

# IRIS

Selected Papers of the  
Information Systems Research  
Seminar in Scandinavia

Nr. 4 (2013)

Issue Theme "IRIS 36 Digital Living"

Coordinating Editor:  
Judith Molka-Danielsen  
Molde University College, Norway

Issue Editor:  
Tone Bratteteig  
Espen Skorve

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## Table of Contents

Foreword by the Editors – Digital Living.....	5
<i>Judith Molka-Danielsen, Tone Bratteteig and Espen Skorve</i>	
<b>Research Papers</b>	
Usability Work in Limbo: Barriers to the Integration of Usability Work in Agile Development.....	9
<i>Adeola Y. Wale-Kolade and Stig Nordheim</i>	
Enterprise Architecture in the Public Procurement of Information Systems .....	23
<i>Juha Lemmetti</i>	
Accommodating Multiple Rationalities in Patient Oriented Health Information System Design .....	33
<i>Lars Kristian Roland, Terje A. Sanner, Prosper Behumbiize, Zikulah Namukwaya and Kristin Braa</i>	
Assistive Technology for Totally Blind – Barriers to Adoption.....	47
<i>Neeraj Sachdeva and Reima Suomi</i>	
Spanning the Boundaries of Benefit Management: A Case study .....	63
<i>Kenneth M. P. Nielsen</i>	
Aging in Place: Dealing with Breakdown of Welfare Technology .....	77
<i>Anita Woll</i>	
Designing a Survey Instrument for Assessment of Assistive ICT Initiatives.....	91
<i>Judith Molka-Danielsen, Carl Erik Moe</i>	
Challenges of Achieving ICT Competent Teachers through Continuing Professional Development: Teachers’ Perspectives .....	103
<i>Sara Willermark and Lena Pareto</i>	
The Ambiguous Photocopier – a Story about Designing for Development .....	119
<i>Hanne Cecilie Geirbo</i>	
Searching for ‘Genuine’ Participation in Information Infrastructure Building .....	135
<i>Eija Halkola, Netta Iivari, Leena Kuure, Tonja Molin-Juustila and Marianne Kinnula</i>	
Properties of Participatory Approaches for Designing with Children in a Health Related Context .....	153
<i>Susanne Lindberg</i>	

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*Det må ikke kopieres fra denne boka ut over det som er  
tillatt etter bestemmelser i «Lov om opphavsrett til åndsverk»,  
og avtaler om kopiering inngått med Kopinor.*

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# Searching for ‘Genuine’ Participation in Information Infrastructure Building

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**Abstract.** Inspired by research advocating the genuine participation of users and children, this paper critically examines the building of an information infrastructure, focusing on the participation of various actors, including children. The study, following nexus analysis as a research framework, identifies a variety of discursive motives ascribed for the participation of the different parties in this information infrastructure building effort. The data include interviews with key participants and documentation of various kinds. The discursive motives ascribed for participation are discussed in terms of challenging the traditional school, providing cutting edge solutions (in ICT, architecture, interior design) and experimenting with them in local settings, developing pedagogical practices, developing practices enabling participation, ensuring equality, sustainability and continuity as well as ensuring local-settings-driven development. The motives brought up in relation to children involve providing information and commenting on solutions offered by adults. The pupils are assigned an important role in the effort as apt technology users therefore providing a motivation for development, but also a motive to ensure equality and continuity. Critical remarks on the case are offered from the perspectives of the genuine participation of users and children.

**Keywords:** genuine participation, information infrastructure, children, nexus analysis

## 1 Introduction

This study focuses on the participatory process of building an information infrastructure (II) (Star and Ruhleder 1996) for an educational network of a Finnish city. The educational network refers to local schools and the municipal educational administration. In the initial stages of the process, the city encouraged the schools in the district to submit applications for development projects. Through this process, teachers and headmasters were invited to participate in a ‘future school programme’ to develop school culture and to look for the best practices in pedagogy and technology use for the ‘school in the 21st century’, ‘the future school’. Ten schools were shortlisted as ‘Smart Schools’, i.e. pilots in technology use and renewal of pedagogic practices. The best practices from the Smart Schools were to be utilized in a future school, so-called ‘Integrated Pilot School’, which was under construction in a new

town area. Experiences of the best practices from the conducted pilot projects were to be extended later to other schools in the city and the whole country.

