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ESTABLISHING THE ROLE OF SPACE IN SOCIO-MATERIAL APPROACHES TO CITIZEN INNOVATION

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Abstract

In recent years a consensus has emerged in the field of Information Systems that in systems development a value-driven approach, the delivery of meaningful benefits (Doherty, et al. 2012:1) should be prioritized over an out-come based perspective. This need stems from many factors, from the formulation of a more open and inclusive design process with the participation of various stakeholders to the non-linear nature of technology adoption. This research-in-progress paper aims to contribute to a deeper understanding of the recent shift from an outcome-based to a value-driven approach in systems development. This will be done by revisiting contemporary socio-material thought. Contributions originating from spatial theory supported by ethnographic material on citizen innovation enable new ways to gain insight to the nature of value. We argue that there is a need for an in-depth spatial and socio-technical exploration that can widen the scope of the Information Systems research agenda. It is our view that such a perspective can also contribute to organizational outcomes to support the creation of more inclusive, socially resilient urban environments.

Keywords: Smart Cities, Space, Practice, Information Systems, Value

1   Introduction

Culture and values, reputation, trust, and relationships have become keywords in the discussion of Benefits Realisation Management. This emerging field links values to everyday organisational outcomes in the form of tangible and intangible benefits to be able to answer to the paradox caused by the exponential growth of IT development and, parallel with this, the large-scale failure of IT projects. When studying intangible benefits in an organisation we recognise (unintended) outcomes that nevertheless considered to be advantageous in nature, and this view has now reached a stage where the assessment of intangible benefits has become an explicit requirement even of investment evaluation techniques (Fox, 2008). This is particularly important in an area where investments are growing from the part of corporations as well as supranational bodies worldwide. Global investment in Smart City technologies is to be expected to reach $108 billion by 2020. There is growing pressure on ensuring the scalability and sustainability of smart urban projects in the light of urbanisation trends and financial interest. In our view, a benefit oriented, value-based approach to smart city projects can help achieve the long-term success of smart city projects. For this, instead of subordinating their assets to a technocratic agenda, we contend, cities primarily need to respond to the social and cultural needs of citizens. Studying the diverse needs of the citizens and the nature of their participation contributes to ensuring the autonomy of citizens throughout the urban design process and helps creating platforms and services that truly benefit all co-creators. The first stage of this exploration is portrayed in this research-in-progress paper.

A decade has passed since the first call was issued for smart city solutions to address sustainability in an era of rapid urbanisation. During this time, the scholarly literature on socio-materiality has done much to illuminate the processes through which urban environments are being retrofit or built anew with digitally readable assemblages of smart technologies. A key challenge remains however: to understand citizen engagement with smart cities. For smart cities, data is of central importance. Data is embedded in the fabric of the city, thereby, as we later show, it is present in the practices that underpin our everyday lives. Data allows for new experiences in organizing, decision-making and creating value within and between organizations. As Knippenberg et al (2015:650) argue, these new patterns bring about new "social and motivational challenges". The way we decided to approach this problem was to explore Knippenberg's challenges and engage in anthropological fieldwork from January-August 2015, with 3 months devoted to ethnographic observation and interviews explore how a digital platform is built by volunteering citizens under the aegis of smart cities. Our attention was focused on motivation, lived experiences and the meanings they assigned to the processes they participated in. Why do citizens autonomously engage in creating digital city services?; Why do they participate in building a data-led, digital urban environment? Our observations of the unfolding of this particular project up until it reached the prototype phase have been very useful in reframing our perspective on studying citizen innovation. Our attention was called to the importance of place and space, new dimensions that help conceptualizing smart urban innovation in further research.

