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WHY DO THE ORDERS GO WRONG ALL THE TIME?

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WHY DO THE ORDERS GO WRONG ALL THE TIME?

Exploring sustainability in an
e-commerce application in Swedish
public school kitchens

In this paper we discuss sustainability, particularly social and cultural sustainability, in relation to an e-commerce application used in the kitchen of a Swedish public school. The notion of sustainability got its public definition through the Brundtland Commission and the report Our Common Future in which ecological as well as economic and social dimensions were underlined. An additional dimension, culture, has recently unfolded. The data reported in this paper were collected in public school and pre-school meal production. This is a large, institutional, tax-funded activity in Sweden as all pre-schools, compulsory schools and most upper secondary schools serve free lunch to the children and students. We discuss how an e-commerce application complicated the daily routines in the school kitchen rather than making the ordering of food stuff easier or more flexible and how small things that mattered in the staff's day-to-day activities shed light on the application's problems and weaknesses. Following Agenda 21, we relate these shortcomings to sustainability and also to participation. The discussion builds on social and cultural sustainability and participatory design with a focus on the involvement of users in design and implementation of IT systems and services.

Keywords sustainability; social; cultural; information technology; participation; public school kitchens; e-commerce

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Introduction

Today, green or sustainable design is given particular attention in architecture and urban planning, industrial development and development of energy systems. Central issues are physical and technological principles, environmental and health considerations. Other aspects include choice of low-impact materials, energy efficiency, quality and durability, reuse and recycling, as well as service substitution, standardization and modularity. The technological focus has primarily been on the development of appropriate technologies that create an overlap between technology and context, as well as cutting the use of resources.

In information systems (IS) design or design of information technology (IT) sustainability has, above all, been used with a focus on durability (Braa *et al.* 2004; Byrne 2005; Byrne & Sahay 2007) or how IT can support a sustainable development of future societies – and less on how the principles of sustainable development can be integrated into the design of future IT services and systems. To use sustainability in this way is probably a consequence of its general meaning. Cheney *et al.* (2004, p. 226) argue, for example, that sustainability was about ‘permanence and implies notion of durability, stability and eternalness’. Although durability is part of the dominant discourse, others also exist. For example Blevis (2006, 2007) has moved beyond durability when he integrates sustainability into interaction design. His rationale is to reduce the use of materials in order to minimize ecological footprints.¹ While Blevis’s focus is on ecological issues, Mörtberg *et al.* (forthcoming) also include the concepts social and cultural sustainability in IT design. Their focus is on standards, formats, and routines in digital design and how to find sustainable ways of living with technologies (Mörtberg *et al.* forthcoming). The exploration builds on two research projects: e-government in municipalities in Sweden and the reconstruction of a Viking boat in Norway. Mörtberg *et al.* discuss how a standard identifier (OCR number) of the invoices causes additional work for the person in a municipal account office responsible for the invoicing process – the design based on the identifier was not sustainable enough without manual interventions to correct inappropriate functionalities of the systems. In the reconstruction of the Viking boat, Mörtberg *et al.* also illustrate the necessity of paying attention to the users’ creation of meanings and values in order to design connections between present understandings and the standards used for archiving cultural objects, narratives and knowledge. They conclude how important it is to also integrate social and cultural sustainability in the design of sustainable IS/IT and services – i.e., as a prerequisite in the creation of sustainable societies.

Shapiro (2005) argues that it is estimated that large scale IT systems are either not used or they do not work according to the specification in around 75 per cent of cases. Shapiro does not discuss the high rate of failures in terms of sustainability, but he argues for the use of participatory design (PD) approaches in order to reduce the rate of failure. The main focus in PD is on participation and how to

involve a range of practitioners in IT design in order to design a system that is based on those who work with it in practice. Our argument to tie together PD and sustainability is based on what PD researchers emphasize:

[Accordingly,] IT usage is regarded sustainable to the extent that it contributes to a balance in the development, use, and protection of a company's resources. This should be done in ways that accommodate the company's existing goals and needs, without jeopardizing its future development potentials.

(Bødker *et al.* 2004, p. 54)

And:

Good IT design requires knowledge of work practices in order to determine which company traditions are fundamental and sustainable, and which are outdated. Put in a different way, only when a design team has fundamental knowledge of existing work practices can it arrive at what we call a 'sustainable design'.