Various actors have been active in the effort, including the educational administration as well as school staff and children. This case allows us to contribute to the discussion on user participation and participatory design (PD) in contemporary information and communication technology (ICT) development, including complex, large-scale ICT efforts (e.g. Braa and Sahay 2013; Bratteteig, Bødger, Dittrich, Mogensen and Simonsen 2013; DiSalvo, Clement and Pipek 2013; Kyng 2010; Simonsen and Robertson 2013). PD has been expanding its scope in terms of the scale of information systems (IS) as well as the diversity of participants, settings and design techniques (Clement, McPhail, Smith and Ferenbok 2012). A turn in attempts by PD to situate itself within a broader community context also displays in the literature (Le Dantec and DiSalvo 2013). The current frontier of PD is infrastructuring, i.e. the development of large scale systems that serve a wide range of needs of varied ‘publics’ (Clement et al. 2012). The relevance of stakeholder participation has been acknowledged in the recent literature on II, yet from the designer’s perspective (Hanseth and Lyytinen 2010). Furthermore, a framework for supporting users’ contribution to work infrastructure improvement has been provided (Pipek and Wulf 2009). There is also literature relating participation to in-between infrastructures from the viewpoint of citizen participation (Botero and Saad-Sulonen 2010). Star and Bowker (2002) consider the Scandinavian school of PD successfully responding to the challenges regarding the socio-technical design process and the political and ethical concerns in the design of II. Neumann and Star (1996) have considered the possibility to apply the design principles of PD in II building. Karasti and Syrjänen (2004) have explored PD ‘in the wild’ in two communities by non-professional designers. In our case, participation has also emerged ‘in the wild’, without our intervention or professionals in PD. We will take a critical look at participation in this case, by drawing on the literature discussing genuine participation within the Scandinavian tradition of PD and within the literature addressing children’s participation. In our study, pupils have participated in the effort among other actors, while children’s participation has not been studied before in II building (except in Halkola et al. 2012, 2014). In II building with a multitude of actors and agendas the integration of children into the development is likely very challenging.

We will examine participation in II building through a discourse and motive analysis of thematic interviews with key persons responsible in the effort. We rely on the research framework of nexus analysis (Scollon and Scollon 2004), which allows extending the perspective from the micro level to the organizational and institutional levels of social analysis that are necessarily intertwined. We have earlier explored participation as social action from the point of view of concrete practices and wider discourses (Halkola et al. 2014, an earlier version of this paper), while this study focuses on discursive motives ascribed for participation by the participants. Those motives will also be considered in relation to the literature arguing for genuine participation of users and children.

The paper proceeds as follows: Next, literature addressing genuine participation, concerning both users and children, is presented. Thereafter, the concept of II is introduced. The research method and the procedures of data gathering and analysis will then be illustrated. Finally, the empirical results and the implications and limitations of the study are outlined.

## **2 Genuine participation of users and children**

It has long ago been acknowledged that users should take part in ICT design. Below, a review of some traditions with intent towards genuine participation of users will be presented, followed by a discussion of literature on children's genuine participation.

### **2.1 Striving at genuine user participation in ICT design**

The origins of the idea of user participation in ICT design can be traced back to the paradigms of action research and the ideas of socio-technical design, where organizational and technical change, worker participation and quality of working life were in focus (Ehn and Kyng 1987). The socio-technical approach was taken up at the Norwegian Institute for Social Studies and tested and further developed in the course of a number of practical projects on industrial democracy in the 1960s. This started the interest in the socio-technical experiments, first initiated in Norway and later Sweden by the central unions and employer organizations jointly in both private and public sectors. (Ehn 1993)

Within the socio-technical approach, user participation is seen as a mechanism in enabling all user interests to be represented and in resolving the inherent conflicts of interests of various parties (Mumford 1983). Mumford (1983) divides user participation into three types. In the 'consultative' type, a great deal of discussion with the users (staff at every level in the user department, workers of the organization) is involved, although it is the designers that act as decision-makers. Within the 'representative' type, representatives of different user groups, either selected or elected, are assumed to speak for the interests of their constituents. They are also assigned some decision-making power in the formed design group. This arrangement, however, entails the problem that the representatives may not correctly interpret the represented users' interests. Attention also needs to be paid to ensuring that all interests are represented, the members of the participative forum appropriately selected or elected, and groups at different organizational levels established when necessary. When a structure for participation is created, decisions are also needed on the desired extent of influence by certain groups of participants. Within the 'consensus' type of participation, an attempt is made to enable all those affected to take part throughout the whole design process. (Mumford 1983.)

Most of these socio-technical experiments were controlled by the local management, reducing the aim of participation for democracy (Ehn 1993). In opposition to the socio-technical tradition, some Scandinavian researchers and trade unions developed a new approach to democratizing the design and use of computer-based systems (Ehn 1993). New legislation in Norway in the late 1960s, focusing on industrial democracy, increased possibilities for worker influence on new technology (Ehn and Kyng 1987). The Scandinavian collective resource approach was developed as an alternative for advancing participation, work organization, and democracy in the systems development and use. The emphasis was on workplace democracy, enabling workers' influence in the design and use of computer applications in the workplace. The active role of local trade unions was important. The Norwegian Metal Workers' Union (NJMF) initiated a research project in cooperation with researchers (Ehn and Kyng 1987) on participation and skill in the design and use of computer-based systems (Ehn 1993). The ideas of the NJMF-project were tested in the leading Scandinavian projects, all based on the idea of workers' involvement in the design and implementation of the tools they use in their work (Ehn and Kyng 1987). The Scandinavian approach to systems design has also been shared among researchers in the U.S developing

cooperative design of computer systems, where user participation in ICT design has been an interest (Greenbaum and Kyng 1991). Scandinavian research projects on user participation and cooperative design have also been an inspiration for what is now called the Participatory Design (PD) tradition (Schuler and Namioka 1993).

