of modern infrastructures and outlines a brief genealogy of digital infrastructures, with a particular focus on the structuring relationship between information and build environment. Section two studies and merges the integrative approaches that are already available towards the manifold phenomena. The infinitive nature of digital infrastructures – understood rather as spatialization than space - is scrutinized here. Section three extracts conceptual markers and indexes to solidify a relevant methodological approach from the previous two sections. The conceptual markers are not just keywords, but principal concepts to comprehend and anatomize extensive instances of the phenomena. The concepts include, for example, action, activity, mode, operation, process, protocol, embodiment, etc. Section four reviews related works in the field through the newly established points of references.

The second part of case study analysis is based on a three-phase examination method:

Phase one is Selection of Projects. On the scope of architectural scale, I select 3 ~ 4 projects for each of the three groups that I have bundled earlier: responsive architectures, evolutionary architectures, and immaterial architectures. The following criteria of selection are commonly considered: First, projects are restricted to the ones that are designed, from the outset, by treating digital infrastructure as the integral part of architecture. Thus, I exclude the cases in which digital infrastructure is applied only from an add-on level as well as the cases where the main purpose of project is on re-designing existing architecture. Second, I exclude projects that are based purely on cyberspace, where inhabiting it physically at a human scale is not possible. Third, the criteria also require that the selected projects in each group be differentiated in terms of material organization and expression. This is to be done rather intuitively to my best knowledge.

Phase two is Individual Case Study Analysis. In so doing, I experimentally adapt a notational technique from Bernard Tschumi, as shown in *The Manhattan Transcripts* (1976-1981). The method has relevance in the sense that it transcribes an architectural interpretation of reality in a sequential and manifold way, including what is not visible in the discontinuous factors of space [21]. I intend to make the relations *visible* by borrowing the method, how digital infrastructure is articulated and how it enables spatialization in each case study project. The conceptual markers listed

from the first part should be closely involved as forms of analysis.

The third phase is Comparative Analysis and Extraction of Categories. This section should provide crisscross comparisons of transcriptions, between the three different case study groups as well as within the group. It should bring the spectrum of relationships into relief, by contrasting which concepts and indexes play a distinctive role in shaping the experience of the space. For instance, the major activity happening in two comparable projects can be very similar, but how the connections between the two dimensions is made can be completely dissimilar. The point of analysis is to find out in detail how each comes to characterize.

My research is currently on the second part of the actual case study analysis and synthesis, leaving about one year of time. As preliminary experiments, three different sets of categories have been extracted, out of 30 ~ 50 existing projects. Each set of categories was put into a form of an atlas, and presented at interdisciplinary academic conferences. Nevertheless the categories were extracted most of the time in a narrative and intuitive manner. The examples of prior categories are: pets, connoisseurs, oracles, ghosts, bubbles; infra-natural, infra-ordinary, infra-speculative; Scheherazade, Dracula, Orlando, Morel's Machine, The Last Leaf, God, etc. These categories have partially answered my research question in the most easily comprehensible terms, helping to refine the question as well. However, the dissertation should reach a more systematic and scientific level of categorizing.

## QUESTIONS AND ISSUES

Main question at stake is how to name and describe the categories. The critical outcome of the research will be a list of relational categories of spatialization. However, as soon as I give them names, there is a risk falling back to the nominative lens of things. Be it a noun or an adjective, it is crucial that the method of categorizing is reasonable, and at the same time, abstract enough, in order not to impose specific order, hierarchy, and functions. This is why I had adopted literary characters for example, in such a way that each category embodies certain qualities with a powerful vividness and differentiation. Yet, an obstacle is in the subjectivity of abstraction and perception. A key challenge is in finding a relevant balance between a modernistic habit of our mind [7] - and the subjectivism that should be achieved in a non-arbitrary manner. In this sense, there is a lack of methodological and philosophical probe in categorizing.

Another issue is the general appropriateness of the methods especially in the second part of case study analysis.

## BIO

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#### REFERENCES

- [1] Banham, R. *Architecture of the Well-Tempered Environment*. University Of Chicago Press, USA, 1984.
- [2] Beesley, P. <http://www.philipbeesleyarchitect.com>
- [3] Bruges, J. <http://www.jasonbruges.com>
- [4] Bullivant, L. *4dSPACE: Interactive Architecture (Architectural Design)*. Academy Press, London, 2005.
- [5] Bullivant, L. *Responsive Environments: Architecture, Art and Design*. V&A, London, 2006.
- [6] Diller, E. and Scofidio, R. *Blur: The making of nothing*. Ed. Diana Murphy. Harry N. Abrams, 2002.
- [7] Easterling, K. *Action is the Form*. Sentient City: ubiquitous computing, architecture, and the future of urban space, MIT press, 2011.
- [8] Easterling, K. *An Internet of Things*. e-flux Journal, Issue 31, 2012.
- [9] Electroland, <http://www.electroland.net>
- [10] Fox, M. and Kemp M. *Interactive Architecture*. Princeton Architectural Press, London, 2009.
- [11] Haque, U. *Architecture, interaction, systems*. AU: Arquiteutura & Urbanismo 147 (2006), 68-71.
- [12] Hill, J. *Immaterial Architecture*. Routledge, London, 2006.
- [13] Lorenzo-Eiroa, P. and Sprecher, A. *Architecture in Formation: On the Nature of Information in Digital Architecture*. Routledge, New York, 2013.
- [14] Lloyd, S. and Stoll, K. *Infrastructure as Architecture*. Jovis, USA, 2011.
- [15] Negroponte, N. *Soft architecture machines*. MIT press, USA, 1975.
- [16] Oosterhuis, K. *Hyperbodies*. Birkhauser, Basel, 2003.
- [17] Price, C. and Littlewood, J. *The fun palace*. The Drama Review: TDR 12.3, 1968.
- [18] Rahm, P. *Meteorological Architecture*. Architectural Design 79.3 (2009): 30-41.
- [19] Roosegaard, D. <https://www.studioroosegaard.net>
- [20] Tierney, T. and Burke, A. *Network Practices*. Princeton Architectural Press, New York, 2007.
- [21] Tschumi, B. *The Manhattan Transcripts*. Wiley, USA, 1994.
- [22] van't Hof, C., Daemen, F. and van Est, R. *Check In Check Out: The Public Space as an Internet of Things*. NAI Publishers, 2011.

# Designing Interactive Media Architecture

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## ABSTRACT

Public digital displays became an indispensable part of the built environment. Increasingly attached onto existing building surfaces, a large number of these displays turn buildings into 3-dimensional media facades. Whereas public digital displays placed on street level are by now expected to be interactive and interactions with them are well researched, large-scale media facades are mostly showing active visual content. Interactive systems that allow citizens to engage with media facades are still rare. Consequently this PhD research asks what it takes to design interactive systems that allow human participation with large-scale urban screens. Based on a review of existing interactive urban screens and media façades followed by two design based case studies - conducted by the author - we propose a framework for the design of Media Architectural Interfaces (MAIs). The contribution of this research might help communities, stakeholders and designers to collaboratively develop interactive media architecture to enrich urban life.

## Author Keywords

Media Architectural Interfaces; media architecture; media facades; interactive systems; urban computing; mediated urban space;

## ACM Classification Keywords

H.5 [Information interfaces and presentation].

## INTRODUCTION

Within the construction and support of social behaviours the built environment plays a key role. It is well understood that architectural spatial configuration gives rise to movement and encounter patterns, which directly influence social life [9]. In the mid-1990s, Mitchell [13] predicted that future computer technologies would affect most of the built environment to the extent that buildings will turn into computer interfaces. The urban environment today can be considered as a system that integrates architecture and

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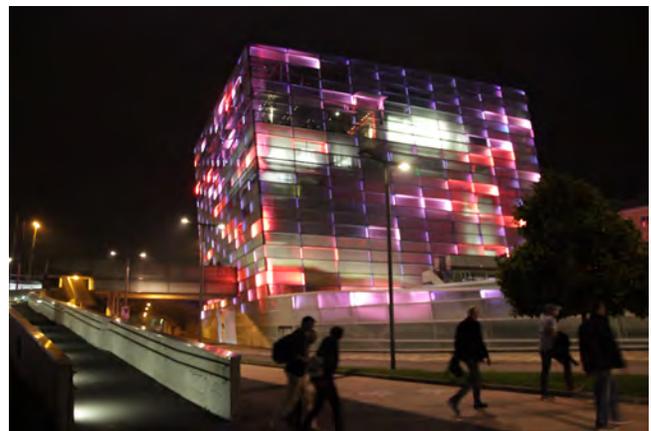
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ubiquitous computing technologies [6].

For a long time a facade was considered as a social interface that connects the bourgeoisie (private space) with the surrounding city (public space) [15]. In this respect with the evermore digital augmentation of buildings through large electronical displays, there is a high potential of creating a built environment of “decorated sheds” [19] rather than a city of interfaces [20]. In other words the challenge here is that when designing interactive media facades there is a need to a holistic architectural approach considering the inside program of a building as well as the surrounding space equally.

But how does one go about designing for an interaction with such a large public screen? Part of the challenge is that there are currently only a few of these kinds of large displays in existence and so there is much to learn from each attempt to deploy an interactive installation.

This research aims to explore how we might approach interactive media facades to 1) design interactions that let the general public take part in content creation, and 2) to what extent these facades might influence the socio-spatial configurations of movement flows, occupation and encounters in the closer as well as wider urban surrounding.



**Figure 1: Case study 2: Low-resolution Ars Electronica façade in Linz displaying SCSD visualization in 2014.**

We will introduce an exemplary system of a media architectural interface (MAIs), which describes the design space of citizens engaging with dynamic content on media façades through shared and tangible artefacts on street level. We apply research through design methods and report

on the technical set up of two field studies, in which we deployed a novel tangible user interface (TUI), called the Smart Citizen Sentiment Dashboard (SCSD) during two media art festival in Sao Paulo [1] and Linz (see Fig. 1) in very different socio-spatial settings.

Early findings suggest that MAIs have an impact on the socio-spatial configuration of urban space. However they are strongly dependent on the spatial context. We contribute to the notion of the contemporary city by helping to understand how design and deployment of novel interfaces may disrupt urban flows and stimulates social interactions towards liveable future cities.

### PREVIOUS WORK

Meanwhile, digital media technology has been weaved into buildings' surfaces. For instance, visually animated surfaces, such as dynamic light facades, have been equipped with numerous addressable light-emitting diodes (LED). The FIESP building in Sao Paulo, which will be discussed in detail in the case study, is fitted with such a façade (see Fig. 2). Only recently the iconic 1970s building on Avenida Paulista was extended by a large programmable pixel matrix, which displays animated visual patterns. From a technical perspective there are other types of artificial light based media facades as well, such as projections onto facades, back projections through glazed facades, or three dimensional media facades (i.e. voxel facades) [8].



**Figure 2: Case study 1: High-resolution FIESP façade in Sao Paulo displaying SCSD visualization in 2013.**

Others consider the potential of media architecture for media art (e.g. Lozano-Hemmer's work [12] or the Connecting Cities network [5]), community and culture (e.g. BlinkenLights [3]) or for community purposes on a neighborhood level (e.g. Screens in the Wild [16]).

Despite the rapid development and deployment of screen technologies in urban spaces and the design of media architecture there has been very little research concerned with understanding this interactivity. The next section will review the mediated urban interactions. With the advent of ubiquitous computing [21] and its application in urban space (i.e. urban computing [11]), novel technologies

support 'tangible interactions' [10]. These technologies provide new opportunities to enable technology-mediated encounters of people in urban space [17]. 'Tangible User Interfaces' (TUIs) "give physical form to digital information, employing physical artifacts both as representations and controls for computational media" [18]. 'Tangible interactions' evolved from research in Tangible User Interfaces (TUIs) and rely on "embodied interaction, tangible manipulation, physical representation of data, and embeddedness in real space" and "give computational resources and data material form" [10]. The purpose is to surround our everyday activities with computing. Having this in mind, various projects have explored, how users could connect to media facades. Mostly through mobile interfaces such as mobile phones or tablets [2].

In HCI research, Brignull and Rogers [4] have described a framework for understanding the movement flow of people around public displays. Activity spaces were identified to categorize human behavior into peripheral, focal and direct awareness. At the same time, technology-mediated phenomena were acknowledged, such as the 'honey pot' effect [4] or 'display blindness' [14].

A framework for urban HCI has grown from the SMSlinshtot project [7]. The SMSlinshtot is a shared TUI that lets participants shoot individual messages onto a media façade. This set up was studied thoroughly for the purpose of exploring the spatial zoning of people's actions in relation to the spatial layout during installation. As a result Fischer et al identified amongst others zones such as: 'Display spaces' in which one can see the media screen, 'Interaction spaces' in which participants directly interact with the installation or 'comfort spaces' that allow passers-by to watch the scene without being dragged into any actions.



**Figure 3: The Mediator – situated TUI – developed for Ars Electronica Festival 2014.**

We contribute to this body of research by exploring specifically the relation between passers-by and users, a tangible interface and a media façade in a given spatial layout through conducting two case studies. In the next section we introduce the notion of MAIs, which aims to clarify the aforementioned relationship.

### MEDIA ARCHITECTURAL INTERFACES (MAI)

We consider MAIs as the synthesis of situated ‘tangible user interfaces’ (TUIs) connected to media façades in urban space. These TUIs are generally located on street level, whereas media facades are mostly vertical surfaces attached to buildings. At the same time MAIs act as Attractors, which means they potentially entice people to step out of their routine and perceive urban space differently or act differently within it. In this research attractors are studied as a combination of 1) a Mediator (see Fig. 2) (i.e. situated TUI) and 2) a Carrier (i.e. media facade). Further, the triangular relationship between the Spatial Layout, the Attractor (i.e. Mediator and Carrier) and Movement (i.e. human-computer interaction, social interaction and social encounters) are interdependent key properties of what we define in this paper as socio-spatial configurations.

To explore the relevance of the notion of MAIs, we report on two case studies, which describe MAIs consisting of a Mediator and a Carrier in two different spatial settings.

### METHODOLOGY

In the following this PhD research suggests a methodology, which brings together empirical architectural research and interaction design research. It is driven by a research through design approach using qualitative and quantitative methods.

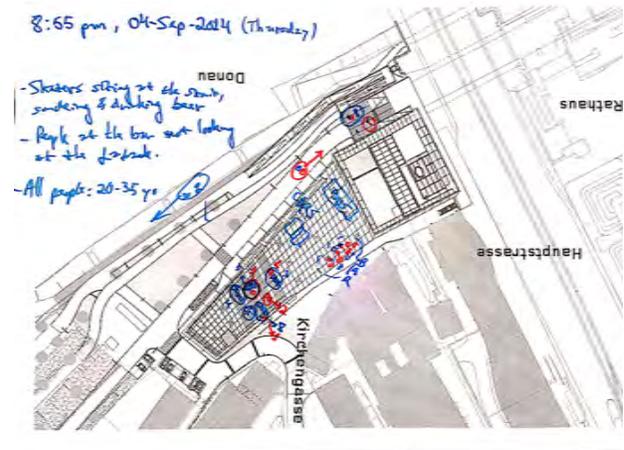
The methodology will focus on four goals in order to address the research:

- Design and deployment of an exemplary MAI.
- Analysing full-body interactions of participants interacting with the MAI.
- Identifying participants’ behaviour when bridging the focal awareness space at the TUI and the distant awareness space around the MAI.
- Observing and analysing of pedestrian flows, encounters and social interactions before and during the deployment of the MAI.

### QUESTIONS AND ISSUES

The case studies we will take into considerations for this research have been designed by the author and co-produced for two media art festivals. As these projects take a lot of resources to be deployed, and the nature of media art festivals is highly dynamic, rigid research is sometimes cumbersome to conduct at the same time. The challenge here is to what extent can we generalize our findings to validate the research questions.

On the other hand interdisciplinary research in between the fields of architecture and HCI seems to meet the demands of each field not sufficiently.



**Figure 4: Snapshot of pedestrian flows, encounters and social interactions during the deployment of the MAI at Ars Electronica (courtesy of Luke Hespanhol).**

### BIO

The author is an architect and maker, an interaction designer and researcher aiming to combine architecture with human-computer interaction. His work focuses on technology-mediated interactions in urban spaces, which support citizens and communities to engage with social challenges in their city. His recent project aims to design, deploy and research media architectural interfaces that are built on tangible user interfaces as mediators between citizens and interactive media facades. As part of the EU funded “Connecting Cities” network and in collaboration with Nina Valkanova, Moritz has been invited to produce an installation for the Ars Electronica Festival in September 2014 later this year. Currently Moritz is a PhD candidate at UCL The Bartlett in London. Previously he was employed as research associate in the EPSRC funded ‘Screens in the Wild’ project at UCL The Bartlett, which explored networked urban screens for empowering communities. The author has been working as an architect in residential and exhibition projects in Berlin. In London he has been working in different practices as a design consultant for major retail companies. Prior to that he gained a MSc in Adaptive Architecture and Computation from UCL The Bartlett in 2011 and received a masters in architecture from Technical University of Berlin in 2009. Moritz started his career working as a cabinetmaker in the south of Germany.

### REFERENCES

- [1] Behrens, M., Valkanova, N., Brumby, D., Fatah, A. 2014. Smart Citizen Sentiment Dashboard: A Case Study Into Media Architectural Interfaces. *PerDis '14*, June 03 - 04 2014, Copenhagen, Denmark.
- [2] Boring, S., et al. 2011. Multi-user interaction on media facades through live video on mobile devices. *Proceedings of the 2011 Annual Conference on Human Factors in Computing Systems - CHI '11*. DOI= <http://dx.doi.org/10.1145/1978942.1979342>.

- [3] Blinkenlights project. 2001. <http://blinkenlights.net/blinkenlights> [accessed 25.04.2014]
- [4] Brignull, H. et al, 2003. Enticing People to Interact with Large Public Displays in Public Spaces. In: *Proceedings of INTERACT'03* (Zuerich, Switzerland, Sep. 2003), pp. 17-24.
- [5] Connecting Cities Network. <http://www.connectingcities.net/projects>
- [6] Fatah gen. Schieck, A., 2006. Towards an integrated architectural media space, First Monday, Special Issue #4: Urban Screens: Discovering the potential of outdoor screens for urban society.
- [7] Fischer, P.T., et al. 2012. Urban HCI: Spatial Aspects in the Design of Shared Encounters for Media Facades. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 307–316. CHI '12. DOI= <http://dx.doi.org/10.1145/2207676.2207719> .
- [8] Haeusler, H., 2009. Media Facades: History, Technology, Content. AVEdition, Ludwigsburg.
- [9] Hillier, B., Hanson, J. 1984. *The Social Logic of Space*. Vol. 2. Cambridge University Press Cambridge.
- [10] Hornecker, E., Buur, J. 2006. Getting a Grip on Tangible Interaction: A Framework on Physical Space and Social Interaction. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 437–446. New York, USA. DOI= <http://dx.doi.org/10.1145/1124772.1124838> .
- [11] Kindberg, T., et al. 2007. Guest Editors' Introduction: Urban Computing. In *IEEE Pervasive Computing* 6, no. 3: 18–20. DOI= <http://dx.doi.org/10.1109/MPRV.2007.57> .
- [12] Lozano-Hemmer, R. 2010. People on people. In [http://www.lozano-hemmer.com/people\\_on\\_people.php](http://www.lozano-hemmer.com/people_on_people.php) [accessed 25.04.2014].
- [13] Mitchell, W. J. 1996. *City of Bits: Space, Place, and the Infobahn: Space, Place and Infobahn*. New ed. MIT Press.
- [14] Müller, J., et al. 2009. Display blindness: The effect of expectations on attention towards digital signage. In *Pervasive Computing* . Springer Berlin Heidelberg. DOI= [http://dx.doi.org/10.1007/978-3-642-01516-8\\_1](http://dx.doi.org/10.1007/978-3-642-01516-8_1) .
- [15] Neumeyer, F., 2002. *Quellentexte zur Architekturtheorie: Bauen beim Wort genommen*. Prestel, München;
- [16] 'Screens in the Wild' research project, UCL The Bartlett. <http://screensinthewild.org/> [accessed 25.04.2014]
- [17] Struppek, M. 2006. The Social Potential of Urban Screens. *Visual Communication* 5, no. 2: 173.
- [18] Ullmer, B., Ishii, H. 2000. Emerging Frameworks for Tangible User Interfaces. *IBM Systems Journal* 39, no. 3.4: 915–931. DOI= <http://dx.doi.org/10.1147/sj.393.0915> .
- [19] Venturi, 1977. *Learning from Las Vegas: The Forgotten Symbolism of Architectural Form*, Revised edition. ed. MIT Press.
- [20] Waal, M. de, 2014. *City as Interface: How New Media Are Changing the City*. NAI010 Publisher.
- [21] Weiser, M. 1999. The Computer for the 21. Century. *SIGMOBILE Mob. Comput. Commun. Rev.* 3, no. 3: 3–11. DOI= <http://dx.doi.org/10.1145/329124.329126> .

# Adaptive Architecture

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## ABSTRACT

Until recently, architectural practice primarily dealt with forms of architecture that had a final static state. In a potential adaptive architectural paradigm, the design challenges will continuously be present and addressable during the lifespan of the physical building, and possibly even beyond. Importantly also, an adaptive architecture will change the way in which architects design and inhabitants engage with architectural space. In order to support this advancement in architectural practice, I suggest the development of a design literacy, which is specifically tailored to accommodate an adaptive architectural design paradigm. This paper presents an approach to an explorative framework for investigating experiential qualities in architecture with a particular notion of adaptivity that is framed by temporality, memory, learning and emergence.

## Author Keywords

Adaptive architecture, experience, performance, architecture, design, responsive spaces, method, theory

## ACM Classification Keywords

J.5 Arts and Humanities: Architecture, performing arts (e.g. dance, music)

## INTRODUCTION

With information processing being increasingly integrated into everyday objects and activities, it is of importance to discuss the concepts and design of our physical surroundings in relation to this development. This discussion is particularly crucial in the specific practice of designing and planning these surroundings: architecture. Recent developments of computation in architecture are on the verge of impacting built design in ways we have never before experienced. If we wish not only to sustain but also to enhance quality in the built environment then we need to address the important technological changes that

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architecture is currently undergoing.

In contemporary architectural practice, advancements in computation have motivated a concept of an adaptive architecture. We see a shift from a static paradigm to a permanent dynamic paradigm of persistent transformation that will have significant impacts on the architectural design practice as well as our environment and our experiences of those environments. As computation continues to increase in complexity and functionality, we are not only witnessing an impact on built architecture but also on developments of new design paradigms [2].

In this Ph.D. project I seek to develop, through exploratory research, a certain methodology and literacy for designing with adaptive architecture. I will do this through full scale prototype design processes and theoretical development of critical concepts and contexts.

## PREVIOUS WORK

Adaptivity in an architectural discourse is a concept currently under development. What is understood by the term ‘adaptive’ varies across different architectural communities, as well as from scholar to scholar.

The idea of an adaptive architecture spans from considerations on moveable, flexible or adaptable structures over reactive, responsive and interactive structures to built-in intelligence or spaces containing a capacity to construct new outputs on the fly.

Architecture that is flexible and contains some form of change over time is however not a new concept. Already five decades ago 1954 Gropius framed an idea of an architecture, which embodies “*the flow of life*” as well as touches upon the notion of the unpredictable and uncertain through achieving a “*flexibility to absorb dynamic features*” [7]. Likewise Zuk & Clarke state “*our present task is to unfreeze architecture, to make it a fluid, vibrating backdrop for the varied and constantly changing modes of life. An expanding, contracting, pulsating, changing architecture would reflect life as it is today and therefore be part of it.*” [33].

Several scholars extend the notion of change in relation to the flexible, fluid and dynamic and discuss a variation of implications for architecture. These developments may even “*challenge the very nature of what architecture really is*” as it is an architecture of agility, unpredictability and undercertainty [13, 27]. It can be pre-programmed to self-

destruct, it can grow or transform itself or adopt more than one geometrical form of stasis [6]. The main difference from earlier forms of flexibility is the inclusion of interaction where users don't necessarily have to manipulate the physical geometry manually [6, 15, 12]. Further Fox & Kemp distinguishes between adaptability and interactive adaptability, where interactive adaptability involves an environmental sensitivity (incl. the 'user'). In "interactive" architecture, the interaction is circular and systems "interact" instead of just "react." They define adaptability as *"the ability of space to be flexible enough to accommodate changing demands on a system"*. This ability of accommodating changing demands Sterk [29] unfolds in a distinction between direct manipulation (deliberate control), automation (reflexive control), and hybridized models as forms of interaction between the users and the technologies behind responsive systems. For Sterk [29] *"the hybridized model can also be used to produce responses that have adjustable response criteria, achieving this by using occupant interactions to build contextual models of the ways in which users occupy and manipulate space."* As Usman Haque [10] emphasises, the goal is *"a model of interaction where an individual can directly adjust the way that a machine responds to him or her so that they can converge on a mutually agreeable nature of feedback: an architecture that learns from the inhabitant just as the inhabitant learns from the architecture."* And *"A truly interactive system is a 'multiple loop' system in which one enters into a 'conversation': a continual and constructive information exchange"*.

### SIGNIFICANCE AND INNOVATION

When we enter into the 'conversation of the truly interactive system that Haque [10] describes and if meaning in architecture is constructed as an encounter between architecture and the public [1] then the notion of adaptive architecture puts an emphasis on investigating and understanding these encounters because of their increase in complexity. With our architectural environment soon encompassing features never before experienced, it is necessary to critically explore, evaluate and discuss this development. This critical exploration is a prerequisite to foster the experiential qualities of our future built environment. The movement from static to adaptive may very well, for example, reveal new potentials with regard to energy efficiency, repurposing and smarter buildings.

In an upcoming adaptive architecture, which Theo Spyropoulos describes as a necessity; the future architecture professionals need tools, methods and understandings of this emerging type of adaptive architecture [28]. Further Kolarevic [11] states, "Change in architecture is far from being adequately addressed or explored theoretically, experimentally, or phenomenologically." Taking up this challenge I will briefly provide an outline of the current discourse of adaptive.

### CONCEPTUAL FRAMEWORK

Adaptive architectural space enters into a domain where active relationships and negotiations between space and inhabitant are integral to an architectural design practice. We therefore need to reassess how we can inform our design methods and practices, in ways that particularly support the characteristics of adaptivity.

Based on the understandings of adaptivity presented in the 'previous work' section', I propose a definition of *adaptivity*: It is an architecture that unfolds over time, contains memory and learning capacities and that has emergent potentials.

In the following I will highlight four of key characteristics that forms this particular notion of adaptivity. These characteristics are of specific relevance in relation to further positioning the notion of adaptivity as well as for forwarding an understanding of adaptivity. They form a framework for exploring and enquiring into adaptive spaces. Subsequently I will present 'experience' as the focal lens through which the relationships and negotiations between space and inhabitant can be explored.

#### Adaptivity

A. Temporality: In an adaptive spatial ecology a change in the environment changes the context of the spatial structure. If we want to understand how a spatial structure can maintain a reference to the environment, it becomes essential to address what happens across several instances of time. When the environmental reference is an active element in negotiating the spatial structure, there must be an exchange of information between the states of change.

B. Memory: For information on spatial change over time to be continuously accessible over time, in a relationship between a spatial structure and environment, we need a capacity to archive and retrieve the information. Adaptive spatial structures require accessible information storage to keep track on the changes it has undergone over time: I.e. its position, direction, light conditions, temperature or other parameters of interest. These parameters may be used in later stages of adaptation.

C. Learning: The more the occupants of architectural space engage with it in a specific (or advantageous) way, the more a specific trait ought to be reinforced or modified until another change in the environment renders the trait no longer meaningful (non-adaptive). Synthesizing information through means of learning, pose a potential strategy to obtain a flexibility to absorb and feed back some of these dynamic features.

D. Emergence: As we far from always can anticipate in which ways the occupants will engage with an adaptive spatial structure, a new area of opportunity unfolds. With spatial traits that are continuously reinforced or modified, we will likely experience outcomes that include uncertainty and unpredictability. A traditional linear design process is less useful for engaging with potential unforeseen patterns

and properties occurring over time. An attention to what emergence means in terms of design literacy then becomes important, if we want to actively address this new character of adaptive space.