(Bødker *et al.* 2004, pp. 140–141)

The social and cultural sustainability that we explore here proposes a focus on an e-commerce application used in municipal meal production in Swedish institutional kitchens. We pay particular attention to participation and PD as enablers to involve employees in IT design in order to make social and cultural sustainability visible, and to integrate them in the design and implementation of IS/IT.

In the next section, we present the notion of sustainable development, Agenda 21, and the four dimensions of sustainability. This is followed by a description of PD and participation. The setting, context, and methods are then described and the empirical data collected in the meal production for schools are presented. We will end with some concluding thoughts.

Sustainable development and Agenda 21

Sustainability has not always been connected to ecological issues but derives from the emerging environmentalism in the 1960s and 1970s. Ecological dimensions were reinforced when sustainable development was given its public definition in the Brundtland Commission and its outcome, *Our Common Future* (WCED 1987). The liveable and sustainable futures with 'a development that meets the needs of the present without compromising the ability of future generations to meet their own needs' were highlighted in the report (see <http://www.un-documents.net/ocf-02.htm>). Further, sustainability was extended with the inclusion of a social and economic dimension to the existing focus on ecological dimensions. There is not, however, an existing common understanding of the notion of sustainability

because it has been unfolding since the 1960s and, today, it is used in a variety of ways and settings. Eichler (1999, p. 189) concludes that the notion 'gives most of us a warm and fuzzy feeling but we don't know what it means'. Others claim that the concepts of strength, flexibility and possibilities are shown by continuous discussions and debates about its meaning (Lafferty *et al.* 2006).

The notion may not stable and fixed, but the Brundtland Commission's outcome documented in the report *Our Common Future* (WCED 1987) was a starting point for integrating social, economic, and ecological dimensions in the objective of achieving sustainable futures. This work continued at the United Nations Conference on Environment and Development in Rio de Janeiro in 1992. A result of this was a plan for actions, Agenda 21, in which the three dimensions of sustainable development: ecological, economic, and social, were reinforced. Agenda 21 also emphasizes the need for grass-root-level involvement in development projects which reinforces people's opportunities to become involved in the creation and implementation of sustainable futures. Participation was one normative principle in *Our Common Future* and it was strengthened in the action plan, Agenda 21, through the emphasis on local action. In addition to local actions, Agenda 21 also emphasized that actions should be integrated into the whole society, globally and nationally, in order to support sustainable development. Further, specific groups are designated in Agenda 21, such as women, NGOs, business, industry, and scientific communities. (It is noteworthy that women, as a group, are singled out but not men.) Agenda 21 also focuses on innovative and system-changing attempts in the development of technologies, in particular in relation to inclusion of groups that are neither the most dominant participants in the development processes nor are generally involved in decision-making positions. The focus on technology is in continuation of the work of the Brundtland Commission, with its requirements for the development of sustainable technologies: 'a technical system that can search continuously for new solutions' (WCED 1987, p. 65). The focus on technology has, however, been discussed and criticized because of its tendencies to fall back on technological optimism and also because it is yet an additional expression of western countries' domination over other cultures (Visvanathan 1991; Escobar 1995). Despite the criticism, the commission's statement about technology can still be used as a point of departure in explorations of sustainability in IT design.

While *Our Common Future* and its followers focused on sustainable development in general, the United Nations plan of action shed light on information and communication technologies (ICT) and its relation to sustainability. Cultural diversity and identity, linguistic, and local content are examples of the 11 key principles for the sustainable development of an Information Society (WSIS 2003). Hence, stimulating respect for cultural identity, traditions and religions are defined as essential. Among the principles, cultural diversity is defined as diversity of cultural expression, indigenous knowledge and traditions, on

institutional, national and private levels. The focus on diversity calls for a better understanding of how to integrate diversity in IT design particularly, with a focus on social interactions and social life in the development of information societies, and, in our case, how cultural diversity and identity can influence social interactions with technologies. This needs a more distinct notion of what cultural diversity consists of – and how to analyse it in real-life situations.