The political roots of the Scandinavian tradition emphasize acknowledging the politics of the design process with inherent conflicts between managers, workers, different user groups and designers, all with differing needs (Greenbaum and Kyng 1991). Since the 1970's, however, the political issues of power and industrial democracy have been deemphasized, while the focus within PD has shifted to making system design more co-operative and participatory. This is very much due to ICT being nowadays integrated into the everyday life of most people, whereas in the early projects users were wage earners working at specific workplaces, involved in the design through trade union activities. Thus, the scope of PD has broadened from workers and workplaces to numerous kinds of people using ICT in different places (Kyng 2010). However, the importance of safeguarding user interests also in today's context has been argued for (e.g. Bratteteig et al. 2013; Kyng 2010). The roots and basic elements of the Scandinavian tradition have been brought forth to remind the researchers of these principles still being valid in the changing world (Simonsen and Robertson 2013). While in the contemporary ICT development settings not all can be involved, one can still advocate user representation at least – be the representatives users or professionals assumed to 'know the users' and to 'speak for the users' (Iivari et al. 2009). The use of PD with interest groups representing the actual users has also been suggested (Kyng 2010).

According to Bratteteig and colleagues (2013), open criteria for participation are essential as well as mutual learning to ensure participants' **genuine** participation. The PD tradition has explicitly advocated genuine user participation, referring to the "fundamental transcendence of the users' role from mere informants to legitimate and acknowledged participants in the design process" (Robertson and Simonsen 2013, p. 5). This concerns the political, democratic rationale of PD – listening and empowering workers, communities and marginalized groups and giving them a possibility to shape their world over time – but also the willingness of the users to participate and acknowledging the users' interests as "fully legitimate elements of the design process", resulting in the fulfilment of the pragmatic rationale: creation of better designs (Robertson and Simonsen 2013, p. 5). According to the principles of PD, users should 'have a say' in the process to affect the outcome. Moreover, users need to be informed and able to express their views. Finally and fundamentally, users need to have power to influence decision-making, which is more than just 'having a say'. In order to have long-lasting effects, PD needs to be part of a long-term strategy addressing several societal levels, e.g. letting local projects influence beyond the project boundaries. (Bratteteig et al. 2013.)

## 2.2 Children's genuine participation

Within PD and Human-Computer Interaction research, interest has been paid to special user groups such as children. To add to the discussion on PD above, children's participation can be seen as more widely related to children's right to participate in making decisions concerning their own lives, raised in the United Nations Convention on the Rights of the Children. In ICT development, children's participation has been tackled in studies on interaction design with children. During the early days, the focus was on children as users of ICT and on the consequences and impact of ICT on children. The focus has moved on involving children as

testers, informants and design partners (Druin 2002), the last role being closest to the PD ideal. The ICT studies involving children are typically small-scale, while studies on children's involvement in more complex cases along a longer time span and with multiple partners are lacking (Halkola et al. 2012). In fields such as Community Development and Urban Planning, however, numerous larger initiatives and programmes can be found with children as important participants, the researchers trying to enable their contribution to formal public decision-making (Percy-Smith and Thomas 2010). In these studies children's participation has been seen as essential and adding value for the surrounding society, although children's contribution and role in the studies have varied to some degree.

The researchers within these other disciplines have also had an interest in children's **genuine** participation, as opposed to tokenistic or decorative (Hart 1992), sharing the concern of PD researchers related to users in general. However, in our adult-led world children's interests are rarely prioritized, even with the adults' best intention, which makes it necessary to plan children's participation with special attention. In large-scale initiatives with multiple adult stakeholders, this is especially highlighted. For this purpose, Chawla and Heft (2002) present criteria for project planning purposes, in order to take into account the different facets of children's participation. They argue that project activities should build on existing organizations and structures, making children's participation as natural as possible and based on their interests. The child participants and their families should be given a sufficient amount of information on the project, participation should be voluntary and accessible for children, and the selection of participants should be fair. All participants are to be treated respectfully and they are to support and help each other to express views. Children should have real influence, possibilities to initiate actions, and decision making power in the project; their competence and contribution are to be heard and respected as well as used for defining the goals of activities. The decision making process should be transparent for children, who should also be provided with possibilities to develop their competence. Critical evaluation and reflection of the results should take place, and the reasoning behind the decisions discussed. Further, power relations should be negotiated and the project outcomes should be tangible. Although many of these criteria belong to the principles of PD, Chawla and Heft (2002) manage to convey them explicitly. We argue that such criteria would be beneficial in any kind of participatory project. However, they are especially important with more vulnerable user groups such as children, if genuine participation of users is to be solicited.

