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Open-ended participatory design as prototypical practice

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Abstract

This article argues in favor of seeing co-design as an open-ended exploration where prototypical practices are explored, that engender favorable conditions for ongoing negotiation of meaning. Participatory design approaches to designing for specific practices are reviewed with particular focus on how to handle constantly evolving practices, where some design researchers argue for creating open and flexible technical systems while others emphasize design as primarily concerned with questions of changing practices. By discussing an extended participatory design project in which new ways of engaging in informal learning through self-produced videos were explored in an intensive care unit, I argue first and foremost for viewing co-design as prototypical practice which is explored through an open-ended exploration of possibilities. Secondly, I argue that a focus on practice necessarily requires *in situ* explorations to see if the proposed design explorations invoke relevant prototypical practices in the midst of work. Thirdly, I argue that a focus on practice entails viewing tools as temporary props for various settings rather than as central features that define the settings of learning, knowing and working.

Keywords: participatory design; prototypical practice; *in situ* explorations; informal learning, workplace studies; healthcare

1 Introduction

In an extended participatory design project we had the opportunity to inquire into how healthcare professionals at an intensive care unit could engage in new informal learning practices. The project resulted in the development of self-produced videos of day-to-day work and the incorporation of the videos as temporary props or memory aides into ongoing work. These results grew out of a collaborative process of exposing, articulating and reflecting upon existing practices of learning and knowing as well as by probing for new learning opportunities through an open-ended exploration of various design opportunities and through conducting experiments in the midst of the ongoing work.

Throughout the project we have struggled with such fundamental questions as how the unknown future can be collaboratively explored and what is to be designed. In particular, how can we design for learning, knowing and working that at the heart demands improvisation and competent action while products, systems, environments or services inevitably standardize and, to some degree, structure the human activities they aim at supporting? How can we design for a practice undergoing constant change for emerging and future problems and contexts which are inherently unknown during the design process? To what degree should the practitioners be able to redesign what has been designed? Should an open-ended flexible system be fully handed over to practitioners or should designers aim at supporting practices that are better equipped to handle ongoing change?

I begin the article by discussing various approaches to participatory design that have either emphasized the design of open flexible systems or emphasized participatory design as the development of new practices. Building upon the practice perspective I briefly outline my own standpoint. Next I describe how the designers, nurses and nurse's aides in the project we were involved in collaboratively explored their existing practice, and how this pointed out the complexity of their work, and the tight connection between learning and working. The broad and open-ended approach to the initial question of how information technology could support learning challenged us as designers. It pointed out that we needed to probe for new forms of learning opportunities by staging various experiments in the midst of ongoing work and that both the nurses and the designers needed to be ready to reconsider what was to be designed as the project evolved. I end the article by advocating for an approach that sees participatory design as prototypical practices that can handle that the needs of the practice as it constantly changes.

2.0 Approaches to designer–‘user’ relations and emergent practices

Participatory design (Greenbaum & Kyng, 1991; Schuler & Namioka, 1993), from which user-centered design developed, has a longstanding tradition of involving those stakeholders that will be affected by the design in the design process. To open up for an empowering co-design process and a mutual learning process, proponents of early participatory design developed methods for exploring design alternatives that were meaningful and engaging for all stakeholders and that allowed for a shared understanding of current and future ways of organizing the work. Developing methods for prototyping was a central contribution from the early participatory design tradition, which was for the most part engaged in co-developing IT systems in particular organizations. This contribution was central because it established new ways of communicating around future use situations where designers and practitioners engaged in design-by-doing through concrete artifacts such as cardboard computers and paper prototypes. For the practitioners, enacting through such concrete objects made more sense than technical system descriptions that were typically used by system developers at the time, and prototyping opened onto a richer dialogue between designers and practitioners.

These early approaches to participatory design, although emphasizing the need for designers to take practice seriously, often had a strong system or artifact focus. System development and design was regarded to a large degree as a question of developing a technical system that needed to become freestanding. A dilemma that was not taken into consideration was that needs, problems, and the people working within a particular practice change over time while freestanding systems do not change. In the context of systems design and development those who participate are only positioned as representatives for the larger and coming practice.

2.1 Recent approaches to participatory design

As participatory design matured, designers' understandings of practices and the contextual use of computers deepened. In particular, the field of computer supported cooperative work contributed to the understanding of how practices at work evolve around communication artifacts and the relationship between participation, learning, work and change. Various human-centered and participatory design perspectives have evolved in recent years in the diverse community interested in co-design and participatory user-centered methods. Put broadly, these perspectives have either taken on the tool or system perspective or advocated for seeing design as foremost a question embedded in practice and emerging from specific practices.