The four dimensions of sustainability have been extended to include social and economic rather than just ecological issues in order to create viable futures. The ecological dimension is discussed in terms of responsibility and not preying too much upon our common resources. Health and viability are related to economic sustainability, and equity and justice to social sustainability. A fourth dimension, cultural sustainability, has emerged out of social sustainability (Hawkes 2001). Cultural sustainability has its focus on the development, renewal and maintenance of human cultures in order to create positive, enduring relationships with other people in the immediate neighbourhood but also throughout the world (Hawkes 2001). Cultural sustainability embodies new approaches to be integrated in design in terms of identity, values, norms, diversity, and tradition, among both users and designers. This gives valuable knowledge that can be of help in the design of sustainable products and systems. Our focus will be on how these traditions, identities, norms and values in school and pre-school kitchens are considered in the e-commerce application. We will also argue that ecological, economic, social, and cultural sustainability are valuable dimensions to be integrated in sustainable IS development. Such dimensions intersect in people's everyday lives, consequently it is not always possible to figure out where one dimension (ecological, economic, social, cultural) stops and where the other starts (Alander 2007). It is, however, valuable for analytical reasons to separate the dimensions.

Participation in design and implementation of information technologies

In *Our Common Future* the dimension of sustainability was developed, along with the development of technologies as a way to create sustainable lives. These lines of thought have been developed in the action plan, Agenda 21, in which actions and participation with a particular focus on the local was underscored. Enhancing participation and fostering cooperation and common responsibility are all obvious social efforts in the work for sustainable development. But transitions towards sustainability will also affect every dimension of the sociotechnical system in which we live (Alander 2007). We argue that when the principles of sustainability are translated into IT design, additional principles are required in order to enhance participation – so that the IT systems will be adapted to the work practice or that the system will support citizens and prospective users in their everyday activities. This is underlined by the key principles for an

information society for all: 'Applications should be user-friendly, accessible to all, affordable, adapted to local needs in languages and cultures, and support sustainable development' (WSIS 2003, p. 7).

Participation is emphasized by both the WSIS and Agenda 21; PD is an approach with a focus on participation in IT design, enabling the involvement of various stakeholders and practitioners in the IT design and implementation process. Participation and participation *on equal terms* are elementary principles in PD. Further, rather than IT systems and applications being designed and implemented in isolation, 'decisions about technology also involve decisions about work content and job design' (Greenbaum 1993, p. 28). Hence, in PD projects, a *range* of people with different experiences and knowledge are involved in the design and implementation of IT systems. Consequently, their visions and ideas intervene in the design of the system, but the question is whether equity can be achieved, even where the intention is to work on equal terms. A range of methods and techniques have been developed by the PD community in order to enable various stakeholders to get first hand experiences of a practice, and to try and obtain equality in the cooperation. Examples are future works, participant observations, interviews, scenarios, story-boards, prototypes, etc. (Bødker *et al.* 2004). This also includes more creative and experimental methods such as games (Brandt 2006), probes (Gaver *et al.* 2003), cartographies (Mörtberg & Elovaara 2010 *in press*), and performances (Jacucci *et al.* 2005).

The involvement of practitioners or users in IT design has a long tradition in Scandinavian countries. This tradition can be described with its two main trajectories: one to democratize the working life and the other to democratize the design process in order to get a better understanding of the practice and to involve those who work in the practice (Bjerknes & Bratteteig 1995). The aim of involving prospective users has been based on the ambition to support those at the margins. Today, various practitioners are involved in order to contribute inspiration and creative ideas to the design process (Kanstrup & Christiansen 2006). Kanstrup and Christiansen (2006, p. 328) emphasize how the Scandinavian tradition of PD builds on *phronesis* (practical wisdom) when they write: 'designers strive to serve the common good and avoid harming people's possibilities to develop a life of their own'. Hence, participation has a particular meaning in this tradition with its focus not only on participation but on participation on equal terms – that is, to be actors based on equality in the design of IT systems and services. Participation on equal terms is not an easy goal to achieve because asymmetrical power relations, such as gender, age, expert/non-expert, etc., are intertwined with the design process. The rationale for being involved in a PD project is not always the same: some try to obtain cooperation as equals, others to get their product adapted to a new customer. No matter why and how people participate, their motive of being involved has an impact on the process (Jansson *et al.* 2008).