### **3 Information infrastructure**

The traditional concept of IS development is not very suitable for this complex case including ICT development. Traditional ISs were mostly related to in-house development of isolated systems from scratch with IS methodologies designed to support this kind of development. Traditionally, IS design started by uncovering and specifying user needs, and derived the technical solutions from them. Starting the IS development with user needs is linked to the general assumption that the systems to be developed should be or are designed from scratch. It has also been suggested that IS methodologies traditionally aimed at developing a closed system by a closed project organization for a closed customer organization within a closed time frame. However, current changes have increased the interest in understanding more complex efforts within IS research. Today's ICT solutions are significantly different from traditional ISs, integrating numbers of systems across organizational and geographical

borders, connected and intertwined with complex IIs. (Hanseth 2010.) The concept of infrastructure has traditionally been related to large technical and material structures (e.g. water pipes, electricity supply, road networks, Internet) understood as background structures or as platforms, which the other structures depend on (Star and Bowker 2002). In the case of II, the mere concept of infrastructure has been considered insufficient for covering the multidimensionality of the use context and practices (Star and Ruhleder 1996) or analysing large-scale technological systems (Star and Bowker 2002). IIs are, like other infrastructures, evolving over a long timespan. New infrastructures are designed as extensions and improvements required to fit into the existing ones (Hanseth 2010). The design of IIs has been characterized as a complex, continuous, evolving process (Hanseth 2010; Star and Bowker 2002; Star and Ruhleder, 1996) of infrastructuring (Star and Bowker 2002). This research presents an infrastructuring effort within an educational network. For conceptualizing this longitudinal case carried out through various sub-projects within the educational network and involving a multitude of actors, the concept of II is considered appropriate.

Star and Ruhleder (1996) see infrastructure as a socio-technical, “fundamentally relational concept, becoming real infrastructure in relation to organized practices”. They have characterized the salient features of it through eight features: 1) Infrastructures are embedded in other social and technological structures. 2) The supporting tasks are transparent. 3) They have a certain reach or scope (either spatial or temporal, beyond a single event or one-site practice) 4) They are learned as part of membership (the artifacts and organizational arrangements are taken for granted). 5) They shape and are shaped by, or linked with the conventions of practice. 6) They are plugged into other infrastructures and tools in a standardized fashion, though they are also modified by scope and conflicting (local) conventions (embodiment of standards). 7) They are built on an installed base, i.e. they do not grow *de novo* but wrestle with “the inertia of the installed base” and inherit strengths and limitations from that base. (Star and Ruhleder 1996.) The inertia of the installed base refers to the influence of the existing base of infrastructure, which the new elements always have to be adapted to. Infrastructure is evolving and never built from scratch, which then influences the possibilities to change and design the new elements (Hanseth 1996). 8) The normally invisible infrastructure becomes visible upon breakdown (Star and Ruhleder 1996).

Star and Ruhleder (1996) see infrastructures as evolving while locally tailored technologies become interweaved with the elements of the formal infrastructure. Infrastructure is thus shaped by the conventions of a community of practice while these, again, have to be adapted to the existing infrastructure, i.e. intertwining and shaping each other. In organizations, locally-tailored applications and repositories begin to interweave with the formal infrastructure to create a unique, evolving hybrid. Thus the emergence of a transparently supporting infrastructure is “organic” and evolving in response to the community evolution and adoption. (Star and Ruhleder 1996.) As infrastructures have to support current conventions in local organizations, they also have to be changeable to support the evolving practices and use involved. An infrastructure emerges when the tension between the local and the global is resolved and local practices are afforded by larger-scale technology, which can then be used in a natural, ready-to-hand fashion (Star and Ruhleder 1996). The development of infrastructure is seen as processual, evolving and constructed over time on the existing installed base (Star and Ruhleder 1996). Star and Ruhleder’s (1996) definition of infrastructure also implies that the technologies to be developed should be seen in terms of organized practices, as part of the social and organizational structures where the infrastructure

is embedded. Star and Bowker (2002) share the view of infrastructures as relative to working conditions, never apart from people who design, maintain and use it.

## 4 Research design

This paper sheds light on the process of participation in II building for an educational network of a Finnish city, during the years 2007–2010. The study followed an overall research strategy of nexus analysis (NA), which entails a special focus on social action, i.e. any action taken by an individual with reference to a social network (Scollon and Scollon 2004). The first task in NA is engaging in the community being researched, looking for important social actions to be studied and key actors. Next, navigating the nexus of practice takes place, using various methods and data. By participating in the practices, the researcher also becomes involved in changing them. An important aspect of NA is studying how participants ascribe motives for or position themselves discursively in relation to the actions they take. (Scollon and Scollon 2004.) The nexus of practice addressed in this study is the development of the school for the future, encompassing the concept or ideology of a ‘school for the 21st century’. The effort involves designing a new school building in a Finnish city (the Integrated Pilot School) and technology-mediated pedagogical practices for use more broadly. The process was facilitated through II development involving new solutions in ICT, pedagogy, architecture and interior design for the whole educational network of the city. Educational administration in the city, companies, researchers and Smart Schools with their headmasters, teachers and pupils took part in the effort. After a survey of the most central discourses circulating around, key participants in the nexus of practice were identified from the data (either due to institutional status or media representation) and interviewed for this study. Two of the interviewees [2 and 3] were project managers in the future school development endeavour, two were Smart School headmasters [1 and 5], and one a city level development manager [interviewee 4]. Two Smart School teachers [interviewees 6 and 7] were also interviewed. Beside the interviews, the data include documents on the future school concept and the II building effort (e.g. minutes, city web portal pages, project pages, reports, newspaper and magazine articles and materials produced by the schools involved).

