

INTRODUCTION

Enhancing Places through Technology

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The rapid diffusion and uptake of Information Communication Technologies (ICTs) presents a new and unique challenge for cities as social life and urban space becomes increasingly (yet unevenly) mediated by new technologies and digital devices. As ICTs continue to infiltrate urban and social realms, there is a pressing need to understand the complexity of this rapidly expanding social and spatial phenomenon. The papers in this collection contribute to an emerging body of work that seeks to understand the relationships between people, the physical urban space and opportunities for place-making, and technology. These three dimensions form the vertices of an important triangle, having far-reaching implications, be it in the development of new technologies, in the understanding of human behaviour and in the definition, and possibly rethinking, of urban spaces. Possibly more importantly, there are significant overlaps, and interfaces, between these three pillars that are investigated by some of these papers.

The proliferation of, and accessibility to, new technologies have raised significant questions to both research and practice. Technology has redefined our lifestyles on a day-to-day basis and our relationships with one another. It has challenged our conventional outlook towards time and distance and required us to re-evaluate our connection with physical space. It has also made us re-question the value of urban space and the extent to which we may still create meaningful 'places' as opposed to anonymous 'spaces' – an increasingly challenging concept given the risk of alienation brought about by technology and that constitutes an unfortunate, but very real, prospect.

The papers present interdisciplinary perspectives from architects, computer scientists, sociologists, urban planners and designers, among others. Diverse approaches to the research field are also offered, including work on new methodologies, new theoretical or conceptual models for the digital era, as well as preliminary studies of peoples' use of, and engagement with, technology in public space. At the heart of these discussions lies the term 'enhancement', understood in terms of the added value that ICT may bring about, contributing to broader quality of life objectives.

The collection of papers in this publication formed part of the *ICiTy: Enhancing places through technology* conference that took place at the University of Malta, 18-19 April 2016. The conference was a mid-term research event for the EU COST Action TU1306 (CyberParks). The play on words suggested by the name of this conference tried to portray the blurriness between 'ICT' and the 'city' (as a representation of the urban realm) that

is being faced today, suggesting the pressing need for it to constitute a research focus in its own right. As such, many of the papers in this collection present works-in-progress and report on the preliminary analyses of data. The book of conference proceedings has three parts.

PART I: DIGITAL METHODS AND SOCIAL PRACTICES IN PUBLIC SPACE

Papers in this section deal with recent and novel ICT-tools that have been (or are being) developed in order to research the use of, and user-behaviour within, public spaces.

The paper by Bahillo, Díez, Marušić, and Marušić reports on a pilot project conducted in a shopping mall in Spain, for which a cooperative location network was developed to assist carers in monitoring the position of their dependents, as the latter roam freely in the space. The authors discuss their implementation (in which dependents are outfitted with a Bluetooth low-energy bracelet), and anticipate how aggregated data from the use of such tools could also serve to gain behavioural mapping insights.

In their paper, Duarte and Mateus report on the initial testing of the WAY Cyberparks application, tested in a Lisbon park in June 2014. Park visitors who download this app have their route tracked, and are prompted for location-based feedback about their park experience as they explore the space. Despite some technical challenges, the early iteration of the tool was assessed as easy to use, as the authors express optimism of the tool's potential future effectiveness at guiding the improvement of public spaces.

The paper by Pierdicca et al explores the topic of mobile AR applications for tourism, outlining best practices as well as technical limitations of such applications. These considerations informed the development of an AR module to be integrated into the WAY Cyberparks app. The authors describe the implementation and testing of this app in Valletta, and report encouraging results for the potential of AR as format for future outdoor touristic and learning experiences.

Complementing the previous paper, the paper by Bonnano et al presents a connectivist approach to the design and evaluation of learning in technology-enhanced open spaces. An inventory of relevant theoretical models is provided, highlighting various dimensions applicable to any Smart City Learning intervention, and identifying various types of learning possible within this context. The connectivist model is applied toward the design of two mobile learning activities designed for sites in Valletta, and managed through the WAY-Cyberparks app.

The paper by Artopoulos presents innovative experimental work in which a variety of immersive technologies are employed to create a virtual reality (VR) environment through which to explore a complex historical site in Nicosia, Cyprus. This system allows users to explore the site while navigating through spaces, historical periods, and roles. Ultimately, the aim is to invite diverse users to explore and ultimately co-curate the architectural

intervention of a complex historical setting. In contrast with the typical practice of presenting historical settings as static spaces weighted with a baggage of historical content, the author convincingly argues that historical settings can potentially serve as a stage upon which visitors can actively express and explore layers of memory and meaning. As such, sensitive and skillful historical interventions can advance the value of social sustainability while also re-associating with the everyday life of the public space.