### **Experience**

When we want to design with active relationships and negotiations, that are an integral part of an adaptive architecture, it becomes important to look at how we engage in and with adaptive spaces. In this engagement, our body and our experience are critical sources of information, as framed by several scholars within phenomenology, cognitive science, sensorimotor perception and perception & action [3, 5, 13, 20, 32]. Noë [16], in particular, provides a central argument on how our experience is connected to our sensorimotor skills and therefore frame the importance of full-scale experiments: *“The world makes itself available to the perceiver through physical movement and interaction...Perceptual experience acquires content thanks to our possession of bodily skills...what we perceive is determined by what we do...we enact our perceptual experience; we act it out”*

Thus spaces with four key characteristics of adaptivity and with a focal point in experience form a basis for conducting my investigations in relation to adaptive spaces.

### **METHODOLOGY**

As architectural design is highly dependent on and has always been driven from practice, the methodology deployed in this project will reflect this manner of working creatively as well as the idea of “thinking through the matter”. The explorations evolve around the production of full-scale prototypes.

The project will to a large extent be driven by practice-led experiential stagings and material evidence both used to push the design and withdraw qualitative data from observations and semi-structured interviews [4, 18, 22]. The explorative, iterative design strategy will run over extensive cycles of divergence and convergence covering planning strategies, structuring insights and developing prototypes [23].

Further, techniques from performance art, offer a method that can be used to explore the experience of spaces that change state over time. Specifically, performance art is a relevant platform since it is inherently a full-scale format. Further it presents three qualities that are relevant for investigating the experience of such spaces, namely; the human body, the environment in which the body is situated and rule-sets that can be used to explore the relationship between the human body and the environment [26]. The exploration of experiences of adaptive spaces can be structured around a triangulation of experiential positions. In this sense the foundation of experience is an on-going negotiation between a set of positions. We can define the roles of participants in a performance as *sourcers*,

*producers, performers and partakers* - also known as the performance quadialogue [9, 14, 25, 26,]

The structure of the performance quadialogue has been framed in relation to the experiential investigation of spatial environments by Søndergaards and Petersen [18]. Therefore, when we want to experientially explore adaptive spaces, we can set up a structure of experiential positions that stage rules of engagement in a prototype environment. We do this, as Schechner puts it, because it is our interest to *“investigate what the object does, how it interacts with other objects or beings, and how it relates to other objects and beings”* [24, p.30]

### **RESEARCH PLAN**

Progress: 1<sup>st</sup> year.



### **QUESTIONS AND ISSUES**

#### **Trans-disciplinarity**

Being situated in several research fields, bridging the gap between research traditions poses some challenges in terms of focus, methods and core theory. Any advice or experience in relation to related trans-disciplinary research is appreciated.

#### **Participation**

As I am involved in my research both as producer and participant, I face the question of participating actively in and therefore affecting my research data. Moving on from the ethnographic approach of the ‘fly on the wall’, scholars within ethnography are currently challenging the ‘fly on the wall’ paradigm, e.g. Sarah Pink’s “Sensory Ethnography” that involves active researcher participation[19]. Along those lines I seek to expand my horizon and strengthen my arguments.

#### **Experience**

The notion of experience in architecture is not new. Juhani Pallasmaa[17], Steen Eiler-Rasmussen [21] and Peter Zumthor [34] all make an effort in emphasizing the importance of experience in architecture . However, I find fewer accounts on *how* to actively *design with* experience in architecture, how experience influences the relationship between space and occupant and which ‘experiential design concepts’ are at stake. References, ideas and approaches from other research fields are very welcome.

## BIO

Cameline Bolbroe is a Ph.D. Fellow at the IT University of Copenhagen where she conducts explorative research in adaptive architecture. Her research explores the potentials of architectural design that support adaptivity in relation to human experience and design process artifacts. Of particular interest is the development of design methods and design thinking of experiential qualities in architectural design that shows the capability to modify to change in the environment and incorporate new parameters from the environment. Her research involves the making of full scale prototypes orchestrated as design development tools and/or adaptive experiential environments that explores these features. Cameline has a professional trans-disciplinary background within architectural design and computer science as well as she has run her own company for several years in the intersection of fine arts and architecture.

## REFERENCES

1. Allen, S. Practice: Architecture, Technique and Representation. New York: Routledge. (2008).
2. Alquist, S., & Menges, A. Computational DesignThinking. Chichester: John Wiley & Sons. (2011).
3. Ballard, D. H. Animate Vision. Artificial Intelligence 48, p. 57-86 (1991)
4. Beim, A., & Thomsen, M. R. (Eds.) (2012). The Role of Material Evidence in Architectural Research. Kunstakademiet Arkitektkskole Forlag.
5. Evans, G. The Varieties of Reference. Oxford: Oxford University Press. (1982)
6. Fox, M. & Kemp, M. Interactive Architecture. New York: Princeton Architectural Press (2009)
7. Forty, A. Words and Buildings: A Vocabulary of Modern Architecture. London: Thames & Hudson (2000)
8. Gibson, J. J. The Ecological Approach to Visual Perception. Hillsdale, NJ: Lawrence Erlbaum (1979)
9. Goffman, E. The Presentation of Self in Everyday Life. London: Penguin Books. (1959)
10. Haque, U. The Architectural Relevance of Gordon Pask, in Bullivant, L. (Ed.) 4DSocial: Interactive Design Environments, Architectural Design No 77. London: Wiley.
11. Kolarevic, B. Exploring Architecture of Change: ACADIA 09:Reform (2009)
12. Kronenburg, R. Flexible: Architecture That Responds to Change. Laurence King (2007)
13. Merleau-Ponty, M. The Phenomenology of Perception, London: Routledge (1962)
14. Meyerhold, Vsevolod. Meyerhold on Theatre. Trans. and ed. Edward Braun. New York: Hill & Wang. (1969)
15. Moloney, J. Designing Kinetics for Architectural Facades: State Change. New York: Routledge (2011)
16. Noë, A. Action in Perception. Cambridge: The MIT Press (2009)
17. Pallasma, J. The Eyes of The Skin. Architecture and the Senses. Chichester: John Wiley & Sons. (2012)
18. Petersen, K., Kristensen O. & Søndergaard, K. Experiencing LED lighting: new form and experiential qualities, emerging in lighting systems using LED. (2013) Retrieved from: <http://adaptive.itu.dk/wp-content/uploads/2013/09/Experiencing-LED-lighting.pdf>
19. Pink, S. Doing Sensory Ethnography. Sage Publications LTD (2009)
20. Ramachandran, V.S. and S. Blakeslee, Phantoms in the Brain. New York: William Morrow & Co. (1998)
21. Rasmussen, S. E. Experiencing Architecture. Cambridge: MIT Press. (1959)
22. Rubin, H. and Rubin, I. Qualitative Interviewing: The Art of Hearing Data, 2nd Ed. Sage.
23. Saffer, D. Designing for Interaction, 2nd Ed. Creating Innovation Application and Devices. New Riders (2010)
24. Schechner, R. Performance Studies – An Introduction 2nd. Edition. New York: Routledge. (2006)
25. Schechner, R. Performance Theory. London: Routledge. Revised Ed. (2003)
26. Schechner, R. & Schuman, M. Eds. Ritual, Play and Performance. New York: Seabury Press (1990)
27. Schnädelbach, H. Adaptive Architecture – A Conceptual Framework. (2010) In MediaCity: Interaction of Architecture, Media and Social Phenomena
28. Spyropoulos, T. London: SmartGeometry. (2013).
29. Sterk, T., Responsive Architecture: User-Centered Interactions Within the Hybridized Model of Control. In Games and Match II: On computer Games, Advanced Geometries and Digital Technologies. Rotterdam: Episode Publishers (2006)
30. Søndergaard, K. & Petersen, K., in The Role of Material Evidence in Architectural Research. (2011)
31. Terzidis, K. Algorithmic Architecture. Oxford: Architectural Press. (2006).
32. Varela, F.J., E. Thompson, and E. Rosch. The Embodied Mind. Cambridge, MA: The MIT Press (1991)
33. Zuk, W. & Clarke, R. Kinetic Architecture. Van Nostrand Reinhold. (1970)
34. Zumthor, P., Atmospheres: Architectural Environments - Surrounding Objects. Birkhäuser (2006)

# Cartography as embodiment process

Introduction to Em:toolkit for urban mapping and performance practices

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## **ABSTRACT**

In this essay I examine Em:toolkit, a system with which I aim to answer many of the questions I ask myself as an artists/performer and researcher about cartography as result of certain affects upon body perceptions and practices of space. The toolkit proposes a new methodological approach for urban mapping for performance, applying self-reflective practice and Action Research. The goal is to apply a mapping process, through a series of steps comprising observation, analysis, extraction and embodiment of data. The result is a body-action that functions as a map. At the moment, Em:Toolkit forms the basis for my Phd research, and provides me an important point of reference in a wide-ranging debate about the cartography, mapping process, representation, embodiment in the arts.

Keywords: critical cartography; performance; mapping; toolkits; action research; data embodiment; space; body; urban complexity;

## **Introduction.**

At a first stage, Em:toolkit's main framework was the need to create a system of composition for performance that could be shared with my collaborators along the creative process. In a second stage, it asserted as a tool to explore modalities of urban mapping process with audio-visual practices and was studied, developed and used by several artists and researchers. In this latest stage, I developed the toolkit, introducing some theoretical directions given by James Corner (1999) about cartography, in particular as process accumulation-disassembly-reassembly. In terms of methodology, I considered the typical Lewinian cycle process (common to all action research) in relation to the latest discussion and connections within complexity and Action Research (Phelps, Hase 2005). Add to this, at the practical level, I implemented some of the principles of the real-time composition for performance practice developed by the performance artist as Joao Fiadeiro. As results of this process of self-training and experiential-learning, I developed a new version of Em:toolkit. It enables users to observe, analyze, extract and embody data. The result is a body-action that functions as a map.

Therefore, the toolkit functions not only as performance practice tool for urban mapping, but rather as a sort of work ethic: a way of looking for different ways of mapping and representing the urban space. It also aims to open to various possibilities of cartography, data embodiment and mapping making.

## **Rethinking cartography as performative practice.**

From ancient maps of Ptolemy's to the Emotional Map of Christian Nold, or the last experiments of the SENSEable City Lab\_MIT and Google Earth, mapping and cartography, has been one of the main tools to understand and represent the complex relation with body and space (Harmon/Clemans, 2009). While in the traditional cartography, the process of mapping refers to specific techniques and concepts for representing data and information into maps related to places, the recent discussions around cartography, interdisciplinary and critical, in particular around urban studies, human geography, performance studies and art practice, has opened up new prospective and understanding about the practice of mapping.

Corner (2009), describe cartography as data collection process, in which the map is the display of the alternating between processes of accumulation, disassembly and reassembly of data. Critical Cartography as emergent field, propose to rethink about this processes as result of certain effects upon perceptions and practices of space (Crampton, JKrygier, 2006). More than just data, Critical Cartographers argue that, during the mapping process, fears, hopes, emotions and perceptions about places and people through mapping, and these dimensions are essential for fully understanding our relation to places (Caquard, Vaughan, Cartwright, 2006). Data-based mathematical models, Participatory GIS, walking practice, emotional cartography, map-art, social networks, are the tools to express understandings of cartography. I argue that those tools, have offered a new and fresh perspective of mapping, however often, even they claim the centrality of the body during the mapping process, for example during the practice of walking, the result of the translation, still related to traditional understanding of map as visual display (Dodge, Kitchin, Perkins, 2009). I am claiming that this modality is the main feature in contemporary cartography, and it still

related to visual and info-graphic culture. Therefore, Critical Cartographers (Corner, 1999; Thrift, 2000) argue that the experience of mapping is as much immaterial as it is physical, as much bound into time and relational connections as it is to traditional notions of enclosure and place. For Crang and Thrift (2000), the relation within body and space become a landscape of experience, dominated by the embodiment of subject and object. Space is an issue of perception, and body, the medium for perceiving it, and then the world (Merleau-Ponty, 1967). Physically, the body inhabits the space that it is. To be is to become a matter of corporal space. Thus, the space is part of the body. If space and body are blended in a continuum landscape of experience (Spuybroek, 2008), can the body be a tool to map, collect, read and translate data? Considering mapping as result of certain effects upon perceptions and practices of space, what type of informations the body are able to maintain from such experience? Can the body be simultaneously actor and observers of the mapping process, and how do we assimilate data from this interaction? How performance practices can be used to mediate between various fields of investigation, as cartography, geography, city and complexity?

#### Urban space, complexity and adaptive systems.

Central to the understanding of the mapping process, is to consider urban space as an articulated dense environment of 'events'. People, objects, streets, and their relations, constitute a complex urban texture, as system (Batty, 2011), in which bodies, as agents, interact, transform and move.

Bodies, navigating within and into space, experiencing the urban space by encountering 'events': I wait for the bus, I take the bus, I go to work, and so on, each of these are 'events'. Simply put, each of these are connected to each other as if they formed a linear timeline. Therefore, we could say, that an urban space 'functions', if it is able to preserve the linearity of this timeline. I argue that, in order to preserve the stability of it, the urban space, as system keeps a certain 'horizontal'. Any interruption of it, I argue, would generate a 'vertical'. This "vertical" is a moment, an unexpected 'event', that destabilizes system, the urban space. At this critical moment of instability (Batty, 2011), the system adapts itself to the given situation, re-establishing its 'horizontal' once again. This process of adaptation (Batty, 2011). I would describe it as 'diagonal'. In simple word, I propose to describe this process with a simple formula, which I create, as it follow:

$$\ln(-1)0 + \ln$$

With  $\ln$  (horizontal) the system is stable, it keep a certain linearity. If suddenly, any unexpected 'event', occurred, there is a -1 (vertical). This moment, bring the system into a kind of 'turbulence zone' in which create a period of instability. In this moment, the system moves to a critical point, described as 0 (diagonal) in which adapts

itself to the given situation, re-establishing  $\ln$  (horizontal)

This sort of tension between order and chaos, described as cyclical pattern, horizontal-vertical-diagonal, is the most common structure of any adaptive complex system (Bohm, Peat, 1987).

#### Action research as tool for understanding complexity.

Some of discussions and connections about complexity and Action Research (Phelps, Hase 2005), consider the cyclical patters of learning, as complex, adaptive and non-linear process. Phelps and Hase (2005), argue that working with non-linear research contexts is central to action research, because it relies to notion of energy input. In fact, the 'action' which is inherent in action research is an energy input which actively prompts a state of non-equilibrium as expressed in the following:

*"A good deal of research is post hoc and involves finding out what has happened rather than what is happening. There are obvious limitations in post hoc designs. Action research provides the opportunity to look at a phenomenon while it is evolving... and to fiddle with it as you test out hypotheses 'on the run'. It's a chance to look at the potentially myriad variables that might be coming into play as they occur (Hase, 2000, p.4).*

For Phelps and Hase, acknowledging complexity encourages to anticipate and welcome change and evolution, just as action research has done: *"We can look for the new opportunities that states of disequilibrium present to us for evolution (and perhaps revolution)"* (Gough, 1999, p.59). Drawing-upon it, we could argue that, there is a common perspective of looking at the cyclical pattern of "events", as we described as "horizontal-vertical-diagonal", in urban space, and the action research cyclical pattern loop of learning described by as Phelps and Hase (2005) as adaptive and non-linear system. In both, complexity is understood as change and adaptation stemming from the interaction, alignment and organization of agents (for example body, "events" or any occurred situations) into higher levels of complexity (Lee, 1997). As Phelps and Hase (2005) argue, the emergent global complex system behaviour involves the aggregate behaviour of individual agents. Thus, they continue, in action research, participants are encouraged to challenge their assumptions or schemas and to explore and challenge these schemas with other participants (agents). This process, in itself, is introducing 'noise' and actively promoting disequilibrium. Indeed, I argue that in the urban space, we could see that 'noise', as something generated from the constant and emergent occurred of unexpected 'events'. Drawing on Doolittle (2000), that see complexity as an opportunity, within the field of education, to adopt a new model or metaphor for learning, I claim that type of 'noise' should be consider as well an opportunity, and a central element the development of a mapping process. Therefore, in order to

create a mapping tool able to deal with the constant and alternating disequilibrium of 'events' – horizontal-vertical-diagonal, I argue that the mapping process should be cyclical, adaptive and actively promoting disequilibrium.

### **Mapping as adaptive embodiment process**

The relation between action research and complexity, has introduced a central element to understand the mapping process, the concept of 'noise' (Phelps/Hase, 2005). As we proposed, in urban space, it is generated from the constant and emergent occurred of unexpected 'events'. How the body do experience those 'events' in real-time happening in the urban space? As Crang and Thrift (2000) explained, the relation within body and space is a landscape of experience, and space is an issue of perception. The body, according to Merleau-Ponty, (1967) is the medium for perceiving it: space and body are blended in a continuum landscape of experience. If the experience of the unexpected 'events', emerges as result of certain affects upon body perceptions (Merleau-Ponty, 1967), I claim that the mapping process, of such experience, it should be consider as performative practice, bound into time and space. Considering the body, as much immaterial as it is physical (Crang/Thrift, 2000) and its adaptive and endless capacity of accumulation of immaterial and physical experiences, I argue that mapping process (Corner, 1999), should be circumscribed within and into the body. I propose to consider the body as the initial and ultimate tool of the mapping process. Drawing upon this, I propose a mapping process with the aim to:

- a) consider the body-actions as map, avoiding any visual and graphical outcome or representation;
- b) provide the opportunity to map urban space and its inner 'events' while they are evolving;
- d) include complexity as an opportunity to adopt a new model for mapping tool;
- c) rethink cartography as performative practice;
- d) use cyclical patterns of learning to map the emergent occurred of unexpected 'events'.

### **Proposal for adaptive tool for mapping urban space:**

In the following section, I will introduce the key principles of Em: toolkit. I designed the tool as combination of my personal mapping process modality and the cartography process – accumulation-disassembly-reassembly (Corner 2011). Add to this, I implemented some action research methodology, in particular those that deal with complexity, proposed by Phelps and Hase (2005). By applying this, the result is an adaptive, cyclical and performative urban mapping toolkit.

The general aim of Em:toolkit is to develop a particular state of awareness in those performers using it, prompting them to become more aware, to observe and interpret the

'events' that occur and happen in real-time in the urban space. The tool enables performers to reveal those 'events' that already exist in urban space, but that we are not fully aware of because they are at the periphery of our attention. I suggest that they are just waiting to be discovered and that therefore the work of the mapping process is to reveal them and activate what would otherwise be latent.

Therefore, the toolkit, aim to inspire performers, to engage 'the unknown', and actively to sense the 'noise' as something generated from the constant and emergent occurred of unexpected 'events'. Interacting with and in the space, the performer is constantly in the position of affecting and being affected. Indeed, mapping process, change and grow whenever situated and performed;

### **Em:toolkit – principles**

Drawing on the cartography process suggested by Corner (2009), accumulation-disassembly-reassembly, I propose to readdress for each of them, an equal step, **observation, analysis, extraction**, in which the users must embody. The result is body-action that functions as a map. The first and the third should refer to a beginning and final stage, the second should 'supports' the action. Within these three steps I aim to create a tool in which the performer is enable: first, to create the field, the setting of rules and the establishment of a system; second, to relate to the extraction, isolation of parts and data; and third, the plotting, the drawing-out, the setting-up of relationships of the parts.

In order to enrich and define the application and modalities of the toolkit, I implemented some of the principles of the real-time composition for performance developed by Joao Fiadeiro (2013). In particular, I looked at Fiadeiro's method procedural mode of 'positioning'. I found that this principles are similar are, in some ways similar, to action research patterns cycle (Phelps and Hase, 2005) and the cartography process accumulation-disassembly-reassembly (Corner, 1999).

In few words, Fiadeiro defines with three body-actions, or "positions", into space, the modality for performer generate an 'event' and open possibilities to other performers to interact with it. Fiadeiro propose a method of composition for performance in which performers act and deal with 'events' in real-time composition. One by one, each performer suggests "events" with an body-action. As an unexpected 'events', this activates the second action, in which has to be related to it. A third action would confirm the relations, with the first and the second action, generating a sort of performance narrative and compositional direction. Unlike the method proposed by Joao Fiadeiro, in which the practice takes place in a studio, as safe and controlled environment, I proposed to apply a similar process, directly into the urban space: complex environment, full of pre-existing and on-going 'events' (Spuybroek, 2008).

### Modalities and Application:

Starting from the theoretical frame proposed on by Corner (1999), Phelps and Hase (2005) and from the practical frame proposed by Joao Fiadeiro, on the beginning of September 2014, I conducted a three days workshop with group of 25 young performers from Bologna. The workshop, through the practice, aimed to define the operative mode. As we define, the mapping process, proposes three steps: **observation**, **analysis**, **extraction**. In the **observation**, performers define the location, the physical space in which they would operate. They create a boundary, with variable dimension and scale, in which they focus their interests, mapping process and action. With the **analysis**, performers circumscribe the 'event' and formulate an body-action, as an embodied data of the experience. The last step, the **extraction**, operate as execution and repetition of body-action. The three steps are cyclical and they are constantly activated by the performer whenever an "events" occurred. Performers, experiencing the emergent occurred of unexpected "events", have to adapt their body-actions to the given circumstances. The self-reflective mode and action research learning-patters (Smith, 2007) , the three steps proposed are cyclical. During the mapping process, they are Thus, as the outcome of each cycle, the user can embody the extracted data, into a body-action that functions as a map.



Em:toolkit – extraction mode. Danza Urbana Festival, Bologna

The mapping process starts in the urban space. The first step is the **observation mode**. While moving in the urban space, performers are waiting to be "caught" by an "event".

Suddenly, an 'event' occurred. It is an interruption of the established **horizontality**. The 'event' is unexpected and it produces a **vertical**, a 'turbulence' zone. It could be any 'situation' that affect the performer. For example it could be an object placed in the middle of the street, some clothes hanging, a car, an action etc. In this moment, the performer activates the **analysis** mode. The performer is not just a passive spectator. Unlike, as it is affected, immediately it opens several hypotheses of actions in respond to the 'event'. Those takes place in form of small "holograms" in its minds. In order to avoid any 'instinctive' action, the performer should hold, wait and analyzing the 'event' and answer to the following three questions:

- 1) what does this event has?
- 2) how can I make a relation with it?
- 3) where/when I should make my action?

In the moment, the performer, activate as self-reflective modality of learning. In this step, we not are looking for a simply description that answer the question what is it? Infact, we are not looking at the "is", but we are more interested in the "has". Answering to "what does it has?", the performer are looking for the property and possibility of the 'event'. It is exploring the affordance of the 'event'.

With the first question, the performer, make a list of property possibility of the 'event'. Answering to the second question, the performer, imagine a body-action related to it. Before to make the actual body-action, the performer answer the "where/when I should make my action?". Once, it is decided the performer make the action. This has in the meanwhile, "re-written" the 'event', as it were not visible or not in the centre of our attention. This a process of circumscription, defined as **diagonal**, is able to re-established the **horizontality**.

Once the action is executed, the performer proceeds to the **extraction mode**. The performer extract the body-action from the location has been performed, and it memorized it. As final step of mapping process, the extracted body-action, become unity of movement, in which it can be repeated. I argue that this unit is function as map.

Once the unity is extracted, the performer come back to the **observation mode**, waiting to be "caught" by another "event". When it happen, the performer reformulates the three questions what-how-where/when, and start again with a new cycle.

In short, performer moves in the urban space waiting to be "caught" by an "event". Suddenly an 'event' occurred. The performer are affected by a situation. It activates as self-reflective modality, asking itself the three question what-how-where/when, and then it make a body-action. The performer memorize it as unit of movement, and it can repeated it. The performer can start again new cycle of mapping process.

## Conclusion

Despite the first test, I conducted with group of 25 young performers from Bologna, Em:toolkit need to be developed. By introducing some directions given by James Corner (1999), Phelps, Hase (2005) and Joao Fiadeiro, this essay have introduced some of the principles of Em: toolkit and mapping process. Drawing from the major discussion on cartography, I proposed to look at the cartography process - accumulation-disassembly-reassembly (Corner 1999), as performative practice. Considering urban space as complex system, I proposed to look at action research methodologies, in particular those related with complexity (Phelps, Hase 2005), as methodological ground to for Em: toolkit. Add to this, I also implemented into my practice, some of the principles of the real-time composition method proposed by Joao Fiadeiro. As results of this combination, at the latest stage, Em:toolkit become an adaptive mapping tool, in which the outcome of such a process, is not a visual or graphical representation, but a body-action that functions as a map.

Regarding the further steps of my PhD, I will concentrate, on one hand to the development of the toolkit, on the other hand, I will setting-up three case studies, in which I will apply the method.

## Biography

Interdisciplinary artist, addresses his research paths on multiple domains both from theoretical and practical studies. His experience, gained as visual artist and performer, focuses on the body and its relationship with the city. In recent years he has developed several projects, exhibitions, performances in Europe, USA, Hong Kong, India and China. On the occasion of 13<sup>th</sup> Venice Biennale International Architecture Exhibition, he has opened the Hong Kong Pavilion with the performance Learning Curves. <http://progressivearchive.com/>

## References:

- Batty, Micheal. (2009). Complexity And Emergence In City Systems. *Malaysian Journal of Environmental Management* 10(1) (2009) :
- Batty, Micheal. (2008). Cities as complex systems: scaling, interactions, networks, dynamics and urban morphologies, 1–63.
- Caquard, Sébastien, Laurene Vaughan, and William Cartwright. (2011). *Mapping Environmental Issues in the City*. Springer.
- Corner, James. (1999). *The Agency of Mapping: Speculation, Critique and Invention*. In Mappings. Reaktion books.
- Crampton, J / Krygier, J. (2006). *An Introduction to Critical Cartography*, in ACME: An International E-Journal for Critical Geographies Vol. 4, No. 1 (pp. 11–33)
- Crang, Mike, and Nigel Thrift, eds. (2000). *Thinking Space*. London and New York: Routledge.
- David Bohm/F.David Peat. (1987). *Science, Order and Creativity*, with David Bohm, Routledge
- Doolittle, P. E. (2000) *Complex Constructivism: A Theoretical Model of Complexity and Cognition: Draft*. Available:<http://www.tandl.vt.edu/doolittle/research/complex1.html> [Retrieved, 09/2014].
- Lee, M. E. (1997) From enlightenment to chaos: Toward nonmodern social theory. In R. A. Eve & S.
- Gehm, Sabine (2007) *Knowledge in Motion: Perspectives of Artistic and Scientific Research in Dance*, Transcript-Verlag
- Gough, N. (1999) Understanding curriculum systems. In J. G. Henderson & K. R. Kesson (Eds.), *Understanding Democratic Curriculum Leadership* (pp. 47-69). New York: Teachers College Press.
- Harmon, K / Clemans, G. (2009). *The Map as Art: Contemporary Artists Explore Cartography*, Princeton Architectural Press.
- Martin Dodge, R. K. A. C. P. (2014). *The Map Reader*. John Wiley & Sons Press.
- Merleau-Ponty, Maurice. (1967). *The Structure of Behavior*. Beacon Press.
- Phelps, R & Hase, S (2002). 'Complexity and action research: exploring the theoretical and methodological connection', *Educational Action Research*, vol. 10, no. 3, pp. 507-524., ePublications@SCU. Published version available from: <http://dx.doi.org/10.1080/09650790200200198> [Retrieved, 09/2014].
- Smith, M. K. (1996; 2001, 2007) 'Action research', the encyclopedia of informal education. [<http://infed.org/mobi/action-research/>. Retrieved, 09/2014].
- Spuybroek, Lars. 2008. *The Architecture of Continuity: Essays and Conversations*. V2\_ publishing.
- Gough, N. (1999) Understanding curriculum systems. In J. G. Henderson & K. R. Kesson (Eds.), *Understanding Democratic Curriculum Leadership* (pp. 47-69). New York: Teachers College Press.

# Media in Architecture- Intervention and Visual Experience in religious space.

## Nimbus Radiance Gate Project

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### ABSTRACT

The appearance of the new Media technologies have opened new fields of intervention in architecture creating a new dynamic communication in the relationship between public and space, where are present technological devices that enable a new sensory experience, aesthetic and even spiritual. This connection makes relevant the idea of rehabilitate architectonic spaces with new media technologies such as sacred spaces.

