

Scandinavian Approaches to Participatory Design*

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What is distinctive about Scandinavian participatory design approaches? What can we learn from Scandinavian participatory design approaches that we can take into our own design practices, collaborations in design, and design pedagogy? The discussion argues that three principles distinguish Scandinavian approaches to participatory design: striving for democracy and democratisation; explicit discussions of values in design and imagined futures; and ways that conflicts and contradictions are regarded as resources in design. The author draws on recent experiences in Norway, in multi-disciplinary and international collaborations in health informatics. Background on Scandinavian approaches to participatory design is provided to give a sense of their distinctive history and critiques reflecting on problems and limits encountered. An instance of information systems interface design is presented in order to talk concretely about Scandinavian participatory design principles in contrast to mainstream systems design traditions in the United States.

INTRODUCTION

IN PARTICIPATORY DESIGN, ‘the people destined to *use* the system play a critical role in *designing* it’ [1, p. xi, original emphasis]. Participatory design thus entails collaborative partnerships and co-construction of knowledge in analysis and co-construction of changes in social practices. Diverse participatory design *methods* adopted from and inspired by Scandinavian participatory design projects have been practised in North America and elsewhere since the mid-1980s. However, the discussion that follows takes up the question: What is distinctive about Scandinavian participatory design approaches? The discussion includes reflections upon recent experiences in Norway in which the author has participated, and focuses on three principles that distinguish Scandinavian approaches to participatory design:

- deep commitments to democracy and democratisation;
- discussions of values in design and imagined futures; and
- how conflict and contradictions are regarded as resources in design.

A few biographical notes indicate my relationship to Scandinavian participatory design. My discussion draws on my introduction in 1981 to people involved with the Scandinavian Technology Projects in the 1970s and early 1980s. (I was fortunate to have a research travel grant from the German Marshall Fund of the United States.) My participation in the bi-annual Participatory Design Conference founded by Computer

Professionals for Social Responsibility (1990 to the present) [2–7], and my recent experiences as a social scientist working in the Systemarbeid (System Development) group of the Department of Informatics, University of Oslo (1999–2000, 2001–2002). The Systemarbeid group, founded by Kristen Nygaard, has a history of intellectual leadership and research programs related to participatory design and multidisciplinary collaboration in information systems design for which they regularly invite visiting scholars from the social sciences and humanities. (Members of the Systemarbeid group who have been active in participatory design over the years, include Grö Bjercknes, Jørn Braa, Tone Bratteteig, and Kristen Nygaard. Among international scholars who have worked with Systemarbeid over the years are Claudio Ciborra, Joan Greenbaum, Jonathan Grudin, Markku Nurminen, Julian Orr, Toni Robertson, Susan Leigh Star, Lucy Suchman, and Langdon Winner.)

Working with Systemarbeid gave me the chance to begin working with two ongoing projects that adapt Scandinavian, particularly Norwegian, participatory design principles in international and multidisciplinary collaborations in health informatics. The two projects are: the Health Information Systems Project (HISP), a collaboration comprising medical and computer science faculties in Norway, South Africa, and Mozambique and the Ministries of Health in South Africa and Mozambique [8, 9]; and the Health Information project begun during the International Women’s University (IFU), Project Area Information, in Hamburg, Germany during the summer of 2000 [10, 11].

The discussion proceeds as follows. Background on Scandinavian approaches to participatory

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design is provided to give a sense of their distinctive history and critiques reflecting on problems and limits encountered. Secondly, three principles distinguishing Scandinavian participatory design are discussed: democracy and democratisation, values in design, and conflict as a resource in design. Finally, two works in progress are described, as they suggest possibilities for practising participatory design in contexts outside of Scandinavia. An instance of information systems interface design is presented in order to talk concretely about Scandinavian participatory design principles.

BACKGROUND

User participation in design is desirable for several reasons with mixed motivations [12]:

- improving the knowledge upon which systems are built;
- enabling people to develop realistic expectations, and reducing resistance to change; and
- increasing workplace democracy by giving the members of an organisation the right to participate in decisions that are likely to affect their work.

The first two rationales for user participation are not unique to Scandinavian participatory design; they are found in several system development approaches. It is the third motivation—the desire to increase workplace democracy—that is culturally and politically based in Scandinavia, in legislation and in participatory design approaches [13]. Over the years, Scandinavian participatory design has also been known as the Collective Resource Approach [see, e.g., 14, 15], Cooperative design [see, e.g., 16, 17], and, more recently, Cooperative Experimental System Development [18]. (In the United States and elsewhere, participatory design approaches include work-oriented design, situated activity [19, 20], contextual inquiry [21] and situated design [22].)

Participatory design methods are diverse [1, 22] including but not limited to ‘design-by-doing,’ ‘mock-up envisionment’ [see, e.g., 23], future circles, future workshops, organisational games, co-operative prototyping, ethnographic field research, and democratic dialogue [see, e.g. 24]. As for motivations to improve design through user participation, participatory methods are employed in a wide variety of design contexts; Scandinavian participatory design practices are not distinguished by particular methods but rather by political commitments to societal concerns and relationships with participating users and communities. Pelle Ehn writes: ‘In the interest of emancipation, we deliberately made the choice of siding with workers and their organisations, supporting the development of their resources for a change towards democracy at work . . .’ [25, p. 47]. In the Scandinavian countries, in addition to

participatory design *per se*, there are broadly shared traditions in mainstream informatics and information systems design that favour ‘user-oriented’ and ‘human-centred’ design. [see, e.g., 15, 26]; there is also an orientation towards action research. Morten Kyng observes that the emphasis in participatory design on *design as an experimental inquiring process*, as a *learning process*, is broadly shared. ‘In other words, a growing body of work in CSCW, HCI, Requirements Engineering, Information Systems research and experimental system development shares with PD [sic] a profound dissatisfaction with the shortcomings of a traditional, mechanistic approach to system development—and some of the attempts at overcoming them’ [15, p. 17]. Regarding multidisciplinary as well as designer-user collaborations in design, Kristen Nygaard and Pal Sørgaard argued in the mid-1980s that ‘the capability of multiperspective reflection is essential for all computer professionals’ [27].