The interviews and other data gathering was part of ‘engaging’ the nexus of practice, when looking for attachment points with the various social actors in the effort. The study then continued as ‘navigating’ the discourses circulating around. The analysis of discourses proceeded through a succession of data-driven stages. The discursive motives ascribed by the interviewees were then analysed in relation to participation in the effort. In analysing the discourses, the researchers got acquainted with the data making initial observations. An in-depth analysis followed on one of the interviews mapping the topics discussed by the interviewees and the discourses that were seen to emerge in the talk. The analysis was then extended to the rest of the data. Thereafter, also the concrete participatory practices of teachers and pupils were noted. When the main discourses and practices had been identified, an initial motive analysis was conducted to see how the key participants were accounting for participation in the effort, leaving a full analysis of the types of discursive motives to later stages of research beyond this study.

## 5 Participatory building of information infrastructure

In the data, a discourse calling for all the actors to challenge the ‘traditional school’ as well as a discourse emphasizing the appreciation of the local settings and practices of each school is identified. Moreover, discourses promoting equality, continuity, sustainability and cutting edge solutions are found. Furthermore, several concrete participatory practices of teachers and pupils are identifiable. In the following sections, we will discuss these discourses and practices from the perspective of motive allocation of social actors of this effort.

### 5.1 Discourses arguing for challenging but also appreciating the traditional school

In the empirical data, a discourse arguing for challenging the ‘traditional school’ becomes evident: the existing infrastructure of the traditional school is to be modernized with the pedagogical practices and learning environments of the 21st century: *“It is a kind of ideology, which involves a consideration of the learning environments of the 21st century, learning in the 21st century. How should the traditional school boat be updated, then, for us to reach these, to offer our future experts the skills of the 21st century in the changing world?”*

[Interviewee 2] The motivation for participation is highlighted in terms of different parties: all-embracing renewal is needed concerning teacherhood, leadership, physical learning environments and technology: *“And there is change ... we want to develop the whole or in other words develop all of it as a whole... On all levels something has been done – teacherhood, leadership, physical learning environment, infrastructure, technologies.”*

[Interviewee 2] Tripartite cooperation between public, research and business sectors is featured as necessary: *“Within all the sectors something has been done and company collaboration and research collaboration has been launched and, well, with these ten Smart Schools we have been busy and advanced them, their ideas have been enriched and supported. And, these projects have then been established around it.”* [Interviewee 2]

The participation of a global and several local companies – providing solutions in ICT, architecture and interior design – is constructed in the data as necessary for challenging the traditional school. Such motivation is supported by examples of companies having opportunities for product development and experimentation in local settings for which the Smart Schools are said to offer living-lab environments: *“In relation to the collaboration with the business people we have been talking about concepts such as Democenter or Living Lab.”*

[Interviewee 3] Research collaboration is suggested as essential in providing theoretical understandings on pedagogical practices for experimentations with educational technologies: *“the way from the researcher’s chambers or the researcher’s thoughts to practice, how it proceeds to the most distant classroom, that is not very easy, that is the reason why we would need that collaboration and exchange of ideas ... so against that background we have also challenged all kinds of research to join the future school and we’ll see that all kind of research is valuable and sheds light on this”* [Interviewee 3] Developing teacher expertise during initial teacher education already is also seen as important: *“people have seen it important to challenge teacher education to work according to the same background ideology ... created a kind of umbrella for the future school programme and project ... that would be a sensible way to link the university to collaboration.”* [Interviewee 3]

In the interviewees’ accounts, the effort not only involves challenging the traditional school. It is the local actors’ knowledge of the local settings that also emerges as essential:

*”We [in the educational section] believe in the constructivist view in this development work, too, that it has to be created within the organization and there you have the knowledge once you find it and share it and that is where the best practices emerge.”* [Interviewee 4] The Smart Schools contribute through smaller scale development projects for which the schools have profiled their own strategies. These projects are illustrated as advancing the local, school-level goals and activities. This way of working is put forth as necessary, while building a model to be transferred to different contexts is portrayed as ‘old-fashioned’: *“This model is good for starting to support the schools in this way, so that they get started from their own profiles and utilize their own practices and search for those strengths, take them forward. But the transferability of such models is sort of old fashioned thinking.”* [Interviewee 4] For the reason of appreciating the starting points of each school, broad participation of schools is presented as a prerequisite. As a discursive strategy, the interviewee also takes the position of an agent supporting the other parties’ role in the action.

## **5.2 Discourses arguing for equality, sustainability, continuity and cutting edge solutions**

Discourses arguing for equality, sustainability, continuity and cutting edge solutions are also evident in the data. They also offer motives for broad participation of different kinds of actors. The discourse on equality identified from the data demands broadening the development of a single school, the integrated pilot school, to concern also other city schools. The new integrated pilot school to be built is from the outset planned to become a model for other schools, where new learning technologies with new practices would be developed and further exposed to other schools. However, ensuring equality in education becomes prevalent as a motive for school participation. Providing equal opportunities to all schools in the city if not even nationally, e.g. through a similar level of technological equipment, is postulated as important: *“At that stage in the educational administration it was wisely determined that we cannot be building one innovative school, one elitist school in a way that other schools envy”* [Interviewee 2] The metaphor of ‘elitist school’ as antithetical to equality thus suggests broad participation by the schools and collaboration on national level as necessary.

