

The meaning of time in a cross-disciplinary arena project

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Abstract

The lack of long-term strategies regarding energy efficiency of multi-family buildings in Europe has resulted in acute need of renovation of these structures. To meet sustainability targets and speed up renovation, the Swedish Government granted time-limited funding of collaborative energy-development projects. A longitudinal case study (2008-2010) of one of these projects, aimed at establishing a cross-disciplinary knowledge arena (researchers, practitioners and regulators) to enhance knowledge concerning energy efficient renovation of multi-family buildings is in focus. The aim of this paper has been to explore how conceptions of time, e.g. as idea, constraint and resource, are manifest in the unfolding of the arena project. The study draws on qualitative analysis of 18 in-depth interviews with actors from the participating disciplines, observations of meetings and close-reading of project documents. The paper discusses prevalent contradictions between conceptions of time within the various social practices and mindsets of the involved parties, and how these have implicated the outcomes of the project.

Keywords: energy efficiency arena, knowing, practice, renovation, time, Sweden

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1. Introduction

As a result of many years' neglected maintenance, a majority of the Swedish multi-family buildings constructed between 1965 and 1975 are in imminent need of extensive renovation. Today, these buildings have an average energy consumption of 185 kWh/m²/year, which needs to be extensively lowered in order to meet the governmental target of reducing the total energy use by 50% until 2050 (Swedish Energy Agency, 2010). How to address this challenge is prioritised among researchers, practitioners and policy makers.

The main problem is not that energy-efficiency policies and strategies are lacking, but rather that these do not take into account local contextual circumstances, i.e. adhere to the building science and technology logic. Little attention is also paid to practitioners' knowledge and how their actions relate to and influence various systems, structures and established conventions (Gluch and Räsänen, 2012; Whyte and Sexton, 2011). In addition, the area of energy efficiency research is largely influenced by anecdotal data, urban myths, vested interests and conflicting arguments (Oreszczyn and Lowe, 2009). Yet, little effort has been invested in trying to understand the complexity and dynamics of the social and political facets that frame energy-efficiency decisions and practices (Guy and Shove, 2000). One of these facets is the dynamics of time. How is time conceptualised within different social systems, and what happens when these systems have to collaborate in a project? How do different ontologies, epistemologies and ideologies of time implicate the development and outcomes of a collaborative knowledge arena project for energy efficiency endeavours?

Over the last decade, the Swedish construction industry has invested much effort and resources into developing technology and implementing various control systems to make buildings energy efficient (Malmqvist *et al.*, 2011; Swedish National Board of Housing Building and Planning, 2010; Thuvander *et al.*, 2011; Toller *et al.*, 2011). This development has largely been driven by governmental regulation and policies, self-regulation activities (through standards such as ISO14001, LEED) and R&D collaboration between industry and research institutions (e.g. E2ReBuild, 2012; Lågan, 2012; Tofield and Ingham, 2012;). One such initiative was the 2007 Swedish Energy Agency grant program aimed at stimulating R&D initiatives for sustainable renovation of apartment buildings (Cerbof, 2011). Due to this grant it was possible to initiate a arena project in 2008, later entitled the *MILPARENA*, an abbreviation of the three words "MILLion", "Program" and "ARENA" where the million program refers to the approximately one million apartments that were built in suburban areas of the major cities in Sweden during a rather short period in the 1960-70s. The arena project's aim was to develop a forum for cross-disciplinary interaction and sharing between various types of professional actors engaged in energy-efficiency and renovation endeavours and also to enable mediation of practical knowledge from ongoing projects to researchers (Dalenbäck and Mjörnell, 2011).

The development and implementation of the *knowledge arena* was studied over a period of three years (2008-2010). Results from the case study have previously been presented in a two papers (Gluch *et al.*, 2012; Johansson and Gluch, 2010) and in a dissertation (Johansson, 2012) where focus has mainly been on knowledge sharing in and across organisational borders. In this paper the focus lies on the concept of time and its

manifestations as the project developed. We discuss the ways in which time is conceptualised e.g. as idea, resource and constraint. The paper probes prevalent contradictions between social practices and conceptualisations among involved parties and identifies tensions at the interfaces of practitioners, researchers, funders and stakeholders.