Scandinavian participatory design approaches emphasise change and development, not only technological change and systems development, but change and development of people, organisations, and practices, occurring in changing socio-historical contexts. ‘Design is about changing: changing artefacts as well as changing people, organisations, communities’ [28]. Thus, there is an emphasis on imagined future use with new tools and changed infrastructures and interactions. From this perspective on *design as change*, ‘. . . participatory design approaches seek to include future users in most parts of the design process, even as co-designers. Ideally, users at many levels participate so that change can be shaped from several perspectives’ [28]. At a minimum, as Finn Kensing put it, employees collaborating in a participatory design project ‘must have access to relevant information, they must have the possibility for taking an independent position on the problem, and they must in some way participate in the process of decision making’ [29, p. 223]. Knowledge about the politics and power structures in social settings is essential; such local knowledge also recognises possibilities for change already there [30, see also 31]. Creating the preconditions for viable participation includes working to bring forward tacit knowledge and shared knowledge that is taken for granted and therefore usually unspoken or invisible. Mutual learning between and among designers and users is a core principle in working relations. The generative nature of social, symbolic, and material threads of designers’ and users’ experience in formulating multidisciplinary design collaborations are highlighted by Cherkasky [32].

DEMOCRACY AND DEMOCRATISATION

Deep commitments to democracy and democratisation continue to motivate Scandinavian

participatory design projects and ways of working [9, 13, 15, 23, 24, 33–37]. The participatory design movements in Scandinavia have their roots in post-war political movements striving for industrial democracy including forms of co-determination by unions and ‘shopfloor’ workers in decision-making and efforts to improve the quality of working life, in the broad context of democratisation of society. (Kuhn offers a definition of the principle of co-determination as ‘unions and management making joint decisions on matters that affect the company and the workforce’ [38, p. 287].) The example of the Norwegian work environment law requiring employers to redesign jobs to eliminate monotony illustrates these relationships: the regulation was not only premised on concerns regarding the ergonomics of increasingly computer-based work but also motivated by social research that showed that monotonous repetitive work contributes to apathy and alienation from political participation. The Norwegian industrial democracy movement, part of the renewal of democracy following the Nazi occupation of Norway during World War II, was an important precursor to the trade union-based technology projects and the participatory design movement engaging computer scientists, social scientists, and trade union leaders and members. The work of Paulo Freire, Brazilian educator and theorist of a pedagogy for critical consciousness and liberation [39, 40], was another contributing influence to the participatory design movement. Action research and participatory action research also provide significant inspirations and broad methodological grounding for participatory design practices, particularly in emphases on mutual learning and reciprocity in relationships in research in community-based and organisation-based change projects [41–43].

Leading early projects that were inspirational include the technology project of the Norwegian Iron and Metal Workers’ Union, begun in 1970 in collaboration with the Norwegian Computing Centre, the Swedish DEMOS project (Democratic Planning and Control in Working Life) (1975–1979), the Danish project DUE (Development, Democracy and EDP) (1977–1980), UTOPIA (1981–1984), a joint project including the Nordic Graphical Union and computer scientists, sociologists, economists, and engineers from several research institutions such as the Swedish Arbetlivscentrum (Centre for Working Life), and the Florence project (1984–1987), a collaboration of computer scientists and nurses, focused on the knowledge of a profession and knowledge needed in daily work (*in situ*, in specific work contexts) [see, e.g., 1, 13, 14, 44–46]. (UTOPIA is a Swedish acronym for Training, Technology, and Products from a Quality of Work Perspective.)

Many of the early Scandinavian technology projects aimed at expanding *working life democracy*—‘industrial democracy’—to include workers’ influence at the societal level, as well as

workplace democracy, understood as the rights of all employees to participate in decision-making about their work and how it is changing. Striving for goals of democratisation, a number of the early projects devised strategies combining global and local actions: acting ‘globally’ at the central level of institutions and in the political arena and making use of legislation; acting ‘locally’ to engage the expert knowledge of workers in systems development projects including critiquing the present and envisioning future use. Co-operation projects between the Norwegian Iron and Metal Workers Union and the Norwegian Federation of Trade Unions and Norwegian Employers Federation (LO-NAF) contributed to the passage of legislation (notably a revised *Worker Protection and Working Environment Act*), union-negotiated ‘technology agreements,’ and workers’ representation on boards of directors. These laws and agreements govern rights regarding technological change in working life to this day.

The next generation of participatory design projects in the 1980s extended their focus to include *technological alternatives*, the development of alternative technologies to what software vendors offered, and on involving users in the design of alternatives. The UTOPIA project is especially known for its emphasis on quality of work and quality of the product, in training, work organisation, participation and skills as well as in technology design [25, 44, 47]. In the Florence project, a project with nurses to design an information system and tools to facilitate computer use, systems design and design of tools were evaluated as resources for enhancing learning, communication, co-operation, and for addressing conflict [see, e.g., 48].