The continuity of the actions, the development effort, from the viewpoint of children is also placed into an important role offering a motive for broad participation of schools and teachers: *”Our contribution with respect to this age group ends on grade six, but it is not the aim to finish with that age group but create ground for them for continuation so that they could then until the end of comprehensive school utilize or use the methods that we have here launched. Enrich and develop them.”* [Interviewee 1]. The motive suggesting engagement of other schools conveys an anticipatory discourse; the pedagogical practices employed with the new learning technologies are envisioned to be further applied in the upper grades as well as in the elementary school with smaller children. This emphasis on continuity justifies the inclusion of numerous schools into the effort. This is considered as accomplishable e.g. through in-service education arranged for teachers of the Smart Schools.

Furthermore, the discourse on sustainability is also evident in the data accounting for motives for the action of the educational administration. This emerges, for example, in the talk emphasizing how important it is to be able to continue with the practices and technological solutions in schools developed during the pilot projects: *“One should find such sustainable solutions that can be funded even if the economic situation deteriorated a little.”*

[Interviewee 4] The development of the infrastructure for the educational network of the city is portrayed as having grown from applying funding for separate pilot projects towards continuous development in the educational administration of the city.

An emphasis on world-class, most up-to-date, cutting-edge solutions is also evident in the interviews as a motive for the participation of various kinds of companies. The interviewees highlight how they have relied on *'technologies as innovative as possible'* [Interviewee 2] or argue how *'we have tried to be a few years ahead'* [Interviewee 3]. The process is characterized even as *"soaring"* [Interviewee 1] or taking *"quantum leaps"* [Interviewee 4] in the ICT development. This can be connected with expressions such as *'bringing the technological solutions all over the world'* [Interviewee2] through which motives for collaborating with the global network are expressed. The educational authorities and project managers collaborate within the global network with pedagogical and technological experts to define the general goals for action in constructing the future school of the city and to share experiences internationally: *"There have been international experts related to learning (...), at every stage we have figured out the experts, who have given their own input to this work"* [Interviewee 3] The need for cutting edge solutions has justified the inclusion of even global companies and schools into this II building effort, according to the interviewees.

### **5.3 Participatory practices among teachers' and pupils'**

The motive of challenging the traditional school has been concretized in the actions of the schools involving headmasters, teachers and some pupils participating in the pilot projects. Especially the teachers' contribution in developing the pedagogical practices has been crucial according to the interviewees. Interior design and ICT solutions requiring teachers' pedagogical expertise for grounding the solutions to the local Smart Schools' settings and practices are ascribed as motives for their participation: *"We maybe have a more pedagogic orientation to what should be done with the equipment. There is no point of ordering here a huge amount of screens if we have nothing to present. (...) I am involved in our development effort of this innovative hall, in a kind of group, group of developer teachers. There are three teachers. (...) First of all, we have together in this group designed everything, made these activity descriptions and planned what is needed for these different activities possibly. We approach it so that we have made very detailed descriptions of all the situations, learning situations and some other school related situations"* [Interviewee 7]

The pupils are also positioned as an important stakeholder group. First of all, the whole effort is legitimized from the perspective of children's technological skills in their everyday-life *"as children already have at home their computers and mobile phones."* [Interviewee 1] Thus, pupils characterized as apt technology users offer a motive for the II building. Pupils have also acted as informants and testers in the II building effort. As informants, elected representatives of the pupils have been asked for comments concerning architectural plans and plans for the selection of specific learning technologies in meetings: *"Well in these joint meetings when the premises have been planned and put into practice, at regular intervals, the representatives of the student body, representatives of children and of pupils have been present in planning meetings"*. [Interviewee 2] The representative of the teachers explains the motive of assigning pupils to participate as follows: *"We have together with pupils considered what we needed and how this equipment will be used."* [Interviewee 7]

Children's participation is also identifiable in a discourse concerning the school's role in enabling children's more genuine participation (see e.g. Hart 1992). An interviewee, the headmaster of the new Integrated Pilot School, views the school children's involvement as a subject to be learned in the future and worth advocating in itself: *"Then there's one topic that has kept appearing - engaging children – children and young people in the design of the activities and in starting the activities themselves. We should also have practiced that - in designing this house, for example, and considering the things that should be purchased, furniture, for example, so that is actually what we have sort of practiced and thought about."* [Interviewee 5] The representative of the educational administration further accounts children's genuine participation as a driving motive for future developments. There already are structures in the school that enable children's participation: *"We do have well-functioning organizations, student councils at each school, and there is sort of really favourable ground."* [Interviewee 4] Therefore, it is maintained that children's genuine participation should be realized by allowing them to take part in constructing their school and planning the activities in there more comprehensively.

## 6 Concluding discussion

In the following sections, the results are summarized and discussed from the viewpoint of genuine participation in II building. Thereafter, the limitations of the study are outlined and paths for future work considered.