Approaching participatory design from a system and tool perspective, Fischer & Giaccardi (2006; Giaccardi, 2005) have advocated for what they call *Metadesign* which they define as under-designed yet complete complex flexible systems that users can change on their

own in use. Fischer and Giaccardi argue that a meta design strategy is necessary because participatory design processes are only of temporary character and practices' needs constantly change in ways that designers cannot predict. They argue further that a meta design strategy is also necessary because designers can never understand practices fully and therefore need to hand over significant parts of designing to the users. This is made possible by under-designing the system during what they call "design time" and by making the system flexible so that users can own the problems and make significant re-designs during "use time" without the developers' involvement. *Design time* means the initial participatory design process when a complete system is being developed and *use time* refers to when the users on their own use and adjust the complete system, which will be cleaned up by the developers later. Under-designed systems are neither low-level open flexible programming environments nor are they domain-specific closed systems. Rather, each under-designed system is a "complete" system that allows users to reconfigure it without demanding deep knowledge of programming, as is the case with low-level open systems. The Metadesign approach proposes that the solution to the dilemma that practices are emergent lies in creating freestanding, open and flexible systems. Through this approach Fischer and Giaccardi have aimed at finding a way, for those committed to technical development, to take seriously the fact that practices evolve. However, Metadesign remains similar to early participatory approaches in that it tends to delimit what emergent practices can be developed by focusing on particular technologies.

Star and Ruhleder along similar lines see systems and tools as the starting point of design. New tools or infrastructures cannot be seen as a substrate, but have to be seen as relational concepts which arise in relation to the social and technical arrangements which they become sunk into (Star & Ruhleder, 1996). They acknowledge, as Fischer and Giaccardi do, that practices constantly evolve and therefore suggest that we need to see the development of systems as a process of *infrastructuring*. This is in line with Berg (1997, 1994) who states that the development of new tools and techniques should be seen as a forever incomplete, unending, and non-unitary process of convergence where the technique and setting reciprocally change each other in the accomplishment of work. The infrastructuring approach shares the starting point of Metadesign as the development of systems and tools, which then structures and delimits significantly what can be designed.

Seeing design as embedded in practice and in particular seeing that design is first and foremost a question of developing emergent practices rather than developing system or tools, was to some degree a standpoint already present in some early participatory design approaches. Ehn and Sjögren saw the basic problem facing system developers and designers as "a question of

organizational change, education and requalifications” (Ehn & Sjögren, 1991, p. 254). Design-by-doing was conceived as a broad open-ended activity of play and a possibility to open up for new practices, where existing software and hardware would play a role, but not the defining role for framing the design situation. At the time Ehn (1988), building upon Wittgenstein, argued for seeing design-by-doing as a meeting of language-games. Nonetheless, the design processes driven strongly by prototyping still tended to be tool- and system-centric.

More recently Ehn has argued that the language-game perspective that he put forth in the late 1980’s could be complemented with seeing design as the meeting between communities of practice. Lave and Wenger’s (1991) notion of communities of practice is less language oriented than Wittgenstein’s notion of language-games and includes material aspects of the practices and secondly, it emphasizes how meaning is created through negotiation within and across practices. Wenger argues for seeing participatory projects as the meeting of communities of practice that interact and challenge each other in the design process (Binder, 1996). The turn towards the notion of communities of practice, as I interpret it, means foregrounding practice. Designing for practices needs to be grounded first and foremost in what it means to be a competent practitioner within a practice and in future visions of new embodied practices without regards to whether such visions will lead to new tools.

Suchman *et al.* (1998) have, perhaps more insistently, argued for viewing design as the development of emergent practices. They argue that design experiments could be seen as “occasioned practice of technology design and use” (p. 1) that are direct and intense ways of embodying interaction that “simultaneously reconfigures the work’s practice while maintaining its accountability of relevant professionals and organizational constituencies” (p. 5). For Suchman *et al.* design is primarily about a changed practice and as such design experiments need to as much as possible to be grounded in the needs of the professionals and their embodied practice. In the Work Practice and Technology laboratory, Bloomberg *et al.* (1996) proposed case-based-prototypes where new technological possibilities are explored through real cases that are informed by the users’ needs and their practice where material from the worksite is incorporated. In further developing further the practice perspective, Suchman has argued for viewing co-development as an ongoing process, rather than being delimited to a design project phase in the development of freestanding systems. She argues that designers and technologists need to get away from seeing their production as discrete objects and as network of devices. Instead, they should view their work “... as entry into the networks of working relations – including both contests and alliances – that make technical systems possible” (Suchman 2002, p. 92). In other

words, designers need to establish long-term relationships where continuous co-development can be realized.