This research aims to create a media project integrated in sacred spaces that combine Architecture, Art and New Technologies, exploring new perspectives and diferent dynamics in space

### INTRODUCTION

The project presented in this investigation is part of the multidisciplinary field of Architecture and explores an experience in media architecture. The media today reflect an undeniable dynamic in many fields of human relations skills - encompassing social, economic, cultural and even spiritual aspects. This project explores the potential of new technologies in the context of the tectonic architecture creating sensory experiences. That affect both (the built environment and the user) by introducing a macro view media in which scale becomes a determining factor in the implementation and impact of the work. Within the context of Architecture, Art and Media, the relationship between architectural structure and visual image has been explored channeling this study to sacred spaces.

The objective of this work is to create a visual experience comprehending Architecture, Media and Art. It is intended to specifically explore the sacred spaces that are losing social, cultural or religious dynamics and insert new Media technologies to create a new generate momentum, testing tools, techniques and methods of implementation. Given an

architectural project methodology, the location is naturally the starting point for the development of this technological apparatus. The church of Santa Clara in Santarém, Portugal emerged as an experimental space for apparatus presenting itself as both temple and museum. We also aim to address the concept of rehabilitation through media technologies

directed at interventions that may have an impact on energizing spaces. The idea is emphasized on the rehabilitation of spaces that, one way or another, may gain new dynamics after a media intervention. Thus we intend to affect



the play with a sensitive and spiritual character which endemically sacred spaces have by exploring a sensitive aspect of the subject and drawing up new ideas for meditation and spiritual reflection.

The proposal does not distinguish nor is aggregated with any particular spiritual or religious group: it is intended that the project may pass through different contemplative spaces in order to rehabilitate these. In the specific case of this investigation additional care must be taken when using media technology into spaces of contemplation because some constraints are placed on the development of the proposal. The aim is to put in a contemplative space a media apparatus that holistically integrates architecture and suits the endemic, aesthetic and ethical character of the place - promoting a new perspective not only of space but also of users.

This research has as its starting point a clear and objective observation about the architectural space, specifically the sacred space and the public that uses it. We try to find ways to (re) use the contemplative space, in an era in which media technologies have become an integral part of our experiences.

The investigation was done across many visits to contemplation spaces gathering a specific iconographic set about the state of use, degradation and dynamization. This fact was allied with an idea of rehabilitation through the new media technologies that promote and widen a new perspectives... Today the architectural spaces considered sacred can also intensify the experience of those who have religious beliefs but also open to other alternatives experiences whether they are cultural, spiritual, or even technological.

The sacred space can be a multisensory experience not caused by the worship or veneration of a religious iconography and narrative but by a new expression of the digital times where the image and their interaction become a perceptive, aesthetic and cultural experience. The concept of this piece is based on an idea of screen, encompassing the user and the space in a site specific idea and goes beyond the double screen including transparency and reflection of visual representation.

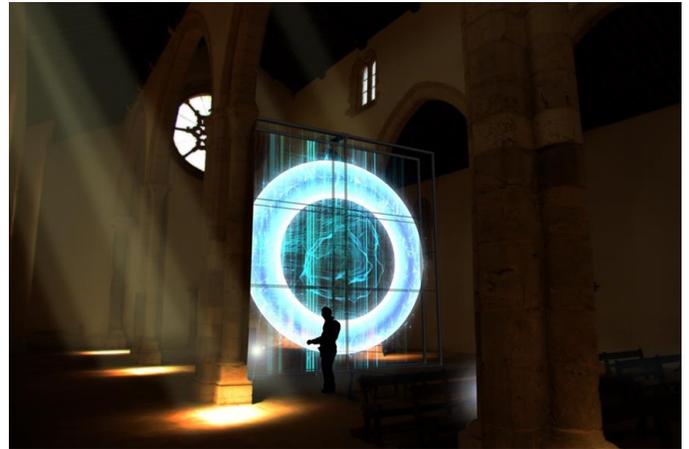
The piece itself represents five steps in your drawing content, namely: color, shape, environment, vector variations (animation) and surface transparency. The implementation of formal presented is based on the use of two software: Maya to build three-dimensional elements and TouchDesigner for viewing and combination content of the piece and its display.



The piece is composed of two distinct planar structures spaced 40 cm from each other and supported by a iron base.

The two plans are formed with rectangular profiles in iron composed of separate parts. The final dimensions of the

piece is a square with 6mX6m. The work is designed primarily as a visual experience that encompasses the space, the object and the user. The structure have two transparent holographic screens where will be projecting two images that complement the translucent overlay film, thus making the merger of two projections. The digitally created content reacts to the presence of observers through infrared cameras, placed strategically. The object revives the memory of the altarpiece as an architectural surface promoting the expansion of messages through the media technologies.



### SIGNIFICANCE AND INNOVATION

The relevance of the project justified by the experimental nature of the proposal, which places the object in a new field of intervention, blending architecture and art , proposing the concept of rehabilitation through new technologies including macro projections, and 3D motion graphics, contributing to a possible work in the field of renovation and revitalization of sacred spaces.

The Radiance Nimbus Gate Project is assumed as media architectural intervention with a specific projective methodology opening a field of experiences in religious or contemplative spaces. This is not a momentary and ephemeral structure, but a permanent apparatus that fits and makes the architecture a kinetic space.

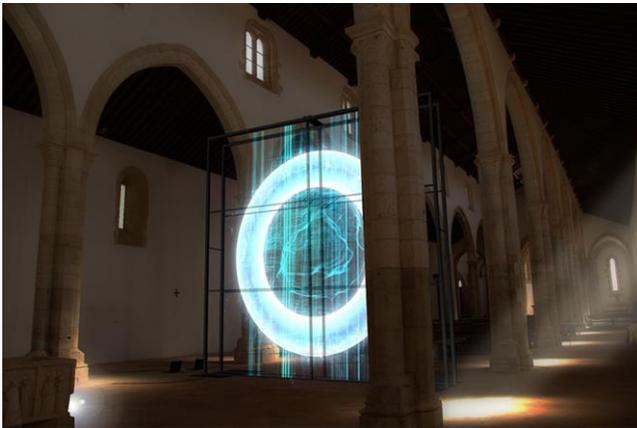
### METHODOLOGY

The method used in this research was made in three distinct phases: i) The process began with a survey and interviews to the Catholic Church, Islamic Center in Lisbon, Hindu Center in Lisbon and Jewish Community in Lisbon. These interviews and surveys was aimed to assess the openness to inclusion of Nimbus Radiance Gate Project in a religious space. After data analysis began an investigation that included general and specific literature focused in anachronic and synchronic approach about Machinery and techniques that were linked with the spiritual universe resulting in the collection of images and texts. ii) Research in religious and artistic references that could be relevant to the purpose of the project with the organization of a storyboard, creating a cartography of the process. iii)

Sketches and virtual trials was implemented in software Maya and Touchdesigner where we made a selection of the content of the piece and virtual tests.

### QUESTIONS AND ISSUES

The inclusion of new technologies media in architectural design is a reality but some issues arise with its versatility: there are a excessive number of buildings that lose dynamism and ceasing to be active in their endemic function, could be media an element of rehabilitation of architectural spaces? We believe that it is possible to use new technologies in an attempt to rehabilitate spaces, not in structural component but in a visual component, communicative, interactive and fundamentally aesthetic. Another issue that is pertinent focus on specific space: what kind of space can be a viable rehabilitation through the media technologies without distortion in its function or purpose? These experiences have acquired a character of great significance in the dinamic spaces, reactivating, innovating and interacting with the users. However, what to do in specific spaces when the symbolic component is markedly, such as in religious or contemplative spaces? How media technologies can promote these spaces in a rediscovery of sensitivity and spirituality affects the human being stimulated by the architecture and the new technologies? The art was always encouraged and affects our sensitive system and mental elaborations, creating definitions and concepts like aesthetics, sublime and transcendence. Is it possible to explore the sensitive side of media technologies and making it a visual experience preconditioned by a religious architectural space? What instruments are used and what tools for design a project of this nature? Which is the impact of media structures in religious spaces in the public view and in the users?



### BIO

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### REFERENCES

- Andersen, P. B. (1997). *A Theory of Computer Semiotics*. New York: Cambridge University Press.
- Anderson M.D. (1963). *Drama and Imagery in English Medieval Churches*. Cambridge: University Press-
- Crowley, E. D. (2007). *Liturgical art for media culture*. Minnesota: Liturgical Press.
- Coomaraswamy, Ananda. (2007). *Figures of speech or figures of thought? The traditional view of art*. Bloomington: World Wisdom.
- Couturier, Marie-Alain (1983) *Art sacré*, Paris: Menil Foundation.
- Crowley, E. D. (2007). *Liturgical art for media culture*. Minnesota: Liturgical Press.
- Eliade, Mircea (1985). *Symbolism, the Sacred, and the Arts*. New York: Continuum.
- Elkins, James (2004). *On strange Place of Religion in Contemporary Art*. New York: Routledge.
- Gadamar, Hans-Georg (1998). *Verdade e Método- Traços fundamentais de uma Hermeneutica filosófica*, Petrópolis: Editora Vozes.
- Gailardetz, R. R. (2000). *Transforming our days: spirituality, community, and the li-turgy in a technological culture*. New York : Crossroad.
- Gamwell, Lynn (2002). *Exploring de Invisible, Art, Science and Spiritual*, United Kingdom: Butler & Tanner Limited
- Haeusler, M. (2009). *Media Facades, History, Technology, Content*. Avedition.
- Hall, Stuart (1997). *Representations: Cultural Representations and signifying Practices*, London: Sage Publications.
- Hauser, Arnold (1962). *História Social de la Literatura y el Arte*. Madrid: Ed. Guadarrama.
- Huyghe, René (1986). *O poder da imagem*. Lisboa: Edições 70.



# Interactive Design (ID): Designing Sensorial, Dialogical Spaces

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## ABSTRACT

Within this short paper, first I set the research in a larger context and explain how it started, the main questions that arose in time and of course the aims of the research. Previous work is also presented throughout installations either realized or in the concept phase, as well as pointing out its significance and innovative aspect like representing a base for designers, architects within the process of design of interactive spaces. Finally, I conclude with a reflection upon the unique methods and framework that this research requires and some important questions and issues to be discussed.

Designing engaging interactive spaces would imply the creation of interactions within physical spaces that use digital technologies and thus could be a way to facilitate social interactions within the built environment. So the question that rises is how should we design these spaces that we term interactive spaces? The context here is prior, as architecture reflects what a society holds important.

## Author Keywords

Interactive Design; Interaction Design; Intuitive Interaction; Sensorial; Installations.

## ACM Classification Keywords

Real-time systems; World Wide Web; Human Computer Interaction; Interaction Design; Collaborative and Social Computing; Ubiquitous and Mobile Computing; Visualization; Arts and humanities; Technologies.

## INTRODUCTION

The ID project is a practice-based research initiated at an international level during the Research Training Sessions at the KU Leuven Faculty of Architecture. It started with the purpose of addressing challenges regarding the

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Architectural Space and Information and Communication Technologies (ICT) with a design-oriented approach, specifically focusing on the design of interactive spaces, that are interactive and human-centered.

In this process, several challenges were identified. Among those the two pressing ones were: 1) rethinking and reconciliation of the materiality with virtual images 2) overcoming interaction limitations of the built environment through the use of ICT (Rahaman, Tan, 2009)

In this context, the main aim of the ID project was to explore alternative ways for combining materiality with virtual images and understand the spatial qualities that emerge through the user interactions.

In relation to the above, several questions arose:

- What are the alternative approaches for designing interactive spaces?
- What are the impacts of interactive interventions in existing spaces?
- Which interventions promote more user engagement?
- Should the interactivity and virtual images be included in the design phase or later as an afterthought?
- How long will the process last, considering that it involves a broader design issue?

This research project will try to find answers to the above, through the design and evaluation of a series of contemporary solutions that can be used and further developed by designers, artists and architects.

The design process will require creating unique spaces that would take into account each time the context and today's social needs. Our society requires flexible spaces, innovative and transmitting knowledge. The interactive spaces are today mainly within the Art Museums or Galleries and as observed so far these are mainly artistically endeavors, and not permanent creations. As identified by Rahaman and Tan (2009) there seems to be two categories: one where the whole space interacts with the passersby and one where the interaction is with an installation within an architectural space. Thus the intention of the research project is to take into account these types of innovative solutions to existing social demands or questions today. Testing new materials and lighting techniques, breaking

boundaries, experimental approach will be at the core of designing new kinds of interactive spaces that includes different media and becomes a reflection of today's society.

### PREVIOUS WORK AND THE CURRENT STATE OF THE RESEARCH PROJECT

More and more interactive installations, artistically endeavors, give us clues on how to approach the design of interactive spaces in architectural design. Among those are realizations, for example the interactive space designed by Art+Com, Joachim Sauter, called Spheres for the new BMW Museum in 2008, Munich, the Canadian office Iregular or Kollision in Denmark or several interactive installations by London based office rAndom International, Lab[au] just to name a few.

After this analysis process, a preliminary installation was produced during the ByDesignForDesign Research Training Session in 2011.

It is called "Sensorial Space" and it basically transformed a rather static space within the Brussels context into a dynamic one. It was based on a succession of clear/halftone projection of the activity when there was any and an animation when no activity was registered. It was easily conceived using an Apple laptop that was running a software transforming the Webcam into a motion sensor and a beamer that was projecting the information onto the surfaces within the space. The impact was quite high and it received interest from the passersby. However no formal observations were made during this installation.

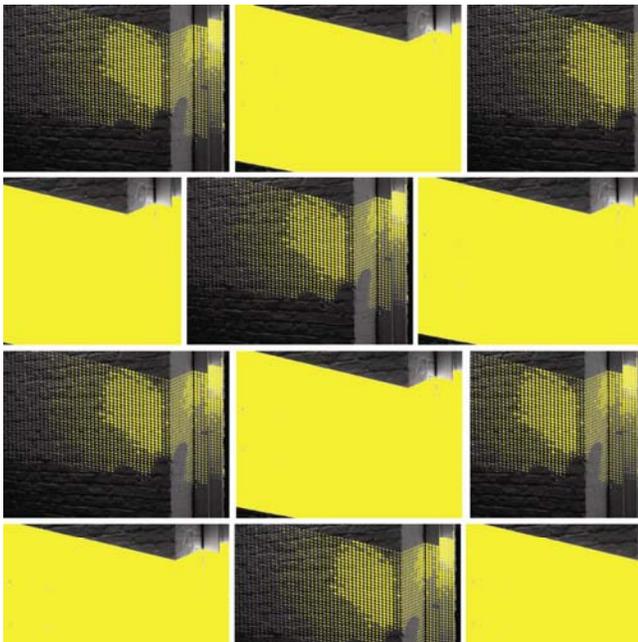


Figure 1. Sensorial Space Installation, Brussels 2011

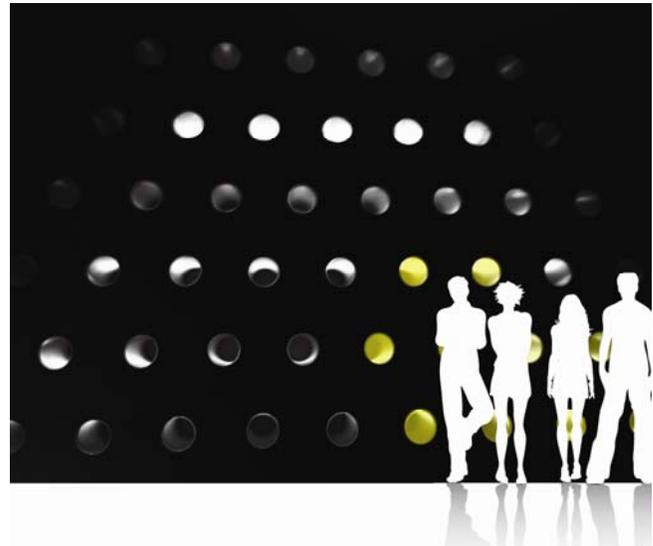


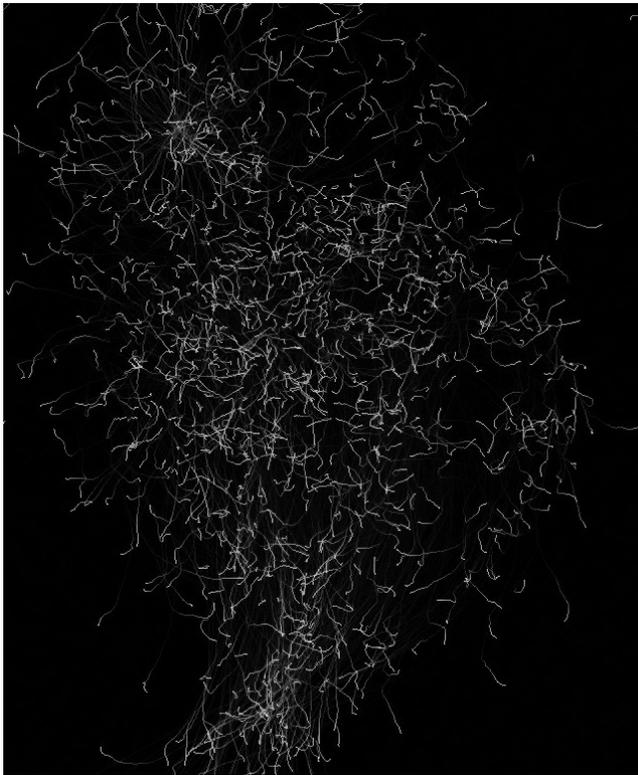
Figure 2. iLIGHT Interactive Installation Concept

Following the "Sensorial Space" installation, a new project, the "iLIGHT" Interactive Installation is in the design phase. It suggests energy saving and raises awareness on zero emission buildings. The pedestrians activate the installation which fades out slowly as they move away. The focus is on energy saving and transmitting this knowledge to the public and creating a dynamic pattern activated by the presence of the passersby.

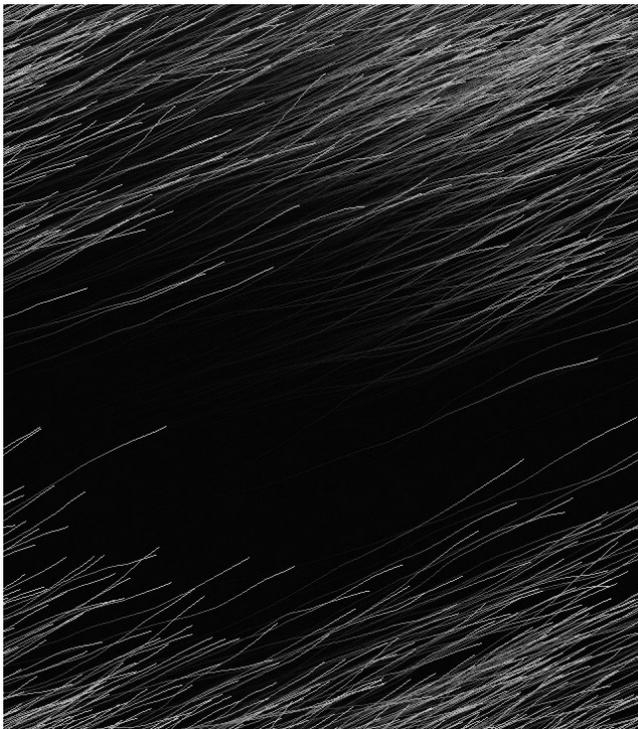
"Lightscape" Interactive Installation is another new concept for a space that wants to suggest the speed of today's life. We seem to lean on simpler and faster solutions that give results than to invest more time. This has positive as well as negative repercussions; one could be that the attention to detail sometimes is lost. Here I am referring also to solutions like 3D Printing for example that seem to be used in several domains already and develop the way we manufacture products. Laser cutting is another technique that involves precision and speed into the process, or prefabricated and highly energy efficient facades that are mounted onto older buildings for example.

The first figure suggests no movement when the passerby appears, so a lighted pattern indicating this appears. While the passerby moves away the pattern changes into a more dynamic one indicating the speed, the movement.

With rather simple techniques and light embedded materials for example, some amazing results could be achieved. The intention is to try to use embedded sensors, controllers, ultra materials rather than projections onto surfaces.



**Figure 3. Lightscape Interactive Installation Concept. No movement.**



**Figure 4. Lightscape Interacting Installation Concept. Moving away.**

### **SIGNIFICANCE AND INNOVATION**

**Significance (“the pain”):** The research project tries by design interactive spaces to first enhance the experience of space for people, as to represent a base as well as raise questions for designers, architects further. Considering the increased interest for interactive installations, the research seems to be significant also due to the experimental and new state that it is within the architectural design.

**Innovation (“the pain killer”):** Each interactive space is and will be unique in its own way, answering questions to existing needs and to certain contexts and thus advancing and contributing to the knowledge production within this field. The research project is innovative due to the fact that it raises certain questions and offers design solutions based on collaboration and through test and trial technique. Each interactive space is basically an experimental platform, thus novel in its own way.

### **METHODOLOGY**

The envisioned framework and methods are rather unique in a way and through designing. Each interactive installation or space will be based on certain societal questions, contexts and will be analyzed based on feedback received. The idea is not to use questionnaires or very theoretical ways, but to record and observe the reaction of passersby, whether the space developed the intended effect and so on. Akpan and al used a method that implied installing the installation or recreating the interactive space in several locations that have different characteristics, social contexts, spatial properties. What is important though is “understanding the nature of public engagement with an interactive installation for their successful design”. (Akpan et al., 2013) Akpan et al. also identify the so called “honey-pot effect” where there is a progressive increase in the number of people looking at the installation or in the interactive space due to an initial group of people interested and engaged. Muller observed that passersby often notice interactivity just as they leave the interaction space, and have to walk back to interact, the so called “landing effect”. Also that “interactive art exists through the participation of its audience” (Muller, 2008-2009) A participant that is engaged in interaction is not just interacting for themselves, but is also performing for an audience and can be encouraged and motivated by their reactions but there is also social inhibition that is associated with the interaction in public. Muller also suggests that “many interactive displays fail to sufficiently attract attention from the passersby, and if they do, many fail to motivate people to interact.” (Muller, 2008-2009) Bilda (2011) developed systematic evaluation methods for obtaining solid results to measure engagement within and across many different examples of artworks, experiences and categories of audience. These methods included experience evaluation (verbal reports and interviews, behavioral data as recorded videos), prototyping (“unfinished working models used for

testing and refinement”) thus a longer evaluation period, protocol analysis (“analyzing the period from when a participant walks into the exhibition space to finishing his or her interaction with the artwork”), developing the Creative Engagement Model (CEM), developing 9 design principles (“set expectations, invite for interaction, surprise, allow time for adaptation, provide consistent feedback, allow for anticipation, allow for uncertainty, introduce challenge, provide audience space to reflect on their previous intentions and question their current interactions”) based on the stages of engagement phases (“Initial encounter”, “Adaptation”, “Anticipation”, “Deeper understanding”).

When designing these spaces what is very important to take into consideration is the audience and Costello (2007) talks about the Beta-Space, “an experimental exhibition environment”.

The interactive space becomes a place that is characterized by memories, experiences, norms and patterns of behavior.

So far, literature study, an analysis of existing interactive spaces and installations, has been realized while in the same time designing and putting ideas into practice. Designing more is envisioned in the future.

#### **QUESTIONS AND ISSUES**

As mentioned in the introduction part, there are several questions to which we are working on developing answers and solutions. The interactive installations and spaces are a hands-on and minds-on discovery in a way. Over stimulation can be avoided by using different clusters for example. There are several issues that these spaces or installations raise and that is related to them being useful or just some “useless” interventions, or “overwhelming” with technology for example, as well as:

**What are the alternative approaches for designing interactive spaces?**

**What are the impacts of interactive interventions in existing spaces?**

**Which interventions promote more user engagement?**

**Should the interactivity and virtual images be included in the design phase or later as an afterthought?**

**How long will the process last considering that it involves a broader design issue?**

#### **BIO**

Cristina R. Maier is currently developing a research project on “Interactive Design: Designing Sensorial, Dialogical Spaces”, initiated at Faculty of Architecture and Fine Art, NTNU, Trondheim, Norway and KU Leuven Faculty of Architecture, Campus Sint-Lucas Brussels/Ghent, Belgium.

Between 2009-2011 she attended the Research Training Sessions at KU Leuven Faculty of Architecture, Campus Sint-Lucas Brussels/Ghent, Belgium which lead to two publications within the Reflections series.

While working on several projects at distinguished architecture and landscape architecture firms in Norway (Saunders Architecture, landskap DESIGN, LJB), she became more aware of the added value of a transdisciplinary approach in practice and subsequently in research. Also, the high level of the practical experience represents a solid foundation for further work carried out.

Between 2004-2007, Cristina received a Master of Architecture from the National School of Architecture, Grenoble, France, a Bachelor of Architecture from the Faculty of Architecture and Urban Planning, Cluj-Napoca, Romania, tutored / participated to several International Workshops in France and created various installations.

[www.coroflot.com/InteractiveDesign](http://www.coroflot.com/InteractiveDesign)

#### **REFERENCES**

- [1]. Akpan, I., Marshall, P., Bird, J., and Harrison, D. 2013. Exploring the Effects of Space and Place on Engagement with an Interactive Installation, University College London, UK.
- [2]. Bilda, Z., 2011. Designing for Audience Engagement, L. Candy & E. Edmonds (Eds.) “Interacting: Art, research and the creative practitioner”, Oxfordshire: Libri Publishing, pp. 163-181.
- [3]. Costello, B. 2007. A Pleasure Framework, Leonardo. 40(4). 370-1.
- [4]. Edmonds, E. 2011. The Art of Interaction, Digital Creativity, 21(4), 257-264.
- [5]. Moreno, C., Dywan, B. 2005. They are “Content to Play”: Creating Resonsive Interactive Spaces, presented at the J. Paul Getty Museum Symposium “From Content to Play: Family-Oriented Interactive Spaces in Art and History Museums”.
- [6]. Muller, E. 2008-2009. The experience of interactive art: a curatorial study, Leonardo Abstract Services (LABS).
- [7]. Rahaman, H., Tan, BK. 2009. Interactive Space: Searching for a dual physical-virtual world, International Conference on Computer-Aided Architecture Design Research in Asia (CAADRIA), Taiwan, pp.675-684.

# Socio-spatial practices in socio-technological peripheries: the case of rurban communities in Brazil

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## ABSTRACT

This PhD research investigates the relationship between the recent use of Information and Communication Technologies (ICTs) and the social-spatial practices in rurban communities in Brazil. It departs from the potential of ICTs to foster emancipatory actions—socio-spatial practices resulting in increase in social justice and improvement on quality of life—in the context of socio-technological peripheralisation: a process where communities are marginalised both territorially, for occupying geographical peripheries, and digitally, for their limited socio-technological access to ICTs. It draws from the growing body of research on urban media to understand the benefits and drawbacks from the association of ICTs, urban space and communities, to discuss the rurban needs.

## Author Keywords

social-spatial practices; rurban communities; digital marginalisation; socio-technological peripheries

## ACM Classification Keywords

• *Applied computing~Law, social and behavioral sciences*  
• *Applied computing~Sociology* • *Applied computing~Architecture (buildings)* • *Networks~Social media networks*

## INTRODUCTION

The investigation of this PhD research analyses socio-spatial practices in rurban communities in Brazil with recent introduction of Information and Communication Technologies (ICTs). ICTs are understood as technologies—hardware and software—that, when interacting with people and other technologies, are able to stimulate, mediate and collaborate towards dialogues, as opposed to discourses. Socio-spatial practices are those practices “dense with spatiality” [1]. In such cases, space is not only seen as the material basis where social practices develop. Rather, it is seen as an actant in the interaction networks that unfold as socio-cultural constructions engendered in given historical context and that conform heteronomous or autonomous *socio-spatial processes* [2]. *Rurban* refers to peripheral spaces in the urban fringes where rural and urban features meet, mingle and clash. For Henri Lefebvre, this “ugly but meaningful neologism”, developed by geographers, represents a generalised confusion of “the countryside losing itself into the heart of the city, and the city absorbing the countryside and losing itself in it” [3].

It is important to understand whether the increasing access to ICTs in socio-technological peripheries—those places where the *socio-cultural access to technology* [4] is still marginal—is fostering everyday practices that defy the heteronomous *status quo* towards the construction of a *socio-spatial autonomy*. Such a collective autonomy calls for an overarching realisation that the access to information is foremost a political issue; that the peripheralisation process is also technological; and finally, that the marginalised access to ICTs consolidates *political poverty*—the inability of a community and its individuals to mobilise themselves in various spheres of individual and common life [5]. It is also important to situate this discussion within urban studies and the recent approach to urban media, especially urban screens.