In participatory approaches, it is also important to identify activities that are not always visible or obvious to others not involved in the day-to-day activity because they take place backstage, or have low status and are considered as routine work (Karasti 2001). The meal production explored in this paper is a sector with low status, dominated by women, and in which IT systems and services have recently been implemented.

Design from somewhere or nowhere?

Design is a practice with the potential to learn from each other. That is, the designers learn from the users and the users learn from the designers: mutual learning (see, for example, Bratteteig 2004). Design and implementation processes are thus sites for knowledge production. Suchman (2002) locates design with the use of three positions: 'design from nowhere', 'detached intimacy', and 'design from somewhere'. In the position of 'design from nowhere', the designers distance themselves from the practice where the system will be used, from the prospective users and their activities. This can be compared with what Haraway (1991) calls 'the view from nowhere'. In this position, knowledge is regarded as universal and uniform, without impact from the individuals involved in the research or in the design project. In 'design from nowhere', the designers can see everything but not how their own position, knowledge, and understandings intervene in how the design is conducted, and also in the system's functionality. Further, designers think they are able to design IT systems and services without the involvement of prospective users or other practitioners in the process. Features of the second position, 'detached intimacy', include building alliances with professional colleagues in order to create intimate relationships with them while, at the same time, keeping their distance from prospective users and their work practice.

In 'design from somewhere', designers consider themselves as actors in practices with a range of experiences and knowledge but also consider that their own visions and ideas are created 'somewhere' because knowledge is not complete but is always partial and situated (Haraway 1991). Designers who are located in this position understand that it is impossible to capture everything but, with involvement of various competences and views, it is possible to extend their understanding in order to take responsibility for the design process and its outcome. Basic principles in PD locate the approach in this position as 'design from somewhere' or located accountability (Suchman 2002).

PD strives for a design process on equal terms and to find out fundamental traditions and values in a practice. Equity is an aspect in social sustainability, tradition, identity, norms and values in cultural sustainability, and in Agenda 21's focus on local activities. We argue that PD is useful in the development of sustainable design practices, methodologies and methods.

Research methods and context

The empirical data used in this paper were collected in public-sector-meal production in a municipality in northernmost Sweden during 2002–2005.² Interviews with two municipal managers of the meal production for children, participation observations in kitchens, and literature studies, including texts and documents concerning the municipality and public sector meal production, were used. In this paper we use data from participant observations in a pre-school kitchen and two interviews conducted with the municipal manager of meal production for schools, manager A, and her successor, manager B.

The participant observation was carried out in 2002 in a pre-school kitchen. The first interview was conducted in February 2003 and the second in October 2005. A range of projects had been conducted in school kitchen meal production with the goal of changing the practice. Manager A had been involved in these projects and it was the reason why she was interviewed: she had an overview of the transformations that had taken place, on both the municipality and school-kitchen level. The second interview was conducted in order to follow up the transformation that had taken place in the municipality described by manager A in the first interview. As manager A had been replaced, the second interview was conducted with the new manager, manager B. The interviews were semi-structured, audio-recorded and transcribed verbatim. They lasted for approximately 90 minutes and were carried out in the managers' offices.

Public meal production in Sweden

In Sweden, all children in compulsory school (from the age of 6 until they are 16) get free lunch that is tax-funded. This is also the normal situation in the majority of upper secondary schools. Free school lunches have been served in compulsory schools since 1946 and became a legal right in 1998. The legislation was approved after this right had been questioned during the economic crisis of the early 1990s. Together with the meals served in day-care centres, school lunches make up almost 2,100,000 of the 2,600,000 meals that are produced in the Swedish public sector every weekday. The public sector's meal production is extensive, tax-funded, and dependent on a range of technologies. Thus, the meal production has an impact on most Swedish people and it is an extensive activity not only in terms of economy and technology but also related to social and cultural aspects. Consequently, the sector is of interest both in relation to design and implementation of IT-based information systems and to sustainable development.

The Swedish public sector is in a transformation or modernization process where rationalization and effectiveness are more or less explicit goals. Therefore public meal production is also under transformation. This is, among other things, carried out with the implementation of large-scale systems, such as cook-and-chill, where the preparation and cooking is concentrated to a few

kitchens where the meal is chilled before it is transported to the local kitchens. This transportation takes place a number of times each week. Another transformation is the implementation of a range of IT systems and services such as, for example, the application used in the school kitchens that we report on here.