A shift ‘from the political to the ethical system developer’ occurred in the second generation of Scandinavian participatory design projects in the 1980s, associated with shifts in arenas for participation and democratisation. ‘When the focus of the projects shifted from working life in general to specific workplaces, the arena for system development—and democracy—shifted from structural institutions to actions in particular situations. Now, the efforts were concerned with how the (individual) system developer should act in a particular setting’ [13]. In other words, although all of these projects shared democracy as an explicit goal, the projects entailed shifts from political to ethical action and from larger multi-level contexts to specific workplace situations.

Co-operative design certainly supports user participation. But the focus on process, action, and situatedness tends to disconnect the design process from the larger organisational context in which power is enacted. The scope is the design process itself viewed as a (rather harmonious) dialogue between a designer and a user about the design of a particular computer application . . . The underlying belief is that a democratic process will give a democratic result (i.e., an improved work situation) therefore computer

systems developed in a co-operative process have a liberating power. This is not always the case. [13]

In a retrospective review of participatory design projects in the 1970s and 1980s, Andrew Clement and Peter Van den Besselaar also point to the complexity and elusiveness of the relationship between the goals of improving workplace democracy and participation in systems design, and to the dilemmas of practising participatory design ‘without organisational reform in the direction of greater democratisation at all levels’ [33, p. 36; see also 35]. (Clement and Van den Besselaar were concerned with participatory design projects inclusively, not only in Scandinavia, and therefore used a broader definition of participatory design, that projects have ‘the intention to involve users as central actors in system development activities’ [33, p. 29].) Kari Thoresen states the problem succinctly: ‘Without democracy, we lose the general dimension, and are left with just a number of local methods for designing IT systems.’ [Thoresen quoted in 33.]

To pursue democracy requires multi-level strategies, including activities in relation to the work situation, the workplace and organisation, inter-organisational relationships and alliances, working life, internationalisation of labour and production, and processes of globalisation facilitated by information and communication technologies. To do anything ‘local’ requires analysis of national, inter-organisational and international alliances, and global networks. Structural changes since the early to mid-1980s include but are not limited to:

- considerable loss of influence for both individual workers and unions [see, e.g. 49], resulting in more pressured, coercive, or openly hostile work environments; greater focus on customers than employees in many companies;
- changes in organisational structures and employment relationships including the evolution of ‘virtual organisations’;
- the increased importance of computer networks and interlaced technological infrastructures.

By the late 1990s, ‘the notion of worker-controlled resources and independent worker activities in combination with negotiations with management, as a strategy for influence, has almost totally disappeared’ [Kyng quoted in 51]. ‘The change of power structures in society during the last decades is an important challenge for system development research which cannot be dealt with without discussing the political dimension’ [13].

Furthermore, as Bjercknes and Bratteteig (1995) point out, to achieve democracy may require non-democratic strategic moves, for example, affirmative action to achieve the inclusion of women, people of colour, and people otherwise under-represented in the workplace and in society. Trade unions, as important as they have been in participatory design projects, are not necessarily the most strategic institutions for working toward

democracy. Social movements—among women, environmentalists, for multicultural diversity, physicians and computer professionals for social responsibility, non-governmental organisations (NGOs)—may provide viable bases for strategies and alliances to realise democracy. [see, e.g., 50–52]

To summarise, Scandinavian participatory design approaches have a history of *striving for democracy*, always with complications and shortcomings, always in dynamic, changing circumstances, always with the need to involve new actors and new ideas as well as new technologies, and always requiring iterative analyses of changing situations and power relations as well as iterative design of technological artefacts. In Scandinavia, questions about democracy and democratisation in relation to design have been asked persistently for three decades. Has greater democratisation been achieved, in a workplace and/or in society? Do the design intentions and imagined future uses of a particular design promote or diminish the conditions and possibilities for democratic practices? Does a newly designed information system and its associated informational and communicative tools and affordances facilitate greater influence among all employees, more widely shared participation in decision-making, and resources for co-ordination, collaboration, and for creatively working with differences, argument, heterogeneity, conflict and contradictions? Such considerations about democracy and more broadly about values implicated in design processes and products of design are included among criteria for evaluations of and theorising from participatory design projects and practices.

VALUES IN DESIGN

Writing of Morten Kyng’s contributions to creating the Collective Resource Approach, Lucy Suchman describes the explicit emphasis on values in design as one of the orienting premises of the alternative that Scandinavian participatory design represents in computer science and systems development: ‘. . . designing computer artefacts is an inherently value-based activity, deeply implicated in longstanding political struggles of the wider society in which computer science is embedded. Rather than viewing this fact as a breakdown in what should be a disinterested project, this alternative position embraces the place of systems development as a critical arena for the expression and enhancement of values of industrial democracy’ [Suchman: 51, p. 46]. This stands in sharp contrast to the still dominant mainstream view in the United States of systems design and research and development in engineering and computer science as ‘strictly technical and commercial arenas’ in which technical expertise is privileged above other forms of knowledge and co-modification powerfully shapes and constrains design.