Our ethnography pointed to the materiality of the practices we observed and highlighted the importance and entangled nature of spatiality. Thus, in the following sections we turn first to Orlikowski's foundational work on socio-materiality, extending out to research on, for example, digital platforms, social media engagement, online communities (Orlikowski and Scott, 2014; Honglei, 2012:82). We then reopen fundamental works on space to emphasize spatial dimensions of citizens' engagement with smart urban environments. As space still demands theoretical and empirical attention within IS literature, this paper speaks to its importance using the example of citizen engagement. Although many disciplines have long used spatial theory to understand social practices arising in the digital environment, Information Systems has understandably focused on the relationship of the human to tech-

nology and has often attended to space only as the empty stage on which practices occur. We regard smart ecosystems as arising in the dynamic context of smart urban spaces, therefore we are foregrounding space as an active constituent of socio-materiality. In short, we argue for the vital role that space plays in the creation of smart urban practices. Our approach will shed light on emergent practices and indicate the path through which we will be able to understand new meanings and thereby how values and benefits can be realized in human organizations.

2 Defining and researching voluntary participation in the smart city

Studying the nature of voluntary engagement in the context of Information Systems means going beyond open innovation to explore participation in emergent, complex and political processes. Take for example the following statement by one of the creators of a digital innovation dashboard, a smart urban solution, for communities in Dublin: "I think the first thing you ever want to do is to be visible. So other people know you exist. I think it is as basic as that." The dashboard aimed to digitally visualize and connect urban projects in the area to help create a more resilient urban space where people can collaborate more effectively on urban projects. But, standing back, one can see that such projects are turning the urban fabric into a digitally readable assemblage of responsive artefacts, enabling the different stakeholders to perceive, conceive and experience urban space. The data-informed, digitally visualized city-scapes provide the smart ecosystems with new ways to achieve cooperative urban governance and enable innovation. But when we do stand back, we lose sight of the fact that one of the key building-blocks is participation. Our ethnographic research showed that this participation and its social relations involved an openness to innovate and co-create in order to build better cities. Ethnographic attention to participation and social relations pointed to the crucial role of space, and as Henri Lefebvre insisted "social relations…have no existence save in and through space. Their underpinning is spatial" (1991:404).

As Schaffers et al (2011:432) contend, smart cities are increasingly seen as open innovation environments. From this perspective, urban, rural and regional environments are conceptualized as "agents for change" and environments of "democratic innovation." On the other hand, access to the means of participation and the preparedness of citizens is often taken for granted, while the digital divide widens. In the smart city context, we can also observe the formation of smart ecosystems consisting of different stakeholders that can broadly be characterised as citizens, governments, enterprises, researchers. Through innovation processes they participate in the reconfiguration of urban life and create new working and living scenarios with the help of various technologies (see Schaffers et al 2011:432).The term "smart city" is used herein in a double sense. On the one hand, it denotes the fabric of the city equipped with "everyware" (ubiquitous computing embedded in the fabric of the city); on the other hand, it will be used to also refer to the development of a knowledge economy within a city-region (Kitchin, 2014:2). This definition serves as a springboard for this paper. It introduces three interrelated domains of the smart city phenomena: space, technology and society.

Voluntary participation in the creation of smart urban artefacts emerges, in-part, from hackatons and meetups designed to answer sustainability challenges in urban areas. The complex nature of urban problems calls for various sets of skills and types of expertise. Rabinow and Bennett (2007) calls this an emergent problem-space, to which a diverse expert-collaboration can respond. In other words, there is a need for emerging experts to bring different skills to the table and provide tacit knowledge about urban areas and their functions. Diversity in these collaborations therefore ranges from citizens from various backgrounds to city leaders, and from business representatives to urban developers and programmers. Exchange of knowledge is enabled by assigned spaces and events that support long-term

engagement for co-creation of novel urban artefacts. The technological solutions, such as different forms of ICTs, smart software, mobile applications, and coded environments constitute part of the smart city agenda. They participate in reconfiguring well-known city assets that are to be adopted by the citizen-experts of the city.

When our ethnographic observations commenced, only an initial mock-up existed for the digital dashboard. The idea of the creator was to assign communities in a certain Dublin region to clusters, such as: planning authority, communities of practice, social entrepreneurs, etc. The definition and composition of these clusters were reframed by the participants multiple times. The aim of building a resilient network and collaboration on various urban projects (food coops, urban beekeeping, urban gardening, etc.) was to be realised by displaying communities and their projects digitally. We observed online conversations, public events, meet-ups with the volunteer team that brought the project to the prototype phase, a phase which was a milestone to ensure further city council support for the project.