Moving away from thinking about design for practices as systems design, Binder (2002) has argued for seeing design as the designing of props for a set of environments where people can temporarily incorporate the props into the setting in order to invoke relevant practices. This conceptual shift is important because the notion of 'users' and 'tools' tends to delimit the context and practitioners' possibilities for participation to handling particular tasks through particular tools, rather than thinking in terms of how design artifacts or props can become temporarily part of various environments. Binder's (1995) proposal that we see participatory design explorations in relation to learning at work as prototypical learning processes anticipating possible future appropriation of the design developed is also important because it means seeing the design process as a joint inquiry of new practices rather than the construction of new learning aides.

Building upon these practice-oriented perspectives and my experience of co-designing for work practices, I advocate that we view design as a joint inquiry into prototypical practices. My concept of *prototypical practices* points to the multiple ways that the practices explored and developed are new and exemplary. They are *new* in the sense that they are perceived by the practitioners to extend existing communicative practices. They are *exemplary* in the sense that they are constructive and of value to the practice being designed for; they contribute to sustaining as well as developing the practice. With the word *practices* I point at how emerging communicative practices are part of an encompassing competent engagement within communities of practice including its members' identities.

This turn towards practice means that we as designers need to build upon and take as the starting point the needs and concerns of the practices being designed for. It requires an engaged open-ended inquiry into future practices without a strictly defined *a priori* view of what technologies or processes designers should aim for. It also entails conducting scores of small *in situ* experiments -- design experiments in the midst of ongoing work -- and paying attention to whether they invoke relevant practices in the present and prototypical practices that may emerge.

3.0 The intensive care unit

In a project running between September 2000 and December 2002, a colleague and I had the opportunity to work with healthcare professionals at an intensive care unit (ICU) at the Malmö University Hospital, Malmö, Sweden on how they could engage in new informal learning practices.

The ICU, with a staff of 140 medical professionals, is a highly specialized unit staffed by ICU physicians, anesthesiologists, critical care nurses specialized in intensive care, nurse's aides, physiotherapists and a social worker. The ICU has the capacity to treat ten patients and takes care of patients needing assistance with life-sustaining functions such as circulation and respiration. The unit, although highly specialized, treats various patient categories and this requires the staff to have a very broad knowledge base. We were contacted by the nurse in charge of competence development because the ICU wanted to explore how information technology could help their employees to be better updated to relevant new knowledge. The dilemma facing the ICU staff is that procedures, medical technical equipment, and the people working within the unit are constantly changing.

The research team consisted mainly of two interaction designers, Per-Anders Hillgren and the author, who conducted the field study, workshops and experiments (see Hillgren, 2006 and Björgvinsson, 2007). Table 3.1 shows the stages and activities of the research project.

September – December 2000	January - May 2001	August 2001 - June 2002	August - December 2002
Field study	Early small scale design experiments at the ICU	Pilot study of making and incorporating self-produced media into ongoing work	Organizational anchoring
A collaborative exploration of the nurses and nurse's aides work for two months was conducted, which included two workshops (three hours each) where issues of learning and working were discussed through metaphor games with five nurses and nurse's aides.	A three hour workshop with nurses and nurse's aides on future use of various technologies was arranged. Three experiments with making self-produced videos were conducted, the possibility of creating an ICU 'TV Channel' was explored and the first <i>in situ</i> design experiments of using mobile video were conducted.	Forty-three videos were made covering 26 topics, by 14 nurses, five nurse's aides, a physiotherapist, and a physician. Seven <i>in situ</i> experiments with mobile videos were conducted and seven film review sessions were held where four to seven co-workers participated.	A video film group was established. Three full day workshops engaging a total of 100 employees were arranged where they created, reviewed and viewed video on hand-held devices. Two formal reviews were held to review new videos produced at the ICU.

3.1 Design as emerging out of existing practices through open-ended explorations

The project provided the opportunity to explore how learning practices could be developed through an open-ended design process, focusing primarily on organizational and educational issues through open-ended concrete engagement, rather than first considering a

particular technology. This approach allowed us to build upon existing practices within the unit and opened up a rich design space where possible emergent practices could be explored.