2. Theoretical framework

The study reported here is framed by a practice-based perspective in which knowing and doing are dynamically intertwined activities that take place in situated contexts through practices (e.g. Lave and Wenger, 1991; Gherardi and Nicolini, 2000). Seen from this perspective, knowledge in general and knowing in particular are not contextualised abstractions or generalisable “rules” stored in a knowledge repository to be accessed when needed; rather they are embedded in the people, processes, methods and tools of a particular practice (Gherardi and Nicolini, 2000). A practice can be described as an institutionalised ‘doing’, which has been socially and culturally constructed over time within a social system of relations. In this system, agency may be distributed between individuals as well as artefacts. Practice and knowing emerge, are maintained-for-now, and change through an ongoing mutual influence, a duality of structure (Giddens, 1984) between agents (the collective carrying out activities within a practice) and the practice as such. The practice compels particular behaviour and actions of the actors while adjustments and developments among agents in turn develop the practice (Heiskanen *et al.*, 2010; Gherardi and Nicolini, 2000; Gluch and Räsänen, 2009; Gherardi, 2009).

Knowing in a given practice takes place when individuals collectively engage in activities in which they have strong commitment or vested interest. It is in these activities that information is exchanged and knowledge is shaped, re-shaped and shared. In such a relational shaping process, notions of, for example, energy efficiency and climate change may be verbalised in the discourse of a particular party, but these notions also need to be translated into the relevant discourses of other parties before the notions may be appropriated and made sense of by all parties (Füssel, 2005; Stenberg and Räsänen, 2006). Knowledge sharing across disciplinary boundaries can, according to Teigland and Wasko (2003), be facilitated through participation in social networks, informal meetings and workgroups.

Furthermore, governing entities may act as enablers for knowledge sharing across these boundaries by mobilising incentives for collaborative endeavours and mutual engagement to solve societal or organisational problems (Brown and Duguid, 2001). Based on a study of a zero-energy residential building project, Brown and Vergragt (2008) concluded that higher order knowing within a project community was achieved when there were overlaps of the interpretive frameworks and practices held by the participants, such as developer, urban planner, architects and energy analysts. These meaning-making processes also require proactive and ongoing attention to the dimension, of time and space as characterised by Nonaka’s notion of $\beta\alpha$, where time and space are merged (Nonaka and Konno, 1998). This conceptualisation of time, in our view, is crucial to the success of a knowledge-sharing arena with the aims mentioned above. Although research tends to be prescriptive concerning indicative factors for successful knowledge sharing in cross-disciplinary projects, there are

insufficient empirical studies concerning the conception, experience and use of time. In interdisciplinary arenas, it is therefore important to pay attention to how engagement and knowledge sharing within communities evolve in terms of time.

3. Method

The empirical data were gathered using qualitative methods: observations, interviews and document analysis. Over a period of three years (August 2007 – May 2010) two workshops at the initial stage of the arena project, five planning meetings, two open seminars, one reference-group meeting, two company presentations, which included construction-site visits, and three site meetings of a pilot project within the arena, were studied. Field notes of formal and informal interactions, and talk provided a contextual understanding and helped to make sense of the interviews.

Eighteen interviews, lasting between 1 to 3 hours, were carried out. The interviewees were selected from the arena's contact list of 50 individuals. All the interviews were recorded. The interviewees were divided into two groups: *researchers/experts* (8 interviewees: R1-8) and *practitioners* (10 interviewees: P1-10). R1-8 were employed either at a Technical University (TU) or at a Research Institute (RI). Interviewees employed within municipal housing companies, a local energy company and the local governing authority made up the P1-10 group. We, the authors, were positioned as academic observers trying to understand and interpret the dynamics of the arena, with as little direct participation as possible.

For the purpose of this paper, a content analysis of the interviews was carried out focusing on the interviewees' interpretation of events. The interviews were summarised iteratively to compile representative stories, depicting different views and attitudes toward arena events and activities. Documents produced within the arena, such as meeting protocols, information leaflets and seminar material were analysed and served to create a "formal" timeline.

4. Findings

4.1 The arena project

Researchers from a Technical University and a Research Institute in the western part of Sweden initiated the knowledge-sharing arena. A professor in building energy technology took on the role of self-nominated arena leader without apparent resistance from fellow researchers. Together, these actors wrote and were also awarded an Energy Agency grant to develop the arena in collaboration with interested municipal-housing companies practitioners. The arena objective, as formulated in the application, was three-fold: 1) *to share knowledge between researchers and practitioners* (clients, contractors and consultants), 2) *for researchers to gain knowledge from real-life projects* and, 3) *to disseminate this knowledge to future projects*. A central idea was that participants in the forum would create and share knowledge by interacting with each other in common forums where particular and relevant mediating tools would be devised and used. The underlying assumption reflected in the arena objective seems to have been that knowledge and knowing are automatically generated and shared when people from different knowledge

fields within a particular subject domain meet and interact around a shared interest and/or activities.