### 6.1 Summary of the results

There is a need to broaden our understanding of 'genuine' participation of various actors in contemporary IS development settings such as in large-scale, longitudinal infrastructure building efforts. The paper, following nexus analysis as a research framework, identified a variety of discursive motives ascribed for the participation of the different parties in this II building effort. Some of the motives were ascribed for the participation of the speakers, while others to the participation of the other parties. The results are summarized in table 1.

<i>Social actor</i>	<i>Motives ascribed for participation</i>
Teachers	Challenging the traditional school, inevitably drawing upon the local school settings Developing pedagogical practices Ensuring continuity
Headmasters	Challenging the traditional school, inevitably drawing upon the local school settings Ensuring continuity Ensuring equality Ensuring sustainability
Companies	Challenging the traditional school Providing cutting edge solutions (in ICT, architecture, interior design), experimenting with them in local settings
Researchers	Challenging the traditional school Developing pedagogical practices (theoretical understandings, teacher education)

Educational administration	Challenging the traditional school, still appreciating the local school settings Developing enabling practices (funding, in-service education, school-company cooperation) Ensuring sustainability Ensuring equality
Global network	Challenging the traditional school, inevitably drawing upon the local school settings Offering cutting edge solutions (in ICT) Developing pedagogical practices
Pupils	Providing information and commenting on the adults' solutions (Offering a motive as apt technology users for the whole II building effort) (Offering a motive for others to ensure equality and continuity)

Table 1: Motives ascribed for participation in the information infrastructure building effort

Broadly speaking, challenging the traditional school was presented as an important motive for all of the actors to take part. Companies were suggested to be agents for providing cutting edge solutions in ICT, architecture and interior design for experimentation in Smart Schools. Local Smart Schools, including teachers, headmasters and pupils, were needed for providing the environments for the experimentation of the solutions in local settings. Providing information and commenting on the solutions were the motives for pupils' participation while teachers and researchers were seen as having agency to develop pedagogical practices by themselves. The role of teachers and headmasters was given as essential in ensuring continuity for the pupils, while the participation of the headmasters and the educational administration were motivated also through ensuring equality in education and sustainability of such development efforts. The educational administration also motivated their participation as developing enabling practices – those supporting such development work and participation of other parties. Finally, children as apt technology users were presented as providing a motive for the whole development effort. They also offered a motive for teachers, headmasters and the educational administration to ensure continuity and equality in education.

## 6.2 Genuine participation in information infrastructure building

Recent research has shown interest towards broadening our understanding of participation in large-scale, longitudinal infrastructure building efforts. PD has been expanding its scope (Clement et al. 2012; Le Dantec and DiSalvo 2013), the current frontier of PD being infrastructuring, the development of large scale systems that serve a wide range of needs of varied 'publics' (Clement et al. 2012). The participation of various stakeholders has been addressed in II literature (e.g. Botero and Saad-Sulonen 2010; Hanseth and Lyytinen 2010; Pipek and Wulf 2009) and research considering PD in II building exists as well (e.g. Karasti and Syrjänen 2004; Neumann and Star 1996; Star and Bowker 2002). This study offers a critical, discourse oriented look into participation of various stakeholders in II building, the stakeholders including children among others.

The construction of 'the future school' concept and related II building in this study can be seen as a dynamic and political 'network of action' (Braa and Sahay 2013) where new actors and partnerships are continuously emerging to collaborate around the shared interests (DiSalvo et al. 2013). The network is never static nor apolitical; new partnerships are always

being developed. At best, this ‘network of action’ allows collective learning more effective than within singular units (Braa and Sahay 2013). In our case the ‘Future School’ concept is developing through pilot projects developing pedagogical practices and emerging potential of modern ICT, shaped by the local practices and organizational settings. Several global and local companies are involved. The Smart Schools offer environments for trialling and developing the solutions. The social relations in the network of actions are ambiguous compared to formal structures as in traditional, single workplace context. Experiences and best practices gained from various development projects and heterogeneous settings have been shared and discussed within the educational network. Participants also seem to be familiar with some participatory ideals. Various forms of participation have emerged, even without professionals in PD. The development has integrated with ongoing practices in various settings where needs have emerged and the process has been continuously reconstructed by the participants as in DiSalvo, Clement and Pipek (2013). In this II building effort for the educational network, user participation may be characterized as participation ‘in the wild’ (Karasti and Syrjänen 2004) without professionals in PD. Thus, this study increases the existing understanding of participation ‘in the wild’. Like Karasti and Syrjänen (2004), we wish to increase the understanding on the organizational and social context in which the participatory infrastructuring is conducted.

The PD tradition has explicitly advocated genuine user participation referring to the transcendence of the users’ role from mere informants to acknowledged participants in the design process (Robertson and Simonsen 2013, p. 5). According to the principles of PD, users should ‘have a say’ in the process to affect the outcome. Moreover, users need to be informed and able to express their views. As the fundamental principle in PD, users need power to influence decision-making, which is more than just ‘having a say’. In order to have long-lasting effects, finally, PD needs to be part of a long-term strategy addressing several societal levels, e.g. letting local projects influence beyond the project boundaries. (Bratteteig et al. 2013). Regarding genuine user or children’s participation in this case, teachers and pupils are of particular interest. No explicit effort of advocating PD or participation related to these two groups was brought up. Still, interested teachers in the Smart Schools had the possibility to develop and experiment with teaching practices; actively contributing to the development in the pedagogical domain, bearing important implications for the (learning) practices of the pupils. Moreover, pupils were also invited to take part in the II building. However, they were primarily seen as users, informants and testers (see Druin 2002) providing feedback on some specific solutions. Some adults, nevertheless, brought up that children should be involved more comprehensively and their more genuine participation (cf. Hart 1992) supported. This is a positive observation even though no concrete actions were reported alongside future visions. One can conclude that there was no wide or systematic teacher or pupil participation in this effort and their participation was not genuine in the sense presented in this paper.

