Making the Case for “Architectural Informatics”: A New Research Horizon for Ambient Computing?

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ABSTRACT

Society is undergoing a major digitalization - not at least in the field of architecture. The digitalization of our built environment has also begun to reflect itself in research (see e.g., Cai & Abascal, 2006; Margolis & Robinson, 2007; Greenfield, 2006). At the cross point in-between architecture, urban development, and the digitalization of modern society, there is a major research potential – untapped and ready to be explored. This paper initiates an “architectural informatics” perspective and outlines a research agenda as to address questions of how to better integrate our built environment and digital world. This paper outlines three research themes including: 1) Architectural composition with digital materials (theory development), 2) Architecture for sustainable digitization (development of value ground), and 3) Digitization processes & architecture as social intervention processes (methodology development). Common to these three areas is the overall aim to develop architectural and computational concepts and theories as to address this common area, to find new practice based methods to facilitate new forms of cooperation between engineers, architects and the inhabitants of our built environment, as well as to explore architectural informatics as a phenomenon and opportunity.

Keywords: Ambient Computing, Architectural Informatics, Architecture, Digital Technology, Materiality

1. INTRODUCTION: TOUCHING THE “MATERIAL GROUND” FOR ARCHITECTURAL INFORMATICS

Our society is undergoing a major digitalization - not at least in the field of architecture. The digitalization of our built environment has also begun to reflect itself in research (see e.g., Cai & Abascal, 2006; Margolis & Robinson, 2007; Greenfield, 2006). At the same time, the digital is increasingly becoming a natural architectural element (Greenberg, 2006; Wiberg, 2011). As the digital gets integrated in our built environment, typically addressed as ambient computing, it creates and enables new functionality for buildings, new opportunities for building construction, and new architectural expressions. With this development follows that the digital is neither possible nor meaningful to separate from the social, the physical, and the material world. Rather, we find meaning in texturized and working compositions made up...
of physical, digital and social elements (for a further discussion see e.g., Robles & Wiberg, 2010; Wiberg & Robles, 2010; Wiberg, 2011).

For the research program “architectural informatics” as presented in this paper this is a guiding vision in which no categorical distinction is made between the physical and the digital in the first place. On the contrary, the physical, the digital and the social is now to a large extent integrated in our everyday lives. The history of informatics research shows that with full clarity. People shape digital technology and the digital technology is shaping us. Several concepts have over the years succeeded each other in informatics research to make this point. ‘Socio-technical systems’ (Hirschheim & Klein, 1989) was one of the first concepts formulated to point to the fact that technical and social systems are fundamentally inseparable and as such constituting a socio-technical materiality. The concept of a “duality of technology” (Orlikowski, 1992) was further developed as a concept aimed at describing the relationship between the social and the technical world. When the complete fusion of the physical and digital occur, there is no point in further distinguish these elements. This knowledge led to the development of the present concept of ‘sociomateriality’ (Orlikowski, 2007; Orlikowski & Scott, 2008) or simply ‘materiality’ (Leonardi & Barley, 2008) aimed at highlighting how social practices relate to the material in our increasingly digitalized society.

In the modern society our built environment and our digital reality are increasingly defining our social, cultural and professional everyday lives. With this as a point of departure a number of researchers in recent years have stressed the importance of closer interdisciplinary collaboration between the fields of architecture and IT research (see e.g., Streitz et al., 2002, p. 555; Jones et al., 2005; Sengers et al., 2004). Despite this obvious fact, very little has been done in order to build strong research on an integrative approach of the two areas (Mitchell, 2000; McCullough, 2004; Wiberg, 2005). The research agenda as presented in this paper is an attempt to contribute to this need.

At the core of this research program is an opportunity to reach new knowledge in the joint, interdisciplinary area that we think of as “architectural informatics” (for a further motivation see Robles & Wiberg, 2011). We view architectural informatics as the study of the entangled design and practice of digital material use at the scale of architecture. Such entanglements manifested through architectural composition of known architectural materials and new digital materials requires the development of architectural theory, including concept development capable of framing and describing new spatial and temporal dimensions of new architectural forms. As will be further elaborated through the three research themes presented in this paper the research program on architectural informatics takes this material understanding of our reality as an important point of departure.

The rest of this paper is structured as follows. First we present a number of research questions that serves the purpose of illustrating the current research challenges facing this area. Moving on from these challenges identified this paper then present three research themes designed to address these challenges. With a point of departure in these three areas we then reflect on different methodological approaches needed to explore this area followed by a discussion on potential results from this exploration. The paper ends with the sketching out of a research agenda that might leverage current research on ambient computing into the area of architectural informatics.

Research Questions & Interdisciplinary Research Challenges

The overall research questions guiding our research program on ‘Architectural Informatics’ are all of a strong interdisciplinary kind and as such they also serve as a common starting point for the involved parties in our research environment. The questions are also deliberately formulated as to work across the three thematic areas of the research program as will be described later on in this paper. The main research questions include e.g.: - How can architectural theory be developed with regards to architectural informatics? - How can new architectural compositions that include digital
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