The initial ethnographically inspired study, which included observations, interviews and two workshops pointed to the richness of situated learning and the staff's committed engagement in re-developing aspects of their practice. The early workshops that engaged nurses and nurse's aides were especially important in initiating a dialogue between the designers and the nurses on such topics as the roles of artifacts within the ICU and learning within the ICU. In the workshops, the nurses and nurse's aide played metaphor games that were made specifically for the project by the designers. Playing the design game *The ICU as a Family* gave the nurses and nurse's aides the opportunity to discuss and negotiate how new technology affects cooperation at work and what type of artifacts they valued (see Figure 1). The game consists of a board representing a generic home which was exchanged in the second round for a board representing the ICU. The game pieces comprise family members and common artifacts such as telephones, newspapers and washing machines. For every game piece placed on the board, the participants must describe why they find the piece important, explain the meaning of the location of the piece on the board and then jointly rank the importance of the piece. The nurses and nurse's aides pointed out that they valued most highly artifacts that engender discussions and sustain traditions. In the home the newspaper was such an artifact. At the ICU the *Today Binder*, placed in their coffee room where new routines and reports from the competence development groups were posted, was equivalent to the daily newspaper. During the second workshop the pro's and con's of the current learning culture in the ICU was discussed by playing the metaphor game *The ICU as a Garden*. The garden metaphor was chosen by the designers because it highlighted the sowing, growing, spreading, and maintaining of knowledge. Playing this metaphor game pointed out that patient care situations were like "greenhouses" meaning a rich place for learning and constructing new knowledge valuable for the whole clinic. It also pointed out that the staff is encouraged to "sow" and "grow" knowledge, which all the different ICU competence groups attested. The problem, however, was that the knowledge gained beside as well as knowledge developed within the various competence groups did not spread well enough in the clinic.

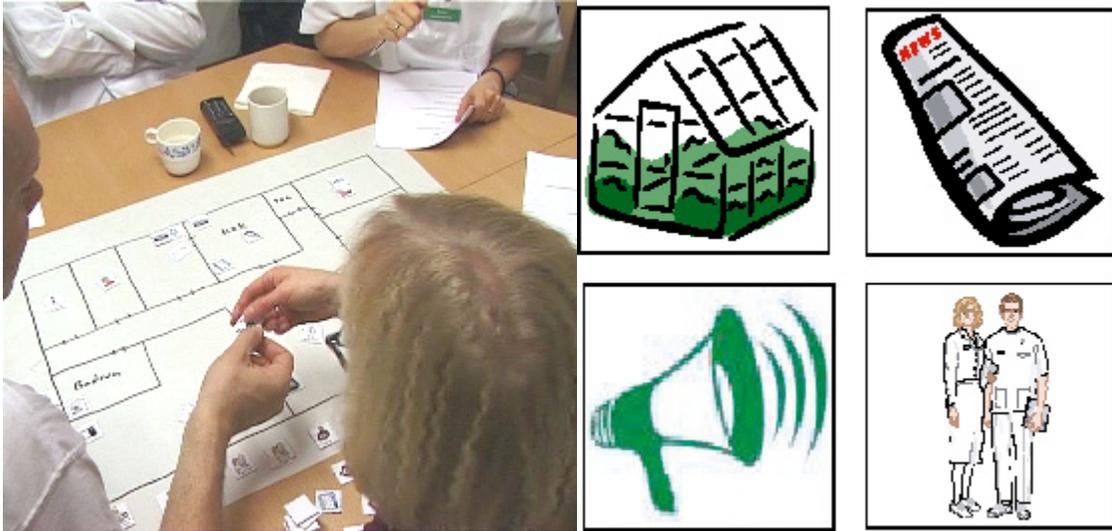


Figure 1. The nurses by playing metaphor games made by the designers opened up for a rich design space dialogue between themselves and the nurses and designers on workplace issues.

The field study pointed out several qualities in the practice that could be built upon such as peer-to-peer learning during work and the need and satisfaction invested in developing new ways of working, among many others. These insights in turn contributed to constituting a rich design space and pointed toward various paths that could be pursued; subsequently the participants decided on two paths to be explored simultaneously. The first path was how learning and knowing supported by some kind of technology could become an integrated part of day-to-day work. For example, would it be valuable to have digital information placed out in the work environment through barcodes that could be accessed through hand-held devices, as suggested by one of the nurse's aides during the future use of technologies workshop? Two nurses quickly explored the idea at work, initially identifying where and when during the shift they would want to access digital information in their work environment. The second path was how the unit could increase their sharing of experiences gained from work. For example, could self-produced videos engender such sharing? The idea was explored briefly by making three videos with the staff and showing them on the ICU's TV. Subsequently these two paths were combined and it was decided that the project should focus on how self-produced video could support the sharing of knowledge gained through experience at work and how the videos could become an integrated part of their day-to-day work.

