



A framework for open and participatory designing of built environments



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ABSTRACT

The Internet has dramatically changed everyone's access to information, knowledge and other people. In many fields, this has resulted in an opening up of business models, products, services and organizations. Examples include open academic publishing, open software and open innovation. Experts are increasingly aware that a significant amount of knowledge and experience exists outside of their companies and institutions, which used to be the exclusive creator, aggregator and curator of knowledge and the sole places of innovation. Institutions are responding by reducing their boundaries and are opening up to the outside. A particularly potent technology for engaging people and capturing their knowledge has been social media. However, theories of participation and participatory approaches to shaping the built environment greatly predate even the Internet. In this paper, we present a conceptual framework for open and creative designing. A proven three-tier architecture, various theoretical levels of participation and an abstract view on social media tools have been used to develop an original, flexible, generative, "one size does not fit all" platform that can be used for the optimal collection of external information and knowledge. The platform allows for simple enhancement of in-house information systems (IS) with socially rich components. We are finding such a modular approach as very flexible for organizations that host the planning processes and that the application of social media technology creates very low barriers for the public to contribute.

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1. Introduction

Creativity is an increasingly important economic resource. Its role has been gaining prominence throughout the 20th century. Schumpeter (1934) claimed that innovation and creativity are the strategic stimulus to economic development. He advocated motivating creativity and innovation through protection of intellectual property and rewarding innovators. Hayek (1945) complemented these ideas by focusing on expanding capacity for creativity and innovation. He claimed that knowledge in a society is dispersed, that innovation and problem solving is a trial-and-error process, and that as many individuals as possible should be in a position to be creative. Together with Karl Popper (2012), he advocated an open approach to creativity and innovation in an open society. Greenspan (2004) claimed that, over the past century, economic growth has reflected "the embodiment of ideas in products and services that consumers value. This shift of emphasis from physical materials to ideas as the core of value creation appears to have accelerated in recent decades."

With the popularization of the Internet, several scientists and thinkers have studied its impact on the phenomenon of creativity.

Pink (2006) sees creativity as a step toward the society of meaning (rather than knowledge). For Florida (2005), creative human talent is, in addition to tolerance and technology, one of the three Ts that contributes to creativity.

Because of communication technology, the sources of knowledge have changed. In the traditional world, the vast majority of the relevant knowledge and ideas are inside organizations. Today as a result of a well-educated population empowered by access to information on the Internet and the ability to contact other smart people via the Internet, the tables have shifted. A significant portion of knowledge may be on the outside of organizations. Their challenge is how to make use of that knowledge.

These theoretical works on the one hand and Web 2.0 (O'Reilly, 2005) technologies on the other hand set the stage for new paradigms of creativity and innovation. These paradigms have manifested themselves in open science (David, 2003), open-access publishing (Suber, 2007), open innovation (Chesbrough, 2006) and open education (Seely Brown, 2008). In addition, in construction, there has been an increasing awareness of the importance of creativity (Skibniewski & Zavadskas, 2013).

The new types of knowledge creation and management have been extensively studied within project-based industries (such as construction), where the effective management of external knowledge is of the utmost importance. As even traditional industries are becoming

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outside-in (Klinc, Turk, & Dolenc, 2010), research provides empirical evidence of the ability to obtain significant benefits with IT-based knowledge management (Yang, Chen, & Wang, 2012). As noted by Dave and Koskela (2009), social networking applications as well as other collaborative people-based services are transforming the way people share ideas.

In the specific area of the built environment the developments toward more open organizations result in better collection of data and the capturing of external tacit knowledge. Social media tools are a useful tool to do so.

1.1. Research objectives

The above developments are valid for construction and for the shaping of the built environment. Although there surely are skills and knowledge that one cannot expect to find with lay people, there are areas where the general population could contribute significantly.

One such area is urban planning. Urban planning concerns the space in which people live, in which they perhaps have been living for decades and about which they may have historic memories for centuries. This area seems to be one such area where the ideas of mass creativity and innovation could be tested.

It has already been demonstrated (see Section 2.5) that it is possible to include the public in spatial planning more actively, achieve better response and better coverage, obtain effective public participation in spatial planning, and harvest the knowledge of the public about the local community in which they live. One should combine professional and crowd knowledge. In addition, to do so, one could use social media, which has been designed from the ground up to allow people to collaborate.