As mobile phone use continues to intensify, the paper by Joković, Dimitrijević, Atanasković, and Dončov offers a comprehensive introduction into the issue of electromagnetic frequencies (EMF), which can potentially impact human health. Basic concepts concerning electromagnetic radiation are introduced, and two prevalent sources are identified: cellphone base stations, and mobile phones themselves. Standard measurement and estimation techniques are described, as well as the variable factors that add complexity to the measurement task. The paper mentions how EMF levels are systematically measured in all European countries from time to time, and reports that the measured radiation levels are currently well below the recommended exposure limits. Notwithstanding, this issue (of EMF exposure from fixed outdoor sources) has importance in the long-term risk assessment of populations in public space.

PART II: ETHNOGRAPHIC CHALLENGES AND THE CREATION OF DIGITALLY MEDIATED URBAN SPACES

Papers in this section explore contemporary design research and innovative open space development practices, illustrating the design challenges of new media for urban and landscape design, and discuss cultural and sociological fieldwork using innovative theoretical and methodological approaches, addressing contemporary knowledge about the use of new media technologies in public spaces from an ethnographic viewpoint. The papers thus address three broad themes: research methodology; applied work; and design challenges.

The first paper by Suchocka, Maksymiuk, Kimic and Kołodyńska is an empirically informed paper that explores the main types of Wi-Fi users in urban spaces and their main activities. They focus specifically on the group they call the 'digital natives' – those who are comfortable and familiar with technology and ICTs. Four types of ICT users were identified within this group: those focussed on work; those focussed on entertainment or social engagements; those passing through as pedestrians; and tourists or other such users. Through observations, interviews and an online questionnaire, this study reveals robust empirical insights into the behaviours of ICT users. Importantly, the study found that users of Wi-Fi hotspots are diverse and they approach the space for different reasons. The research will inform designers and design guidelines for urban public spaces with technology.

The role of ICTs in enhancing citizen engagement in decision-making is the focus of the paper by Ivanova-Radovanova and Radovanov. Here, the authors describe a range of initiatives currently being deployed in the city of Amsterdam, The Netherlands. The authors draw on

research carried out with residents in the city of Sofia, Bulgaria, to gauge the reactions of citizens to the Amsterdam examples. The particular aim of this research is to explore whether initiatives may be transferable between differing urban contexts, and what role the specificities of urban context play in the success and/or failure of such initiatives.

The paper by Bull, Everitt and Rieser describes the *Greenview* project which involved the development of an APP for the purpose of creating behaviour change among users, specifically in relation to energy consumption on the university campus. For this project, animated cartoon characters were created to act as virtual mascots in each university building. The APP was developed to elicit an emotive response from users (based on the emotive nature of the 'Tamagochi' concept) as an engaging way of encouraging them to care for the environment. The central premise of the APP is that when energy consumption levels exceeded those on the same day of the previous year, the visible well-being of species would change, thus highlighting to users the increased energy consumption and drawing out an emotional response, with the aim of encouraging a change in behaviour. The authors pilot tested the APP with a sample of participants to determine key strengths and limitations. In all, the team found that the Greenview APP was perceived by users to be friendly, fun and visually attractive. Participants recommended that the APP needed to be more intuitive and interactive, and also incorporate guidance for users to help them behave differently with regard to energy use.

Suchocka, Maksymiuk, Kimic and Kołodyńska present a second paper based on an initial premise that technology and landscape architecture may interact seamlessly, thereby increasing the potential value of public spaces and users' experiences therein. Building on a previous research carried out by the same authors, which assessed users' behaviour and expectations of technology within leisure spaces, and supplementing this with further empirical work, the authors identify salient spatial characteristics that would incentivise users within public spaces and subsequently suggest tangible design and development principles for hotspots, discussed from specific points of view including users, disadvantages of mobile devices' usage, weather conditions, equipment, materials and health condition (comfort and broader quality of life considerations). Following on from this discussion, the authors proceed to provide some examples of proper and of inappropriate hotspot locations. These principles and examples offer useful pointers that could inform both further research and practice, understood in terms of design policy formulation and implementation. The authors make some final observations regarding the attitude of the new generation of 'digital natives' towards technology and conclude that, while the development of appropriate hotspots is an important requirement, one should not forget the rapid rate at which this technology is changing. They reiterate the crucial role played by open spaces in attracting new users, in providing a setting for the interaction with technology to occur and in contributing more broadly to individuals' quality of life, which should remain central to the discussion.

The paper by Menezes and Smaniotto Costa offers a review of the methodologies and questions associated with ethnographic research, and argues that despite the emergence of new data collection methods, the urban ethnographic toolkit remains a valuable research methodology, because it allows for detailed, culturally-sensitive data collection, with a human-centred perspective. As such, the authors propose an analytical ethnographic framework designed to guide further discussion within the CyberParks project. The framework analyses two rich intersections: firstly, the intersection between information communication technologies (ICT) and urban public spaces (UPS); and secondly, the intersection between ICT and processes of planning and citizen participation. The framework offers a set of 7 questions to guide inquiry, and highlights several dimensions of analysis.