Two communities in Brazil are being studied. Santo Antônio do Salto and Noiva do Cordeiro are both geographic and technological isolated places—that is, typical peripheries—but which have been having a complete different development in the last years. Both are briefly presented.

Noiva do Cordeiro is a rural community in the fringes of Belo Vale, a 7.000 inhabitant city in Minas Gerais, Brazil. According to local accounts, the community started when, in nineteenth century, newly wed Dona Senhorinha left her husband for Francisco Fernandes fleeing to the outskirts of a nearby village. As a strict catholic region, the couple was excommunicated by the church and raised their family isolated from the surroundings. Fifty years later, Delina, one of their granddaughters, married an evangelic minister who founded a strict religion named Noiva do Cordeiro, reinforcing the prejudice against the community. The strict rules—which included daily prayers, constant fasting and public punishments—led the community to extreme poverty.

It was only in the 1990’s, with the minister’s death, that the community concerted to fight poverty. Its inhabitants have started to undergo a process of *critical awareness* to strengthen the community. They have reversed the isolation process by attracting attention to their own cultural ties and have created traditions that bond the younger generations together. Locally, they have organised themselves non-hierarchically to allot daily tasks. Formally, they created an association allowing them to request public funds and

legally commercialise what is produced there and currently, they engage in many different social activities in Belo Vale region. They have also elected a city representative, who fights for their rights in the governmental sphere.

ICTs have an important role in this change, being used by the population as a tool for improvement and development. If they were digital illiterate, in 2006 they became a reference in the region as they received the first rural informatics lab in the state through a partnership between the local association, the Committee for Democratisation of Informatics (CDI) and Vale Foundation. Rapidly they became known as *rural pioneers*.

In 2008, the increased interest in their lifestyle led to the production of a documentary taking Cordeiro overseas and furthering the interest of laypeople and academics. To advertise themselves, they have a page on Facebook and a blog. They also use the Internet as a knowledge-building tool, such as in the preparation of the *Night of the viola*, a weekly meeting where they play games to inform and bond people together. Various themes discussed are obtained through online research. Since the landline is almost inexistent, they have managed to buy a mobile phone antenna, facilitating the connections within the community and contact from the outside. Almost everyone has a phone and they text each other to program harvest, when before they had to knock from door to door.

Santo Antônio do Salto is a district of Ouro Preto, former gold capital in the eighteenth century. The lack of formal historical documents implies its peripherality since gold mining era. Salto did not connect important places and it developed no strong commerce or agriculture. In the 1930s, a political decision to house an aluminium industry in Ouro Preto was seen as crucial for the villagers, who had been starving and had no income source. The job offer attracted people from nearby and contributed to Salto's timid urban development. According to accounts, plot division was based on how much money one had to buy barbed wire and fence the land. This might have led to Salto's linear development with no spatial centralities.

The arrival of the aluminium plant has settled the population, who not starving anymore did not have a clear reason for mobilisation. Since then, Salto depends on the private sector. There are no strong associations and most attempts to mobilise the community come from the outside and have failed, such as the village tourism initiative, where locals could use their own infrastructure to welcome tourists, practice with positive response in other places.

Salto is the politically poor stereotype. Its inhabitants complain but never formally demand their rights for their lack of understanding of their own dependence to external agents. They have a weakening cultural identity as many young people see leaving Salto as the only solution. In interviews conducted in 2013, almost every interviewee pointed the lack of union as Salto's biggest problem, but

none of them seem to personally relate to the fact. They wait for the solutions to come from the outside—be it the government, private companies or even researchers.

The recent arrival of Internet, mobile phones and landlines will not naturally mobilise people toward change. Clearly they all have facilitated the communication among Salto's inhabitants and the outside, by increasing (and furthering) their networks, as they can contact family, do business, call for a doctor without depending on the low-quality pay phones. Nevertheless, it becomes clear that what lacks in Salto is not only the infrastructure, even though it is not widespread yet. There is a socio-cultural gap that reflects their inability to organise themselves not only mediated by ICTs, but also mediated by the space itself.

### PREVIOUS WORK

There is an established debate on the role of technology for development, focusing on the one hand on its emancipatory potential [5][6] and on the other on its contribution to the maintenance of the social relations of production [7][8]. For Lefebvre, the social relations are "those relations which are constitutive of capitalism and which are increasingly (and increasingly effectively) sought and imposed as such" [9]. These progressively align with asymmetric technological development and appropriation, leading to renovated forms of labour division based on the access to (and ability to produce) information-capital and knowledge globally.

It is only recently that the different roles assumed by knowledge in capitalist accumulation are being discussed in political terms. Two strategies of accumulation are worth noting: the transformation of information in knowledge and assurance of its scarcity through monopoly [10] and the use of *absolutely* unpaid work produced by users in mass web communication [8]. Both strategies are conflictive with autonomous appropriation and construction of knowledge and find parallel in the way our urban spaces are produced in association with ICTs. One interesting strand of research related to it is urban media, especially *urban screens*, digital displays with cultural and social concerns.

In this discussion, two heterogeneous and apparently opposing groups project. The first comprises those who support the social transformation potential of urban displays—such as artists, architects and urban planners. The second, those who benefit from the colonisation of urban space by the *Culture Industry* (as defined by Theodor Adorno)—i.e., the infrastructure providers that extract *informational rent*. Informational rent is "a socio-historical construction, only possible in capitalist conditions of reproduction and private appropriation of the value [...]. Information is relational, social, inappropriable. Its value is in the action, in the concrete labour. But capital only exists and subsists in the basis of appropriation and privatisation of the product of the abstract labour" [11]. The relation between both groups delineates a scenario where monopoly rent is guaranteed to the second group through high investment and its ensuing bargaining power. Infrastructure

providers also benefit from urban approaches that invest in *creativity* as a tool for capital reinvention and global projection in a *second circuit of capital*. “As the principal circuit—current industrial production and the moveable property that results—begins to slow down, capital shifts to the second sector, real estate” [12].

For being a recent phenomenon, the interaction between informational capital and real estate is hardly addressed in social terms contextualised in a political discussion, failing to expose the process of capitalist accumulation behind it. There is a complexification of the process of surplus extraction in the urban space through the association of real estate and informational *rentiers*. Thus, a double process of marginalisation can be observed: a socio-spatial, in which there is differentiation based on the consumption of space and technology, and a socio-technological, subjecting collectives to low qualification and low income jobs that force them to commute to nearby urban centres. According to Dantas [13], “[t]he capitalism, in this new informational stage, has become a mode of production that excludes from the production processes and the usufruct from wealth, an immense contingent of the population that no longer appears even as ‘an industrial reserve army’”.

Still, urban displays are the most pervasive form of digital technology present in our cities and are fairly assimilated by the population. Discussing their social potential can indicate how urban technologies contribute to awareness raising, empowerment, emancipation and, ideally, social transformation. Similarly, it can contribute to understand the role of ICTs in the increasingly *connected rurban*.

### SIGNIFICANCE AND INNOVATION

Surely ICTs can provide new hybrid political agoras [6] for citizen empowerment, considering that fighting political poverty can happen through informed decisions developed and shared not only spatially, but also in the technological domain. Nevertheless, it is still only a relative small number of researchers that focus on the importance of grassroots movements as groups that innovate, subvert and adapt technologies to serve their own demands, not always as planned by the formal market.

Despite the increasing interest in the social, cultural and economic relevance of access to ICTs for development—an increase in social justice and improvement in quality of life [1]—, the discussion is still superficial in regard to socio-technological peripheries mainly for three reasons: 1. it is developed from the centre outwards—Euro-American theories define dependency patterns in the peripheries of the Global South [14]—; 2. it regards the marginalised access as an instrumental gap to be bridged, overlooking key issues such as access, skills, economic opportunity and democratic divides that are associated to social marginalisation (Mosberger et al *apud* [5]); and 3. it lacks a spatial framework of socio-technological peripheralisation, disregarding that the social relations of production that disfranchise those in the South are also spatial relations [9].

These shortcomings in research are to be overcome by 1. discussing peripheral issues from the periphery standpoint; 2. establishing the relationship between spatial and political strands of technology, especially through Critical Theory and Political Economy of Information, Communication and Culture (PEICC); 3. refining a socio-spatial-technological framework to discuss social-spatial practices in rurban communities that are being *wired* only recently.

### METHODOLOGY

The project has a heuristic approach in two different moments. Informing the whole research, the abductive method is employed to define its four stages: 1. delimitation of the object, definition of key terms and the definition of an overarching theory—the PEICC; 2. presentation of the communities under an ANT approach; 3. analysis of the introduction of ICTs in socio-technological and geographical peripheries through socio-spatial and socio-technological supporting theories; 4. development of a theoretical framework to discuss a social-spatial-technological development of those peripheries. In Part 2, Actor-Network theory (ANT) is applied in the presentation and discussion of the cases. ANT is a social theory that enables accounting humans and non-human actors—or *actants*—in networks and socio-technical systems in a non-deterministic way, as it does not privilege any [15].

This research is entering its third year. I have already developed the first and second parts, but due to the method of abduction, they will not be finalised until the research has entered the writing up stage. I am focusing now on the third part, discussing socio-spatial and socio-technological issues in connection to the communities. I will also have the opportunity to join a research called *Sustainable Digital Neighbourhoods* at Plymouth University. This project focuses on the relation between broadband access and social networks in place-based communities in United Kingdom. It will be possible to draw parallels between ICTs and social inclusion also in the context of central countries.

### QUESTIONS AND ISSUES

#### Space as an actant

ANT is a methodological approach that is becoming familiar in urban studies mainly through the dissemination of the *assemblage urbanism*—understood as a tool for researchers to discuss issues of agency in urban space as well as an empirical tool to investigate urban inequality and its backlash in space [16]. For Bruno Latour [17], [ANT] “is a theory that says that by following circulations we can get more than by defining entities, essences or provinces. ANT is not a theory of the social, it is a theory of a space in which the social has become a certain type of circulation”. The author presents an abstract space of associations, and though he encourages the integration of ANT with architecture and urban studies, space is still regarded as a stage for social encounters rather than an actant. Still, besides being able to determine and serve as a “backdrop

for human action”, space can also “[...] authorize, allow, afford, encourage, permit, suggest, influence, block, render possible, forbid [...]” [15]. How can we surmount the difficulty to discuss space as an actant?

### **Socio-technological peripheries**

The centre-periphery debate was introduced in the 1940’s by the Economic Commission for Latin America and the Caribbean focusing on the commercial transactions of Latin America. This approach is inadequate to discuss the current relations between central and peripheral countries. There is a socio-technological peripheralisation process that, though reinforced by geographical and economical hierarchical relations, is not caused by it. How does it manifest globally? What are the effects on the local scale?

### **Reconceptualising the centre-periphery discussion**

Ananya Roy [14] argues for a relocation of the centre of discussion and theory production to the Global South as means to overcome the common interpretation of the South as “interesting, anomalous, different, and esoteric empirical cases.” This relocation implies a re-signification of centre-periphery processes not only as a North-South struggle but also as a phenomenon that happens within central and peripheral countries. Agreeing with the author, how would the relocation proposed contribute to the discussion of the social-spatial access to ICTs also in central countries?

### **Possible interrelations between urban experiences and urban specific needs**

Despite the need to address the social and political development of urban ICTs, the field is expanding and both research and practice are rapidly advancing. The discussion of urban screens and their process of learn-by-doing can contribute in this early stage where ICTs are just being introduced in urban spaces, provided that differences in the socio-cultural context are acknowledged. What are the possible interrelations between urban experiences and urban specific needs?

### **Alternatives to capitalist dissemination of technologies**

There are alternative tools being developed based on collaborative work which can either fall into the capitalist trap or strive in empowering people. In the first case, they are absorbed by large corporations that continue to invest in its authorial development or deactivated to avoid competition. In the second case, it resists the market pressure to be continuously developed for the users’ own benefits. What are the conditions that further each approach and what are the associations community-space-technology that are driven towards socio-spatial autonomy?

### **BIO**

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### **REFERENCES**

- [1] Souza, M. L. 2013. *Os conceitos fundamentais da pesquisa sócio-espacial*. Bertrand, Rio de Janeiro.
- [2] Corrêa, R. L. 2007. Diferenciação sócio-espacial, escala e práticas espaciais. *Cidades* 4, 6, 61-72.
- [3] Lefebvre, H. 1996. *Writings on cities* (Vol. 63, No. 2). Blackwell, Oxford.
- [4] Baltazar, A. P. 2009, *Cyberarchitecture: the virtualisation of architecture beyond representation towards interactivity*. Doctoral thesis, London, University College London.
- [5] Demo, P. 2007. Marginalização digital: digital divide. *Boletim Técnico do SENAC*, 33, 2, 5-19.
- [6] Merrifield, A. 2013. *The politics of the encounter: urban theory and protest under planetary urbanization*. University of Georgia Press.
- [7] Lefebvre, H. 1976. *The survival of capitalism: reproduction of the relations of production*. Allison & Busby, London.
- [8] Dantas, M. 2014. Mais-valia 2.0: Produção e apropriação de valor nas redes do capital. *Revista Eptic Online*, 16, 2, 89-112.
- [9] Lefebvre, H. 1992. *The Production of Space*. Wiley.
- [10] Dantas, M. 2010. Trabalho e informação: para uma abordagem dialética. *Revista Eptic Online*, 12, 1.
- [11] Dantas, M. 2014a. As rendas informacionais e a apropriação capitalista do trabalho científico e artístico. In: Marques, R. M. et al (org.). *A informação e o conhecimento sob as lentes do capitalismo*, p. 35-60. Garamond, Rio de Janeiro.
- [12] Lefebvre, H. 2003. *The urban revolution*. U of Minnesota Press.
- [13] Dantas, M. 2006. Informação como trabalho e como valor. *Revista da Sociedade Brasileira de Economia Política*, 19, 44-72.
- [14] Roy, A. 2009. The 21st-century metropolis. *Regional Studies*, 43(6), 819-830.
- [15] Latour, B. 2005. *Reassembling the Social: an Introduction to Actor-Network-Theory*. Clarendon, Oxford.
- [16] McFarlane, C. 2011. Assemblage and critical urbanism. *City*, 15, 2, 204-224.
- [17] Latour, B. 1999. On recalling ANT. In: Law, J., Hassard, J. *Actor Network Theory and After*, 15-25. Wiley.

# Design Models for the Adaptive Built Environment

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## ABSTRACT

This paper provides the research outline of the PhD project entitled: Design Models for the Adaptive Built Environment, undertaken by Hugo Mulder at the IT University in Copenhagen. The perception of adaptation in the built environment is driven by processes of ongoing digitisation, mechanisation and by trends that care to prioritise individually tailored environments, and gives rise to the notion of an adaptive environment. This Adaptive Built Environment (tABE), where boundaries between digital and physical blur, provides opportunities for new approaches to design that for example remain entirely virtual, that recognise human perception as a key design parameter and that allow for changing roles between designer and end user. With a focus on the design modelling environment, this PhD aims to follow a transdisciplinary approach in order to develop future design scenarios, tools for design modelling and guidelines for the design practice of tomorrow.

## Author Keywords

Architecture; Built Environment; CAD; Experiential Design; Transdisciplinarity

## ACM Classification Keywords

• Applied computing~Computer-aided design • Applied computing~Architecture (buildings) • Human-centered computing~Collaborative content creation

## INTRODUCTION

The PhD research outlined in this paper aims to investigate the relation between the Adaptive Built Environment and the software, hardware and organisational systems that support its design and operation. The research is placed in the overlap of, and borrows from the fields of architectural and engineering design, design research and CSCW.

## the Adaptive Built Environment

The Adaptive Built Environment (tABE) is a term coined to describe that part of the built environment that is perceived

by users as dynamic and adapting. The perspective taken in this PhD research leads to include in tABE those that are perceiving, noting that the perception of adaptation can originate in the systems that adapt, or in the perceiver themselves. Due to a process of digitisation of both the processes that give shape to the built environment and the built environment itself, and an ongoing trend of mechanisation of the built environment, the built environment can be said to become increasingly adaptive.

*Built environment* is terminology used widely to indicate the artificial structures in which most human activity takes place. In this sense it refers to buildings, public space, roads and other infrastructure for power and sewerage. The word *environment* is also important to distinguish it from architectural space only. As I will later write, this research will focus on design processes that include those of buildings, but have a wider application. My own professional experience lies in the engineering of kinetic structures that were sometimes, but not always, supportive to architecture, although they always operated on the scale of architecture.

## Digitisation

Through the infiltration of digital technologies, tABE is in essence both digital and physical, combining the actual with the virtual. The built environment is sometimes referred to as the brick and mortar world that is static and slow to adapt. The digital world on the other hand is agile, moves quickly and adapts at the level of individuals. Two streams can be identified of research and development that take place in academia and industry regarding digital technologies in the built environment: (1) the digitisation of the design process and (2) the infusion of sensors, actuators and control into the built environment.

Regarding the first stream, it can be said that the changes the design process of the built environment has undergone in the last decennium are marked. If we look at the process in design offices (in architecture and engineering practice), the changes can be clearly seen as a transition from the delivery of paper based drawings towards digital models. In no way is the process currently completely digital, as physical models and paper sketches are still the norm in many offices, but the delivery of digital building models does become the norm. This has had a significant effect on how designers work and collaborate and is expected to have further effects over time.

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Regarding the second stream, developments in building management systems and at home, home-automation, have introduced the internet-of-things in buildings. Buildings and building parts become more connected in networks and systems measure conditions to optimise the overall building performance. Large amounts of data become available that are not only relevant for a buildings current operation and its current users, but also for design of the next generation buildings.

The digitisation of the design process and of the building, almost naturally lead to a closing gap between design process and operational building. The closing of this gap not only means that production methods change, but also mean that design and design intent become closer to usage and operation. It allows for buildings to inform design and for design to inform building at any stage of operation. The roles therefore of expert designers and (expert) users become less distinguishable. If one describes the relation between designers, users and systems in network terms, it can even be argued that all three roles become interchangeable.

#### **Adaptation**

Adaptation in tABE may consist of (but is not limited to) dynamic physical change of objects in the built environment (translation, rotation, transformation), variations in ambient conditions (light, temperature, air flow, humidity, acoustics) or changes in usage (a public library used as a polling station). These types of adaptation are realistic in today's world. Many buildings have features that can be interpreted as being adaptive: sports stadia have roofs that open and close and building facades become more or less translucent depending on weather predictions or actual measurements. Building management systems stabilise the conditions indoors even when usage changes. And many spaces today have multiple functions at different times, sometimes functions they were not designed for.

Human perceived adaptation may consist of the perception of processes described above; i.e. something changes in a measurable manner. But instead of being external, perceived adaptation can also originate from the perceiver. The perceiver can perceive adaptation of the self, or perceive the environment to adapt. Imagine for example a long corridor where the light level is locally increased to alert passers-by of some steps. To the passer-by the light now seems to adapt to the conditions. In a similar sense change in behaviour of others can be perceived.

#### **Design**

The design of the built environment is inherently a multi-disciplinary exercise. The complexity of buildings of today requires the expertise of specialists in different fields. The complex nature of these design challenges has led to the term *wicked problems* [11], problems that cannot be clearly defined and that will not have a unique solution. It should be noted that multi-disciplinarity in the built environment often restricts itself to domain specialists, i.e. all experts

typically operate in the design of buildings, the design of infrastructure etc.

The digitisation of the built environment however means that a range of new experts is entering the stage. This requires new understanding, new ways of working, or at least embedding these specialists in existing work practices. Just communication or understanding across discipline boundaries is often not enough for design that deeply integrates different disciplines. To do research in this field however and to synthesise understanding on a supradisciplinary level, a transdisciplinary research approach is required that allows for the methods of one discipline to be applied in the other.

#### **Design Models**

Design models (as representations of the designed object) have in the past played an important role in multi-disciplinary design, either by forcing specialists to work in the same modelling environment, or by using design models for communication. We can therefore describe the design model as a meeting place for experts. The meeting place however is only one aspect of a wide spectrum of functions and potentials of the design model. For example, design models capture design intent, present a potential reality and are organisers of thought [10], and as such become tools to provide focus [12]. The closing gap between design and buildings mentioned before also affects the way the design model can be described where its function transitions from a sketch, to a blueprint for production, to a prototype, or to the actual result of the design process itself.

#### **Aim and objectives**

The aim of this research is to investigate design models in processes of design of the Adaptive Built Environment, how these are influenced by their ongoing digitisation and by perceived adaptation of this environment.

The research objectives are:

- To develop a series of speculative future scenarios for the Adaptive Built Environment.
- To develop the notion of the design model as a meeting place for experts, and to provide tools for the design of the Adaptive Built Environment.
- To develop a series of guidelines for practice regarding the design of the Adaptive Built Environment that can be embedded in current practice.

#### **Research Questions**

The research questions are formulated as follows:

- What does collaboration look like for future teams that design tABE?
- Could tABE be conceived if there was no designer, or if everyone was its designer?
- How can perception be a force in the design of tABE?
- What remains of the traditional notions of design model, prototype and end product in tABE?

- What relations exist between the digital the physical in tABE and in its conception?
- How can current practice support the design for tABE and what guidelines can support its development?

### PREVIOUS WORK

The research builds on strands of research in the fields of architectural and engineering design, design research, computer aided design and perceptual studies. Adaptation of the built environment has a long history since movable buildings have been indexed in [13] and [4]. Via architecture that is programmable [9] and performative [5], two major conferences have recently put adaptive architecture back on the agenda [14][15]. The discussion about the changing role of the architectural model has recently been addressed by Phil Ayres through a selection of essays in [2]. Architectural design methods more generally have been mapped by Philip Plowright in [10]. Human perception and especially in the phenomenological sense is described as enacted perception by Alva Noë in [6][7][8]. A discussion about collaboration in design was recently held in Barcelona [16]. Industry in the meanwhile is working on the next generation of building models such as [1] and [3].

### SIGNIFICANCE AND INNOVATION

Significance can be defined on the level of practice and on the level of academic research. For design practice a reality emerges in which various trends influence the use of and expectations about the built environment that are not addressed in the current design process. This mismatch may lead to unsatisfying outcomes of future design work. For academic research the significance lies in the need to further the understanding about collaborative design in particular scenarios of transdisciplinary practice.

The outcomes of this research in terms of the research objectives are a set of future scenarios, tools for design modelling and guidelines for practice. These aspects can be regarded as components of an overall design approach, and it is therefore anticipated that this triangle of outcomes will reinforce itself. A scenario for design of the Adaptive Built Environment for example will provide guidance for the development of guidelines and for tools for modelling. These outcomes provide a means to integrate concepts such as human perception into design processes.

### METHODOLOGY

The PhD is three years and I am currently three months underway. The PhD will be by papers with a concluding thesis and defence. Co-sponsored by industry, the research will relate to the practice in various phases of the project, by establishing a peer-panel with members from architectural and engineering design practice. Note that this is not a review panel, but a panel with the character of a sounding board and members may take part in data collection. For review in the academic context, conferences and journals from the fields of architectural and engineering design, design research and CSCW will be targeted and an

academic committee will assess the thesis. Both quantitative and qualitative methods will be used throughout the project.

The foundation phase covers roughly the first nine months and includes a literature study and a mapping of current practice through semi-structured interviews and focus group events. Practitioners are sought in companies like Arup (engineering consultants) and Foster + Partners (architects). Qualitative analysis will be applied to extract relevant input for the next phases of the research.

An explorative design research phase follows in three stages: (1) scenario development, (2) model and tool development and (3) guideline development. The development of scenarios will be explorative in nature and takes at the basis a number of existing projects and seeks to develop new solutions under a set of different or extreme projected conditions. The outcome will be a number of critical aspects that support the production of design models and tools for design. Guideline development lastly will produce a number of generic principles that may be used by the practice in design. Methods used in this phase are action based (research by design) and seek connections to practice through focus group events. Qualitative assessments will be applied iteratively to synthesise data into a set of critical parameters.

### QUESTIONS AND ISSUES

Questions for discussion at the Doctoral Consortium reflect the early stage of the research. They are grouped below. Note that some questions are slightly polemic to invite discussion.

#### Positioning of the research

- The research takes place in several (overlapping) fields. Is there a recommended strategy to position the research more firmly in one of the fields?
- Although the PhD is academic, it somehow stands between practice and academia. What experience can people share about similar setups? Are there particular pitfalls or opportunities that should be taken care of?

#### Methodology

- Is the range of methods that fall under *research by design* only applicable for research in design fields themselves?
- What is the recommended practice to 'validate' design in the case of *research by design*?
- The project looks at developing a number of speculative future scenarios. Is there recommended good practice for the development of these?

#### Focus of research

- The research description is implicitly hypothesising a future with a greater emphasis on certain aspects in design; partly this is based on personal experience and expectations. How can this be defended in a scientific context?

- Design practice influences the problem setting for this research, but is also known for its agility to follow trends that may run completely counter earlier trends. How can a three-year PhD remain relevant in such a context?

#### Placing of outcomes

- Can potential applications be identified in other areas than the Built Environment?
- Are pointers available to successful examples of guidelines for practice where these were produced as the outcome of the research?

#### BIO

Before joining the Adaptive Environments research group at the ITU in 2013, Hugo worked as a senior engineer in Arup's Advanced Technology + Research group in London where he was part of a specialist team that dealt with the design of movable structures in architecture. He was involved in the design of retractable stadium roofs, great observation wheels, transformable facade systems and dynamic art sculptures. Because kinetic systems require atypical design tools Hugo developed and adapted computational techniques for dynamic problem solving and design collaboration. Since he joined Arup in 2002 Hugo has worked on various projects including the Public Library in Amsterdam, the European Extremely Large Telescope enclosure design in Chile, the Las Vegas High Roller observation wheel and the Qatar National Museum. Hugo graduated with honours from TU Delft in 2003.

Hugo held lectures and assisted architects and engineering students at various schools and universities and has been part of the organisational team of Smartgeometry in 2010, 2011 and 2012.

#### REFERENCES

1. Autodesk. Project Dasher. 2013. <http://www.autodeskresearch.com/pages/dasher>.
2. Ayres, P. *Persistent Modelling: extending the role of architectural representation*. Routledge, 2012.
3. Côté, S., Trudel, P., Snyder, R., and Gervais, R. An augmented reality tool for facilitating on-site interpretation of 2d construction drawings. (2013).
4. Graefe, R., Hennicke, J., Kugel, F., et al. *IL 5 Wandelbare Dacher Convertible Roofs*. Institute for Lightweight Structures, 1972.
5. Kolarevic, Malkawi, A., and Malkawi. *Peformative Architecture*. 2004.
6. Noë, A. *Action in Perception*. 2004.
7. Noë, A. *Out of Our Heads: Why You Are Not Your Brain, and Other Lessons from the Biology of Consciousness*. 2009.
8. Noë, A. *Varieties of Presence*. 2012.
9. Oosterhuis, K., Bouman, O., and Lénárd, I. *Kas Oosterhuis: programmable architecture*. L'Arca edizioni, 2002.
10. Plowright, P.D. *Revealing Architectural Design: Methods, Frameworks and Tools*. Routledge, 2014.
11. Rittel, H.W.J. and Webber, M.M. Dilemmas in a general theory of planning. *Policy Sciences* 4, 2 (1973), 155–169.
12. Snyder, R., O'Bryan, M., Mulder, H., and Côté, S. Focus Devices in Hybrid Data: Usefulness in Design Thinking and Communication. *DCA Proceedings*, (2014).
13. Zuk, W. and Clark, R.H. *Kinetic architecture*. Van Nostrand Reinhold, 1970.
14. Adaptive Architecture. 2011. [http://www.buildingcentre.co.uk/adaptivearchitecture/adaptive\\_aboutus.html](http://www.buildingcentre.co.uk/adaptivearchitecture/adaptive_aboutus.html).
15. *ACADIA 2013 Adaptive Architecture: Proceedings of the 33rd Annual Conference of the Association for Computer Aided Design in Architecture*. 2013.
16. Transdisciplinary design symposium - RMIT University Europe. 2013. <http://www.rmit.eu/common-assets/news-items/2014/june/barcelona-design-symposium/barcelona-design-symposium.html>.