At the initiation of the arena, scant reflection concerning the nature and interpretation of the term *knowledge* occurred, and there seems to have been no effort spent on attempting to assess the “actual” knowledge needs and social paradigms of the prospective participative disciplines. Time was limited to the project duration of three years and no specific time plan or communication plan was established.

The subject domain of the arena was renovation of multi-family housing, which gathered local authorities, housing companies and energy suppliers to join forces with the researchers to develop the arena. Altogether, six municipal housing companies, one local energy company and the local governing authority were co-opted as partners in the shaping of the arena community.

4.2 Perceptions of time and of energy-efficiency as a knowledge domain

Table 1 presents a short-form of findings from the analysis (for a more comprehensive description see Gluch et al, 2012). It shows how the two groups, R1-8 and P1-10, perceived the topic “energy-efficient renovation of buildings”.

Table 1: How energy-efficient renovation of buildings was framed by the interviewees.

	Researchers	Practitioners
Scope	Integrated on a societal level.	Limited to local interest within a specific type of business organisation or renovation project.
Time frame	Long term perspective (10-50 years)	Short term (now - 2 years forward)
Conceptual frames	Zero-energy, passive housing, sustainable solutions, socio-technical approach, societal values.	Reduce energy use per m ² , technical solutions, performance, return on investment.
Technical frame	A systems approach in which change toward energy-efficient renovation of buildings lies in the managing of system structures.	A practice-oriented approach in which energy-efficient renovation of buildings lies in fine-tuning existing systems and changing technical details.
Problem solving approach	To influence system structures through full-scale socio-technical experiments (pilot projects). Provide normative guidelines.	To influence practice by identifying technical solutions through one-off development projects (pilot projects). Use of tools.
Collaborative approach	Peer collaboration and practitioner participation.	Interaction with peers to identify best practices.
Collaborative space	Pilot projects	Pilot projects

The researchers spoke of energy efficiency in housing as a concern that implicated society as a whole, both current and future generations, and must therefore be dealt with in a *long-term* perspective. In their view, particular and immediate technical solutions would only marginally impact the societal imperative of developing sustainable energy consumption. Achieving energy-efficient renovation demands a socio-technical approach, involving the collaboration of actors at various levels and spheres of society and using a variety of integrated technologies and artefacts. They thus perceived change towards energy-efficient housing built into the handling of system structures, i.e. the way technical structures and/or society is able to support change toward using less energy, energy reuse and small-scale production of 'clean' energy such as solar panels and waste energy delivered to the grid. In order to be able to influence system structures and systems thinking, researchers preferred working in pilot projects (full-scale socio-technical experiments) in collaboration with other researchers and with industrial partners (practitioners). They also tended toward a normative and prescriptive research ideology to influence and underpin regulatory measures to support funding of large-scale development of energy technology. They saw themselves as the propagators of research-based knowledge beyond their own institutes to professional and practitioner communities. In this way they perceived that they contributed to societal and technological change.

The discourse of the researchers tended to be couched in abstract concepts and technical jargon, e.g. passive housing, and their discourse was oriented toward future possibilities rather than solving day-to-day problems. Time in the researcher mind-set took on an imprecise fluidity extending into an idealised and unspecified future of "zero-energy". Process time seemed more important, in which systems thinking is achieved through collaboration and a socio-technical approach, incrementally over a long time span. The arena project seemed to be viewed as one such increment.

The practitioners manifested a short-term perspective on energy-efficient renovation. Some argued that this was a reflection of the organisation's mind-set, in which the predominant concerns were for financial value, budgetary constraints, revenues and return-on-investments. This delimited time perspective not only framed energy efficiency as being energy use per square meter through fine-tuning the existing systems and changing technical details, i.e. a patchwork approach rather than a holistic one. This short-term perspective constrained their abilities to engage in conceptions of long-term investments and systems thinking in their day-to-day practices.

Key terms frequently used by the practitioners when explaining the notion of energy-efficient renovation were technical solution, reduced energy use and return on investment, which reflected a pragmatic mindset very much oriented toward the present and short, time-determined future. Similarly to the researchers, pilot projects were seen as important for the practitioners, especially if these were carried out in their own organisations. The pilot projects served as reference objects when communicating and explaining the concept of energy-efficient renovation. For the practitioners, knowledge was used as a commodity, consisting of formulated and accessible facts acquired through interaction with peers.