Discussions of values in design—explicit discussions of design intentions; explication of values embedded in design strategies and choices; shared discussions among participants of the values that are implicit and explicit in imagined futures and changes in practices envisioned in design projects—all characterise collaborative work in Scandinavian participatory design projects. Embracing value-oriented design thus encompasses care in building working relationships of trust, reciprocity, and mutual learning, with the understanding that these are relationships with (and within) communities that need to last over time, to form the basis for viable participation and codetermination, as design and changes in practices unfold iteratively. The orientation towards imagined futures, including participatory design methods for critiquing the present and envisioning change, is related to: conceptualisation of *design in relation to social practices, continuous learning and change, and imagined futures*, rather than a narrower focus on *design in relation to a product or system*; to openness in design—keeping design decisions open; and to conceptualising participation and ‘diverse forms of ongoing design-in-use’ [15, 51] along cyclical design and development over time. (For discussions contrasting the ‘product-oriented’ and ‘process-oriented’ perspectives, see [17, 53].) Yet, in practice, it is rare that designers and user communities maintain contact after the intensive period of collaboration.

Figure 1 highlights the iterative and cyclical nature of design and development over time. The depiction of an organisation can be extended to a community or communities. The graphic suggests how important *relations of design* are, as

participation should occur in every aspect of design (‘phases’ of design that may be concurrent rather than sequential in time). Methods for participatory design include techniques for involving future users, people who know the work, in all parts of the development process:

- determining design objectives on social {not only technical} bases;
- analysis of the current situation and co-construction of problem formulation; conceptualisation of design, designing and evaluating possible design solutions;
- implementing changes including training people for new practices;
- evaluation, maintenance and ongoing improvements;
- iterative design.

Local knowledges of individuals and communities are respected, such as the expert knowledge of workers in work-oriented design. ‘In addition, co-operative approaches argue that workplace language and daily experience of users need to be placed centre stage in an effort to enable users. For enabling users implies not just using their experience, but creating and fostering an environment where they can feel empowered to express their ideas’ [50, p. 31].

CONFLICT AS A RESOURCE IN DESIGN

When conceptualising conflict as a resource in design, conflict is broadly conceived and may, variously, refer to different perspectives, argument, heterogeneity, or contradictions. Early

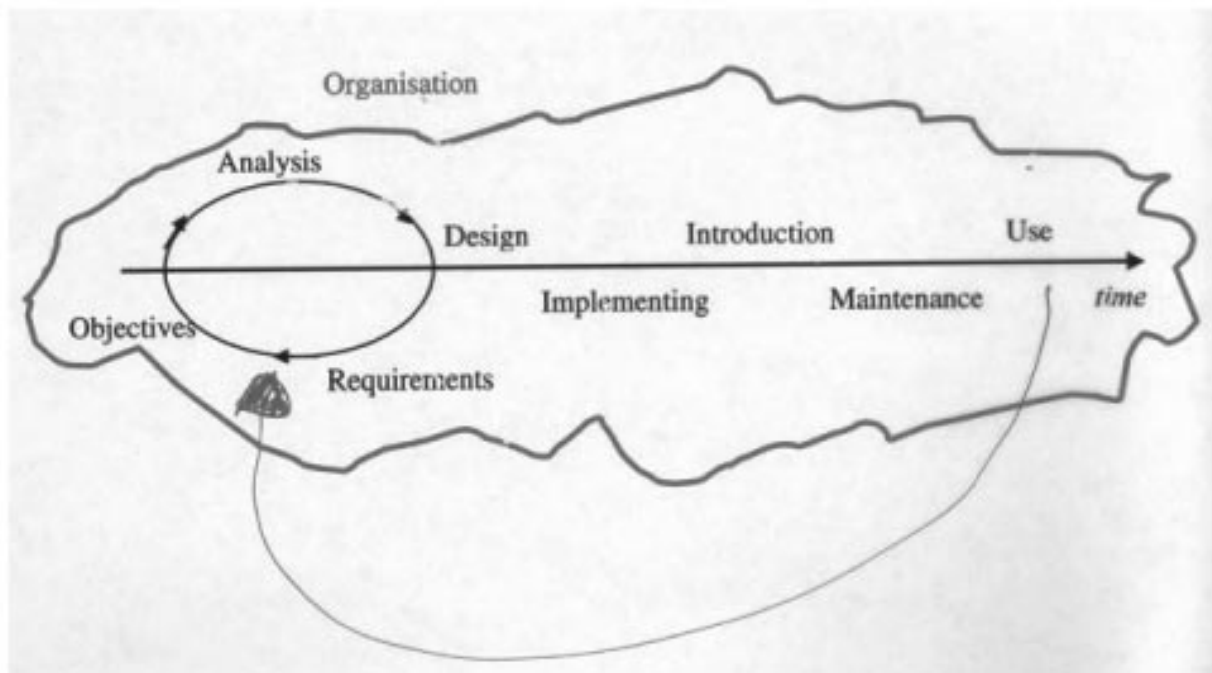


Fig. 1. T. Bratteteig, ‘Participatory Design: Ideas, Methods, Practices’, lecture, International Women’s University (IFU), Project Area Information, Hamburg, Germany, July 26, 2000.

Scandinavian participatory projects took up conflicts between management and labour as a matter of principle, asserting a ‘conflict perspective’ in contradistinction to the prevailing ‘harmony perspective’ [see, e.g. 15, 25]. Kyng (1998) writes [15, p. 23]:

The design process is a political one and includes *conflicts* at almost every step of the way . . . If the inevitable conflicts are pushed to one side or ignored in the rush toward an immediately workable solution, that system may be dramatically less useful and continue to create problems.