# Temporary Urbanism in a Network Society:

A study of spontaneous production of urban spaces applying new media

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## ABSTRACT

This PhD research is concerned with the flow of spatial interventions of people in social networks. Addressing the relationship of social media and temporary design of places by everyday users, this investigates how the emerging culture of participation is reflected in space transformation. What are the opportunities and challenges of employing media to generate an integrated collection of spontaneous actions in urban places? And what is the network dynamics, whether online or offline, of spatial interventions?

Based on the content analysis of DIY Rainbow Crossing, a participatory action research will be conducted to advance our understanding of the transmission of design patterns in media. Applying network analysis methods, this study models the individual actions of people brought together in a singular process through social network sites.

## Author Keywords

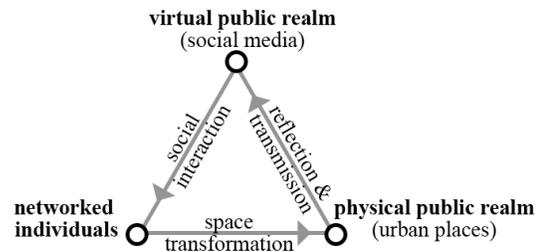
Social networks; participatory design; temporary change; spontaneous actions; intervention pattern

## INTRODUCTION

In a widely connected network of people generating place-based information through social media, urban environments are perceived in new ways. This research claims that new media and urban design are converging as temporal aspect of places are more emphasized: media as an accessible tool increasingly operated by people and design as an ongoing and collaborative process of creation. Besides, the culture of spontaneous actions and real-time expressions in virtual space has led to an emerging shift in physical place occupation and regulation. Considering the aim of research which is exploring the relation of new practices in urban design, associated with active participation of people, and media, there are two major areas of inquiry:

- The primary goal is to inquire how the emerging culture of *spontaneous actions* and real-time expressions in new media space finds expression in physical places.
- Besides, this aims to gain an insight into the *collective* nature of space interventions and the process in which a pattern of change is shaped in social networks.

Considering the process of coming-into-being to disappearance of urban events [10], central questions of this research are: *What are the opportunities and challenges of employing media to generate an integrated collection of spontaneous actions in urban places? How might the reflection of these actions in media, after disappearing in place, lead to the extension of physical transformation? And what is the network dynamics, whether online or offline, of the whole process of emergence, transformation and conclusion of an event spatially and socially?*



**Figure 1:** the flow of a pattern of a temporary intervention in a network of people

## PREVIOUS WORK

As famously stated by Castells [4]: “networks constitute the new social morphology of our societies. While the networking form of social organization has existed in other times and spaces, information technology provides the material basis for its pervasive expansion throughout the entire social structure”. Putting forward this view, Rainie and Wellman discuss that because of the widespread use of the internet and mobile phones “social networks are large and diversified [14] and “connections shift between multiple networks” [14] as people are enabled to manage a larger and more diverse set of relationships.

This debate is fostered by Fischer and Giaccardi who highlight the relevance of communication technologies to social creativity: “Bringing together different points of view and trying to create a shared understanding among all users can lead to new insights, new ideas, and new artifacts.

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Social creativity can be supported by innovative computer systems that allow all users to contribute to framing and solving problems collaboratively.” [5] Similarly, E. Page argues that having diverse perspectives, people “see or envision the set of possibilities differently” [13]. Transformation of a single action to collective is an important step in the process of social engagement. Oswalt and Philipp [12] argue that to make an informal intervention, interested groups linked together in a network to support the event and develop it.

From an architectural perspective, as Alexander argues, in a collective action, “groups of people can conceive their larger public buildings, on the ground, by following a common pattern language, almost as if they had a single mind.” [1] He draws our attention to the patterns of events which are “merely anchored in space” [1] and can be transmitted. In fact, the transmission of a pattern takes place as an event repeats in different situations and places. In this process, the collective action of people makes a system similar to nature in morphological characteristic in which “there is endless variety; and yet at the same time there is endless sameness [1].” In other words, “the sameness of the patterns, interacting with the difference of the contexts” [1], makes the situation different and unique. While there has been little discussion about the impacts of network relationships on this process, it could be argued that new media, empowering and being empowered by people, not only reacts to physical transformations, but generates a common language of intervention.

This idea is along with ‘unitary urbanism’, “a concept of the city based on the construction of participatory situations. [8] The constructed situation is a short-lived event or performance with a number of props in which the users are also the designers and builders. While it might include the transformation of existing forms and spaces and the creation of new ones, neither is intended to be long lasting”. [8] In parallel with such a view on interchangeable roles of designer and user, Halprin argues that a process-oriented system of design allows “the activity itself to generate its own results in process.” [7] Such a process redefines the role of designer, users or audience. Designer opens possibilities and makes process visible. [7]

Similar to this view on design, the idea of meta-design has been suggested by Fischer who proposes a conceptual framework promoting new forms of collaborative design. He notes that in conventional design approaches two stages can be found: design time and use time. “At use time, users use the system but their needs, objectives, and situational contexts can only be anticipated at design time.” But in meta-design, the system can be modified by users and evolves at use time. Drawing a fine distinction between participatory design and meta-design he also argues that in the latter, system develops at not only design time but use time.

From another point of view, the notion of repetition is along with the general concept of rhythm. Repetition of an event might occur in whether a certain or different places. Lefebvre describes civic rhythm as a repetition of actions and situations which has birth, growth, peak, then decline and end [10]. With respect to the repetition of temporary: “Structures, such as the London Eye or indeed the Eiffel Tower, which were intended to be temporary, have endured due to their popularity and have become iconic landmarks. Numerous community gardens around the world, which were permitted temporarily following intense public campaigning, have become permanent too. Often it is public support that has ensured that it will never be expedient politically to remove them. [3]” This raises questions about the role of media in this process which this study is concerned with.

The argument on non-static dimensions of design is supported by McCullough [11], who proposes the concept of “quiet architecture” referring to the changing role of architecture and urban planning along the rapid technological development by providing a fixed but decent context for the flows of ubiquitous technology and temporary design. He argues that applying digital technologies with the capacity to express the culture of the moment relieves architecture from its struggle to be at the fashionable center of attention. This approach is along with the idea of unfinished design which means building or landscape finishes in situations by people, smart objects and temporal designers.

In a comprehensible argument close to the main theme of this PhD research Oswalt and Philipp states that “new media enable new forms of spatial appropriation, in particular spontaneous and momentary spatial organization. The new media facilitate dealing with the city. They enable editing the city. Temporary uses are concerned less with constructing new spaces than with locating existing urban spaces in order to edit and curate them. [12]” It should be mentioned that under the broad concept of media-based design, a large and growing body of literature is investigating the capacity of digital technologies in detection and reaction to the users, kinetic architecture and animated spaces. This has opened up possibilities in intensification of use and experience. In the near future people enabled by technology will create physical space as they are now creating content in virtual space. Consequently, the role of architect as a meta-designer will change in appropriating space for uncertainty and offering a higher degree of “transformational potential” [15] of built environment which is open for interpretation and enables people to make a change.

Such a view on temporary nature of cities has been advanced by Townsend who addresses the digital layer of cities as an ephemeral component: “telecommunications networks let us see, increasingly in real time, the vital social processes of cities. As much as they enable urban

sociability, they are an indispensable tool for studying this ephemeral layer of the city as well. [16]” however it could be argued that in response to such temporary layer of interactions the physical layer of cities is getting less permanent and more fluid.

**SIGNIFICANCE AND INNOVATION**

Studying the flow of an intervention in networks of people is significant because it raises questions about the effective ways of getting people involved in space production. More specifically, it demonstrates how to apply the capacity of new media in bringing social creativity in an urban design process alive. This study advances our understanding of the transforming nature of design process of public places. It is hoped that the findings will make an important contribution to establishing a mechanism for collective actions of spatial design in urban places. This promises a future in which city image is diversified as citizens are enabled to participate in shaping the city spontaneously.

Although studies in media and city have examined the hybrid structure of urban life, little is known about the significance of real-time behavior in the emergence, transformation and conclusion of a space production. Therefore, this study provides an additional insight into the extension of people’s ability through new media platforms to appropriate and personalize their physical realities. This gives emphasize to understanding issues of ‘time’ and ‘situation’ for design, and underlines the appropriation of public spaces for uncertainty and change.

**METHODOLOGY**

In order to seek the spatial outcomes of social interaction in virtual space, a case-study approach is employed. The case study is “an empirical inquiry that investigates a contemporary phenomenon within its real-life context” [17]. However the problem with studying temporary activity is that “by the time an interesting temporary phenomenon reaches our attention it may well no longer be there to be studied.” [3] Although there is a wide range of formal temporary transformations of urban spaces from annual events, art festivals and local markets taking place in specific time and place, this study is concerned with spontaneous actions which couldn’t be anticipated. Therefore, rather than studying an existing formal event, the proposed research is planning a change, acting and observing the process [9] of a self-regulated action in response to that change. Hence, following a case-study design, this study will conduct a participatory action research. This will be based on the content analysis of DIY Rainbow Crossing, a community action creating rainbow pedestrian crossings in chalk.

Content analysis of a temporary transformation already occurred as “an unobtrusive research allows the researcher to study social life from afar, without influencing it in the process” [2]. Data is taken from secondary documents and new forms of recorded human communication in social networking sites, Facebook and Twitter in the case of DIY

Rainbow. This provides a framework for discussion on the potentials of online networks to promote spontaneous actions in urban environments.

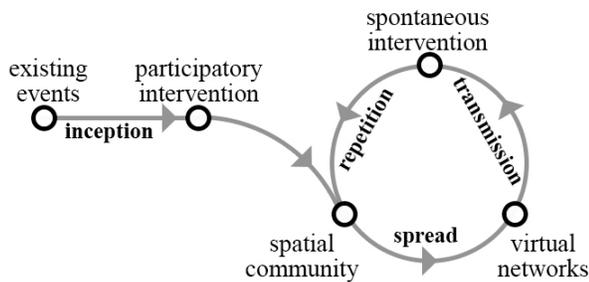


**Figure 2:** Screenshot of DIY Rainbow Facebook page

However, understanding the role of media in the whole process of inception, creation, representation and conclusion of the temporary use of urban places is possible through the real-time monitoring of social networks. To instigate a participatory action, a process-oriented practice of design is planned in spatio-temporal context of a Sydney-based event. In other words, a context which is capable of welcoming spontaneous interventions is designed. In this way, we plan a passive environment which accepts not only programmed but also unexpected events and encourages social environments to be active and take physical actions. The passive context might take the form of an unfinished installation or pavilion set for a short period of time as a catalyst of creating networks of people on-site.

Addressing the changing nature of community interaction, Foth [6] proposes network action research “to guide studies that involve people, place and technology”. This research as a hybrid study calls for online and offline activity of participants. It will be initiated by shaping a participatory intervention. Subsequently a temporary community will be built whose members are asked to make media content of the action, including text, image and video, and share it with their friends. In this way, an online community of the engaged people and their connections will be made. Sharing content with a specific hash tag facilitates the process of retrieving data from multiple social media platforms.

The proposed intervention will be organized with accessible materials and easy-to-follow rules so that it is likely that other groups of people take the same process. Due to the unfinished nature of intervention, the procedure might be replicated in different locations. Such a flexible approach allows us to reproduce the same structure in different places, regardless of the context. Contextual issues will be considered by local people taking part in completing the transformation of space. “Inviting the unexpected events and encouraging spontaneity, this process is exploratory and not finite. [7]” Such a process is capable of continuous further development as schematically illustrated in Figure 2.



**Figure 3:** research design: a social algorithm of small-scale urban design

Data will be collected through on-site observation and social media monitoring to understand how people interact with an urban intervention as media content or with one another in social networks. Then, a network analysis, combining qualitative and quantitative methods, will be employed to uncover the relationships in the process of hybrid community building.

### QUESTIONS AND ISSUES

The main issue lies in finding the practical method of studying spontaneous activities as they are unplanned and unpredictable. One might say that the wide range of temporary activities in cities opens up many possibilities in approaching cases, but the majority of them are formal events with a low level of active participation of people in generating a physical change. Thus, focusing on this might lead to a failure in addressing the collective actions in urban places influenced by media.

On the other hand, the problem in extracting data from existing evidence of spontaneous activities, like DIY Rainbow, is that access to the network structure at the time of event is limited. Besides, there are few practices of participatory design applying the potential of new media: a small-scale intervention but globally replicable; a non-deterministic but orchestrated design of places. Consequently, conducting a real-time study necessitates embarking upon an action research which is also problematic due to health and safety constraints of activities in a public space. Regarding these, the central issue is how to design and conduct a research to track a change over time; more specifically, how to take a snapshot of social networks of people participate actively in a physical transformation of space.

### BIO

Homa Rahmat started her PhD at University of New South Wales, Australia in February 2014. She graduated in Bachelor of architecture with a first class honor and Master of architecture from University of Tehran, Iran.

### REFERENCES

- [1] Alexander, C. 1979. *The timeless way of building* (Vol.1). Oxford University Press. Chicago
- [2] Babbie, E. 2012. *The practice of social research*. Cengage Learning.
- [3] Bishop, P., & Williams, L. 2012. *The temporary city*. London: Routledge.
- [4] Castells, M. 2000. "The rise of the network society. Vol. 1 of *The information age: Economy, society and culture*." Massachusetts and Oxford: Blackwell.
- [5] Fischer, G., & Giaccardi, E. 2006. Meta-design: A framework for the future of end-user development. In *End user development* (pp. 427-457). Springer Netherlands.
- [6] Foth, M. 2006. Network action research. *Action Research*, 4(2), 205-226.
- [7] Halprin, L. 1969. *The RSVP cycles: Creative processes in the human environment*. New York: George Braziller.
- [8] Hill, J. 2003. *Actions of architecture: architects and creative users*. Routledge.
- [9] Kemmis, S., & McTaggart, R. 2005. *Communicative action and the public sphere*. Denzin, NK & Lincoln, YS (red.), *The Sage handbook of qualitative research*, 3, 559-603.
- [10] Lefebvre, H. 2004. *Rhythmanalysis: Space, time and everyday life*. Bloomsbury Publishing.
- [11] McCullough, M. 2005. *Digital ground: Architecture, pervasive computing, and environmental knowing*, The MIT Press.
- [12] Oswalt, P. and O. Philipp 2013. *Urban catalyst: the power of temporary use*. Berlin: Dom Pub.
- [13] Page, S. E. (2008). *The difference: How the power of diversity creates better groups, firms, schools, and societies*. Princeton University Press.
- [14] Rainie, H., & Wellman, B. 2012. *Networked: The new social operating system*.
- [15] Stokols, D. 1988. Transformational processes in people-environment relations. Adapted from a paper presented at the US-Japan Seminar on Environment-Behavior Research, University of Arizona, Tucson, Oct 1985, Sage Publications, Inc.
- [16] Townsend, A. M. 2013. *Smart cities: big data, civic hackers, and the quest for a new utopia*. WW Norton & Company.
- [17] Yin, R. K. 2009. *Case study research: Design and methods*, sage.

# Play, learn, work. Towards a collaborative environment.

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## ABSTRACT

In a world where collaborative workflows gain importance everyday through disrupting technologies, disciplines and methodologies, this study aims to put into perspective and reframe, through the perspective of collaborative and social rituals, the whole human life process of game playing as a prelude to learning, and learning any given subject as a pre-condition to working professionally on it.

Collaborative tools help to distribute play-learning-work and put knowledge together, but few times the span and intensity of these stages is taken into consideration.

The research aims to establish a timeline and key points in this process, very much interlinked with our everyday routines, as the limits between work, leisure, learning, blur. Even more so, splitting into two environments, physical and virtual. Finding the correct “mix” into this process, according to different needs and circumstances, is key to its success.

### Author Keywords

Collaborative environments; serious games; immersive learning; time sourcing ;visualizations;3d worlds; collective imagination.

## INTRODUCTION

My PHD project tries to depict the evolution of collaborative design within the last 20 years, parallel to the evolution of technological tools, computer aided systems and interactive environments, and aims to establish an optimal flow from the three main actions or strategies we use in everyday action...play, learn, and work. Playing for the sake of fun itself, learn for the sole purpose of knowledge, and work as a mean of life. But all these processes can turn into one another just altering minimally the conditions surrounding them, and can be interpreted as one another depending on the interface through which we observe them.

### ACM indicators

D.2.2 Design Tools and Techniques.

-User interfaces.

-Human-Computer Interaction and Visualization.

## PREVIOUS WORK

Previous research has been made both on graphic design, 3d design collaborative tools, architecture representation. I have completed an MS degree on project managements, focusing on collaborative design large groups management.

I am now a PHD candidate on design engineering, specifically on virtual geometric crowdsourced designed models.

## SIGNIFICANCE AND INNOVATION

Research question: Which is the optimal framework for collaborative dynamics in the field of design?

Research innovation: More than innovation I would like to think it is a genuine perspective, based on a personal professional path, a particular mix offline and online tools, social studies, anthropology and use the state-of-the-art technologies available, focusing on open source technologies, and availability of access to large social and academic groups.

To try establish a research question I need to refer to my own personal path: During 10 years Lego-playing as a kid, 8 years architecture studying at college, 15 years architecture designing at professional level, and 6 years of architecture teaching, I've found specific gaps into the representation, communication, and so forth, interpretation and experience of architecture, that need to be filled. Of course, technologies and trends have hugely shifted in the last 20 years, and some of these gaps are already generational.

I strongly believe that the correct and “solidary” use of technologies can bring out the best in everyone of the agents involved ..a correct use and mix of technologies and online offline skills is key to the success.

Moreover, I focus specifically on the visual aspect of processes, taking into consideration that all languages originally come from the visual and tend to merge again into the visual.

## METHODOLOGY

Conceptual frame: This research is exploratory in its methodologies, field studies and cases used. Inductive in the way it gathers experiences taken from a 16 years' experience to try and build a probability which will be possibly valid for a short period.. It actually aims to depict a "tendency" of facts regarding and surrounding the design action. And finally, it is a constructivist research to the extent it learns from and puts a lot of single intelligences together.

Research question : whether collaborative design, object based work can overtake individual design, based in the scale of the object. Find the optimal allocation of resources, dependent on the scope of a range of different size projects.

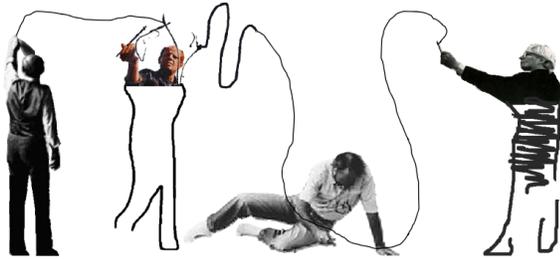


Figure 1. Collaborative work MS final work cover.

BIM Modelling teaches us that collaborative modelling, made of many intelligences, of bits of environments, each one of them forming a unit of sense, are more efficient in the long term compared to individual, speculative approaches. Instead, an individual focus gives more edge on the short term, which is an actual increasing demand of industry, with more complex and changing demands, and a growing tendency to one-off projects, limited to a single time, occasion, or instance.

Every time design is more informed and the natural process doesn't always incorporate all the inputs by means of meeting a certain deadline or due to uncertain environment conditions. To balance this equation, a careful a priori study, analyzing many different size cases, must be made in order to establish a coherent framework to every project.

The same way the design of a piece of furniture relies on different inputs and stakeholders than a piece of a city, scale has always been almost an obsession for architecture in terms of the different logics associated to it. There's always been the statement "a tiger is not a big cat" ...scale informs and shapes the final outcome of design itself, the final nature of the object designed.

New generations, grown on a mature publicity market, are attired to shorter, stronger, more visual messages. The same way that the 80s generation was grown among 4 minute video clips, 1 hour classes and 120 minute films, the last decade teenagers, born on between 1990 and 2000, have grown amidst less than 45 seconds average loyalty to YouTube clips, 50 min classes and 35 min TV series.

Attention span has drastically shortened, the intensity and complexity of communication channels and inputs increased. The promise for design interaction still remains a promise, far behind the evolution of videogames, still wondering about the very nature of interaction applied to design.

I base on the working hypothesis that collective work is more efficient than individual one, and try to determine to which extent this is true in the field of architecture design.

I understand everything is a communication ritual, in the shape of design, words, etc. I find myself in a cross territory in which visually communication is the key aspect, and immersion is the most important process, by sake of the spatial nature of architecture and urban design.

Strategies: workshops group mixing crowdsourcing, group dynamics, derives and spontaneous actions ...communication games, express work, gamers profile, team building, etc.

I use exploratory research in the courses I teach, to address different issues that arise around architecture. Only using case studies as field research on the "BREGAN food raise project". "TETUAN neighborhood project", field applications on the VOLOS BOX or pilot studies such as Valencia's NYC project the point can be approached and an optimal workflow hypothesis can be established.

### TETUAN PROJECT (2013)

Tetuan: case study of crowdsourced design tools and resources. Can a small scale urban intervention be optimize on its visibility. Can visibility and crowd feedback be a design tool?

Method: case study. Hypothesis. Key steps identified.

**1-Calling for massive contributions:** crowdsourcing through social networks. Put the problem on the table.

**2-Mapping the problem** Identify potentially problematic areas in the neighborhood with collaborative map editor. Overlaps and photo location indicate most degraded areas.

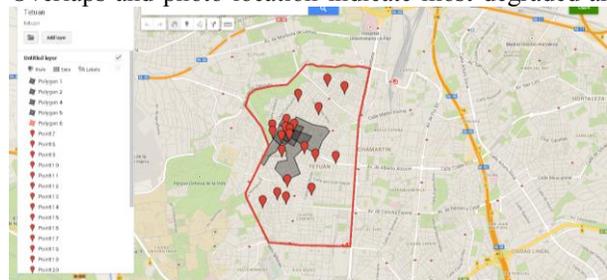
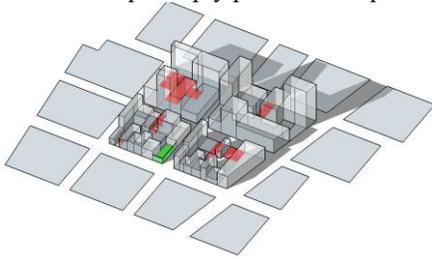


Figure 2. Google maps engine collective timeline map.

**3-Survey for desired uses** google forms can provide with statistics of desired uses, lack of services, and other hard to

ponderate factor such as assimilation of new technologies or degree of conviviality in the neighborhood.

**4-Urban to detail scale Modelling** Massive online 3d design file. Urban shape empty plots. Green plot identified.



**Figure 3. Detail scale. Plot intervention. sketchup free version**

**4-Collective Publishing**

**5-Feedback period:** publish results in real time in public dropbox html file

<https://dl.dropboxusercontent.com/u/5322317/Tetuan/web/index.html>

**6-Mapping material resources (donations, etc.).**

**7-Execution:** An idea for a crowdsourced call for 3d printed parts of a larger model was proposed, without any further detail. Still, after 18 months, new powerful and easier tools to 3d print have been released (reprap, tinkercad, autodesk 123d..)

**8-Final Publish and maintenance of a web site:** follow up web site <http://www.luzazulweb.com/skpcad/indexclara>



old approach stages	visibility	new approach stages	visibility
1-urban study walks	low	1-calling for massive contributions	high
2-plot allocation		2-mapping the problem	
3-design		3-survey for desired uses	
		4-urban to detail scale modelling	medium
		5-collective publishing	
		6-feedback period	
		7-mapping material resources (donations, etc.)	
4-execution	medium	8-execution	
5-result publishing: call for users	high	9-publish and follow	

**Figure 4. Collective design optimal timeline.**

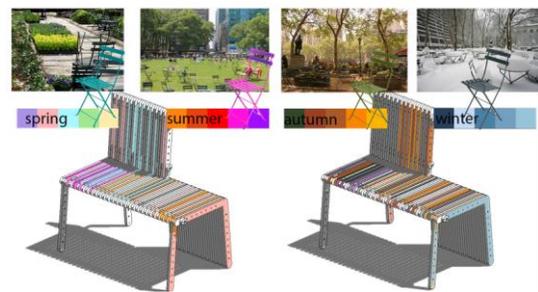
**BRYAN PARK (2011)**

Bryant park (speculative urban icons research) patterns of use, public space and city symbology as recurrence of images.

Research question: what defines the character of a physical public realm, as opposed to a virtual one. Rules of conformation. Similarities and differences. Time sensitiveness as new input



**Figure 5. Bryant Park social network diagram.**



**Figure 6. Bryant park time sensitive urban furniture.**

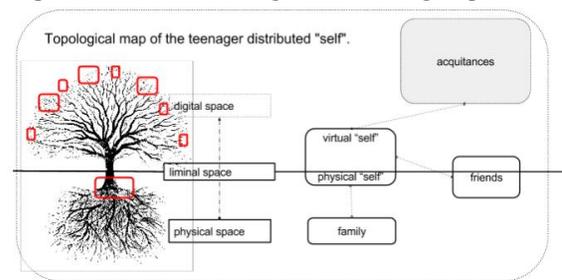
**VALENCIA VS NY PROJECT (2014)**

Valencia vs NYC: field study on time sensitive hybrid space inhabitation

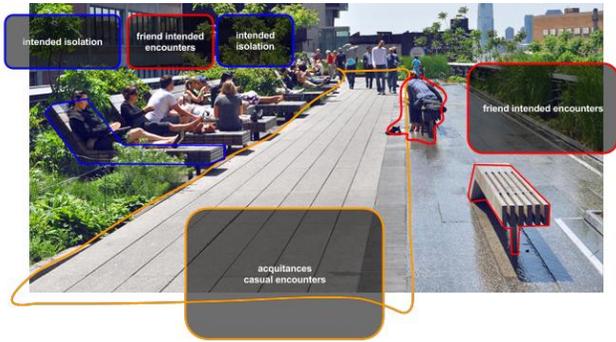
Research question: can public spaces be modeled and interpreted as negative occupations of the online space, according to the space and time patterns on the social networks?

Method: recursive analysis of patterns of use through year round images and big data processing.

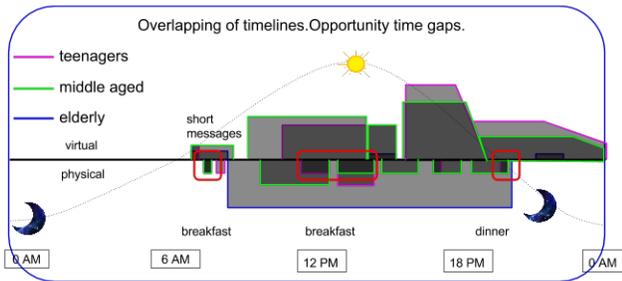
Analyzing user profiles, use patterns and contested spaces, I formulated an hypothesis on the evolving occupation pattern of both offline and online spaces, proposing a way to put back different generational groups in contact.



**Figure 7. Generational diagram of the distribution of the "self" in the real and the virtual, and within the social and family links.**



**Figure 8. Compared topology of contested public and private, offline and online, and cross generational spaces.**



**Figure 9. Timeline diagram of the distribution of the “self” in the real and the virtual, and overlapping of different generations into spaces of opportunity.**

### VOLOS BOX Project

This project was developed during the 3<sup>rd</sup> EINS Summer school in Volos, Greece, in the Urban interaction design department, and it aimed to establish a communication channel with local citizens to address any urban problem or circumstance that may arise, through “message in a box” game.



**Figure 13. Ritual of “message in the box”.**

### QUESTIONS AND ISSUES

Many questions have arisen during these years, I will individualize the ones that align more with my research.

- What’s the best workflow for architecture design
- What makes a work group become a team
- How solid are age barriers. Can generational gaps become unreachable?
- How can experience be properly transmitted in the new protocols?

### BIO

Gonzalo Reyero Aldama (Madrid, 1974) I am a MS Architect with honors from ETSAM Architecture school in Madrid. Apart from Spain, I have played, studied and worked in the US (Santa Barbara camp counselor 1996), Italy (Erasmus 1997), UK (Foster and Partners 2002-2004), and China (Spanish architecture in Asia 2010-2011). I have attended to architecture workshops in France, Greece.