Framing the design situation as open-ended with a focus on existing practices and organizational change created a rich setting where the healthcare professionals found it beneficial to discuss and explore how they wish to engage in day-to-day learning at work without strictly

defined pre-given agendas regarding technology and ways of organizing it. Furthermore, with an open-ended framing they felt that they had a genuine say about how a possible future learning practices could be shaped.

3.2 Initial in situ experiments of invoking practices of making and watching videos

Experiments revolved around how learning and knowing could be become closely intertwined with day-to-day work by having self-produced videos accessible through hand-held devices. The hope was that this approach would allow the nurses to arrange their own flexible ‘learning’ setting, rather than being engaged in a flexible system. This demanded that we first experiment with how the videos could be made so that nurses on their own could continue to make videos after the project ended.



Figure 2. Agreeing on what the process of making the videos could be like and finding the right tone and level for the content demanded creating new media practices and media languages specific to the ICU's needs.

These experiments pointed out that script-writing could be avoided by relying on the “actor’s” fluency of the work activity being recorded and that cumbersome post-production could be avoided by editing the film within the camera. But we also jointly needed to settle on how the content should be shaped and for whom it was oriented. These experiments showed that the tone of the video should be collegial rather than depersonalized and objectified, and that the videos should be targeted toward regular ICU staff which meant that that basic nursing know-how could be excluded from the videos. A long and a short version of the video on how to connect a booster to a respiratory, for example, showed that the shorter version was preferred, which took for granted that all nurses know how to set up an infusion bag and other basic knowledge. The nurses and nurse's aides’ engaged in the informal reviews arranged by the designers agreed that the

videos should show an experienced co-worker's way of carrying out the procedure rather than an explanation of all possible features and ways to perform the procedure in detail as traditional instructions often provide. Two films on the topic of fixation of tracheal tubes were made to explore if certain procedures could be shown on dolls or if it would be preferable to have a documentation of how the procedure is performed on patients. Real situations were preferred since they showed how procedures are entangled in other treatment processes. This also showed that the everyday language used within the clinic should be used rather than more precise and "correct" terminology. The rules of thumb or loosely defined templates that were jointly defined, formed the basis of all subsequent video-recording and production. Agreeing on what the process of making the videos could be like and finding the right tone and level for the content demanded creating new media practices and media languages specific to the ICU's needs. Doing so was considerably trickier than finding the right technical assemblage.