The work on meal production is distributed over the whole day, though probably it is more intensive on some occasions than others, e.g., during lunch. In school restaurants, though, the workload is more concentrated around lunchtime, some school kitchens serving lunch for up to 500 pupils during a few lunch hours. The work in kitchens and restaurants includes, of course, keeping the kitchen in order: washing up, taking care of the waste and ordering, unpacking and storing the food-stuffs, and so forth. On weekdays, approximately 25 per cent of the inhabitants have at least one meal from the institutional kitchens in the municipality (elder-care included) (Alander 2007). The work in school kitchens and restaurants is mobile in terms of responsibility for who does what around the kitchen and in the restaurants, particularly in pre-school kitchens.

A pre-school kitchen

In pre-school kitchens, normally, one person works alone. In the school studied, Lisbeth (the name is fictitious), (the majority of kitchen staff are female) was responsible for preparing, cooking and serving breakfast, lunch and afternoon snacks or sandwiches to 20–80 people. Besides cooking, she ordered, received, unpacked and stored the food-stuffs, dished up and took care of waste. Once a week, foodstuffs and other things required in the work practice were delivered by a small truck and then stored in a room connected to the kitchen. The kitchen was rather small with just enough space to move around between the different technologies and equipment placed along the walls. A cooking island was placed in the middle of the room with an oven, sink, chopping board, and four stove plates. Lisbeth had arranged a small office area with a telephone, files, and a notepad. The office area was just by the only window in the kitchen. At the time of the observation, an e-commerce application had been implemented and was in use in the municipality's kitchens. The computer was placed in a room beside the kitchen.

All the problems – articles, quantities and fresh fruit

The main argument for the purchase and implementation of the e-commerce application was to make the municipal invoicing process more efficient. One part in the rationalization was to integrate the meal production, invoices, and the orders for food-stuff and other goods into the application. Every school kitchen was equipped with a stationary computer, with Internet access, to be

used to order foodstuff for the school restaurant. The orders were carried out with the use of a web-based interactive form. The e-commerce application was thus a web-based, standard application developed by an external software company. The co-operative distribution and the municipal's new agreement on purchasing were introduced simultaneously with the e-commerce application. The structures of the new purchase agreement and the co-operative distribution technology were integrated in the e-commerce application, although not dependent on it.

The employees in the kitchens were not familiar with the use of computers and IT systems in their day-to-day practices. Meal production has a low status, is dominated by women, and has not been given priority when IT systems and services have been designed and implemented. In order to know how to use the application and the functionalities, all those responsible for ordering (or at least one person in every kitchen) participated in a training course. An employee in the municipality was appointed to do the training. Manager B was responsible for the training before she replaced manager A as the manager of the municipal meal production for schools.

We have chosen to focus on problems and shortcomings with the e-commerce application. The argument is that in 2005, three years after the implementation, 10 out of 21 kitchens had returned to manual ordering. We start with a brief description of the transformations in the school kitchens that took place with the new e-services.

Transformations in the school kitchens

In the interview, manager A explained that the meal production's complexity was the reason why it had been chosen to be the first sector in which the e-commerce application was implemented. This complexity was supposed to be simplified and made more effective with the use of the IT application. Manager A also explained that this municipality was a pioneer compared with other municipalities in implementing IT in meal production. Manager A said the application had both advantages and disadvantages. Both the user's adaptation to the application and the contextualization of the application to the specific practice could be bedevilled by 'teething troubles'. Manager A explained that the system would be an advantage if 'the ordering goes faster' and 'one becomes more aware of the prices'. She was also clear that 'it is necessary to get the systems to work' in order 'to do the ordering more quickly' because the employees in kitchens do not have spare time to sit in front of the computer. Efficiency was also the main argument for implementing the application. But did the assumptions prove true and did Lisbeth share manager A's optimism? We will illustrate the experiences with some examples of how small things matter in the day-to-day activities.