Cherkasky points to participatory design as a field that offers resources for addressing diverse interests in design projects [32]:

Participatory design provides a framework for individual designers to deal with issues raised during collaboration in design, including how to negotiate conflicting constraints and values, make visible diverse stakeholders’ interests and knowledge, and assess design success along a variety of metrics The field provides an enormous set of resources for investigating the social thread of design, including organisational structures and collaborative tools.

What does it mean to see conflict as a resource in design? In Susanne Bødker’s analysis of interface design, conflict in design is an important resource for creativity [54, p. 48]:

Design is fundamentally a collective activity, in which the various practices of the participants meet in a process of mutual learning. This meeting creates conflicts that create new possibilities in design.

Conflicts arise in relation to multiple needs, multiple objects (motives), and the alienation that individuals experience within institutions and the order imposed by work and societal institutions. ‘Furthermore, the needs of the individual as part of different collective activities might differ and even conflict. We can say that the human being has not one need in the concrete activity but a whole cluster, some of which are conflicting’ [54, pp. 23, 24]. In Cecelia Sjöberg’s (1996) study of a Swedish participatory design project in primary healthcare, the design process is understood as a culture of argument. Sjöberg frames doubt and doubts, openness, incompleteness and lack of closure, iterative processes, critique of both the product and processes of design, and argumentation as important resources to be valued in the design process [24, pp. 125, 126]: ‘. . . conflict and disagreement seem to be unavoidable elements in participatory design in practice, and have to be acknowledged and managed.’ The principle of ‘democratic dialogue’ in participatory design and argumentative design strategies hold that: ‘Power and dominance are . . . meant to be visualised, not neutralised’ [24, p. 4].

In analyses for design drawing on cultural historical activity theory and Finnish developmental work research [see, e.g., 54–56], attention is especially directed to systemic disturbances, discoordination, dilemmas, breakdowns, and

contradictions as they present opportunities for innovation when people figure out how to overcome troubles that confront them. Because dilemmas point to systemic tensions in activity systems that confront individuals in their everyday activities, they are especially important, not only for the analysis of everyday troubles, but also as clues toward the analysis of contradictions. Structural dilemmas and contradictions are openings for expansive transitions that go beyond situated problem-solving to potential transformation of an activity system through the emergence of new ways of learning, working, and imagining [57, 58]. Trouble and opportunities for innovation are understood to be related, both motivated by the dynamics of contradictions. Following dialectical historical materialist principles, activity theory posits ‘the idea of contradictions as the driving force of change and development in human organisations’ [59, p. 181].

I now turn to two case examples of design projects in progress outside of Scandinavia that are particularly influenced by Norwegian participatory design.

THE HEALTH INFORMATION SYSTEMS PROJECT (HISP)

The District Health Information System (DHIS) is an open source software for health management information developed in South Africa in the Health Information System Project (HISP), a Norwegian–South African development collaboration comprising the computer science and medical faculties of University of Oslo (Norway), the University of the Western Cape (South Africa), and the Ministry of Health in South Africa. The DHIS software was first piloted in three health districts in Cape Town (1996–98) and was subsequently introduced into all 173 health districts in South Africa (during the period 1999–2001) [9]. HISP was one of Norway’s highest-ranked international development projects for the year 1999–2000 because of its success in promoting self-sustainable grassroots implementation, following principles of participatory design and development. Jørn Braa and Calle Hedberg acknowledge the early Scandinavian participatory design projects as sources of inspiration for HISP’s objectives [9, p. 3]:

Our approach to action research and information systems design was initially influenced by a number of union-based action research projects in Scandinavia in the 70s and 80s. . . . Adaptation of information systems to the local context, empowerment through practical learning, and the creation of local ownership through participative processes are central issues in the Scandinavian projects which, despite differences in context, offer important lessons for third world IS design.

The overall objective of the Health Information System Project is ‘to develop a local information

culture which we firmly believe. . . can result in more efficient use of available resources, meaning better healthcare, and in the end, a better outcome in health terms for the population. That's the crucial thing, that's our aim' [60].

The project employs a rapid prototyping strategy—'cyclical prototyping with guided user participation'—adapting participative prototyping. Whereas ' . . . prototyping as described in the literature . . . is usually quite formal and structured, with well-established user groups, channels of communication and conflict resolution' [9, p. 15], *informality, improvisation, creating tools that become vehicles for learning, and keeping design decisions open* are important features of participatory systems development in the contexts of South Africa and HISP. *Improvisation* refers, for example, to the informality of communication between developers and users, that 'any interested or innovative user, regardless of her place in the hierarchy, had full access to the development team. . .' In *guided user participation*, 'the development team normally has to guide users to a significant degree in understanding their own requests and how they can be implemented in practice' [9, p. 16]. Braa and Hedberg think of participatory design as *cultivation*. 'By cultivation, we mean a slow incremental bottom-up process of . . . gradually transforming social structures and information infrastructures where the resources already available form the base. The precise

outcome of the design process is not given, but is negotiated within a broader set of goals' [9, p. 5]. The design strategy is characterised by both *improvisations* and by a strong emphasis on *keeping design options open*. Tools associated with the information system need to be immediately usable and practical for users and, at the same time, to be designed as 'vehicles for learning.'