### References and related readings

1. Seltzer, E., Mahmoudi, D.: Citizen Participation, Open Innovation, and Crowdsourcing: Challenges and Opportunities for Planning. *Journal of Planning Literature*. 28, 3–18 (2013).
2. Brabham, D.C., Sanchez, T.W., Bartholomew, K.: Crowdsourcing public participation in transit planning: preliminary results from the next stop design case. *TRB 89th Annual Meeting Compendium* (2010).
3. Sanders, E.B.-N.: Generative Tools for Co-designing. In: Scrivener, S.A.R., Ball, L.J., and Woodcock, A. (eds.) *Collaborative Design*. pp. 3–12. Springer London, London (2000).
4. Rosenman, M.A., Gero, J.S.: Modelling multiple views of design objects in a collaborative cad environment. *Computer-Aided Design*. 28, 193–205 (1996).
5. Carmona, M. (2011) *Design Coding: Mediating the Tyrannies of Practice, in Urban Design in the Real Estate Development Process* (eds S. Tiesdell and D. Adams), Wiley-Blackwell, Oxford, UK. doi: 10.1002/9781444341188.ch3

# Media Development by “ordinary People” – Processes and Practices in the Development and Establishment of Media Facades as digital Facade Media

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## ABSTRACT

Despite the increasing importance of “ordinary people” for media development beyond pure content production, they get only little attention in research. It is the aim of this qualitative research project to provide these actors at the center. It concerns the processes and practices that allow “ordinary people” – as a counterpart to professionals – to create a new medium with specific capabilities as well as individual tasks and functions and to become “mediapreneurs”. The processes and practices of the development and establishment of digital media facades as façade media are very suitable for such a research project. Here participate actors, which prior to this had (almost) no experience with media development and which – in this context – can be called as “ordinary people”: architects, artists, designer, programmer, film artists, city planner, building owner, social groups and public authorities. The project will bring up their *individual* motives and expectations to the new façade media and to what people should do with it in specific contexts. It will also answer the question, whether and how these ideas were transformed into *common* goals, strategies and tactics, and if/how all of this lead to a common sense within the façade media community about the meaning of “media” and especially “façade media”.

## Author Keywords

Media development; Media facades; façade media; ordinary people; Mediapreneur; research project; PhD project; doctoral workshop paper.

## ACM Classification Keywords

• *General and reference~Empirical studies* • *Applied computing~Sociology* • *Hardware~Emerging technologies*

## INTRODUCTION

In the past, media were almost exclusively developed, produced and allocated by media companies or similar institutionalized organizations with interdisciplinary teams. However, digitization and networking caused a change in this structure and brought the users into a new position. On the one hand, ordinary people became content producers for media – and became so-called prosumers; on the other hand, they can now more than ever develop media

technologies as well as create processes and structures by their own. I assume that they have probably been collected only little experience with media development and production before and therefore bring their own “unencumbered”, perhaps idealistic and naive ideas of what other users could or should do with a new medium, into the processes. I also assume that they form individual new processes and practices that affect not only the development of new media, but also the general understanding of “media” itself. Traditional definitions could thus become less important and would need a reformulation. It is the aim of this qualitative research project to provide such actors at the center. It concerns the processes and practices that allow these “ordinary people” – as a counterpart to professionals – to create a new medium with specific capabilities as well as individual tasks and functions and to become “mediapreneurs”.

The processes and practices of the development and establishment of digital media facades as façade media are very suitable for such a research topic. Here participate actors, which before had (almost) no experience with media development and which – in this context – can be called as “ordinary people”: for example architects, artists, designer, programmer, film artists, city planner, building owner, social groups and public authorities. However, a specific characteristic needs to be emphasized: There does not exist any fixed community who develops *the one media* “media façade”. Rather, this process takes place simultaneously at different locations worldwide. Therefore, it is also required to investigate, if/in which way this translocality influences (f. ex. slows down or advances) the development of a generally accepted medium. In addition, of course not every media facade is planned as a medium, so I need to differentiate here.

The research project aims (a) to specify the differently focused stakeholders (mostly “ordinary people”) who work on different façade media at different places (each with its own social, technological and cultural environment) and who are involved in parallel but individual processes to develop local anchored, self-sufficient, yet similar new media for public spaces, and (b) to highlight their respective motives, expectations, goals and strategies. The project continues (c) to explore, which mutually interrelated

processes are necessary to develop such media, and (d) how the actors with their individual social, technological and cultural backgrounds affect these processes. It shall be (e) pointed out, in which form they work together locally and trans-locally, which regular and non-regular actions they execute and to which practices these actions can be summarized. Finally, it shall be (f) found out in this project, in what degree and in what form the several established façade media are similar or different, and whether there can be identified any dimensions of “mediality” that are distinctive enough to declare the establishment of a new trans-local homogeneous medium for public spaces with specific capabilities and individual functions.

These goals can be achieved by examining the development of media facades into facade media. Media facades are (a) a widely spread but specific local parameters underlying phenomenon with (b) individually different dimensions of “mediality”. (c) Technical, non-technical and economically interested actors, but also social groups and authorities influence the development of façade media. Some of these – in this context – more or less “ordinary people” without relevant prior experience are working together in (d) trans-local networks for the extension of the creative and social-communicative potential of media facades and actively support their further development into digital façade media.

These outlined basic objectives are concretized in one overall project question and three research questions:

#### *Overall project question*

Which actors are using what processes and applying which practices in order to develop locally anchored, autonomous and individual media facades that can be called as digital façade media based on common dimensions of “mediality”, and that represent a new medium for public spaces with specific capabilities and individual functions and tasks?

#### *Research question 1*

Which human and non-human actors and actants (f.ex. stakeholder; objects; discourses) influence firstly the development of at different places locally embedded and autonomous media façades to digital façade media and secondly their later establishment? What are the motives, expectations, goals and strategies of the actors?

#### *Research question 2*

Which processes took/take place in detail to strengthen the dimensions of “mediality” of locally anchored and autonomous media facades? Which practices are developed and applied by the actors? How do the individual processes and practices affect each other?

#### *Research question 3*

To what degree and in what form does any common dimension(s) of “mediality” exist across different locally-anchored facade media objects? Are these dimensions sufficient to postulate the façade media as a new independent medium in public space?

## **PREVIOUS WORK**

I am researching in the field of media facades for several years and from different perspectives. In 2010, I gave a lecture about strategies for emotionalization through digital media facades at the conference “Inside Out-of-Home-Displays” at Lucerne University (Switzerland). In January 2011, I spoke at a PhD workshop of the University of Aarhus about the possibilities of using user interfaces for media facades. In March 2011, I attended a workshop of experts in the framework of the *Innovation Forum Urban Screens* in Berlin and published in a subsequent publication to “Identity and the role of media facades” [1]. Only this year I finally decided to claim the hereby-described research questions as my PhD-topic and I will publish my first – more pre-empirical – findings about the development of a new (digital) medium at the beginning of next year [2].

## **SIGNIFICANCE AND INNOVATION**

By answering the overall project question and the research questions, I want to generate new knowledge in the field of media development research. When we talk about media development within the media and communication studies, the debates mostly revolve around the interrelations between media change on the one hand and resultant meta-processes of cultural, social and societal change on the other hand. It turns out that there still is a lack of a (postmodern) theory of media development in the sense of configuration, creation and establishing of a new medium, which is more than a teleologic and linear historical work.

Also new is the consideration of the roles of “ordinary people” in the development of media. Since the TIMES convergence (the approach and fusion of the five sectors “telecommunication”, “information”, “media”, “entertainment” and “security”) and the subsequent development of digital network media, not only the technical possibilities of influence by ordinary people changed, but also the previously clearly defined roles within the more or less linear relationship of production, allocation, reception and use of communication. [3] If the involvement of users and consumers is considered to production processes, one speaks today of prosumers and means either *producing* or *professional consumers*. Alvin Toffler has introduced this term in 1970 in his book “Future Shock” [4] and elaborated it further in “The third wave”(1980) to describe the participation of people in the production of goods and services for a non-exclusive personal use. [5] Since the research regarding prosumers focuses mainly on production and allocation of goods and information, it reaches not far enough for my project. Media development starts earlier; frames and structures for a production and allocation of communication need to be built first. I want to extend the known models into this direction.

Basis of a successful media development is not just a technology with the potential to enable new social and societal relations, but also the suitability of the actors to

develop these and make them usable. Often, a medium becomes only at the stage of its establishment a subject of research. Then, when the question is asked “What do people do with media?”, it usually interests just the perception and use of “finished” phenomena. However, a change of perspective is necessary for this research project – towards the question “Why and how do people (as developer or producer) do media?”

It is not only the goal of the project to describe the different actors, processes, practices and dimensions, but to put them in relation to each other. Ideally, there emerges a sort of guideline for the development of façade media that supports managers and decision makers in practice – in identifying requirements for the development of a façade medium, its possibilities and limitations as well as its risks and rewards. At the same time, the results of the work should help stakeholders to optimize the strategy and objectives formulation for façade media.

Finally, the work aims to contribute in strengthening the role of media and communication researchers within the scientific discourses on media facades, which are determined yet by architects, designers and urban planners. However, these discourses also help to increase social acceptance of “mediality” in the public space.

#### METHODOLOGY

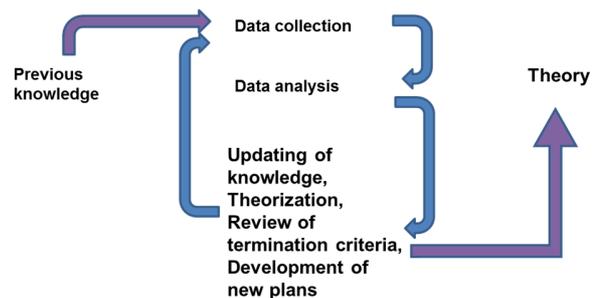
All the following methodological approaches and concepts are only planned yet. I will start with the field research within the next weeks.

First, I will start with the pre-selection of investigation objects, which for pragmatic reasons should be located in the German-speaking countries (D-A-CH). At least one object should be located outside Germany to point out, if/how f. ex. different legal rules can bring effects on media development. In addition, some technical criteria are relevant for the selection: The objects should play both during day and night. They should furthermore have a sufficiently high resolution to display texts and images and to display video. In the shortlist are for example the former T-Mobile media façade in Bonn, the media facade of the PSD Bank in Munster (Germany) and the ars electronica building in Linz (Austria). The aim of the pre-selection is getting in contact with as many actors/stakeholders as possible as described in research question 1 to conduct expert interviews.

In addition, in this first phase I want to find at least two trans-local acting stakeholders. These actors can be both individuals and networks that are not focused on one media façade. It would be particularly interesting to work with networks that are created as trans-locally and/or in which different stakeholders come together. An example is the "Connecting Cities" network that for three events in the years 2013-2015 developed an infrastructure of media facades in several European cities and that organized a series of workshops and conferences as well as an exchange

between “urban activists,” creative people, passers-by and city residents about urban screens and media facades.

The research project is designed as a qualitative study. To focus on people and their perspectives on social and cultural phenomena – resulting from their own communication and action practices –, theory-generating methodologies are particularly suitable. I use the Grounded Theory Method in this project, which firstly sees all the people as experts who know the object of research from their social and cultural practices and have their own relevant perspectives, and secondly wants to explore their knowledge. The Grounded Theory is a theory-generating method. It was founded in the 1960s by the American sociologists Barney G. Glaser and Anselm L. Strauss [6] as a basis for data-based and object-oriented generation of theories. It is based on the assumption that theory must be continually reviewed to ever-new data and therefore can be only provisionally – during the development process as well as after its completion. An important part of the Grounded Theory is the “theoretical sampling”. It stands for the repetitive process of case-related data collection, evaluation and analysis associated with the parallel decision what data will be collected next and where to find it.



**Figure 1. Schematic representation of the process of theory-generating research**

The survey methods will mainly be expert-interviews. As mentioned before, all stakeholders who were involved in the development of façade media will be seen as experts. They will be asked to talk about their individual motives, objectives and strategies as well as their roles and their various activities and actions in relation to the development of digital façade media. Due to the previously unknown knowledge of the respondent and to ensure that she/he can provide as many as possible information I will use non-standardized guideline-based interviews. To enable new perspectives and responses in the later interviews, the Grounded Theory Method claims to adapt the questions and the guidelines after each interview according to the findings.

The data evaluation is carried out mainly in a multi-stage coding-process. At the end of this process there emerge one or more key categories, around which the theory needs to be established. The entire data material has to be rearranged according to these categories in order to shape the theory.



# Hybrid Cemeteries: Dealing with Death – exploring the connections between people, places and social mobile media

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## ABSTRACT

In a traditional understanding of the city, urban cemeteries have always had a strong historical, cultural and emotional foothold as places of interment and mourning. But as societies change over time, so do individual and social traditions, rituals and the meaning of the urban cemetery. The foundation of the project is a case study of Almen Cemetery in Aalborg; how it as an ‘urban deathscape’, is materialized, spatialized and culturally constructed today and by which arguments it can be considered a place of meaning, relevance and significance to the citizens now and in the future. From here a smartphone application is developed as a catalyst for new experiences of the ‘hybrid cemetery’. As a methodological tool its abilities to promote, invigorate and enhance the cemetery experience among diverse user groups are tested, followed by a discussion of the hybrid cemetery as a space and place in a time of increased social mobile technology and practice.

## Author Keywords

Urban design; human geography; death studies; social science; mixed methods; qualitative research; social mobile media; urban cemeteries;

## INTRODUCTION

Cemeteries have always had a strong historical and cultural foundation in society. But recently some urban cemeteries are experiencing a shift towards a more casual assorted mixed usage and the public interest in its spatial, sensible and recreational affordances are gaining momentum. Burial traditions, death symbolism and decoration of graves are being influenced by the postmodern shifts towards individualisation, self-representation and experience through various media and thus become distanced from the

embodied emotional practices of everyday life [18, 9]. Since the cemetery still is the primary physical space where death is grounded, what will happen to it, if it’s meaning and significance continuously devaluates and the general public becomes even more distanced to it?

“[...] the modern denial of death can be overcome, if death is articulated in public space, not just a space for life, but also a space for death” [15, p. 22].

Since the introduction of the mobile smart phone people now move differently around the city, their presence in space divided between the real, the virtual and the social. It challenges their simultaneous attention to context, themselves and other people offering new potentials of experience, social behaviour and reinvigorations of content and context, past and present. Researching the affordances of cemetery space and the potentials of social mobile media technologies might establish a new invigoration of the link between lived lives, immanent death and cemetery space.

From these initial ponderings the main objective of the study emanate:

*An in-depth investigation of present use of the Danish urban cemetery as both urban space and cultural phenomenon. This to inform the design of proposals for future experiences of the cemetery focusing on the use of Smartphone applications and changing behaviors in the Danish online and offline culture of mourning and remembrance.*

The research questions in this regard are:

- What potentials does the cemetery hold, as architecture, as experience and as lived space?
- What are the differences and similarities between online mourning rituals and cemetery mourning rituals and what consequences does online mourning have on the use of the cemetery?
- How can smartphones enhance both the use and experience of the cemetery spaces?

Inquiry into the use of virtual/physical hybrid cemeteries in search of empirical data seeks to reveal how the purpose of the cemetery, its identity or cultural significance in the city

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is altered and maintained. Furthermore it is an experience-based design exploration of the cemetery's present public and cultural roothold and a perspective towards future planning, design and experience.

### PREVIOUS WORK

Cemeteries are burial spaces, physical locations that merge spaces of death with spaces of life [9, 1, 17, 15]. But they are much more than that. Due to their inherent affordances, demographic and cultural identifiers (site characteristics, symbolic and cultural features) cemeteries are rich 'texts of culture', that display lifetime-developed relations between religion, social status, and community identity [10]. Beside its material and spatial constituents, the urban cemetery is a strong metaphysical *place* where ethical, spiritual, emotional and aesthetic dimensions unfold and creates a unique sensible atmosphere and identity of place for citizens of the otherwise fast growing and technologically enhanced society [19, 3].

The traditional Danish urban cemetery is a socially constructed *single-minded space*, where social and political agendas of ownership, governance, maintenance and 'rights' to urban space [1, 17] are 'lived out' within clearly defined functional boundaries of little flexibility and tolerance toward multiple uses [21]. However recent changes in cemetery development, the transformation of family patterns and shifts in citizens' religious or secular affiliations has made it a place of growing contest and conflict among planners, communities, and users creating an interconnected yet diverse field of actors, networks and agents that influence the cemetery as both as space, place, institution and social construction [12].

Technological innovation as well affects and changes the cemetery and peoples mourning practices. Assisted by mobile Smart phones and tablets citizens today switch between multiple realities of the physical, the virtual and the augmented as they go about their daily lives. These tools challenge the socio-spatial behaviour and influence how citizens, physically, mentally and socially, relate to their context, themselves and other people [13, 8]. Research in social mobile media and death studies is gaining interest regarding issues of the legacy of mobile social data, geolocate media and the exponentially growing individual digital heritage of everyday life practices [20, 7, 4]. Such issues pose an interesting offset for discussion and for design proposals that might link the physical burial ground of the individual and his/her digital remains (data displaying lived activity, attitudes, relations and memories) based a contemporary urban living. As interventions relying on mobile technology and locative media, such designs can be used to inform and engage visitors of the urban cemetery creating meaningful experiences of narratives of life and death. The question is how the 'hybrid cemetery' (the physical, the virtual and the metaphysical) is designed and later experienced when transgressing from single-minded

mono-functional space towards a more augmented open-minded spatial programming [21].

### SIGNIFICANCE AND INNOVATION

In twenty years the five largest Danish cities, Copenhagen, Aarhus, Odense, Esbjerg and Aalborg will experience an overall population growth between 2-6 percent and their remaining vacant spaces will be challenged to best accommodate the needs and wanting's of existing and new-coming dwellers. The urban cemeteries are already becoming spaces of such contest hence the significance of a discussion of the role of the urban cemeteries in the future. Urban cemeteries serve as the cities' cultural and historical landscapes and the information that can be read, experience and interpret from these urban spaces educate citizens about themselves, each other and the society they are part of. With the introduction of the smartphone citizens are suddenly provided access to these layers of information relevant to the places in which they live and die, making otherwise unknown, hidden or forgotten narratives, stories and memories, present, visible and understandable.

The project is a proposal for a design exploration into media based solutions that can sustain the significance of public cemetery space. Inspired by the smartphone applications *Afveje*, *Recco*, *Geocatching* and *Podruns*, this project will enable people to both experience and contribute to the cultural fabric of the city and take on existing practices for urban experience design and introduce them to the context of the public *deathscapes* and practices of mourning to test whether or not this is a field that is suited for technological enhanced public and private experiences.

After 3 years of study the project will have contributed to the academic fields of death, urban- and experience design studies through generalizing analysis and have contributed to a public and scientific debate about the cultural and social maintenance and mediation of public sacred urban spaces.

### Knowledge impact:

- Mapping contemporary use of the Danish urban cemetery studying Almen Cemetery as a case study.
- Clarification of public opinions regarding the future use and identity of the urban cemetery.
- Snapshots of the Danish culture of remembrance and memorialisation, at the cemetery and on online platforms.
- Different technology and game based approaches to an alternative experience of the urban cemetery.
- Perspectives for an individual post mortem self-realisation process.
- Perspectives for a citizen driven contribution to cultural and historical production.
- Design, use and data retrieval using applications developed for research purposes in urban design studies.

## **METHODOLOGY**

The study of the materiality, spatiality and culture of deathscapes is conducted through the use of a single case study. Case study as method enables an interpretive approach to data, to study ‘things’ within their context and the meaning that actors bring to their design [6]. The empirical background for this research is Almen Cemetery and the study aims at exploring the materiality, spatiality and cultural identities of the cemetery, the activities and actions performed by owners, users and visitors of the space to understand how to “reintegrate the places [deathscapes] into modern life worlds and social and physical geographies.” [22, p11].

### **1. Materiality of the cemetery - objects and space (2014)**

Using cartographic map studies, historic background material and explorative walks around the cemetery and its context, the different urban programs and the material and spatial layout is registered, traced and mapped by paying attention to the architectural and cultural historical categories of the SAVE analysis [11].

### **2. The spatiality and the production of space - observation and counting ( Spring 2014)**

Using field study observation and counting the use, stay and activities of visitors and users have been registered [2]. The counting and observations bring fourth data about who the users are, what they do while there, and in what numbers they come.

### **3.1 Cultural, personal and social identities of place - survey on mourning and use of space (Spring 2014)**

An online survey [2] was conducted via social media (Facebook) and email (snowballing effect) in April 2014 with 163 respondents, examining the role the cemetery play in people’s individual and social practice of grief, mourning and remembrance with regard to physical and virtual platforms, rituals and behavior.

### **3.2 Interviews on site (Fall 2014)**

Interviews have been conducted with respondents present at the cemetery. They have been interviewed using the method of semi-structured interviews on site [2] where they were asked about their present purpose of stay, their perception and experience and their social relational attachment to the cemetery. 27 interviews have been made where 19 agreed to participate in further analysis later in the project. 10 have been preselected for songline interviews and mapping.

### **3.3 Mapping everyday rituals and practices at the cemetery (2014)**

Mappings of the individual respondents’ ‘mourning domain’ for activities and parameters for generation of meaning and mourning have been explored by use of the “Songline” method [14]. As method it captures the respondents experience of the cemetery and enables an understanding of the social practice (what the person is

doing here, with whom, when and why), the connections (internal and external networks and routes), the reminiscence (memories of occurrences), the sensuous experiences (cold, warm, cosy, comfortable, unsafe) and the architecture (spatial qualities, light, material, vegetation and standards of maintenance). The purpose of songline studies is to gain a deeper insight into how life is lived and performed around death, grief and remembrance. The songline maps support the empirical data retrieved from each interview and ensures a visual cartographic representation of the respondents’ lifestyle behavior with regard to the cemetery.

The research is systematised by the following research design:

- Interview about visitors personal experiences at the cemetery and themes such as death, mourning and remembrance (Songline interview).
- Mapping of routes and areas in Aalborg that hold special use, interest and significance to the user (Songline mapping).
- Mapping of routes and areas of interest and significance at Almen Cemetery (Cemetery songline mapping)
- Going to the cemetery (by users preferred way of transportation and route), visiting the grave, walking and talking at the cemetery.

### **4. Experience design and data gathering (Spring 2015)**

Data is gathered by testing the already developed experience design (Smartphone application). Test subjects are handpicked among new and previous cemetery interviewees. The research is systematised by the following research design:

- Preliminary interview with visitor/user at the cemetery
- Introducing the application and the experience design
- Following and observing the user around the cemetery experience route.
- Interview about the overall experience after the walk is terminated.
- Analysis of data gathered through the EMA component, drawing maps, transcribing interviews and logging observations.

Based on 8-10 users the research will be able to generalise upon the experience design and the further developments.

## **QUESTIONS AND ISSUES**

Ontology and epistemology: My theoretical standpoint could use a tightening up and narrowing down. I work with death studies, urban theory, human geography and experience design. But is it an ideal approach; are there too many topics to cover?

Methods: I use a lot of different methods to gather my empirical data some from urban design, some from social

science. Am I lacking in certain areas? How much empirical data would I need to obtain to be able to generalize from my analysis?

I have an idea of an experience design that I want to use as a tool for testing my hypothesis that the cemetery can offer something back to the city as well as provide a physical ground for a hybrid mourning process. Is this too much to integrate in the PhD project? How do I deal with personal bias?

#### BIO

I am 33 years old, living in Aalborg, originally from the town of Viborg. I hold an MSc. In Engineering with specialization in Digital Design from the Department of Architecture, Design and Media Technology, Aalborg University, from where I graduated in 2010. Before beginning my PhD study in 2013 I have worked (2010-2013) as a research assistant at Architecture & Design and Art & Technology with responsibilities within curating, coordination of semesters, supervision of problem based project oriented work, teaching courses of academic methods, representation techniques, projection drawing and urban media facades. I finish the PhD in January 2016.

#### REFERENCES

1. Braae, E. *Rum, Bevægelse og grænser – om kirkegården som et rumligt arkitektonisk fænomen* in Petersen & Sommer, 1998: *Dødens Rum*, Odense Universitetsforlag, 1998
2. Brinkmann, S. & Tangaard, L. *Kvalitative metoder – En grundbog*, Hans Reitzels Forlag, Copenhagen, 2012
3. Böhme, G. *Architektur und Atmosphäre*. Wilhelm Fink GmbH & Co. Verlag, 2006
4. Christensen, D.R. *Don't Rest in Peace: Objects as relationbuilding media on children's graves and in the online*, 2013
5. Dinby.dk. *Metroen er kommet til Assistens*, assessed 22.09.2014
6. Flyvbjerg, B. *Five misunderstandings about case study research*. *Qualitative Inquiry*, 12 (2) (2006), 219-245.
7. Gibbs, M. *Death and the Internet: Consumer issues for planning and managing digital legacies*, University of Melbourne, 2013
8. Gordon E. & A. S. Silva. *Netlocality – Why Location Matters in a Networked World*, Chichester: Wiley-Blackwell, 2011
9. Jacobsen, M.H. *Dødens mosaik: en sociologi om det unævnelige*, Gyldendahls forlag, København, DK, 2001
10. Kolbuszewski J. *Cemeteries as a text of culture*. In O. Czerner & I. Juszkiwicz (Eds), *Cemetery art*. Wroclaw: ICOMOS, 1995
11. Kulturarvsstyrelsen. *SAVE – Kortlægning og registrering af bymiljøers og bygningers bevaringsværdi*, Kulturministeriet, Kulturarvsstyrelsen, 2011
12. Latour, B. *Reassembling the social – an introduction to actor-network-theory*, Oxford University Press, Oxford, 2005
13. Lillemose, J. *Kunst som informationsværktøj. Konceptuel æstetik I den computerbaserede samtidskunst*, AFART #21; Tema: Iscenesættelse, Københavns universitet, 2008
14. Marling G. *The city experienced by ordinary people*, In: Andrade, V., Smith, S. & Lanng D.B., 2012: *Musings – An urban design anthology*, Aalborg University Press, 2012
15. Petersen, A.B. & Sommer, A-L. *Dødens rum*, (Ed.) Odense Universitets forlag, Odense, 1998
16. Politiken. *Kommunen kæmper mod fredning af Assistens Kirkegård*, assessed 22.09.2014
17. Rugg, J. *Defining the place of burial: what makes a cemetery a cemetery?* *Mortality: Promoting the interdisciplinary study of death and dying*, 5:3, (2000), 259-275, DOI: 10.1080/713686011
18. Sommer, A-L. *De dødes haver - den moderne storbykirkegård*, Syddansk Universitetsforlag, Odense, DK, 2003
19. Tuan, Y-F. *Space and place – the perspective of experience*, University of Minnesota press, 1977
20. Van der Linden, J. *Evocative computing – creating meaningful lasting experiences in connecting with the past*, Springer Verlag GMBH Berlin, 2013
21. Walzer, M. *Pleasure and Cost of Urbanity*, in P. Kasinitz (ed.), 1995: *Intoduction to metropolis – Center and Symbol of our Times*, New York: new York University press, pp 320 – 330, 1995
22. Worpole, K. *Last Landscapes – the architecture of the cemetery in the West*, Reaktion Books, London, 2003

# Gamified participation: Encouraging citizen's involvement in local governments

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## ABSTRACT

In my PhD thesis, I explore what elements (e.g. gamification) in mobile e-participation (m-participation) tools encourage citizens' involvement in urban governance and achieve a continuous dialogue between a city and its citizens. In e-participation the most challenging aspects on the citizens' side include encouraging them to participate in the first place as well as keeping them motivated to stay active. My research aims to investigate how game elements such as achievement badges, voting systems and opportunities for social interaction can be utilized to achieve such a continuous participation. For this purpose, using prototypical m-participation systems the effect of those elements are evaluated through user studies. A special focus is further put on exploring what kind of interventions (e.g. setting up missions, offering incentives) the governance can undertake to foster engagement. I will analyse how such interventions have to be designed and placed to achieve the desired outcome of a sustainable strategic participation.

## Categories and Subject Descriptors

H.1.2 [User/Machine systems]: Human Factors

## Keywords

m-participation; gamification; game elements; ubiquitous computing; pervasive games; motivation

## 1. INTRODUCTION

E-participation describes "efforts to broaden and deepen political participation by enabling citizens to connect with one another, and with their elected representatives and governments using Information and Communication Technologies (ICT)" [16, p.5]. According to this definition, e-participation consists of two communication directions: citizens-to-citizens and citizens-to-governance (or governance-to-citizens). It has been argued that governmental representatives usually

interpret the desire to be heard as a call to be consulted resulting in inviting citizens to respond to pre-established policy agendas. However, what the public really wants is to be engaged in a two-way conversation with the opportunity to steer and contribute to decision-making processes. Drawing upon Macintosh's framework, the public wants to be *empowered* [13]. The majority of existing e-participation tools concentrate on enabling and engaging. *Enabling* techniques allow citizens to vote and raise their voices in surveys and petitions. The second level of participation, *engages* citizens to participate by informing them about currently relevant topics and representing interim results. In this framework but also in democratic history, the citizens were initially regarded as information consumers and only slowly grow into active participants in community.



