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The Virtual and the Real in Planning and Urban Design

INTRODUCTION

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At the edge of 'the virtual and the real', new imaginary virtual spaces are created such as augmented realities, virtual realities, gamified environments and places with digital access replacing traditional physical mechanisms of interaction and learning. As our world becomes an increasingly hybrid space where digital technologies are interlinked with the physical world, we construct virtual spaces which models are visually similar to physical spaces with their structures and functionalities allowing the users to immerse, interact with them, play and simulate, learn and communicate.

Over the past decades, in the discipline of spatial and urban planning and design, digital tools, models and games have rapidly developed opening up new perspectives for a paradigm shift and the diverse involvement of stakeholders. This book focuses on perspectives, methods, applications and civic engagement in a world of increasing digital technologies. It is written for those who are interested in digital technologies and recent trends from undergraduate and graduate students to researchers and can be used as learning material for classes.

Part one: Perspectives in planning and urban design

When it comes to the use of and involvement with the 'virtual', many different perspectives and ways are available to encounter with it. A variety of perspectives are entangled with conditioning spaces and how this influences the digital models we design for decision making in planning and design (Yamu, de Roo and Frankhauser 2016). This theme is discussed in Chapter 1 by *De Roo and Yamu*. The virtual realities are synthetic realities we decode when using simulation models for design purposes. Tschumi states, that the creation of urban environments "…is a hybrid art, where the image hardly ever exists without a combined activity."(1996, p. 257).

Urban design as a virtual space evolves as a reflexive instance between pixels and ideas that help to develop a new perception of space and social

life. Turkle (1995) points out that "We are moving towards a culture of simulation, in which people are increasingly comfortable with substituting representations of reality for the real". This idea is explored by *Hamza and Abdelwahab* in Chapter 2.

Games and game mechanics are becoming more prominent. Everyday life and games seem to have become increasingly mixed, identified as the gamification of society as game mechanics and dynamics are used in support of the practice of everyday life (Zicherman and Cunningham 2011). The recent trend of gamification seems to be closely related to a process that can be described as the virtualization of the human lifeworld (herein addressed by *Olthof and Eliëns* in Chapter 3). It is a movement into a lifeworld that is (partially) computationally mediated instead of being directly experienced. The concept of the lifeworld is an invention by philosopher Edmund Husserl and it inspired the philosophical discipline of phenomenology, which takes the world as it is self-evidently 'given' as the starting point of all our experience. It then examines this experience of (human) life, especially in terms of perception and activity (practice) (Ihde 1990, p. 31–41).

Sengupta in Chapter 4 explores, inter alia, routines and perceptions where we often do not even recognize that the virtual has entangled with reality. 'Ubiquitous Computing' or 'pervasive computing' is increasingly becoming a part of everyday life. According to Weiser (1993) it is invisible but everywhere around us, influencing our everyday behavior. We produce a huge amount of data daily to the extent that at some point in the mid-1990s the term 'Big Data' was coined by John Mashey (Lohr 2013) and machine learning – as a branch of artificial intelligence (AI) – evolved where systems learn from data. Recent developments have begun to demonstrate the translation of real world knowledge into digitally recognizable data without the need for human intervention.

Part two: Help planners plan: decision support, methods, tools and applications

In Chapter 5 *König* and his collaborators describe a cognitive design computing system for urban planners that "integrates available simulation methods and combines them with state-of-the-art optimization, the future aim being to mimic the way a designer's brain works." They address in their contribution the idea of cognitive computing, defined as the "simulation of human thought processes in a computerized model" (Rouse 2014). Herein, evolutionary algorithms offer a way of synthesizing and generating a larger number of design options. They are inspired by biological evolution to provide candidate solutions to the optimization problem. This is linked to tackling complex optimization problems. Within the debate of complex problem optimization, and thus inherently linked to complexity theory, the notion of self-organization and fractals comes into play. In complexity

theory, it is well-known that certain self-organizing processes generate patterns with fractal properties. This is reflected in many biological systems. Since the 1990s models and applications (Batty and Longley 1994; Frankhauser 1994) have been developed to apply the logic of nature to planning models generating urban fractal morphologies to ensure highly efficient spatial systems (see Chapter 6 by *Frankhauser*).

Urban morphology, or the configuration of space, is also related to social, economic and cognitive factors. In this context, the space syntax method (Hillier and Hanson 1986) argues for using a modeling approach that links intuition and science and can be used for designing and planning cities (Hillier 2009). It consists of calculating configurative spatial relationships and involves a set of techniques for observing how these networks of space relate to functional patterns, such as movement, land use, area differentiation, social wellbeing and malaise. It also makes it possible to shape theories about how urban space networks relate in general to the social, economic and cognitive factors when shaping them and how they are affected by them (Hillier et al. 2007). It helps us to understand the relationship between an emergent structure and processes (Yamu 2014). This theme is explored in Chapter 7 by *van Nes and Yamu*.