4.3 Joint activities – a matter of time and space

Joint activities formed the catalyst for knowledge exchange between researchers and practitioners. The joint activities in question consisted of the pilot projects initiated by the practitioners, open seminars and arena meetings.

A critical factor for a successful interchange was the possibility of meeting face-to-face and spending time discussing a single issue and its ramifications. Such time was rarely made available in the participant organisations. Many of the researchers and practitioners found the time they spent in the pilot projects self-developing. The former had been eager to collaborate both with each other and with practitioners in order to acquire knowledge of how real-life situations were handled. Practitioners deemed that the time spent collaborating with the researchers on the pilot project enabled them to test their ideas and obtain feedback and evaluation on technical solutions in situ. The pilot project thus provided both time and a space, $\beta\alpha$, where individuals that had not been in contact before could interact. Through this interaction, researchers and practitioners gradually developed a vocabulary, which enabled them to make collective sense of energy-efficiency and renovation in their local contexts and to contribute with their individual experience and knowing. As a result of its situatedness, the pilot project did stimulate the creation of aggregated ideas for addressing the challenge of making buildings more energy efficient for the future.

The interviews as well as the observations of arena activities indicated that the researchers and practitioners, through their discussions and dialogue, gradually developed a shared understanding of the challenges that needed to be overcome to achieve energy-efficient renovation of housing. Moreover, the arena participants' awareness of the importance of allowing time for joint activities as a driver of knowledge sharing was enhanced, which can be corroborated by a stronger interest from municipal-housing companies in initiating pilot projects.

Ironically though, the practitioners' interest in the arena slowly increased while the researchers were dissatisfied in the practitioners' lack of active engagement in the activities and in their lack of initiative in availing themselves of the palette of expertise offered. The researchers had expected the practitioners to initiate more pilot projects than the two that were realised. For the practitioners, however, starting a pilot project was a cumbersome process; pros and cons, financing, resource allocation and most importantly the benefits for the company needed to be deliberated carefully, all of which are time-consuming activities with uncertain future outcomes. For a project with a three-year funding scheme, time is a scarce resource.

5. Concluding remarks

Consequences caused by tensions between the short termed mindset of practitioners focusing on day-to-day problems and the long-term technocratic researcher mindset oriented toward future possibilities was rather evident in the study. Different perceptions of time lead to miscommunication and sometimes to distrust as it emphasised the different views on energy efficiency of buildings. These differences in framing the challenge of reducing energy

use in buildings also created barriers between professional and organisational entities, barriers that needed to be bridged in order for knowledge sharing to take place in the arena.

Creating spaces for knowledge sharing takes time, as does building a knowledge-sharing arena. Some people drop out while others join, which means that the 'drivers' of an arena need to have sufficient space and fulfil necessary conditions if they are to stimulate an interactive innovation process. The three years allotted to the arena project proved too short to develop trust and develop a common language and understanding to achieve cross-organisational knowledge sharing. In spite of the advantageous pre-conditions in the form of funding, the perceived need and enthusiastic actors, the creation of an arena community in the form of the initial vision i.e. a driver of sustainability innovation just barely had time to overcome initial difficulties before the projected time span ended. The social interaction that took place within the arena community did not become durable enough to enhance long-term sharing of knowledge to any larger extent.

Creating social relations takes time, which is normally not available as actors enter and leave at different stages in a project. In fact, a perceived shortage of time can be used as an excuse for not seeking knowledge (Johansson, 2012). In the studied arena project, pilot projects were given extra resources such as financial means. Time was allotted to creating social bonds and for establishing a common vocabulary repertoires, tools and documents that would facilitate knowledge sharing; however, already at the outset of the development of the arena project, content focus and types of activities were biased toward the stronger group of researchers thus creating tensions that reified conventional boundaries rather than relaxing them. These boundaries were evident in the divergently perceived arena objectives and their framing of energy efficiency as a knowledge domain. For the researchers, the arena objectives were instrumental, prescriptive and normative; for the practitioners, they were emergent and principally problem-solving. The researchers had a long-term view on renovation of buildings while the practitioners were constrained by the short-term response to contingencies set by their organisations. With such incommensurable epistemological and ontological differences, having the time can easily turn into a serious constraint if experience and knowledge as to how to use it is lacking.

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