We noted motives behind participation in this digital dashboard project, the creators' explanations for the concepts behind clusters, and the technological practices. Ethnography opened discussion about the benefits that may arise from participation. This is especially important because the literature on the predecessors of smart organizing – e-governance and e-participation – denotes, models for e-organizing often stops at the descriptive level (Porwol, et al, 2013). We, on the other hand, wish to probe notions of belonging and citizenship lived in and through the urban space. Therefore, we propose reopening foundational literature on space in the following sections and make a conceptual bridge to the literature on value and to the Benefit Realization Management Literature. In the next stage of our research we will continue our observations expanding the field to another region in Dublin.

3   The socio-material perspective

As Orlikowski (2007) argues, everyday organizing is inextricably bound up with materiality. She uses relationality as the ontological basis for her analysis, "replacing the idea of materiality as 'pre-formed substances' with that of 'performed relations', in order to characterize the recursive intertwining of the social and material as these emerge in ongoing, situated practice" (Orlikowski, 2007 see also: Pickering 1995; Latour 2005). She recognizes that human and material agency only exist through their mutual constitution. Therefore, in the context of work she looks at "the entangled relations between humans and technologies as performed, that is (…) enacted in practice" (Orlikowski & Scott, 2007:26). A socio-material perspective in the Information Systems literature, therefore, duly explains practice as the central concept for framing research, while foregrounding the social and the technical dimensions as active formants of practices. Studying the interrelatedness of these dimensions, their mutual constitution and their performative nature provides insight into how organizations function.

But how are practices constituted in the smart city context? In this paper we argue that there is much to be taken into account when studying smart urban artefacts created through open innovation processes, *inter alia,*

a) In these processes there is a great emphasis on the locality of the artefacts; they are not produced in context, they are produced through and for the context;

b) Local knowledge is an essential component in creating these artefacts: they are built through processes that incorporate the knowledge of different stakeholders in the city that are as well embedded in the social as in the spatial.

In other words, there is a great emphasis on conceived, perceived, lived experiences of urban space (Lefebvre, 1991) alongside the sense-making processes of socio-materiality (Orlikowski, 2007). In the next section of this paper, we unpack how the spatial dimension becomes a key formant in configuring practices that underpin smart urban processes and thereby the everyday life of citizens. We support our argument by teasing out the mutual constitution of space, technology and society.

4 The spatial dimension

While acknowledging important work on phenomenology (e.g Ciborra, 2002), we contend that the concept of space emerges inconsistently in the Information Systems literature. However, we argue, that analysing practices as stemming from the interrelation of space/technology/society underscores generalizability and gives space for autonomy as well as allowing for a deeper understanding of values, meanings and practices that is a core question of systems development. We explore spatial practices first through the fundamental contribution of French philosopher Henri Lefebvre, then through Rob Kitchin's work, making the case that studying space, technology and society in their mutual constitution helps us to reach a deeper understanding open innovation processes in the smart city context.

To be able to account for the performative power of urban processes, many scholars turned to Henri Lefebvre's spatial theory. Using this perspective means looking at city-formations and understanding events, social processes and power-dynamics as inherently spatial. The spatial perspective also chimes with Michel Foucault's investigation of time and space: whereas once the former was regarded as dynamic and the latter as merely dead background to "social relations, social will and societal development" (Soja 2010: 362), today space is foregrounded. Space, in this understanding, transforms "from emphasising flat cartographic notions of space as container or stage of human activity ... to an active force shaping human life" (ibid.)

Echoing Orlikowski's relational view incorporating technology and society, Henri Lefebvre describes space and society as dynamic and mutually constitutive. He describes space as emerging from social relations; for him space is inherently social, a social product emerging from social relations. Firstly, the interconnections of space and society are modelled through a triadic concept uniting spatial practices, representations of space and spaces of representation. He systematically links space and social reality through everyday activities, visual representations and meaning-making processes. Borrowing from phenomenology, he also uses another triad: the concept of perceived, conceived and lived space. Building on his philosophy, we propose that the quest for understanding meaning, values, engagement and participation in the smart city context should start by considering what Lefebvre terms *l'espace vécu*, "actually lived and socially created spatiality, concrete and abstract at the same time, the habitus of social practices, … a space rarely seen for it has been obscured by a bifocal vision that traditionally views space as either a mental construct or a physical form" (Lefebvre quoted in Soja, 2009:119).