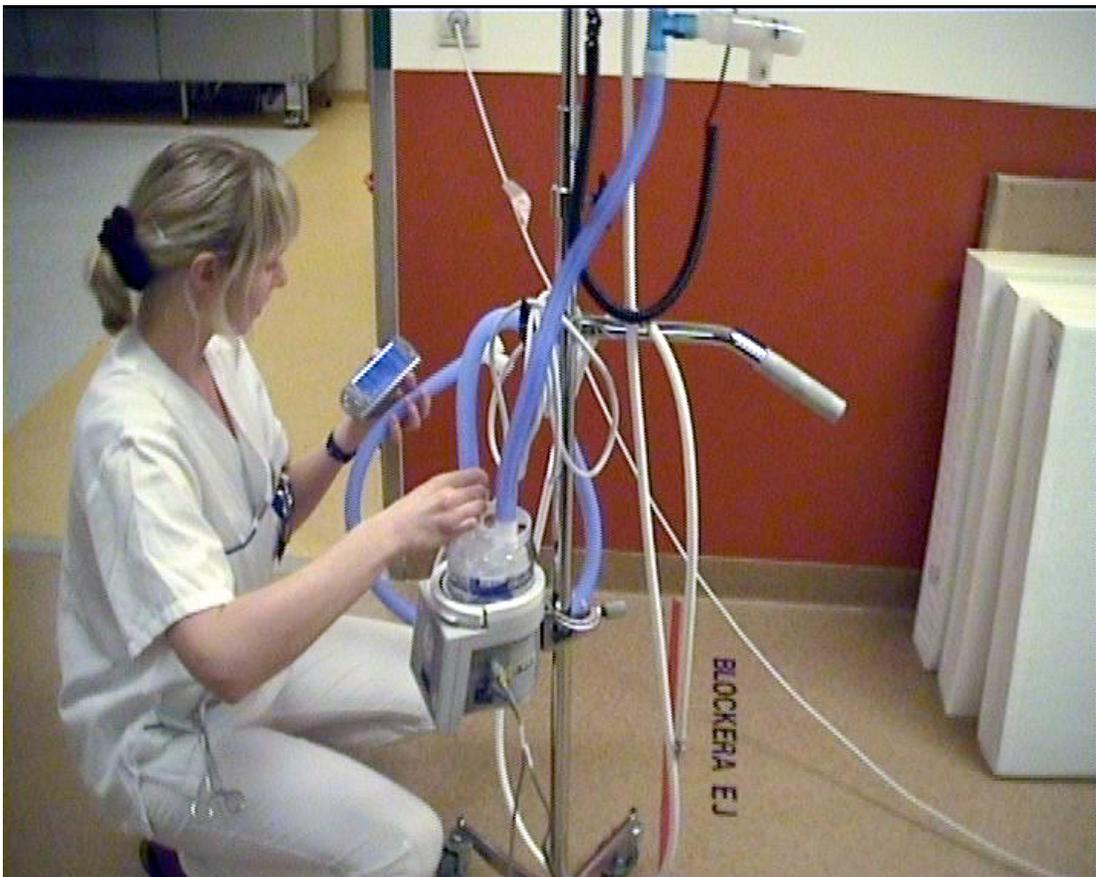


Figure 3. *In situ experiments* of watching videos on hand-held devices showed that they mixed in quite well into the work context and the videos were considered clearer and more trustworthy than the written instruction typically used.

The initial experiments where the nurses watched the videos while performing their work showed that the videos, which were tailored to the specific circumstances at the ICU, were considered clearer and more trustworthy than the written instruction typically used. Both the nurses who watched the video about how to clean the bronchoscope, made by the nurse's aides who typically perform the work, appreciated that they could both see and hear how the nurse's aides emphasized where they need to be careful and where they could use slight force when mounting the bronchoscope into the washer. Similarly, the nurse who used the video on how to mount the CPAP ventilator, made by the physiotherapist who most often uses the ventilator, watched long sequences as she concurrently mounted the ventilator. The portable size of the hand-held computer allowed her to view the video up close while performing the activity and it mixed in quite well into the work context. Only at a few moments when she found it difficult to hold the hand-held device while mounting the ventilator, would she place the hand-held device with the video on an empty patient bed nearby. Being able to view the videos up close also allowed her to use it as a verifying reference by comparing afterwards how she had mounted the ventilator with specific points in the video.

These experiments raised the issue of how the ease of access to learning aides related to the nurses' views on how competence development should be organized. The nurses and nurse's aides were concerned that the ease of access and the ease of flexibly integrating self-produced videos into their work would make them less pro-active and that there could be a risk that they would not update their knowledge base until they were confronted with the new task at hand. They suggested therefore that this arrangement would be best suited for rarely performed activities rather than primary ICU nursing know-how and that the videos should function as memory aides, verifying references or checklists to known practices. Indeed, it turned out that these were the ways the videos were used. The ICU staff also emphasized that the videos should not be seen as cost-effective training that could replace peer-to-peer training sessions. Rather, the videos should be seen as a complement to existing competence development strategies; this also became the ICU's policy. The perceived quality of the new learning practice needed to be discussed and resolved in relation to how the ease of use of the videos as such was connected directly to the unit's existing social arrangements and structures regarding learning and knowing and how the latter might be altered.

3.3 Evolving prototypical practices of watching videos in the midst of work

The initial experiments, although conducted in relation to actual work, were situated outside the patient care rooms. As more videos were made a question was raised about how use of the videos in close proximity to patient care work might affect the nurses' and nurse's aides' needs to display professionalism through reliable and competent performance and their need to be accountable to the patients, their relatives, and co-workers. Some nurses and nurse's aides were concerned that using the videos in close proximity to patients would disturb resting patients as well as other patient care activities carried out nearby. Some were also concerned that using the videos would be viewed as a sign of incompetence by the patients and their relatives.



Figure 4. Watching videos in the patient care rooms raised issues on how it affected the nurses' professional identity and accountability to patients, their relatives, and co-workers.

It turned out that the appropriate use of the video in patient care rooms depends upon the ongoing activities and competent judgment. The two nurses watching the videos on fixation of tracheal tubes and the taping of nasogastric tubes, for example, paused the video for a few minutes because it slightly disturbed other activities going on in the vicinity. Headphones were never used probably because they would considerably diminish the possibility of maintaining a good overview of ongoing activities. None of the nurses reported that they felt using a video was a sign of incompetence; they would use the videos readily even when relatives were present. The two nurses who were watching the video about taping of tracheal and nasogastric tubes felt comfortable watching them although an awake patient was close by and other co-workers were present. Similarly, the nurses that we happened to observe watching the booster humidifier video felt that it was in order to watch it although a relative of the patient was present. The relative considered it unproblematic and did not see it as a sign of incompetence. However, some nurses reported that they sometimes refrained from using videos due to their perception that the use of the videos might affect their professional identity.