Figure 1: Two-way communication between governance and citizens.

Emerging new technologies and changes in society have created new possibilities for meaningful participation [14]. Recently mobile devices (e.g. smartphones) have been identified as powerful ubiquitous participation enablers. While research regarding using mobile devices for citizen participation is still in its infancy and only few applications are yet publicly available, a recent study [7] has shown that most m-participation apps focus on dissemination and reporting purposes and do not aim for a sustainable two-communication between governance and citizens.

My research aims to explore novel pervasive participation interfaces. By investigating concepts for enabling mobile interaction and e-participation in urban governance through citizens' mobile devices the project aims to establish a two-way communication where the governance responds to citi-

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<p><b>RQ1:</b> Can game elements in m-participation tools increase the level of participation?  <b>RQ1.1:</b> What game elements have an influence on participation?</p>
<p><b>RQ2:</b> Can interventions by the governance increase citizen participation?  <b>RQ2.1:</b> Does providing a specific purpose increase the level of participation?</p>
<p><b>RQ3:</b> Does offering incentives have an impact on the level of participation?  <b>RQ3.1:</b> What types of incentives motivate citizens to engage in e-participation?</p>

**Table 1: Research questions to be addressed in this project.**

zens’ ideas and issues as well as actively involves citizens in political decision-making processes (see Fig. 1).

Developing tools and concepts alone does not satisfy the need, people have to actually use the tools. In the presented scenario, it is essential that both stakeholders, citizens and governance, become active. A continuous disconnection between political representatives and citizens will along with eroding political identities ultimately lead to a relative decline in the power of political institutions with the result of political disputes being less engaging and their outcomes less momentous [16]. For the purpose of this project, I will focus on the motivation of citizens and assume that governances have an initial interest in involving citizens.

Public participation exhibits a declining trend [9] that is slowly leaving voting as the only interaction with governance. In order to reactivate citizens’ involvement it is important to give them reasons (meaning) and therefore a motivation to become active. This project aims to explore the potential of game elements as motivational factors. By integrating various game elements into mobile e-participation tools I want to evaluate what influence (if at all) those elements have on the level of public participation.

This overall research question can be split into three blocks each addressing a specific aspect. The first block deals with the general effect of adding game elements in the domain of e-participation. The second touches on the role of governance and asks how it can influence participation. The last block addresses a specific game element, which is commonly used for extrinsic motivation: incentives. Table 1 summarizes the research questions that shall be answered in this project.

The goal of this project is to identify elements and processes that can encourage an interactive and responsive participation where citizens can actively take part in decision-making processes and discuss locally relevant issues among themselves (citizen-citizen) but also with responsible officials (citizen-government). The governance also benefits from the outcomes of the project as such a participation platform provides them the possibility to address and inform citizens (government-citizen) as well as ask for citizens’ input (citizensourcing). Moreover, the platform can be used as an overview that facilitates mood sampling and identification of hot topics.

## 2. PREVIOUS WORK

A growing number of municipalities are increasing their efforts in encouraging citizens to become involved in urban governance and decision-making processes. The current trend is to develop web-based platforms that are designed to facilitate the process of citizens raising their voice.

One way to categorize existing e-participation platforms is by looking at the achieved communication directions between citizens and governance. Traditional websites of municipalities represent a one-way communication as they are designed to merely inform their citizens about facts. One of the main ideas of e-participation is to provide citizens a channel to communicate their own ideas and include those in decision-making processes. Web-based platforms, which implement this idea are for instance *Betri Reykjavik* and the budget planning tool of Berlin Lichtenberg<sup>1</sup>. On the other hand, there are also many examples for tools that are only designed for citizens to report issues, which are then fixed by the municipality (e.g. *FixMyStreet*<sup>2</sup>, *NextHamburg*<sup>3</sup>). Usually the level of interactivity of those reporting tools is rather low. Apart from status updates (e.g. stating whether an issue has been fixed) the communication between citizens and governance is still one-way.

In this context, I define two-way communication as allowing (1) both parties (citizens and governance) to (2) discuss plans and develop ideas together (3) on an equal level. Traditional town-hall meetings may in some forms implement the first two conditions. However, the input of citizens is usually not considered as binding and suggestions are rarely implemented. There is yet a lack of digital systems, which meet all three conditions and hence realize a true two-way communication.

*Betri Reykjavik* is one example for a system that is more progressed both in terms of interactivity and being filed higher up on Arnstein’s ladder of participation [3]. The platform allows citizens to post ideas, participating in other people’s posts by commenting and debating on them as well as expressing their opinion through negative and positive votes. Governance interacts with the citizens through status updates that inform whether this idea will be considered, implemented or rejected. In each case a representative of the city elaborates on those updates. Examples from this participation platform and also Berlin Lichtenberg show how governance is taking citizens’ input into consideration and actually implement some of the proposals.

Supporting citizen discussion is another important aspect of involving the public in political processes. Only recently, a district in Vienna has launched a web platform<sup>4</sup> that targets this aspect by inviting citizens to get involved with their neighbourhood, initiate projects and to socialize.

Researchers only recently started to explore the potential of using mobile applications for public participation. With their online version being so successful, the concept of *FixMyStreet* was released as a mobile application. A quite similar application that lets citizens send messages to the municipality is *MOR*<sup>5</sup>. The first research prototype was *MobileDemocracy*, an application that allowed users to post location-based contributions relating to a planning zone.

<sup>1</sup><https://www.buergerhaushalt-lichtenberg.de/>

<sup>2</sup><http://www.fixmystreet.com>

<sup>3</sup><http://www.nexthamburg.de/>

<sup>4</sup><http://www.weloveottakring.at>

<sup>5</sup><https://itunes.apple.com/us/app/m.o.r./id694620783>

This concept was later refined for the prototype *Mening@Park*. Whereas those systems are map-based, *ARCity* is an example for a system that lets citizens provide feedback on proposals from the city by using augmented reality.

Regarding game-based attempts to involve citizens, *Detroit 24/7* was devised as a full-fledged game designed to give people from Detroit an opportunity to creatively think, learn and share ideas about their city’s future. The game was structured into multiple sequenced missions in which citizens were asked to contribute to a specific theme. All game entries were later on published as the Detroit master plan.

### 3. SIGNIFICANCE AND INNOVATION

With modern governments seen as “large, remote and faceless machine[s]” the key challenge is to “humanize governance, representing it to people, and people to it, in humane and accessible terms” [16]. On the governance side, the motivation to perform this transformation is closely related to expected benefits. If involving the citizens can help achieve governmental goals or facilitate processes, governance is more likely to assume a role in e-participation. Creighton has summed up the core reasons for governance to participate by stating that not encouraging and allowing participation limits government’s sources of options and ideas what on the long run exposes democratic processes to corruption [5]. In fact, this new version of participation has the potential to transform traditional bureaucratic systems to participatory, autocratic to democratic and exclusive to inclusive [10]. For instance, in urban planning inducements to engage in participation processes are to identify smarter solutions to problems, avoiding investments that do not meet actual demand, shaping the identity of local districts and the wish for a higher legitimacy in political decisions.

When implementing e-participation measures it is important to design governance processes in such a way that society overall is benefiting [2]. Citizens should be involved in decision making when outcomes will affect their lives directly [5]. An involvement in turn becomes beneficial when it permits citizens of all classes and groups “to acquire a democratic political culture” [6, p.45]. Moreover, involvement should not only be procedural, but also efficacy should be communicated to citizens by providing results and insights on the impact of their input [1, 15].

The objective of this project is to explore novel concepts of e-participation using mobile devices that aim to accomplish an interactive two-way communication between governance and citizens. The project tries to engage public representatives and citizens in a dialogue-like situation where both ends work together on equal terms to shape their city and involvement can take place in-situ. The novelty of the approach is to deliberately add game elements to the tool with the intention to further encourage people to participate.

#### 3.1 Methodology

This PhD project will follow a participatory action research approach (PAR) [4, 8]. Due to the deliberate involvement of stakeholders (e.g. city officials), it has a tendency toward community-partnered participatory research (CBPR) [11]. The development of the e-participation prototypes will apply a human-centered design approach as grounded in human-computer interaction research. The project will follow two tracks. The first will be a survey of existing e-

participation platforms analyzing which (if any) game elements were included and trying to relate those to the overall level of activity or success of the platform. The list with identified game elements shall then be classified whether being suitable for e-participation purposes. The second track will evaluate a m-participation prototype in various field studies (several smaller ones and one large trial) to investigate the effect of game elements. Those field studies will specifically target the listed research questions. The results of both tracks will then be combined in order to answer the question of whether game elements do have an impact on the level of public participation.

Fig. 2 provides an overview of the planned field studies. The red mark indicates the current progress in the project. For the sake of overview, only the first (current) year of the project is illustrated. In the following year, the larger field trial will take place from April to September. My PhD is embedded in an EU-project, which runs until mid 2016. Right now, we are conducting the “tree grate” study. Here the prototype application is being used to run a voting for tree grates. In addition, I am reviewing related work to find proper platforms for the survey and researching common game elements.

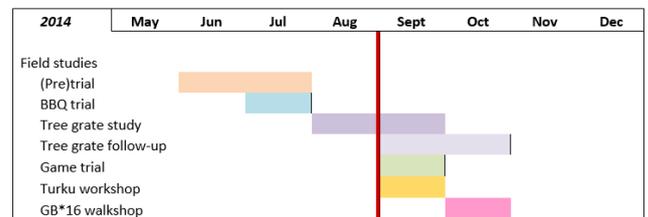


Figure 2: Overview of planned/conducted field studies.

#### 3.2 Questions and issues

**Study setup:** When evaluating a citizens-sourcing application, one has to have people who are actually using the application and thus create content. At this point, the prototype is still being developed and feedback is sought from citizens on what features are desired for getting involved in political decision-making processes and discussing issues with others. As there is yet neither a cooperation with city officials for the small trials or relevant initial content, the prototype itself at the moment does not provide enough meaning for citizens to be motivated to use it. Furthermore, the incorporated game mechanics have a dynamic nature meaning that when wanting to analyze their effect a trial would need to go over a longer period. Overall, recruiting participants for the planned field studies is very difficult. To design the studies more appealing and interactive we adopted the methodology of workshops [12]. However, we are still facing the problem of not having enough participants. Thus, a different approach for both recruiting and designing the study has to be found.

**Use cases:** Governance and citizens usually have a quite different perception of what “issues” are currently relevant, what kind of situations can be “fixed” and which are too abstract to be easily addressed. Some citizens may raise political concerns that are beyond a municipality’s scope of responsibility. In short, there is a gap between gov-

ernance's and citizens' understanding of use cases for m-participation. While governances are usually looking for simple fixMyStreet-issues, the public has the tendency to report complex problems. A related problem is further that reporting platforms do not provide a template for reports leaving it very open to citizens of how they file requests. This eventually creates an overhead for both parties as governance has to ask authors to re-specify their issue and provide missing information. Thus, an e-participation platform needs to make it clear what kind of content or interaction the involved governance is expecting from the citizens. But how can this be done without forcing the public into a pre-defined schema that might prevent innovative approaches and ideas?

**Response threshold:** Not every issue is considered as something that needs to be fixed by everyone. Some might agree that something about the situation needs to be changed, but disagree on the how. What is a fix for some might raise a new issue for others. A procedure for agreeing on a solution for situations has to be established. In that sense, it is also essential to agree when the official side should respond to citizens' input. The municipality cannot answer every single post. Therefore, a way to distinguish between highly relevant topics and individual issues has to be found. Preliminary user studies within the project have shown that feedback from an official side is very important for the success of an e-participation application as it adds meaning to it. Hence, involving municipalities is crucial. This involvement should start in the design process allowing officials time to adequately prepare for their role in the e-participation process (i.e. providing feedback). However, getting municipalities onboard is not always easy as they need to be convinced of the value and especially this method of engaging citizens in political processes. Furthermore, they need to take it seriously and thus budget sufficient resources. Best practices on how to best approach and include city officials are sought.

#### 4. BIO

From 2008 to 2014, I studied media informatics at the Ludwig-Maximilians Universität (LMU) in Munich, Germany. After receiving a Bachelor's degree, I put a strong focus on human-machine interaction as well as the design and development of mobile applications. In 2013, I visited the Urban Informatics Research lab at the Queensland University of Technology in Brisbane, Australia where I wrote my Master's thesis.

Alongside my studies, I have gathered work experience with various companies as a working student in the automotive industry. Furthermore, I worked as a tutor for two university courses. In May 2014, I joined the Telecommunications Research Center Vienna FTW, where I started as a researcher in the User-centered Interaction area. My position as a PhD candidate is funded by the EU-project "building pervasive participation" (b-Part<sup>6</sup>), which investigates novel concepts and solutions for citizen e-participation utilizing latest mobile device technology and appliances embedded in today's urban environments. My fields of interest include (mobile) human-computer interaction, interaction design and technology in society.

<sup>6</sup><http://www.b-part.eu/>

#### 5. REFERENCES

- [1] G. Aichholzer and H. Westholm. Evaluating eparticipation projects: practical examples and outline of an evaluation framework. *European Journal of ePractice*, 7(3), 2009.
- [2] K. V. Andersen, H. Z. Henriksen, C. Secher, and R. Medaglia. Costs of e-participation: the management challenges. *Transforming Government: People, Process and Policy*, 1(1):29–43, 2007.
- [3] S. R. Arnstein. A ladder of citizen participation. *Journal of the American Institute of planners*, 35(4):216–224, 1969.
- [4] A. Cornwall and R. Jewkes. What is participatory research? *Social science & medicine*, 41(12):1667–1676, 1995.
- [5] J. Creighton. *The Public Participation Handbook: Making Better Decisions Through Citizen Involvement*. Wiley, 2005.
- [6] H. Deegan. A critical examination of the democratic transition in south africa: the question of public participation. *Commonwealth and Comparative Politics*, 40(1):43–60, 2002.
- [7] T. Ertiö. M-participation: the emergence of participatory planning applications. *Turku Urban Research Programme's Research Briefings*, 6b, 2013.
- [8] P. Freire. Creating alternative research methods: Learning to do it by doing it. *Creating knowledge: A monopoly*, pages 29–37, 1982.
- [9] M. R. Gramberger et al. *Citizens as partners: OECD handbook on information, consultation and public participation in policy-making*. Publications de l'OCDE, 2001.
- [10] M. S. Islam and S. Business. Towards a sustainable e-participation implementation model. *European Journal of ePractice*, 5(10):1–12, 2008.
- [11] L. Jones, P. Koegel, and K. B. Wells. Bringing experimental design to communitypartnered participatory research. *Community-based participatory research for health: from process to outcome*, 2, 2008.
- [12] M. Korn and P.-O. Zander. From workshops to walkshops: Evaluating mobile location-based applications in realistic settings. In *Proceedings of OMUE Workshop at NordiCHI*, volume 10, pages 29–32, 2010.
- [13] A. Macintosh. Characterizing e-participation in policy-making. In *System Sciences, 2004. Proceedings of the 37th Annual Hawaii International Conference on*, pages 10–pp. IEEE, 2004.
- [14] F. S. Redburn and T. F. Buss. Modernizing democracy. *National Academy of Public Administration, USA*, 2003.
- [15] M. Stout. Climbing the ladder of participation: Establishing local policies for participatory practice. *Public Administration and Management*, 15(1):46–97, 2010.
- [16] E. Tambouris, A. Macintosh, S. Coleman, M. Wimmer, T. Vedel, H. Westholm, B. Lippa, E. Dalakiouridou, K. Parisopoulos, J. Rose, et al. Introducing eparticipation. *DEMO-net The Democracy Network. DEMO-net booklet series*, 1, 2007.

# The urban user experience in the digital age

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## ABSTRACT

Urban public life has been researched extensively. However how urban public life is changing in the digital age has mainly been researched from an urban informatics perspective with a focus on infrastructure deployment and the development of visionary digital products and services. How the status quo of public life has been changed by the sum of all existing interactive touch points however needs further investigation. This research aims at investigating the status quo of the urban user experience in the digital age. How digital life has changed public life and what issues and opportunities this begs. A contextual inquiry of inhabitants in Sydney captures and evaluates current usage of interactive touch points in public life.

## Author Keywords

Digital Public Life; Contextual Inquiry; Urban User Experience;

## ACM Classification Keywords

• **Human-centered computing~Contextual design** • *Human-centered computing~Field studies* • *Human-centered computing~Interaction design theory, concepts and paradigms* • *Human-centered computing~Ethnographic studies* • *Human-centered computing~Ubiquitous and mobile computing design and evaluation methods*

## INTRODUCTION

Urban public life and the urban experience have been researched since the early 1900. George Simmel et al developed early forms of urban sociology and symbolic interactionism [11], which would be further developed by the Chicago School[8]. Jane Jacobs was the first to critique the disappearing of public life in American cities [5]. Henri Lefebvre critiqued the quality of everyday life in relation to capitalism[7] as well as how we produce social space in cities [6]. William H. Whyte was a pioneer in observing public space using time-lapse video techniques [6]. Most

recently Jan Gehl improved the quality of public life in global cities [6].

The above scholars changed how we perceive, understand and design urban space and place.

However the digital age has fundamentally disrupted how we socially interact, communicate, behave, orientate and navigate in public space.

This disruption has been mostly driven out of an informatics perspective. Introducing navigation systems, mobile devices, media facades, location based services, high-speed Internet infrastructures as well as various sensors and actuators. Based on these advancements further visionary research and development has been undertaken and proposed. Such as interactive media architecture, responsive buildings and environments [1] as well as more sophisticated location based digital products and services [10].

This disruption produced an ever-widening gap between the traditional understanding of public life and the life in the digital age.

## PREVIOUS WORK

George Simmel conducted early research in how one can understand the urban experience as a whole. His book “The metropolis and mental life” [11] aims at understanding the complexity of everyday urban life encompassing fields such as science, art and religion. One of his most referenced achievements was the definition of the blasé attitude, which city dwellers developed due to sensual overload in everyday urban life.

William H. Whyte successfully used video time-lapse techniques to investigate the social life of small urban spaces [12]. He videotaped public spaces in New York city to evaluate their use by replaying the video footage in time-lapse mode. The time-lapse mode revealed usage patterns that would allow making conclusions of public space usage, which would influence urban design and planning in the 1980s.

Jan Gehl argued that architects are not properly interested in the life between the buildings. He further developed and refined public space study techniques to create his now established public life studies [2]. After redesigning the inner cities of Copenhagen, London and Melbourne his success allowed him to redesign further global cities such as Sydney, New York, Amman and many more.

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Carlo Ratti directs the Senseable Cities Lab[10] an institution which in 2004 started to research how technology changes how we design, live and comprehend the urban environment. It produced works such as the Copenhagen Wheel, Realtime Rome, Trash Track, New York talk exchange and EyeStop and interactive bus stop.

Sasskia Sassen argues that technology needs to be urbanized, that it needs to be formed around urban context rather than forming the urban context around the technology [9]. She argues that this can be achieved using an open source approach.

Adam Greenfield former creative director of Nokia claims in his book “Against the smart city” [3] that the Smart City approach is a modernist vision, which is bound to fail as the modernist planning approach failed in the middle of the 20<sup>th</sup> century. He further argues that rather than focusing on infrastructure deployment in so called smart cities the focus should rather be on the post-modern smart phone.

### **SIGNIFICANCE AND INNOVATION**

Urban Informatics research and developments like conducted at the MIT Sensable Cities lab is based on assumptions of personas and scenarios as well as discrete use cases. However an understanding of the status quo of the overall urban user experience in the digital age is lacking. This research hence investigates how all existing interactive touch points, applications and solutions collectively change urban public life. Aiming at providing a macro perspective on the digital urban ecosystem, rather than a micro perspective that investigates discrete use cases.

To provide a comprehensive interactive macro perspective not only new digital interactions are considered but also traditional interactions, technologies and touch points such as pressing a traffic light button, using a bus as well as different states of sitting, walking and standing.

The aim is to create user models of complete interactive urban user experiences. These models are consolidated and analyzed to get a deeper understanding of how and why we interact with and in the urban environment in the digital age.

### **METHODOLOGY**

The framework of the contextual inquiry was chosen to facilitate this research, an established ethnographic method in interaction design to investigate user behavior [4].

The method has been developed by Karen Holtzblatt and Hugh Beyer as a “phenomenological research method” in 1988 and was presented as a unique method in 1990. It was further developed as part of a Contextual Design methodology in 1997.

Contextual Inquiry consists of 5 steps: Observational Interviews, Modeling, Model Consolidation, Persona and Scenario Development and Visioning.

In Observational Interviews a researcher observes a user and documents his interactions with an interactive system. The researcher asks in-situ interview questions to probe what a user is doing.

Modeling forms the captured data into five different types of models the physical model, artifact model, sequence model, flow model and cultural model. The models are further consolidated to extract meaning. Based on the consolidated models personas and scenarios are developed which form the bases for visioning new ideas and solutions.

This research conducts a contextual inquiry on inhabitants of Sydney’s Bondi Beach. Participants were researched on an average work day during daytime in average weather conditions in public space. They were observed and interviewed from when they left their house in the morning to when they came back home after work. Participants were only observed outside in public space, not during work hours or inside their work environments.

Each time a participant changed state, touched or interacted a photo and notes were taken. In-situ interview questions further probed the participant’s actions.

Out of the collected data flow, artifact, sequence and physical models are created. The sequence model shows the steps the participant undertook step by step over time. The flow model shows what the participant interacted with and the relationship the participant has with the different artifacts. The Artifact model is a list of artifacts the participant interacted with. The physical model shows the movement of the user in space over time.

To date on the 30<sup>th</sup> of September 10 participants have been observed and the first flow models have been developed. The aim is to observe a total of 25 participants and develop all five models for each participant as well as create consolidated models, personas and scenarios by the 31<sup>st</sup> of January.

### **QUESTIONS AND ISSUES**

Do the consolidated models result in meaningful personas and scenarios?

Can these form the basis for meaningful theoretical argumentation of how the digital has conceptually changed public life and help to speculate about future implications?

Do they allow for more specific design visioning of future urban interaction design solutions as well as more theoretical design implications?

Is contextual inquiry a successful method for digital life research in public space?



Figure 1: Participants observed in Sydney



Figure 2: Participants observed in Sydney

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## REFERENCES

1. Fox, M. and Kemp, M. *Interactive architecture*. 2009.
2. Gehl, J. and Svarre, B. *How to Study Public Life*. 2013.
3. Greenfield, A. *Against the Smart City*. 2013.
4. Holtzblatt, K., Wendell, J.B., and Wood, S. *Rapid Contextual Design*. Elsevier, 2005.
5. Jacobs, J. *The Death and Life of Great American Cities*. Vintage, 1961.
6. Lefebvre, H. *The Production of Space*. Wiley-Blackwell, 1992.
7. Lefebvre, H. *Critique of Everyday Life*. 2008.
8. Lutters, W.G. and Ackerman, M.S. *An introduction to the Chicago school of sociology*. Interval Research Proprietary, 1996.
9. Sassen, S. *Urbanising Technology*. Urban Age Electric City Conference, London, 2012.
10. SENSEable and Ratti, C. MIT SENSEable City Lab. *senseable.mit.edu*, 2004. <http://senseable.mit.edu/>.
11. Simmel, G. *The Metropolis and Mental Life*. 1903.
12. Whyte, W.H. *The Social Life of Small Urban Spaces*. Project for Public Spaces, New York, 1980.

# More-than-media: reimagining mobile mapping practices in Sydney and Hong Kong

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## ABSTRACT

This research is concerned with mobile mapping practices, specifically the use of digital maps on mobile phones. It asks how mobile mapping practices can be situated within a history of urban cartographies and embedded in the spatial production of urban environments. In asking this it undertakes a radical approach to cartographic research - one that focuses firmly on the experiential, as well as the representational aspects of mapping. This presentation investigates how the particularities of contemporary mapping may be understood by viewing digital maps as dispositifs - a product of a history of cartographic reason, embedded in representational flatness and the numerical dissection of experience. This research has been situated in two developing urban environments - Hong Kong and Sydney - which each combine a unique mixture of remnant colonial spatiality with local hybrid practices and traditions.

## Author Keywords

mobile media; digital cartography; mediated space; neogeography.

## ACM Classification Keywords

• *Applied computing~Media arts*

## INTRODUCTION

This paper considers the use of spatial locative media, specifically mobile mapping applications such as Google Maps, from a critical and historical perspective in Sydney and Hong Kong. This research examines mobile mapping practices (and the way in which they shape urban experiences) from a three pronged approach: that of the media hardware, its software architecture and interface; the

urban media infrastructure and spatio-temporal landscapes in and through which they are performed; and, from the perspective of the mappers who use, navigate and re-inscribe urban spaces and mobile technologies. This approach combines a number of differing methodologies from media studies, cultural studies and geography, including textual analysis, media archaeology and work-in-progress video footage of participant-lead walking interviews carried out in Sydney and Hong Kong between October 2013 and February 2014.

The recent proliferation and use of smartphone technologies has been accompanied by an increase in mobile phone applications that engage with urban environments and user positionality via a combination of geo-coded applications, digital media infrastructure and GPS-capable hardware. Distinct from previous iterations of mapping technologies (hand-drawn maps, printed maps and digital maps on desktop screens), mobile mapping applications that roam on 3G or 4G internet have the ability to plug into online digital platforms from a user's personal device while they are on the move, fundamentally altering the experience of reading, making and using maps. This means that, due to changes in media technologies, mobile mapping is now more context-aware, spatially driven, mutable, user generated, and crowd-sourced than ever before.

By moving beyond the binary of representation/non-representation to a study of reading, writing and performative media ontologies, this research aims to shed clearer light on the nuances and tensions inherent in the experience of using mobile media technologies. Central to this research is the suggestion that the urban space (which forms part of the media architecture interface) is not a tabula rasa, but is contains a priori contested discourses, histories, geographies and stories. These elements are carried through to mobile mapping practices as users negotiate between dominant representations of urban spaces on small screens, and the 'off the grid' memories, layers and traces which haunt their experiences.

This contestation is apparent in 'moments' of mobile mapping, during which users, media technologies and urban spaces interact, bringing to the screen a deeply contextual situated cartographic dispositif (Foucault) that is inherently paradoxical - personal yet institutional, unique yet

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homogenous, local yet global. This dispositif reaches beyond the screen, or even mobile media technologies as it engages discourses, agents, institutions, languages, epistemologies, geographies and histories, which exist (often formatively) beyond that particular context. This paper argues that, by using the fluid moment as a lens, we can more closely examine the wider, and often political, dispositif that provides the foundations for the experiential and embedded architecture of media technologies. Finally, fluid moments may also cast light on the ad-hoc actions and (un)intentional everyday resistances carried out by users as affordances, failure and limitations of mobile media technologies are repurposed, reclaimed and reimagined.

This research is framed around a set of three questions that are specifically designed to investigate the relationship between media, geography and mobile mapping practices:

1. How can contemporary mobile mapping practices be situated in urban cartographic epistemological histories and geographies?
2. In what way are historical and contemporary mapping practices embedded in the production of urban environments?
3. To what degree are new performative mapping practices in post-colonial cities altering previous cartographic productions of urban environments, experiences and ontologies?

Each of these questions relates to a specific aspect of mobile mapping: its socio-historical, epistemological and geographical roots; its mediated relationship with urban physical landscapes; and, finally, how the culmination of the above aspects impacts the way in which mobile mapping is performed.

## PREVIOUS WORK

This research is drawn from criticisms of approaches towards understanding mobile technology and mapping more widely. While mobile phone mapping has only recently become an object of inquiry, there is a growing body of literature researching mobile media as well as digital cartography.