As regards social and cognitive factors, the built environment impacts on human behavior and emotion. Virtual methodologies can explore how to inform and predict perception to support urban designers in their design decisions. Lynch suggested certain dimensions of spatial qualities (1984) that include the relationship between the built form (configuration), the city as a network of access and the climatic aspects people prefer. Thus, the method of space syntax can be also used for examining human behavior (Haq and Zimring 2003) using a subjective appraisal determined via explicit measures such as "semantic differential scales" which are a descriptive dimension of an environment (Osgood, Suci and Tannenbaun 1957; Canter and Wools 1970) incorporating a neural network approach (Burden and Winkler 2009) for combining a variety of measures (as explored by *Kuliga* and her collaborators in Chapter 8). This in turn is linked to machine learning techniques and approaches.

So far the chapters have dealt with optimization problems, wellbeing and improvement of the quality of life. We mostly think in the context of urban growth related issues. In contrast, in Chapter 9 *Asami* discusses the population decline that Japan is facing, a trend which is estimated to continue for a long period. The original Japanese planning system (from 1968) is based on urban growth and has recently had to respond to new issues caused by population decline and urban shrinkage. More sophisticated planning support models and planning tools have to be implemented in the planning field, for example incorporating people's individual choices.

Part three: Get the public on board!

The virtual and the real are often intertwined in modern public participatory and engagement situations. The 'real' is present in everyday life, with its reality, the changes and the consequences of these changes affecting people in the places in which they live. Participation in urban planning was designed in the 1960s as an opportunity for people to speak out, collaborate and express their opinions, feelings and expertise. Recently, the process of participating has moved from the original idea of commenting on urban planning ideas and becoming informed to the arena of co-creation, collaboration and consensus building (Innes 1995, 1996), and active feedback. The virtual is becoming an extension of the real, directly interacting with the real, enabling two-way communication, a dialogue. More than that, it enables creation of virtual spaces, virtual places and communication tools that are available at any time and from any place. A variety of visualizations can be presented to the users; the information can be given to them in different forms and formats. These virtual spaces can empower the users and give them a platform for a dialogue, an exchange, a chance for expression and may even involve them in the decision making. Virtual spaces can be designed as games based on the concept of a playful public participation (Poplin 2012, 2014) – participation in which the central element is play. Play as a voluntary and free activity enables immersive and playful civic engagement (Gordon and Manosevitch 2010; Poplin 2012; Devisch, Poplin and Sofronie 2016). In Chapter 10 *Poplin* and her collaborators discuss four game concepts ranging from very serious games to more playful virtual game-based environments. All created games may be used to facilitate participatory processes in urban planning.

The idea of a game can be expanded in game-based simulation environments or crowdsourcing volunteered information systems (VGI). VGI coined by Goodchild (2007) refers to user-generated geospatial information and combines the aspects of crowdsourcing, citizen scientist and amateur mapmaker. VGI creates opportunities for geospatial data creation using local knowledge. *Seeger* in Chapter 11 demonstrates how VGI and virtual platforms can be implemented for a mobile device and offers ten key questions that need to be asked in the process of creating a facilitated-VGI. His contribution expands data collection and VGI to involve non-savvy tech users, which is also the goal of Public Participatory Geographic Information Systems (PPGIS). They were invented, designed, created and implemented to enable map-based civic engagement for very heterogeneous users – for everybody.

The visualization in a PPGIS, the representation of the physical space, mostly used two-dimensional map-based visualization. *Wissen* and her collaborators in Chapter 12 present a virtual tool that expands the two-dimensional PPGIS concept. Their virtual platform adds the third dimension

and sound. It enables the simulation of 3D visualizations of landscapes and invites people to perceive sensually the visual-aesthetic impact as well as the sounds generated by the wind parks. Adding light to the sound and creating a cross modal perception of simultaneous or sequential audio and visual stimuli can be explored to better understand how people respond to such stimuli and their involvement with a virtual media that combines multiple stimuli. Neuroscience and psychology studies have suggested that experiencing multisensory stimuli affects the perception of each stimulus separately (Stein 2012).

Combining multisensory stimuli within an interactive environment can affect how people engage with and through these environments. *Petrusevski and Fatah gen. Schieck* explore, in Chapter 13, the impact of these combined stimuli on people's engagement with multi-stimuli media.

Social media is another example of a virtual space in which people meet, exchange, collaborate and participate. Access to social media may lead to the empowerment of citizens and can give a voice to disadvantaged and low-income populations. *Dobson and Sukumar* in Chapter 14 explore the possibilities for self-organization of people through social media, initiation of viral messages and their impact at the community level. They contribute to the debate on social media and how it may help to support urban pioneering and act as a co-coordinating 'agent' for creative resourcefulness in the digital age.

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