The paper by Botteldooren presents a succinct analysis of principles of classical soundscape design, and discusses how ICT might be used in soundscape design of urban public spaces. To introduce urban soundscape composition, the author distinguishes between the categories of 'backgrounded' soundscape, supportive soundscape, and focused soundscape. Whereas consideration of urban sound has often been confined to a question of noise control, the author cites the potential restorative effects that sound can have, and offers innovative examples of interventions in which sound design influences mood and behaviour in urban public space. Finally, the author describes how the evolution of machine listening opens new possibilities for dynamic urban soundscape design. He anticipates an "internet of sound observatories" combined with different types of actuators and interfaces, which could dynamically alter sound elements or the manner in which they are perceived.

PART III: REFLECTING ON THE RELATIONSHIPS BETWEEN PEOPLE, SPACES AND TECHNOLOGY

Papers in relation to this track reflect on philosophical and methodological approaches and illustrate evidence-informed practice that seeks to understand the complex relationships between humans, public spaces and new media development and how it is (or should be) reflected in the urban fabric and place design.

Social media practices and activities, specifically tweeting in public spaces, forms the core focus of the paper by Djukic, Vukmirovic, Jokovic and Dinkic. The authors aimed to explore the connections between users of online social networks and their engagements with urban public spaces, with a specific focus of Twitter. The study reported on in the paper analyses data gathered from several public spaces in the city of Belgrade to highlight the types of public spaces most attractive to Twitter users in the city, by analysing the concentration of users in public spaces. The results allowed the authors to determine the image of the open public spaces perceived by the users, as well as the intensity of users and tweets through the social networks, with the aim to measure the quality of open public spaces and concentration of users.

The paper by Breser, Zedlacher and Winkler draws on a recent project from the University of Graz, Austria, that explored some technical solutions for representing archival sources of information for urban areas in the digital era. Particular challenges for creating digital archives that are explored in the paper are those related to the archive practices of the analogue world. Here, the authors identify problems with the means of classification of the archives, assignments, semiotic systems and descriptions. In the paper, the authors make use of software applications and mobile technologies to offer solutions for overcoming such problems. The overall argument is that there are very real challenges in comparing and transferring analogue methods to the digital world which are essentially related to the modes of practice in digital and analogue archives that are incompatible and this needs to be reviewed and addressed so information and research materials related to urban areas may continue to be archived into the future.

Klichowski and Patricio present recent work from cognitive neuroscience to explore the question of whether the brain really likes ICT tools and being outdoors while using these tools. The aim of the paper is to evaluate concepts that promote technologically-enhanced outdoor activities, such as CyberParks. The paper poses three main questions: Does the human brain really like ICT tools? Does the human brain really like being outdoors? And finally: does the human brain really like technologically-enhanced outdoor activities? The results of the studies presented show that the human brain does not like ICT tools yet; it likes being outdoors very much. At the same time, it was shown that outdoor activities may be encouraged by ICT tools, yet outdoor activities themselves should be free from ICT tools. The paper concludes that, from the perspective of cognitive neuroscience, CyberParks are not a solution that the human brain really likes.

In a similar vein, the paper by Lister evaluates the concept of smart city learning. In the paper, the author draws on data from an examination of learning experiences in two public spaces in the city of Valletta, Malta. It is argued that the measurement and analysis of individually interpreted learning experiences may build a knowledge picture of how learners perceive immersive technology-mediated learning in smart cities. Mobile learning location-based prototypes were developed and implemented in the two public spaces. The author discusses potential methodologies for designing a measurement of the effectiveness of these learning experiences and associated learning design for immersive urban learning environments mediated by mobile and networked technologies. The research aims to contribute to current approaches of urban smart city environment planning for citizen-engaged 'human smart cities'.

The timely research theme of co-creation in urban planning forms the focus of the paper by Mačiulienė and Mačiulis. In this paper, the authors argue that the notion of cocreation may be used in urban planning by treating citizens as active, creative, decisionmaking equals rather than as passive recipients of top-down design. The focus of this article is the creation of a typology of citizen engagement strategies in urban planning, which sheds light on broader issues around the relationship between technology, urban development and

public participation. By exploring and critically assessing case studies of citizen co-creation in the city context, the authors attempt to illustrate how citizen engagement may lead to construction and redefinition of public spaces.

The paper by Patricio represents a unique offering in this collection with its focus on theoretical and philosophical questions about technology. The work draws on the writings of Nietzsche and focusses on the notions of geophilosophy and geoaesthetics. Patricio's paper is an attempt to read the notion of CyberParks through a Nietzschean perspective and regards the implementation of land art and site-specific art projects as further developments of a CyberPark.

Finally, the paper by Vassi and Vlastos examines the interactions between information technologies and urban public spaces, focussing specifically on the road as a key public space. They argue that technology has altered the nature of the road within cities, as well as the nature of urban transportation. While roads traditionally accommodated vehicle traffic, as well as some leisure, social and work activities, the authors argue that technology has enabled private activities to enter into this more traditionally public space, hence blurring the boundaries between public and private. They focus in particular on the ways in which technology has diversified the means of transport available including the advent of car-sharing schemes and bike rental facilities within cities. Overall they argue that technology is reshaping urban transportation and at the same time it is redefining the road.

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