As reviewed in Section 2, several such systems have already been built. However, rather than solving a problem using state-of-the-art technology, we have been primarily interested in creating a sound conceptual basis for such systems, thus creating a coherent framework that would combine what has been known about participation (Sections 2.1 and 2.2) and social networking (Section 2.3) and applied to the field of urban planning (Section 2.4).

The goal has been to create a conceptual framework of public participation and verify it in a prototype. From this theoretical approach, we learned there is no one-size-fits-all, and it made us look at various technological components of the system in a very abstract manner. This resulted in an implementation that is flexible and that includes a generative platform into which the social media tools can be quite arbitrarily plugged in or out, on demand, to reach various levels of participation known from the theory of participation by using various social media tools. That also presents an original aspect of this work.

1.2. Research methodology and paper structure

Our research combines the theoretical study of creativity (Section 1), collaboration and participation from the literature (Section 2) to form a scientific base for the practical work. An augmented theoretical model for the role of information systems (IS) in open enterprises engaged in participatory creative work is proposed (Section 3). We verify ideas by building a working system and use it in evaluations and day-to-day work (Section 4). The empirical component can therefore be regarded as using an action research methodology.

This section sets the stage and describes both the general challenges at hand and specific issues related to the built environment. Section 2 presents the technological background and related scientific work in the areas of participation in general. It examines social networking as a participation tool and explains the participation challenges of urban planning. Section 3 presents an original conceptual framework for linking the traditional role of IS in an organization (in our case, geographic information system (GIS) and related tools) with the tools that use information technology to create an open, participatory

organization. Section 4 describes the architectural and practical features of the system that has been built. The prototype is designed as a generative web platform. Users of the platform can generate their own array of Web 2.0 tools adapted to specific projects. Feedback from users and SWOT analysis is presented as well. Section 5 presents the findings from the development process, experiences gained with the prototype, the conclusions and opportunities for further work.

2. Legal, technical and scientific background

As discussed in Section 1, urban planning is providing an environment for a case study of social creativity in the following two ways: (1) there are legal obligations to include the public when planning, and (2) the public indeed has tacit knowledge about the space and its use. This public is experienced in using social collaboration tools in their private use of the Internet – using social media applications. In this section, we present the related work in these areas.

In the next section, the importance of public participation from a sociological point of view and especially in the procedures of spatial planning was examined through the history of public participation as well as from theoretical grounds, therefore considering legislation that gives the public the right to monitor and participate in the processes of spatial planning. In addition, the effects of classic methods of public participation have been explored, and corresponding technologies, applications and tools of Web 2.0 have been identified.

2.1. Participation

Participation, especially participation in planning processes, is a topic that has been discussed in many scientific fields for almost four decades. The pioneer of participation research, Arnstein (1969: 216), believes that “the idea of citizen participation is a little like eating spinach: no one is against it in principle because it is good for you”. Moore and Davis (1997: 5) are also very colourful in depicting the perception of people and their understanding of surroundings with an old Chinese proverb (English Language and Usage Stack Exchange, 2017): “Tell me, and I will forget. Show me, and I may remember. Involve me, and I will understand.”

Participation will be successful if decision makers consider the ideas, suggestions and opinions of the public. Participation increases the power of an individual and allows one to have a say in public affairs (Arnstein, 1969). On the other hand, the decision makers must support participation. If they do not, the results of just formal participation opportunities would be quite unpredictable. In most cases, this can result in public dissatisfaction with the process (Cerar, 2014).

There are many theories of participations, and they address different types of participation. Arnstein (1969) split participation into eight levels of the so-called participatory ladder. Analyses of Arnstein's proposed type of participation have shown that power holders do not support full citizen control. Instead, they give more options to participate only to a particular type of participant (for example, the wealthiest, elders or young people) (Carver, Evans, Kingston, & Turton, 2001). However, by doing so, individuals are deprived of participation, which turns off various civil initiatives and local associations (Sieber, 2006). The public does not trust a limited public participatory system with such a level of participation (“virtual participation”). For this reason, a part of the public no longer wants to participate (Kyem, 1998).

Waidemann and Femers (1993) presented a slightly different type of participation ladder. Their ladder has six participation levels (Fig. 1). The lowest is “public right to know”, followed by “informing the public” and “public right to object”. The higher steps on the ladder, namely “public participation in defining interests and determining the agenda” and “public participation in assessing risk and recommending solutions”, provide more participating power to participants. The last step, namely “public partnership and the final decision”, provides maximum participation power to the public. This kind of framing the

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