Generally speaking, mobile media is approached from dual perspectives – either as a hybrid media form<sup>1</sup>, or from the ethnographic perspective of practice and performativity<sup>2</sup>. Central to mobile media research is a focus on the hybridization of digital spaces with everyday materiality<sup>3</sup>, effectively heralding a reconsideration of previous binary distinctions between virtual and physical spaces and experiences. Furthermore, the transformational relationship between media object and text in the case of mobile and digital media has been conceptualized in a myriad of ways from a number of different perspectives - for instance as an media interface<sup>4</sup>, a haptic dispositif<sup>5</sup> or a Latourian sign-

thing<sup>6</sup>. Furthermore, the relationship between the user and mobile media has also been subjected to the same disparity of research. For instance, both Richardson<sup>7</sup> and Ek<sup>8</sup> have analysed mobile media and the process of mediation from a Heideggerian phenomenological perspective, while others have deployed Benjaminian theories of the flaneur<sup>9</sup> or Dionysian media technologies<sup>10</sup>. Researchers have also argued that impact of mobile media has also been deeply connected with shifts in everyday place-making activities<sup>11</sup>, territorialisation<sup>12</sup> and touring practices<sup>13</sup>.

Research on digital mapping has largely arisen from critical cartography, which has a legacy interest in Derridean deconstructionist methodologies and Foucauldian archaeological analysis<sup>14</sup>. There has been a foray into ‘neo-geography’ which has closely examined the discursive and epistemological conditions of the digitalization of cartographic rationalism – including its impact on place-making<sup>15</sup>, accessibility<sup>16</sup> and knowledge-production<sup>17</sup>. What, perhaps, is most determining is a turn towards practice-based methodologies which focus on the broader implications of digital mapping, and which argue that despite an apparent ‘newness’ of digitalization, the same epistemological logics which emphasis acritical accumulation of data remain hegemonically in place<sup>18</sup> and limit the way in which we can research and understand this phenomenon<sup>19</sup>.

## SIGNIFICANCE AND INNOVATION

It is generally agreed that mobile maps engage new technological strata and systems, reframing imaginaries and experiences. This is best described as an emerging relationship between bodies, mobile devices and urban technological infrastructure, constructing architectures of urban being, knowing and experience.

Because of the dissolution of the textual fixity of the map, and the personal way in which mobile media texts ‘come into being’ via practice, space and subjectivity, a binary distinction has arisen between theoretical analysis of mobile media and digital mapping, and grounded empirical ethnographic analysis. However, in these analyses of ‘spatial media’ a common, yet significant, element is missing – an awareness of how specific spaces and temporalities bring forth divergent experiences, epistemes, practices and subjectivities. Although site specificity is often acknowledged – Hjorth’s<sup>20</sup> work on mobile media practices in South Korea, for instance – it is rarely expanded beyond the role of contextualization nor acknowledged as a crucial and defining factor in both the formation of the textuality of the mobile map and the practices which engage with it.

This research approach aims to not merely to accommodate the presence of multiple factors (such as history, geography, memory, and landscape) but to foreground them in any analysis, presenting a rethinking of the way in which

mobile mapping and mobile technologies can be conceived, understood and studied. As such, this research uniquely combines a number of disparate approaches to see if mobile mapping can be understood and analysed differently and more effectively. It focuses on two case studies – Sydney and Hong Kong – and deliberately takes into account their socio-cultural contexts, histories and geographies. These case studies are crucial because within each city are multiple traditions of understanding and experiencing, that have arisen in the wake of their roles in global imperial networks.

## METHODOLOGY

This research method is necessarily experimental – proposing a trialectic approach which considers mobile mapping practices as an assemblage of mobile cartographic media texts, subjective knowledges and experiences, and spatio-temporal urban landscapes - all under a broad storytelling writing mode.

It is framed by a series of participant-led ethnographies, during which participants were asked to choose a path – everyday, or with a specific purpose in mind – and allow a research (myself) to ‘go along’ with them, filming the journey with a small action camera and discussing their encounters with cartographic rationalism, media spaces and the urban environment. Much of this was focused on personal experience and memory, as participants traced their own paths through the landscape, intervening between the representation of space and the urban environment. These go-alongs were supplemented with an analysis of the textuality of mobile mapping applications which the participants used, hinged upon a dual archaeological analysis – a Foucauldian genealogy of the graphical interface, and a media archaeology of the technological artefact and infrastructure of the media device. Finally, all of these experiences were construed as arising from the particular situated nature of the specific space-times in which they arose. As such, I am in the midst of an archival and archaeological analysis of the space itself, which, in the case of both Sydney and Hong Kong, is emerging as an encounter between the western hegemonic force of cartographic rationalism and non-conformist foreign landscapes<sup>21</sup> – an encounter that is still being played out today.

## QUESTIONS AND ISSUES

Currently, this research remains in the haphazard position of being a series of long interview videos, a collection of archival maps, a series of urban landscapes and a number of screenshots.

Most of the participants have agreed to allow me to use footage of their interviews for presentations and in my PhD. Within this material is a number of personal, and often poetic stories about everyday engagements with urban

spaces and mobile media, as participants negotiated and renegotiated the epistemological constraints of visual and oral communication in expressing an array of intuitive, sensitive and visceral reactions. This places enormous responsibility on myself, as a researcher and holder of these experiences, to do justice to both their gravity and validity as modes of knowing and being. Furthermore, these experiences and stories are often counterpointed by the unyielding discourses heralded in media architecture - both in terms of the coded logics inherent in digital media, and the spatial technological infrastructure which supports it. Here, the everyday moments of mobile mapping beckon in the political strata of urban planning, governmentality, surveillance and culture.

This begs the question: how do you meld the delicate experiences of fleeting moments, offhand comments, tacit emotion and temporal desire with the harsh fixity of archival maps (particularly colonial maps) and their claims to represent a certain element of spatial truth or fact? What artistic, poetic and storytelling options are available to researchers and artists to both be critical but also supportive of the complicated relationship between space, media and experience.

Finally, what modes exist for researchers and artists to conceptualize this relationship, accounting for its political nature and the power relations which inform it, but without essentialising, generalizing or overemphasizing particular elements?

## BIO

Clancy Wilmott is a PhD candidate in Human Geography at the University of Manchester, researching mapping, mobile phones and urban environments. She is also a member of Charting the Digital, an European Research Council (ERC) funded project researching digital mapping, lead by Assoc. Prof. Sybille Lammes from the University of Warwick.

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## REFERENCES

- [1] De Souza e Silva, A & Sutko, D. 2009. *Digital Cityscapes: Merging Digital and Urban Playspaces*, Peter Lang.
- [2] Pink, S. & Hjorth, L. 2012. Emplaced Cartographies: Reconceptualising camera phone practices in an age of locative media, *Media International Australia*, 145: 145-156

- [3] De Souza e Silva, A. 2006. From cyber to hybrid: mobile technologies as interfaces of hybrid spaces, *Space and Culture*, 9:3, 261-278
- [4] Farman, J. 2012. *Mobile interface theory: Embodied space and locative media*, Taylor & Francis, London
- [5] Verhoeff, N. 2012. *Mobile screens: The visual regime of navigation*, University of Amsterdam Press, Amsterdam
- [6] Lammes, S. (forthcoming 2014). 'Destabilizing playgrounds: Cartographical interfaces, mutability, risk and play' in *Playful subversion of technoculture*, eds. Cermak-Sassenrath, D. et. al, Springer, Heidelberg.
- [7] Richardson, I. 2010. Ludic mobilities: The corporealities of mobile gaming, *Mobilities* 5:4, 431-447
- [8] Ek, R. 2012. Topologies of human-mobile assemblages, in *Mobile Technology and Place*, eds. Wilken, R. & Goggin, G., Taylor and Francis, London
- [9] Soukup, C., 2013, The postmodern ethnographic flaneur and the study of hyper-mediated everyday life, *Journal of Contemporary Ethnography*, 42:2, 226-254
- [10] Kingsbury, P., & Jones, J. P., 2009, Walter Benjamin's Dionysian adventures on Google Earth, *Geoforum*, 40:4, 502-513
- [11] Wilken (forthcoming). Places nearby: Facebook as a location-based social media platform. *New Media and Society*
- [12] Licoppe, C. & Inada, Y., 2010, Locative media and cultures of mediated proximity: the case of the Mogi game location-aware community, *Environment and Planning D: Society and Space*, 28, 691-709
- [13] Gazzard, A., 2011, Location, location, location: Collecting space and place in mobile media, *Convergence*, 17:4, 405-417
- [14] Crampton, J. & Krygier, J., 2006, An introduction to critical cartography, *ACME: An international e-journal for critical geographies*, 4:1, 11-33
- [15] Graham, M., 2010, Neogeography and the palimpsest of place: Web 2.0 and the construction of a virtual earth, *Tijdschrift voor economische en sociale geografie*, 101: 4, 422-436
- [16] Elwood, S., 2009, *Citizen cartographies and the shifting politics of expertise*, paper given at the 24<sup>th</sup> Annual International Cartography Conference, Santiago, Chile
- [17] Sheppard, E., 2006, Knowledge production through critical GIS: Genealogy and prospects, *Cartographica*, 40, 5-21
- [18] Perkins, C., 2014, Plotting practices and politics: (im)mutable narratives in OpenStreetMap, *Transactions of the Institute of British Geographers*, 39:2, 304-317
- [19] Leszczynski, A., 2009, *Quantitative limits to qualitative engagements: GIS, its critics, and the philosophical divide*. *The Professional Geographer* 61:3, 350-365
- [20] Hjorth, L., 2012, Locating the online: Creativity and user created content in Seoul, South Korea, *Media International Australia*, 141: 187-199
- [21] Carter, P., 2009, *Dark writing: Geography, performance, design*, University of Hawai'i Press, Honolulu

# Urban Affordances from Crowdsourced Digital Media

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## ABSTRACT

Affordances from the urban space shape the way we interact with our environment, whether manifested as driving into the city centre for work or playing sports in designated arenas. Understanding the activity potential of our urban space is interesting for a variety of applications, such as deeper semantic understanding for urban planning, context clues for targeted information delivery, or touristic urban exploration, to name just a few. Towards understanding urban affordances from unstructured data, we have devised methods to identify, gather and extract useful features from digital breadcrumbs generated by the crowd to be able to accurately infer multiple perspectives on the purposes of specific urban spaces. In this colloquium, we seek to discuss the applicability of our methods to complement and solve pressing questions of urban planning and architectural researchers.

## Author Keywords

Urban data mining; Crowd sensing, Social Media Content

## ACM Classification Keywords

H.2.8. Database Management: Database Applications - data mining, spatial databases and GIS; H.3.3. Information Search and Retrieval: Information filtering

## INTRODUCTION

Today's cities are complex systems of interconnected elements, such as of schools, shopping malls, or homes. Our lifestyle defines their temporal use as well as how we move, reside or interact with this urban system. By adapting the urban layout over time to meet our demands, spatial-temporal constraints emerge for how we interact with our urban elements.

To capture this, we introduce the notion of *urban affordance* based on Gibson's general theory of affordances [6]. Analogous to ecological niches that afford shelter or food, the urban space affords education, income through work, or socializing. Often embedded as part of a larger urban environment, places of affordances are without explicit boundaries,

but influenced by nearby elements [6]. To further complicate matters, places in the urban space can provide multiple affordances with respect to time or demographic background. For example, schools provide the affordance of education for pupils, but work for teachers. Similarly, a downtown district affords employment during working hours while affording meals and socializing at noon or in the evening.

Clearly, it is difficult for static layers in traditional GIS systems to capture such interactions between the city and its residents. However, the increasing popularity of location-based social networks (LBSN), such as Foursquare<sup>1</sup>, provide a unique platform for gathering crowd-generated perceptions of the urban environment. Such data, often generated in-situ by smartphones, amass to a rich and dynamic repository of urban perception.

In this PhD project, we first investigate the possibility of applying machine learning methods to automatically make discriminative mappings from unstructured, crowd-generated, and geo-tagged digital media traces to one, or a combination of, urban affordance(s). Second, we aim to derive quantitative understandings of how urban affordances co-locate and complement each other via machine learning models learned from unstructured urban data spanning multiple metropolitans.

## PREVIOUS WORK

Early work in understanding behavioural patterns of groups of people, especially spatial-temporal characteristics via distributed sensors, include the work of Eagle and Pentland [5], where 100 members of MIT recorded trajectory traces via mobile phones. Later, a larger study of 100,000 users was conducted by Gonzalez et. al. [7] to identify strong spatial and temporal regularities in human trajectories. More recently, researchers are exploiting the increasing prevalence of GPS-tracked devices to interpret trajectory patterns and resident-urban space interactions in terms of routine behavioural activities in various spatio-temporal settings. These include the use of call detail records [12], digital traces from social media platforms [18], city-wide bike-sharing traces [4], pedestrian movements at festivals [1], and GPS tracking of taxicab fleets [19]. Although such datasets can provide detailed trajectories of numerous individuals, there lacks an explicit understanding of the individual's intention for making a trip or their destination activity. In other words, while such

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<sup>1</sup><http://www.foursquare.com>

unlabelled data is plentiful, the label of travel purpose is missing, resulting in the inability to objectively assess the generalizability of proposed models.

As government-organized travel surveys contain valuable labels to understand the purpose of trajectories, researchers have started to leverage these datasets. One notable work, by Jiang et. al. [9], utilizes an activity-based travel survey to cluster for demographic profiles of individuals. Their findings show that finer-grain profiles can be extracted beyond the original worker, student, and non-worker profiles. In comparison, our work focuses on recognizing the destination activity as opposed to profile, which can be construed as the affordance of the destination location. Another related work utilizing travel survey data is that of Krumm and Rouhana [10]. While they also attempt to automatically detect destination activity, we leverage crowd-generated LBSN data to provide a much richer contextualization for the spatial aspect of our model.

Another large-scale data source depicting resident-urban space interaction comes from government-organized time-use surveys. Already in 2008, Partridge and Golle [14] leveraged the American Time-Use Survey data to learn mappings between location semantics and their afforded activities. This work is extended by [2] in 2013, where the German Time-Use Survey is compared. Although such data is well-annotated and incorporates input from thousands of subjects, there is significant cost for governmental organizations to conduct such surveys regularly. Therefore, coverage is limited to certain parts of the world. Furthermore, an additional step to obtain “semantics” of a user’s current location is required for activity inference. In other words, the user’s absolute location (geo-coordinates) would need to be converted to a relative location (e.g. via Foursquare to obtain venue type).

## SIGNIFICANCE AND INNOVATION

Affordances from the urban space shape the way we interact with our environment, whether manifested as driving into the city centre for work or playing sports in designated arenas. Understanding the activity potential of our urban space is interesting for a variety of applications, such as deeper semantic understanding for urban planning, context clues for targeted information delivery, or touristic urban exploration, to name just a few. Although governmental surveys or semi-structured interviews of urban residents offer glimpses into urban affordances, such traditional methods are costly to conduct and unable to scale in terms of geographical coverage or subject variety. Furthermore, the multi-faceted nature of urban spaces would benefit from various representations of residents in the city. Therefore, there is a need for rich representation across multiple demographical communities and population scale data to drive quantitative models of urban affordances.

With the advent of the smartphone and the availability of mobile Internet access, users can stay connected with social contacts at any time and express themselves and their current situation via status updates or image uploads. Known as “microblogging”, users write short on-the-spot updates about

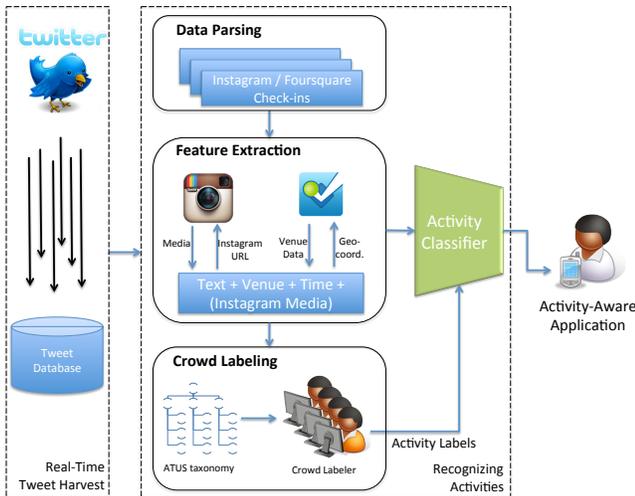
their life and publish these to their social circles or interested followers. Messages are usually short: just 140 characters with optional image attachment in the case of Twitter. According to Twitter’s official blog [17, 16], Twitter users were generating 340M tweets daily in 2012 with 140M active users, compared to 200M Tweets daily in 2011, 65M in 2010 and 2M in 2009. Therefore, it is to be expected that a large fraction of users posts regularly about their routine life experiences. Investigated by [8], typical content ranges from daily life experiences to special interests, and news. In this work, we explore a novel path to understand the activities taking place in urban environments via digital breadcrumbs left in the virtual world about physical world behaviour. Instead of explicitly surveying and collecting instrumented evidence from a small number of user-study participants, we “probe” the population indirectly by picking up implicit signals from their natural mobile phone usage.

As smartphones essentially enable any time use of social media platforms, relevant properties emerge for collecting evidence about the user’s activity. First, content is shared in real-time and focuses on experiences that “happen right now” [13]. Second, “daily chatters” share content multiple times a day [8]. Third, and most importantly, it has been shown that the majority of users focus on themselves, rather than on, for example, sharing plain information or opinions [11]. Moreover, social media usage is widespread geographically and has become a natural part of people’s daily lives. Much of this usage takes place on smartphones while describing what is happening at specific geo-tagged locations in the real world. As a consequence, an abundance of data revealing a user’s activities is generated *implicitly* by the user. Through social media platforms that record such data, we can obtain rich signals for resident-urban space interaction without any extra instrumentation. This data is spontaneously-generated and naturally occurring, thereby providing in-the-wild sensing without the restrictions of laboratory environments.

Our goal is not to incentivize users to post explicitly about his activities or to post in higher quantities. Instead, we believe that data collected by social media platforms can be leveraged by data-driven machine learning models to digest the rich crowd-generated signals to gain insights into human behavioural patterns of individuals and communities. We believe that artefacts from user-social platform interaction can be understood as a reflection of the user’s perception and interaction with the urban space.

## METHODOLOGY

As indicated in previous sections, our goal is to leverage the wide-spread nature of geo-tagged social media content as a proxy for studying urban affordances. One challenging aspect of utilizing such data is that user are not systematically submitting their life activities, a reflection of what is afforded in a physical space, through geo-tagged posts onto social platforms. The unstructured nature of such signals may reflect ambiguous, irrelevant, or even compounded affordances. Therefore, it is a challenging task, not only for machine learning techniques, but even for humans to agree on the implication of a given signal. This opens the question as to how to



**Figure 1.** System architecture for gathering and modeling activities from in-situ, self-report social platform data.

define a common scheme for categorizing the *types of affordances* of the city. In this work, we make use of a standardized taxonomy from the American Time-Use Survey (ATUS) [15]. It is defined by the Bureau of Labor Statistics in the United States for investigating time-use of the population. The taxonomy describes a comprehensive, multi-tier hierarchy of typical activities people perform in everyday life. We select this taxonomy for its relevancy, comprehensive coverage, and also its usage in relevant literature studying large-scale human behaviour [14, 9, 10, 2, 3].

### In-Situ Signals from Social Media

In our earlier approach [20], we investigate the possibility of recognizing the activity of a user by learning a mapping from geo-tagged social media posts to an activity category defined by ATUS. We depict our architecture to gather, label, and process social media data in Figure 1.

Gathering publicly available data from Twitter, which aggregates geo-tagged posts from other platforms such as Foursquare and Instagram, we stream in Tweets generated for the city of San Francisco. We utilize crowd-workers from the popular crowdsourcing platform, CrowdFlower<sup>2</sup>, to gather ground truth labels for training. In Figure 2, we illustrate the frequency in the rise and fall of various activity types throughout the week, which corresponds with general expectations of day-to-day life in an urban environment. Evaluating our system, we find favourable performance up to 83.9% recognition accuracy in data unseen in during the training phase. This implies it is possible to identify activities for specific locations in the city by inferring semantics behind crowd-generated, unstructured, and in-situ self-reports. The occurrence of such activities, in turn, give us a multi-perspective view into the affordances of a physical location.

### Crowd-Augmented Understanding of Urban Affordances

Utilizing travel survey data, typically gathered by government entities, we obtain a rich source of ground truth labels for the

<sup>2</sup><http://www.crowdfLOWER.com>

purposes of locations. In [22, 21], we leverage these labels to evaluate the ability to infer purposes of urban spaces based on the venues contained within. In particular, we harvest detailed venue types (e.g. Elementary School, Squash Courts, etc.) and crowd-generated textual “tips” of the various venues from Foursquare<sup>3</sup> as contextualizing signals.

We show that these signals are able to predict the purposes served by specific urban spaces with a testing accuracy of  $\approx 75\%$ . Furthermore, our evaluations reveal that spatial contextualization brings more contribution than demographical or temporal factors for correctly identifying affordances of a space. Of course, the fusion of all three aspects for contextualization brings the best prediction performance. With this work, we demonstrate the ability to leverage *who*, *when*, *where* found in people’s mobility patterns to infer *why*, denoting the affordance of the destination location.

### QUESTIONS AND ISSUES

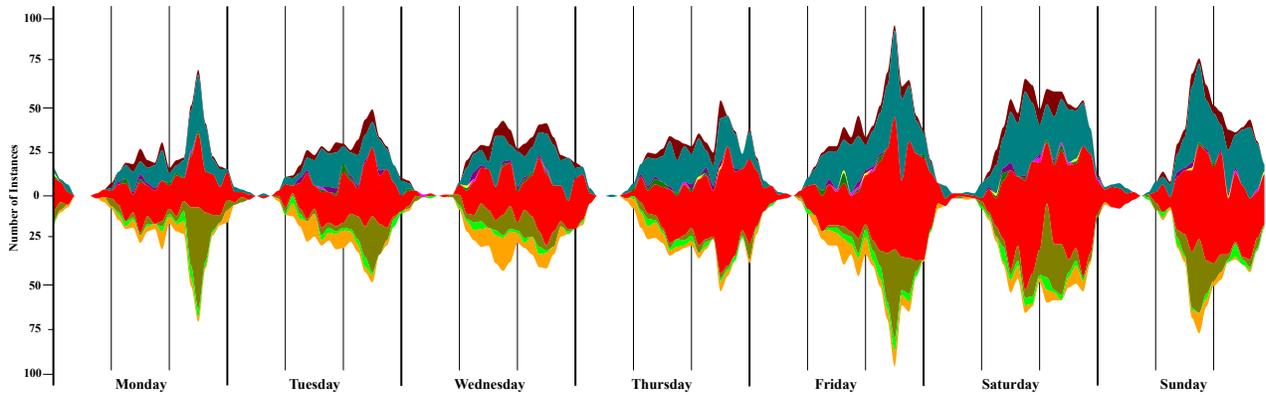
With the aforementioned approaches for identifying affordances of urban spaces from unstructured data, we would like to discuss the usefulness of such methods for researchers from the urban architecture field and potential applications that would benefit from this analysis of unstructured crowd-data. In particular:

1. Given the traditional survey or interview-based method of assessing urban space usage, can the described methodology and crowd-generated data sources be applied to automate or guide urban studies? If so, what are some foreseeable challenges and limitations from the viewpoint of urban researchers?
2. Although our work so far attempts to identify activities afforded by urban spaces, the same method can be easily used to map against qualitative characterization of spaces, such as “pleasantness” or “liveability”. Which characterizations (or qualitative metrics) are important to capture for urban researchers and what are some applications if such characteristics can be identified?
3. We would like to investigate the the construction of similarity metrics based on identified affordances to quantify proximity of neighbourhoods in different cities. As opposed to comparing spaces based on static venue types or zoning codes, would dynamic space usage behaviour benefit comparisons? From the field of urban planning, what existing methodology can we build upon/compare to?

### BIO

Zack Zhu is a third-year doctoral candidate in the Wearable Computing Lab at ETH Zurich. Zack completed his undergraduate studies at the University of Waterloo in Systems Design Engineering in 2009. After, he conducted his masters in Computational Science and Engineering at ETH Zurich, during which, he exchanged at the Hong Kong University of Science and Technology. He completed various internships in the US, Canada, and Switzerland at organizations such as Sun Microsystems Laboratories (now Oracle Labs), Defence R&D Canada, BlackBerry, and Google.

<sup>3</sup><http://www.foursquare.com>



**Figure 2. Weekly pulse of various activities in the San Francisco area. The varying heights of the wave depict variations in the number of instances for that time slot. The colored layers depicting activity categories are in order from top to bottom: Consumer Purchases (Maroon), Eating & Drinking (Teal), Education (Purple), Household Activities (Yellow), Personal Care (Fuchsia), Professional Services (Green), Socializing, Relaxing, & Leisure (Red), Sports, Exercise, & Recreation (Olive), Traveling (Lime), Work-Related (Orange).**

## REFERENCES

- Blanke, U., Franke, T., Tröster, G., and Lukowicz, P. Capturing crowd dynamics at large scale events using participatory gps-localization. *ISSNIP '14* (2014).
- Borazio, M., and Van Laerhoven, K. Improving activity recognition without sensor data: a comparison study of time use surveys. In *Proceedings of the 4th Augmented Human International Conference*, ACM (2013), 108–115.
- Borazio, M., and Van Laerhoven, K. Using time use with mobile sensor data: A road to practical mobile activity recognition? In *Proceedings of the 12th International Conference on Mobile and Ubiquitous Multimedia*, MUM '13, ACM (New York, NY, USA, 2013), 20:1–20:10.
- Coffey, C., and Pozdnoukhov, A. Temporal decomposition and semantic enrichment of mobility flows. *LBSN '13* (2013), 34–43.
- Eagle, N., and (Sandy) Pentland, A. Reality mining: Sensing complex social systems. *Personal Ubiquitous Comput.* 10, 4 (Mar. 2006), 255–268.
- Gibson, J. J. *The theory of affordances*. Hilldale, USA (1977).
- Gonzalez, M. C., Hidalgo, C. A., and Barabasi, A.-L. Understanding individual human mobility patterns. *Nature* 453, 7196 (2008), 779–782.
- Java, A., Song, X., Finin, T., and Tseng, B. Why we twitter: understanding microblogging usage and communities. In *Proceedings of the 9th WebKDD and 1st SNA-KDD 2007 workshop on Web mining and social network analysis*, ACM (2007), 56–65.
- Jiang, S., Ferreira, J., and Gonzalez, M. Clustering daily patterns of human activities in the city. *Data Mining and Knowledge Discovery* 25, 3 (2012), 478–510.
- Krumm, J., and Rouhana, D. Placer: Semantic place labels from diary data. *UbiComp '13* (2013), 163–172.
- Naaman, M., Boase, J., and Lai, C.-H. Is it really about me?: message content in social awareness streams. In *Proceedings of the 2010 ACM conference on Computer supported cooperative work*, ACM (2010), 189–192.
- Noulas, A., Mascolo, C., and Frias-Martinez, E. Exploiting foursquare and cellular data to infer user activity in urban environments. *MDM '13* (2013), 167–176.
- Oulasvirta, A., Lehtonen, E., Kurvinen, E., and Raento, M. Making the ordinary visible in microblogs. *Personal and ubiquitous computing* 14, 3 (2010), 237–249.
- Partridge, K., and Golle, P. On using existing time-use study data for ubiquitous computing applications. In *Proceedings of the 10th international conference on Ubiquitous computing*, ACM (2008), 144–153.
- Shelley, K. J. Developing the american time use survey activity classification system. *Monthly Lab. Rev.* 128 (2005), 3.
- Twitter. 200 million tweets per day. <https://blog.twitter.com/2011/200-million-tweets-day>, June 2011.
- Twitter. Twitter turns six. <https://blog.twitter.com/2012/twitter-turns-six>, Mar. 2012.
- Wu, L., Zhi, Y., Sui, Z., and Liu, Y. Intra-urban human mobility and activity transition: Evidence from social media check-in data. *PLoS one* 9, 5 (2014), e97010.
- Zheng, Y., Liu, Y., Yuan, J., and Xie, X. Urban computing with taxicabs. *UbiComp '11* (2011), 89–98.
- Zhu, Z., Blanke, U., Calatroni, A., and Tröster, G. Human activity recognition using social media data. In *Proceedings of the 12th International Conference on Mobile and Ubiquitous Multimedia* (2013).
- Zhu, Z., Blanke, U., Calatroni, A., and Tröster, G. Prior knowledge of human activities from social data. In *Proceedings of the 17th International Symposium on Wearable Computers (ISWC '13)* (2013).
- Zhu, Z., Blanke, U., and Tröster, G. Inferring travel purpose from crowd-augmented human mobility data. In *Proceedings of the 1st International Conference on IoT in Urban Space* (Oct. 2014).