Case example: an instance of interface design

The following instance of information systems interface design is presented in order to talk concretely about how Scandinavian participatory design principles may be materialised *in design*. In the discussion of this instance from the DHIS interface, a relation is drawn between conflict (potential conflict) and 'errors' in use of the software, in order to contrast how conflict is regarded as a resource in design, a distinguishing principle of Scandinavian participatory design, and the difficulty of working with conflict in design in mainstream US systems design. In the mainstream discourse of systems design in the United States, there is a near obsession with 'human error' and its elimination. The longstanding principle to 'eliminate human error' has often meant to eliminate people—regarded as the sources of error—from work processes, i.e. 'to automate'. This deeply embedded design tradition in the US dedicated to eliminating human error and favouring the inscription of automated 'quality control' processes in

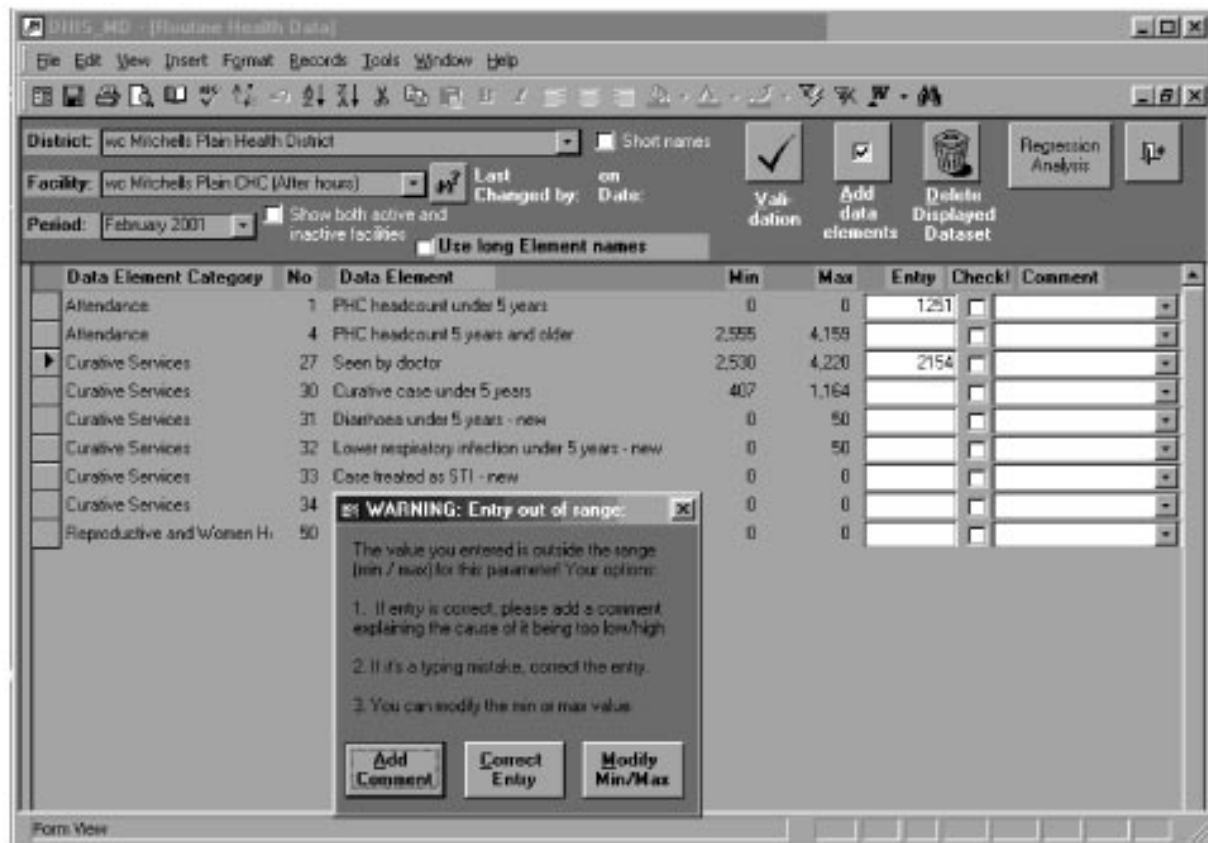


Fig. 2. An interface example from the District Health Information System (DHIS), 2001.

systems design stands in sharp contrast to the DHIS design which deliberately allows people to make mistakes, in order to promote continuous learning and to achieve other purposes that are expressed in design principles. The values orientation of the HISP team includes commitments to local autonomy, localisation, and flexibility of the software (including the ability of individual users to make adjustments), as aspects of developing a local information culture as a building block towards empowerment and democratisation in the context of the reconstruction of the healthcare sector in post-apartheid South Africa since 1994.

Figure 2 is a 'screen shot' from the DHIS interface, showing a computer screen for the entry of monthly health management data in a health district. The reader is invited to imagine two moments of DHIS in use.

In the first entry, for the 'Primary Healthcare (PHC) headcount under five years,' the entry was 'too high,' meaning that it was above the maximum number regarded as possible in relation to the population in the catchment area. The person entering the information chose to 'zero out' the minimum and maximum values, in order to make the entry beyond the expected maximum acceptable by the system. (See the 'Min' and 'Max' columns to the immediate left of the first entry '1251'.)

In the second entry, 'Seen by doctor,' for the number of persons seen by a doctor for curative services (rather than a nurse or other healthcare worker), the entry '2154' is too low to be accepted according to the minimum and maximum settings. This triggers the pop-up window, 'Warning: Entry out of range' that we see in the centre of the screen.