Before the e-commerce application was implemented Lisbeth carried out the food orders by phoning producers and suppliers. Lisbeth worked alone in the

pre-school kitchen, consequently she had to plan her tasks in the kitchen in order to be able to leave it long enough to order the stuff. Lisbeth tried also to plan for the requirements for one week in just a single order. If there were problems with the system it would of course take longer than she had estimated and, if this was the case, she would have to take a break, return to the kitchen, and continue with the order later – a change compared with the manual system, where it was possible to continue with some tasks in the kitchen and she, at least, had better control of the cooking process.

The deliveries were also confirmed by the application. The task of controlling and comparing the delivery order with the goods listed on the invoice was not changed by the IT application. Other manual tasks related to the invoices were, however, replaced through the application. Further, the e-commerce application had caused transformations in how the work was organized and conducted in the school kitchens. The staff had to deal with the transformation, the new tasks and the use of computers, which were a novelty for many in the school kitchens. They used a range of technologies but not, however, computers. Lisbeth's equipment was placed in a room apart from the kitchen – a stationary computer with an Internet connection. Thus she had to leave the kitchen to use the e-service while manual routines had allowed her to remain in the kitchen to control the cooking and also to continue with her tasks in cooking the food.

'Riven' and 'batteridreven'

The articles in the provider agreement were stored in a database to be used in the meal production units when they ordered stuff. Lisbeth and her colleagues ordered the foodstuff or other things with the use of a form on a web page. A browser was also available. She was able to search for an article with its article number or its article name: abbreviated or with the complete name. Although abbreviation was possible it was not always easy to figure out the search function's logic. This was illustrated with an example from manager B who explained that if one wanted to order grated cheese (*riven ost*) one has to register the whole term – '*riven ost*' – because *batteridreven* (a battery-operated thing) comes up if one only registers '*riven*'. The result was not wrong but it was not always self-explanatory, particularly if one was unfamiliar with the application and also had limited time for ordering. Manager B explained that the fastest way to carry out the orders was to use the article number – something the staff in the kitchen were at first unfamiliar with but which they found out after some time. She also recounted that one way to deal with the unfamiliarity was to create one's own paper-based list of the most commonly used article numbers to be placed next to the computer. The quantity was also something the person had to ponder on before s/he made the order: whether it was two bottles of ketchup or two boxes of bottles; if the bags of potatoes were 10 kilos or 25 kilos. Hence, quantity

registration had caused problems and annoyance in the kitchens not only for Lisbeth but also in other kitchens.

Fresh fruit or?

Lisbeth, who worked alone in the kitchen, was proud that she had been able to learn how to work with the computer and even gave the impression that she was almost surprised that she could actually do it. Lisbeth said, however, that stress in the kitchen had increased due to all the problems with the electronic ordering system. Sometimes she created problems by punching the wrong key; other times the errors were attributed to the software or the product list. The latter resulted in wrong deliveries. Lisbeth told how she had realized that if something went wrong it was not necessarily her fault. Lisbeth gave as an example her decision to order several kilos of mandarin oranges. They were categorized under the heading of *fresh fruit* in the product list. Lisbeth made the order but was, however, surprised when the truck arrived with the ordered food stuff: it appeared she had got the whole amount as canned mandarins instead of fresh fruit. Lisbeth said she felt a little silly and thought she must have done something wrong when she registered the order. She repeated the order, this time carefully checking that she ordered fresh fruit. But what happened after the order was submitted? The following week when the truck arrived with the stuff the delivered mandarins again were not fresh but canned. This time, Lisbeth said, she was sure that there had to be something wrong with the system and the order forms. Lisbeth had made the order correctly but the delivered stuff was not in accordance with what she had ordered. The information presented on the webpage and the content in the database diverged. Manager B explained that such problems were well known and also those with ordered quantities.

Small things matter

The meal production manager, manager B, was on leave from her ordinary job as an accountant when the e-commerce application was implemented with the need for her to train all the necessary kitchen staff in how to use the application: 21 people in total. By the time of the interview, manager B indicated that only around 10 out of the 21 she had trained still used the e-commerce application. The majority of the staff in the kitchens had returned to manual ordering due to a deeply-felt irritation with all the problems. For example, some bugs that had been corrected appeared again after a new version had been installed. Manager B explained the latter problems:

a small thing matters and it only has to be a minor thing but it explodes . . . it is very annoying, it will be difficult to gain acceptance of a new e-commerce application – the functionality must be much better.