The initial decision to use small display devices was based on the premise that they would be used individually. However, subsequent design explorations demonstrated that the videos were typically watched collaboratively. In such cases, two or more co-workers had to coordinate and negotiate amongst themselves over how they would view the videos and at the same time perform the work at hand and agree on the status that viewing the video should be given.

For instance when the two nurses were watching the taping of nasogastric and tracheal tubes, one of the nurses had greater access to the video than the other. The unequal access created some tension because the nurse that had greater access corrected the other nurse that was more experienced, but their collaboration did not break apart. In fact, throughout the situation, the more experienced nurse contributed actively to the situation by adding recommendations and insights not contained in the video. In another instance where two nurses watched the booster humidifier video while concurrently performing the work required, they negotiated their respective roles and responsibilities throughout the situation. The nurse treating the patient sought assistance from a nurse working in the administration. The nurse from the administration framed the setting mainly as one of learning. Feeling responsible to walk the other nurse through the procedure, she previewed the video before entering the patient room and decided to have the main access to the video and instruct the other nurse how to proceed. The nurse in charge of the patient on the other hand did not consider the setting as one of learning, but rather saw it as a collaborative endeavor and therefore felt frustrated at times that she did not have full access to the video. In her view she was a full member of the practice, which she also showed by taking active decisions and inviting the other nurse into a dialogue about how to carry out certain parts of the work. Throughout the situation they would waver back and forth; at times having a teacher-student relation and at times collaborating as co-workers (Binder et al., 2006), but as in the other case the tension did not cause their collaboration to break down.

The design experiments done in the midst of ongoing work showed that the nurses and nurse's aides found the videos, which could flexibly become a part of the patient care situation, to be useful memory aids and references for verifying that they had performed the work correctly. The experiments also showed that designing for flexibility is not simply a question of how well the videos could be incorporated physically into the ongoing activities. Rather, flexibility related to the embodied practices of being an accountable professional who needs to be attentive to multiple activities where the nurses' relation to co-workers and patients, family members and visitors, must be continuously attended to and adjusted. For the nurses and the nurse's aides, trying out the videos in the midst of work was important so that they could see how such an

emergent prototypical practice related to existing ways of organizing their work as well as their professional identity.

3.4 Reviewing videos - negotiating meaning

As our joint experiments of making videos evolved it became apparent that the process of recording and reviewing of the videos, established practices of sharing experience across professional domains and supporting collaborative articulation on how work activities could be carried out. The experiments also pointed out that the instructional videos were open and flexible for multiple purposes. Besides functioning as instructions they could be used as problem scenarios, as *instruments* for improving work activities as well as focal points for ongoing and seemingly unending collaborations and negotiations across competencies about current practices and how they should be articulated and changed.

The making of the videos, such as the *Stomach Probe video* on new taping routines, the *Humidifier video*, the *CPAP-ventilator video* and various other videos prompted the exchange of views not only from those involved in the recordings themselves, but by giving voice to an array of individuals within their community of practice who would be involved in the videos' making and use along the way. Learning happened while using the video medium to give temporary form to their thoughts on how the procedure should be carried out, which were then collaboratively reflected upon and assessed.



Figure 5. Making videos created favorable conditions for negotiating meaning across professional borders.

The *Stomach Probe video*, for example, went through several iterations and prompted discussions and informal reviews and re-recordings in the corridors and empty patient care rooms as well as during formal reviews. In some instances the discussions and the reviews would

revolve around aspects of the video that needed to be more clearly and thoroughly explained. For example, it was important to use a specific tape for taping the stomach probe so as to avoid taping patients' lips to minimize the risk of bacterial growth and infections. In other instances, as occurred during the formal review of the video, it helped the senior physician and the nurse in charge of competence development to realize the importance of specific means of securing other devices to a patient's face in a similar manner. The video made problems related to the use of adhesive tape visible and pointed at other tubes and probe procedures that needed to be changed. In other instances, a video would help the staff to articulate why certain procedures needed to be performed in a cumbersome way, for example, why the changing of respirators when using the humidifier had to be performed in an awkward and time-consuming way

What the nurses and the designers came to realize as the experiments with making videos evolved was that what was designed was not a technical infrastructure nor an efficient production process. Instead, what was designed was a process for co-development of prototypical practices – or emergent arenas - that created favorable preconditions or affordances for continuous negotiations between different stakeholders through the making of self-produced mediations about aspects of day-to-day activities and how they could be performed. The collaborative production of videos opened up a space for examining and discussing how work procedures were performed, how they could be described, and in some cases how they could be changed. A central characteristic of this new learning process was that it opened up for increased negotiations and insight and exchange of experiences and collaborative articulation of work procedures across professional borders within the ICU community of practice. In this process the videos functioned as focal points that temporarily reified aspects of everyday practice. The process of making the videos can be seen as a process where different perspectives meet and negotiate and where parts of the practice are stabilized. Stabilization is temporary, however, and needs to be continuously negotiated as the practitioners need to continuously formulate how work procedures can be performed.