In the pop-up window, the user is warned that the value of the attempted entry is beyond the parameters of the minimum and maximum settings. He or she is offered three choices: (1) Add: 'If . . . correct, please add a comment to explain the cause of it being too low/high'; (2) Correct: 'If it is a typing mistake, correct the entry'; or (3) Modify: 'You can modify the min or max value.' One option sometimes exercised by new users is to modify the minimum and maximum values to 'zeros', to 'zero out' the parameters—this is what we see for the first entry for 'PHC headcount under five years'. Not only are the minimum and maximum values set locally, they can also be modified by individual users in the course of work. Allowing what seem by US design standards to be extraordinary degrees of local autonomy and flexibility certainly contributes to the generation of errors in the use of DHIS. These require the time-consuming attention of HISP and clinic staff, to diagnose the errors and clean up the database (to ensure the integrity of the data). At the same time, working with DHIS users to understand and fix errors represents opportunities for localisation and mutual learning; not all entries that appear to be 'errors' are in fact errors. The design principles of local autonomy and flexibility are extended

throughout the system; so, for example, local health district staff and individual users have similar flexibility in deciding how to define, name and adjust clinical indicators for primary healthcare. As one result, Hedberg concedes that 'the heavy bias towards flexibility pursued by HISP and its partners [early in the project] to some extent perpetuated variations even as it reduced overall fragmentation' in the collection and comparative analysis of primary healthcare data across facilities and districts. 'You give people flexibility which they can exercise however they wish, but [that should be done] without undermining the basic principle of [creating] and using an essential data set . . . without jeopardising the quality of the data.' In hindsight and despite the generation of errors and the proliferation of definitional variations, Hedberg, the principal software designer for DHIS, says they would design the system the same way again. (Personal communication with Calle Hedberg, April 2001 and April 2002.)

The design choice represented in Fig. 2 greatly surprised me in contrast with the design approach to which I had been exposed in the US-based Electronic Health Record design project in which I participated during its iterative prototyping phase (1993–98) [61]. (Distinctions must also be acknowledged between electronic patient records and health management information systems, and, for these two cases, distinctions between proprietary software development in a private healthcare company, on the one hand, and open source software development for healthcare districts that are part of a national public healthcare system. My interest is in discerning contrasting *design strategies* and *principles* in order to understand how such differences in principle and strategy inform information technology design orientations towards software development, implementation and infrastructure-building in relation to social systems and cultural-historical contexts.)

Some background contrasting DHIS and mainstream US health information systems design may help readers to appreciate how unusual certain design features of DHIS are in comparison to US design conventions regarding quality control for errors in health management information. The strong structured content design strategy of the Electronic Health Record Project—designed for patient record documentation to be generated from standardised, codified clinical and medical terminologies—exemplifies efforts to create highly aligned, centrally defined systems in which data—and individuals using the system—are to be closely monitored for adherence and variance from clinical and organisational protocols and guidelines. In such systems, it is often impossible—by design—for an individual user to enter values beyond parameters that are determined 'automatically' or at a central organisational level to be clinically or otherwise logical. There is great stress on eliminating errors in patient records; for one thing, the poor quality and fragmented state of

patient information are implicated in medical mistakes. Another motivation for US design strategies that rely on highly aligned information is the desire that a health information system should simultaneously serve an array of purposes—clinical, epidemiological, quality assurance, clinical research, regulatory, managerial, and financial—as part of large-scale clinical information infrastructure building.

But is the instance of DHIS interface design shown in Fig. 2 simply an instance of ‘bad design’? Why would designers make it easy for users to commit errors in health management information data? The design feature represented above makes little or no sense without some understanding of the specific contexts for this design decision including the long-term vision of societal change, the imagined future for its use. The example from the DHIS interface needs to be understood in relation to the primary objective of the HISP team *to create an information culture*, more specifically to create local information cultures in each primary healthcare facility in diverse health districts, and in the context of the movements for democratisation, empowerment, and transformation underway in South Africa. An information system is seen as a social system requiring cultivation over time. Concepts of *community* and *continuous learning* are primary and integral (from the start of and through iterative design cycles) rather than secondary or additive (to be phased in later). Hedberg estimates that fifteen to twenty percent of software development time in HISP is spent in software development *per se*; the remainder is devoted to extensive interactions with district health staff using the system and with the HISP staff involved in training, technical support, ongoing evaluation and reporting. To carry out systems design in the changing context of South Africa, ‘You need some kind of a long-term vision. You might not even activate parts of that vision until further down the line, because some of your vision is basically unattainable in the short-term . . . But you need some kind of a vision, and that vision is not really anything to do with the software—the tools’ [60]. Design features may well change as the base of participation and skill changes; the design principles to support local autonomy, localisation, and flexibility in use may be realised differently over time. The design of a system is iterative and contexts of design change over time: ‘Your choices are constantly changing because of all sorts of external factors. . . You muddle along. . ., you gain experience and you learn. It’s very much a learning process. . . I think we’ve done what we could with the best motives and, you know, history will judge’ [60].

Case example: the ifu’s project area information

The second case example, the health information project of the International Women’s University (IFU), returns us to themes of values in design and

working relations in design [10, 11]. The IFU health information project comprised twelve women from eleven countries, a multi-disciplinary group of women in the health professions and health informatics from Brazil, Egypt, Ethiopia, Georgia, Germany, India, Indonesia, Norway, Tanzania, Togo, and the United States. For three and a half months (July–October 2000), members of the project collaborated intensively to design health information resources focused on nutrition and reproductive health information for adolescents (teenagers) in diverse cultural and socio-economic contexts. Project work entailed participatory design principles and methods in creating conceptual and material prototypes. The group decided to begin with the initial designs for interactive websites to reach urban educated teenagers and school teachers. (The participants in the Health Information project also intend to design parallel informational resources including posters and in-person discussions to reach adolescents, parents, and teachers in rural areas without Internet access.) The project team aims to realise the initially envisioned websites for primary healthcare through continued international collaboration, as a ‘virtual working group’, and through engagement of teenagers in different cultures in participatory design of the website.