Manager B had experience of e-commerce applications other than the one used in the municipality and none was apparently better than the other; they all had their pros and cons. Manager B commented on her experiences: 'those who construct the system do not visit the kitchens to find out how it really is or to listen to the cooks who have not experience of computers'. In spite of this, manager B was enthusiastic over the possibilities that an e-commerce application could bring into the work practice. In the present system, she highlighted the account-coding that facilitated the ordering process in the kitchens as something positive. Manager B had also made suggestions about how to improve the functionalities. As the manager of the meal production, she was also aware of the disadvantages in the present application. One general aspect was the usability, she said: 'it should be easy for the staff; an application should improve the day-to-day work'. Usability issues should be considered in the light of the limited time the staff has because no extra time was assigned to conduct the ordering and associated tasks that had appeared with the IT application. Manager B also expressed doubt as to whether the reported bugs or the suggested improvements had actually reached the software company, though she knew that they had been reported to the person who was the municipality's contact with the supplier. Manager B also pondered whether it had become a matter of prestige, or a need for those responsible for the purchase of the system to minimize the problems. Despite all the problems they had had with the application, manager B was convinced that e-commerce could improve the work in the school kitchens. However, her enthusiasm with the present application had dwindled to mistrust.

Concluding thoughts

We have explored in this article social and cultural sustainability, with a particular focus on participation, in a discussion of problems related to the implementation of a web-based application in the school meal production in a municipality in northernmost Sweden, where, three years after the start, 10 out of 21 kitchens had returned to the manual routines.

Arguments about effectiveness, or how to make a practice more efficient in order to justify design and implementation of IT systems and services in organizations, are usual. The question is whether the e-commerce application can be considered as effective or sustainable when 10 out of 21 kitchens had returned to manual routines. Shapiro (2005) argues for a use of PD in order to decrease failures related to design and implementation of IT systems and services. Participation, and participation on equal terms, in design and implementation of IT/IS is also an argument for sustainability, and particularly social sustainability.

Equity is one aspect of social sustainability, dignity another. Problems with quantities, with categories, and with the wrong products delivered, were things

the staff in the school kitchens had to deal with. To find out that one's orders result in incorrect quantities or in canned fruit instead of fresh fruit does not increase one's self-respect and confidence, particularly if one is unfamiliar with IT systems and services. Initially, Lisbeth assumed that *she* had made mistakes before she realized the system's shortcomings. The bugs and problems seem not to be too complicated; however, they appear to have caused annoyances and stress. Further, that some bugs returned after new versions had been installed increased the annoyance and prevented the work process in the kitchens. Design and implementation of IT services without the involvement of those who work in the school kitchens, and that, in addition, cause a deterioration in the staff's working conditions, is not sustainable enough in regard to either social or economic dimensions.

It did not appear from either Lisbeth's narratives or from those of the managers whether the co-operative distribution and agreement on purchasing integrated in the ordering of foodstuff could explain some of the delivery problems. It was, however, obvious that the employees in the municipality's school kitchen did not participate in either the purchasing or in the design of the application. One of the managers of the meal production for schools expressed an existing gap between those who design the application and those who work in the kitchens where the system was used. The designers have neither the experience nor the knowledge about the work practice and the day-to-day activities. The manager also made it clear that some of the employees had limited experience in using computers in their day-to-day activities. The staff's unfamiliarity with computers presumably did matter, but less so than the application's shortcomings because they failed to benefit from the application, which was not robust or sustainable. The standard application did not reflect the practice, norms and values of Lisbeth and colleagues and can be categorized as 'design from nowhere' (Suchman 2002).

Women as a group are singled out in both Agenda 21 and by WSIS. The meal production in Swedish school kitchens is dominated by women and has low status, and few IT applications have so far been implemented in the municipality's meal production. These circumstances show the importance to pay particular attention to how gender intersect in design (Mörtberg & Elovaara 2007; Jansson *et al.* 2007) or how gender and technology is a 'mutually constitutive relationship' (Wajcman 2000, p. 460).