This paper addresses the inclusion of certain relevant yet ‘marginalized’ groups of actors certainly affected by the change; e.g. the pupils and the teachers. As our empirical data shows, these marginalized actors were participating in the effort, typically being involved in various separately funded local subprojects related to the whole infrastructuring program, yet quite limited in time and influence on the total II. Therefore, their ‘genuine’ contribution as equal members of the group making decisions was questionable. That is why we consider them as “marginalized”. This aspect is closely linked to another emerging issue from the data, namely the question of selecting representatives. Based on our data we would like to highlight the

current obscurity related to this. It seems that only by their formal position, certain key actors were representing others, even without a legitimate authorization (e.g. headmasters representing whole schools, including teachers and pupils, teachers representing pupils etc.). These ‘representatives in the wild’ seemed to emphasize open possibility to participate and the participating actors were assumingly trying to consider the interest of the ‘others’ whom they potentially represented. However, considering is not the same as representing. Moreover, without legitimacy, the same person might even in practice be ‘considering’ several different actors (e.g. the headmaster representing teachers as well as pupils) at the same time, potentially leading to conflicting situations. Such conflicts might remain invisible simply because the ones affected are not aware of being represented or do not understand their rights to be involved. Even the ones ‘considering’ the others might be unconscious of their roles as ‘representatives’. Representation ‘in the wild’ seems to depend on the ability to make actors aware of their position in the ‘network of action’ of the ongoing infrastructuring process.

Selecting real representatives for each potential group of actors may not be feasible in this type of longitudinal, large-scale effort. For example, involving teachers would necessitate special arrangements concerning their everyday work. On the other hand, instead of real users, in contemporary ICT development settings one may involve different types of professionals as ‘user representatives’, assumed to ‘know the users’ and to ‘speak for the users’ (Iivari et al. 2009). The use of PD with interest groups representing the actual users has also been suggested (Kyng 2010). However, in this case, with ‘the representatives in the wild’ it seems that for better mediating the needs and demands of the actors being represented, there is a need to make more visible the role of these mediating actors as responsible representatives of other actors and perhaps even to discover new practices of legitimating their role as such. As our data shows, the selection of potential representatives might benefit from an election-based practice typical for student councils. One of the models for participation in the IS tradition also recommends elected user representatives for IS projects (e.g. Mumford 1983). In this effort some representatives of the student councils, where students are usually elected for, were actually selected as participants in the development projects. However, it was mainly the adults, e.g. the educational administrators, headmasters and teachers, who were acting as change agents selecting the representatives among the pupils.

Our data shows the value of enabling practices supporting participation, training as well as the use of special support groups (e.g. suggested in Braa and Sahay 2013). The case reveals that the local educational administration was active in building up new enabling practices that allowed and supported this kind of school-company cooperation and development work. Within PD tradition the importance of training has been emphasized in worker (Ehn and Kyng 1987) and user participation (Schuler and Namioka 1993). However, in this case participation activities or training related to user participation was not arranged by the trade union as in traditional PD research (e.g. Ehn and Kyng 1987; Schuler and Namioka 1993). There is also a challenge relating to how core information and results can be made understandable to different audiences enabling their ‘genuine’ participation. According to Bratteteig and colleagues (2013), mutual learning is essential to ensure participants’ genuine participation. Obviously, new practices are needed for better integrating these local and situated subprojects within the overall ‘network of action’ of longitudinal, infrastructure building efforts. Training of the children should foremost raise their understandings of their rights to participate. In our case, grounds for this kind for fostering of children’s participation skills have already been considered. Student councils are seen as a way for children to take part in decision-making

that affects their life. Also a call for children's more genuine participation (Chawla and Heft 2002; Hart 1992), emphasizing their right to affect and participate in matters concerning their life, emerged in the data. The emphasis for children's right to participate was discursively advocated even though no concrete participatory activities were reported.

### 6.3 Limitations and Paths for Future Work

For studying an II building effort with a variety of actors, even more material could be gathered. The research framework of nexus analysis provided us a lens for examining the phenomenon from a variety of perspectives, also on macro level. Still, a more detailed look on the dimensions of social action and the discourses would be needed to gain a better picture of the dynamics and intricate arrangements of relationships. Furthermore, our interventions connected with changing the nexus of practice, an integral part of nexus analysis, are yet to be reported. New participatory practices would also be needed for supporting participation. We advocate for better practices enabling the inclusion of different 'marginalized' actors in decisions on emerging issues that affect their technology-rich everyday life.

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