Participatory design and participatory community development were broadly shared themes in Project Area Information of IFU. (The Dean for Project Area Information of IFU, Christiane Floyd, has long been active in discussions of participatory design, and is especially known for her work developing participatory software engineering practices in Germany [see, e.g., 62, 63].)

Participatory design concepts and methods in the Health Information project included information mapping, ‘rich pictures’ [64] to explore tensions between medical and social perspectives and between situations in differing cultural contexts, brainstorming, participatory community development perspectives for primary healthcare, and open planning. Project team members also drew on inspirations from concepts and ways of working in the arts (sketching, narrative, montage, multi-media representations) and architecture (mock-ups, portfolios, models), and gender research methods and principles. The IFU summer project highlights participatory design processes and illustrates how participatory design facilitates the development of people in relation to social change projects. At the heart of project members’ work together were conceptualisations of initial designs and learning how to articulate shared design visions in words, in concepts, and in visual representations. In the experience of conceptualising the design of the interactive websites, the women health professionals in the project were ‘becoming designers’. (As project facilitators, Tone Bratteteig and I saw the women in the project becoming designers’, although we were surprised

that they did not see themselves becoming designers as we did.)

The period of in-person collaboration created important preconditions for ongoing participation in design projects, not only in the imaginative co-construction of design artefacts amongst team members but also in ways that these health professionals began to learn how to communicate and collaborate with technical designers and vice versa. Introductory technical skills gained in the IFU Health Information project provided a basis of familiarity with information technology that can enable collaborations with designers working with interactive multi-media in computer science, communication, and the arts. Most importantly, introductions to generative conceptualisations of information as a social resource and practices in participatory design expand resources for working creatively with differences, heterogeneity, and potential conflicts regarding complex questions engaged in designing health information resources for communities in diverse cultural contexts.

Discussion of the IFU Health Information project raises some challenges that stretch the boundaries for participatory design [see also 34]: How can participatory design be extended to web design and to 'virtual teamwork' over the Internet? How can the principles of participatory design be extended to design projects that are not work-based, for example, involving new constituencies such as teenagers? How can the emphasis on values and politics in design help us in international collaborations that entail profound cross-cultural differences regarding substantive areas, in this case deeply differing cultural perspectives on reproductive health and nutrition for youth?

POSSIBILITIES FOR PRACTICE

The social, political, and economic contexts of Scandinavian countries are uniquely shaped by their respective histories, cultures, and traditions. Social democratic traditions in working life, unionisation, relative homogeneity and small size of populations, established relationships between designers, university researchers, workers, unions, and companies—these represent different cultural historical bases for possible collaborations in design and design research projects. To offer a specific contrast with the United States context, Norway has a population of 4.5 million and a rate of unionisation estimated at 90% compared to less than 15% in the US. Together these different conditions shape far different circumstances for participation and co-determination that structure *time* differently, creating better opportunities to participate in decision-making within daily work-life and to sustain such participation. Yet, the ambitious goals of the early Scandinavian participatory design projects remain as great challenges. It has proved difficult to support 'user/worker participation in design activities proper' and the

basis with trade unions for participatory design strategies striving for democratisation in society has nearly disappeared, according to Kyng quoted in [51]. There are few examples of sustained collaborations between designers and users in relation to long-term iterative design—'diverse forms of ongoing design-in-use' [51]—and it becomes ever more complex to create truly independent resources and spaces for design.

What can we learn from Scandinavian participatory design approaches that we can take into our own design practices, collaborations in design, and design pedagogy? First, we can begin by asking, as the leaders of Scandinavian participatory design asked and continue to ask, how do we create the preconditions necessary for participatory design? How do we create alternative 'contexts for design' [15]? Suchman suggests that, 'as contexts for design in Scandinavia are coming to bear greater resemblance to those of the United States' there is 'more than ever a need to form alliances and develop common strategies' [51, p. 48]. Secondly, we can design with values and politics in mind in our design work and teaching about design. Particularly, as Scandinavian participatory design approaches are about *striving for democracy*, we can critically reflect on our design practices in relation to democracy and democratisation. To give one example: in medical informatics, how might design change if we ask about democracy? One can work in clinical information systems design and development in the USA without concerning oneself with the dual crises in the lack of access to healthcare for 20% of the population who are excluded from healthcare coverage and problems in the quality of care (increasingly defined by market benchmarking schema and cost-benefit regimes). Once we begin questioning how bounded health information design practices are, it seems remarkable that we are trained not to ask such political questions. A third reflection derives from understanding design as being about imagined possible futures and possibilities for dynamic change. If we think of the relationship between design and democracy dialectically, we can see that Scandinavian approaches to participatory design are about striving to redefine democracy as much as they are about redefining design practices and relations in design. (I am indebted to Ron Eglash for discussion of design and democracy as a 'co-evolutionary pair'.) Finally, current works in progress suggest that prospects are alive and well for practising participatory design outside Scandinavian contexts, with commitments to democracy and democratisation, discussions of values in design, and how difference and conflict may be regarded as resources in design.

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