4 Conclusions

The question that needs to be raised for us as designers: What is to be designed? What does it mean to design for evolving practices? What can the relationship between design and practice look like?

I have argued for viewing design as the development of prototypical practices for engaging in learning, knowing and working or, more precisely, as the development of new arenas for communicative action within a community of practice and in particular across professional

domains. Foregrounding practice has meant going beyond designing for particular users and particular tools, which first of all tends to quite severely circumscribe what constitutes practice and secondly tends to delimit what emergent practices can be envisioned and tried out.

This shift has meant framing the design process as an open-ended exploration where the main focus has been on organizational and educational issues. When engaged in these initial open-ended explorations the designers and practitioners have found it particularly fruitful to identify and build upon existing communicative practices and see if they could be extended. Exposing and analyzing existing practices must be a joint activity. The designers by entering the ICU practice did not unearth hidden practices. The nurses in many ways were well aware of their practice and what qualities it encompassed and what areas of their practice could be further developed. However, our entry as designers into their practice meant that the nurses were given more time to reflect upon their practice and given the opportunity to engage in concrete reflections and experiments that perhaps made aspects of their practice become more clearly visible.

This shift has also meant foregrounding the collaborative design process, as it evolved, to be primarily concerned with the meeting between co-workers and different professional domains within a community of practice. Consequently this meant focusing less and less on the interaction between the designers and the practitioners. The designers' role became that of driving the probing into future possibilities by being the organizers of the meeting of competences and acting as the arrangers of concrete experiments where the practitioners could explore new communicative spaces for exposing, reflecting and negotiating amongst themselves. Design experiments thus co-created the momentum and challenge needed for the practice to take a leap into new ways of learning, knowing and working.

A step away from a system and tool-centric perspective towards a practice perspective has been to view new learning resources as props that can be temporarily incorporated into the ongoing work. The nurses clearly pointed out that learning happened throughout the unit as they engaged in their day-to-day work and was not delimited to a particular place or technology. Similarly the prototypical practice of watching videos where an experienced co-worker shows how a particular procedure can be performed, was just seen as one element among others that made up the total patient care situation. The patients, medical technical equipment and not the least, other co-workers, contributed to and made up the setting. The nurses were able to flexibly incorporate these new mediations as they extended the way they were accustomed to assisting each other and verifying that they had performed the work correctly.

Perhaps more importantly, the approach sketched here points at thinking about open-endedness and flexibility as the creation of favorable preconditions or affordances so that practices on their own can develop partially through self-produced mediations. The strategy proposed is one of making the open-ended explorations tried out in the joint design process into an ongoing practice of continuous exposing and articulating of what it means to know and work. Giving form to such processes and exploring various affordances that can facilitate the negotiation of meaning does not, however, mean that we as designers can design new practices. As Wenger (1999) points out, curriculum, visions, legislation, work processes or affordances can in and of themselves never guarantee that people will be committed to creating new work practices or to creating meaning through negotiations. Although new practices can be designed *for* but cannot be ‘designed,’ central to the design approach discussed is that we as designers need to establish situations within the practices that are being designed for, to see what the response will be and what prototypical practices will emerge out of the interventions.

We should also be aware of what Star calls the “the chimera of infinite flexibility” as if flexibility were only “a matter of expanding the exhaustive search for ‘special needs’ until they are tailored or customized; a belief held strongly by many builders of knowledge-based technologies” (Star 1991, p. 36). Star points out that we need to be aware of such naïve beliefs that proclaim that an optimal convention, standard, classification, system and approach to flexible design are possible to accomplish. Any convention, standard, flexible system or practice will fall short in some regards, whether global or local.

The approach and way of engaging in the co-design as prototypical practice described in this article is offered as only one viable approach. What flexibility and open-ended design can mean in the end needs to be jointly explored and defined. What our experience has told us is that we as designers can get quite far and reach good results by focusing first and foremost on new practices, rather than taking as a starting point the development of systems and tools and in particular robust and complex systems that need to last for a long time. Our experience has also pointed out that those materials that become part of such new practices function as provisional props. What our experience has shown us is that a fruitful approach to open-ended flexible design is to aim for co-developing affordances and favorable conditions for continuously sharing experiences and negotiating meaning.

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