We now turn to observe the intertwined configuration of space and technology in a similar fashion. To discuss their mutually constitutive nature, we look at the smart environment as being conceived, perceived and lived in unique ways. For example, urban dashboards provide us with a real-time experience of the city through visually representing data about diverse urban phenomena thereby bringing new functionalities to city governance. Additionally, visualizing urban data has become a generally accepted method of city representation as it also facilitates city benchmarking initiatives. Enabled by IoT deployments, urban areas thus become constellations of multiple interconnected dynamic networks. Through data-led processes, they enable, transform and represent the activities, locations of people. Therefore, we can say in turn that a plethora of these coded objects, buildings, etc. participate in the assisted reproduction of urban space and sociality (see Boellsdorff et al, 2015:61).

Borrowing from Lefebvre and Kitchin, we therefore conceptualize urban space as being produced by and through various kinds of ICTs, diverse types of coded objects and infrastructures with or without human oversight. This dynamic interrelationship is understood as ontogenetic, being always in the state of becoming (Kitchin et al, 2011). Software studies make use of the concept of transduction to account for the entangled nature of technology and space. Through transduction, spaces gain new functionalities and become code/spaces. This is best described by Kitchin as the process through which "software and the spatiality of everyday life become mutually constituted" (2011:16). The emerging reconfigurations are socio-material ""all the way down", entailing computer code written and updated by software-engineers, executing on computers" (Orlikowski and Scott 2008:30). Therefore, turning back to the case of urban innovation processes involving citizens we see the mutual configuration of space, technology and society on various levels. The notion of urban data serves as an illuminating metaphor for the processes described above. It is a constituent and a representation of urban life, it designates location-specific human action brought to life by technology. It underlines our argument that space, technology, and society actively participate in each other's mutual reconfiguration.

5 Discussion

Theorizing socio-materiality through an expanded framework will enable us to tackle the traditional notions of value creation and bring new empirical insights to the research on citizen innovation. By adopting a spatial perspective and bringing it to the analysis of socio-technical systems, IS research may be able to provide valuable insights into the taken-for-granted nature of socio-material entanglements that underpin the processes of knowing and organizing (Orlikowski and Scott, 2008:28). Framing these reconfigurations as practices, then, we are able to further enquire about how socio-materiality is performed, the way it supports sense-making, and the consequences it brings (ibid.).

The treatment of the concept of space is rather uneven in IS literature. The nature of participation around IT artefacts, regarding the social and technological dimension as active formants of socio-materiality is also somewhat unsatisfactory. Applying the spatial dimension as constitutive to citizen innovation, an assemblage of socio-material practices, helps in discovering the missing pieces of the puzzle of citizen engagement with smart urban artefacts.

Citizen engagement is in the focus of every smart city agenda and citizen innovation to a certain extent is a precondition for ensuring the sustainability and longevity of smart urban artefacts. Increasing quality of life appears in the vision-statement of most smart urban strategies, but we know very little about the source of motivation and values that drive citizens in these processes. We argue that theorizing related practices through socio-material lenses by applying a spatial, social and technological focus help reveal often overlooked aspects of the unique cultural, social, political nature of practices. Additionally, in line with Cecez-Kecmanovic's et al (2014) critique of the current research of the socio-material, that the social is almost always foregrounded, our ethnography reaffirms the need to give all formants of sociomaterial practices equal attention.

6 Conclusion

The field of Information Systems is taking on the vital role of Global Gateway. Building out connections for different organizations, countries and societies, while accounting for global and local phenomena, the discipline bridges traditional and contemporary expertise. Bearing this in mind, in this research-in-progress paper we argue for a more thoughtful and comprehensive treatment of the con-

cept of space when considering socio-material environments and we argue that analysing practices as stemming from the interrelation of space/technology/society can enable a deeper understanding of values, meanings and practices – phenomena that are situated at the core of the systems development field.

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