In Lisbeth's as well as in the managers' accounts, it became obvious that Lisbeth and her colleagues in this particular municipality neither participated in the design nor in the purchase of the e-commerce solution. It was, however, unclear if others in the municipality had been involved during the development process. The work in the kitchens is mobile. It became obvious that the employees had to leave the kitchen to make the orders, due to a stationary computer. With the manual routines it was possible to remain in the kitchen and still have control of the activities as well as performing some

of them. Further, the staff had no additional time to deal with the ordering system. The main reason for the implementation was to rationalize the municipal invoicing process, thus, the activities in the kitchens were not at the heart of the process but were integrated into the e-commerce application. Stationary solutions are probably more suitable to accounting practice rather than to activities conducted in the kitchens and to be sustainable, in the meaning of being integrated into long-term work practices, the system should in fact have supported the mobile practice in the kitchens. This may have strengthened the e-commerce applications role in the school kitchens, and would probably have had a higher potential of being adapted into the daily practices, resulting in more employees accepting it.

As the manager for meal production for schools also highlighted, the weakness of the e-commerce application was, among other things, the systems designers' lack of familiarity with the practice where the application was implemented. The managers had an overview of all kitchens and the activities and this, together with Lisbeth's experiences, show how this design and implementation can be located in the position of 'design from nowhere' (Suchman 2002). The designers seemed to have considered themselves, their knowledge and experiences to be sufficient when they developed an application for a practice like the school restaurants. They seemed not to consider the knowledge of others or that experiences and knowledge are diverse, partial and depend on people's doings and actions in day-to-day activities such as those in the school meal restaurants (Haraway 1991). PD is an approach with the aim to involve all stakeholders in the design in order to gain understanding of practices, to involve others as well in the design process and not to trust only the designers. Bødker *et al.* (2004) argue that the necessity to understand prospective users work practices is in fact an important part of a sustainable design:

However, in order to develop sustainable visions of new IT usage, the designers need to gain an understanding of the work – which frequently, upon closer examination, turns out to be quite well-organized

(Bødker *et al.* 2004, p. 285)

Bødker *et al.* (2004) argue how IT design requires knowledge about practices and fundamental traditions in order to design for sustainability. We argue that the experiences of the e-commerce application and the knowledge of traditions, norms and values related to the work practice in the kitchen shows the necessity of integrating cultural aspects to achieve sustainability in the design of IT/IS. Care and wellbeing by serving tasty dishes to the school children are norms and values associated with the practice in the kitchen (Alander 2007) and are an important part of the knowledge tradition that should be included in cultural sustainability. The analysis shows how the e-commerce

application neither renewed nor maintained important values and norms rooted in the practice in the kitchen (Hawkes 2001). In fact, a consequence of the e-commerce application was that new activities were introduced that disturbed the day-to-day practices in the kitchens. The system, however, did not allow the employees to create positive relationships with it and, instead of supporting their work, it created a new set of bugs and errors. This could have been prevented by applying a cultural sustainability approach that focuses, in this case, on the traditions of routines, the knowledge and values that build the rationale of the practices established in the kitchen (Stuedahl 2004).

As we know, green or eco design has for a long time influenced urban planning and architecture with principles built on sustainability. A well-known argument is that IT can support the sustainability of a future society but the time has come to turn the question around and ask how we can design IT systems and services in more sustainable ways. A framework to integrate ecological dimensions as guiding principles in interaction design has been developed by Bleviss (2006, 2007). In this paper we have paid particular attention to the social and cultural factors related to design and use of IT. We have used some examples of transformations taking place in Swedish school kitchens as a consequence of the implementation of e-services. Based on our analysis, we argue for the necessity to also integrate the four dimensions of sustainability, social, economic, ecological and cultural, in the design of IT/IS. This, we argue, will extend the ecological guiding principles emerging in interaction design, and might help us to develop new ways of thinking and articulating ideals of sustainable design in the IT/IS field.

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Notes

- 1 The notion of ecological footprints has its focus on the flows of energy and material that goes to and from a particular entity, e.g., a household, city, or county, – translates the flow to correspond with the land and water needed to maintain the flows. Thus, this approach builds on a method to calculate a certain consumption impact on the ecological system (Wackernagel & Rees 1996).
- 2 Sara Alander collected the data for her doctoral thesis (see Alander 2007).

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