10-2008

CONTEXTUAL DESIGN IN INFORMATION SYSTEMS - A PARTICIPATORY APPROACH BASED ON UNDERSTANDING PRACTICES, MEANINGS AND CHALLENGES?

Bettina Törpel
DTU Management Engineering, Technical University of Denmark, Lyngby, Denmark, bt@ipl.dtu.dk

CONTEXTUAL DESIGN IN INFORMATION SYSTEMS - A PARTICIPATORY APPROACH BASED ON UNDERSTANDING PRACTICES, MEANINGS AND CHALLENGES?

Bettina Törpel, DTU Management Engineering, Technical University of Denmark, Building 424, Produktionstorvet, DK-2800 Lyngby, Denmark, bt@ipl.dtu.dk

Abstract

This paper is a comment on Contextual Design, a method frame proposed by Beyer & Holtzblatt (1998) for redesigning work in conjunction with developing technological support for this work. It is scrutinized in which ways Contextual Design is a participatory approach and in which ways Contextual Design is suitable for capturing practices, meanings and challenges in the work environments to be redesigned.

Keywords: Contextual Design, work, participation, practice, mandate, power, resistance, flexibility, diversity.

1. INTRODUCTION

Contextual Design is a comprehensive method frame proposed by Beyer & Holtzblatt (1998) for redesigning work in conjunction with developing technological support for this work. It addresses the process from a request to optimize business processes supported by (information) technology to introducing a solution. The main Contextual Design reference is Beyer & Holtzblatt (1998).[1] The authors propose a set of procedures. For assessing current work in a work environment to be redesigned, they propose so-called *contextual interviews*. For handling data on existing work, they introduce so-called *work models*, each highlighting specific aspects of work. Further procedures are suggested for facilitating the transition between assessment of the current work and designing new work processes and practices, e. g. the use of storyboards and prototypes.

The starting point for this paper is that the authors of Contextual Design make two important claims:

1. The claim that Contextual Design is an *approach systematically including relevant actors*, especially end-users, in systems design and in redesigning work: "Contextual Design shares with Participatory Design a concern for including customers in the design of how their work will change" (p. 147)[2].
2. The claim that Contextual Design comprises a quick and effective, yet exhaustive and appropriate way to understanding work practices, meanings and challenges in the work environments to be redesigned (pp, 16ff, 36ff).

Occasions for the author to take a closer look at Contextual Design as an approach were provided by design-oriented research and by project teaching. For both activities, work environments were to be redesigned and supported by computer (and other) technology, if appropriate. Two additional characteristics of the research and teaching were that

- participation of a broad range of involved actors was desired and that
- practices, meanings and areas for improvement were to be elicited as relevant for the involved actors.

Such a design process was expected to capture relevant phenomena and potentials for diversity and flexibility in work and organization. (For design oriented research project work, see e. g. Törpel et al. 2003. For project teaching having students eventually proposing conceptual solutions for real-life work environments see e. g. Törpel 2006.) This eventually brought about the question for inquiry of whether Contextual Design really is suitable for research, design and teaching where

- the participation of a broach range of involved actors is required and where
- it is necessary that the practices, meanings and challenges of the work environment to be redesigned are understood.

Another paper with a comment on Contextual Design has been presented by Hartswood et al. (2002) Their main critique is that long-term ethnographic and practical engagement in the form of membership - where members participate in and contribute to the ongoing activities - is missing in Contextual Design, and that Contextual Design could not bring about the thorough insights and appropriate ongoing contributions that the authors report of their own projects where they used an approach the call "co-realization".

In this text I am presenting a summary of the Contextual Design approach. This is followed by a comment structured by the two questions of 1. how participative Contextual Design is, and 2. to which extent Contextual Design can help capture practices, meanings and challenges in the work to be redesigned. This serves to show what the Contextual Design proponents try to achieve and how, and whether and how this can be achieved by Contextual Design or not. In this way this paper is a

[1] When in the remainder of this text pages or chapters are referred to without an explicit reference, then they refer to pages and chapters in Beyer & Holtzblatt (1998).
[2] Here, "customer" comprises users, also end-users, as the Contextual Design authors explain on p. 2.

contribution to purposefully utilizing Contextual Design where appropriate, while modifying or replacing it where not appropriate.

In this text I focus mainly on those Contextual Design activities proposed for capturing current work practices in the target environments and Contextual Design's approach to modeling the data collected. The reason for this selection is that these activities provide the basis for the further design steps.

2. CONTEXTUAL DESIGN – OVERVIEW OF THE PROPOSED PROCESS AND PROCEDURES

In this section, important principles, constituents and procedures of Contextual Design are presented, creating a basis for discussing Contextual Design.

2.1 The design team

The Contextual Design authors describe the establishment of a *cross-functional design team* as an essential constituent of a Contextual Design process (p. 13). Its members assess work practices in the target organization to be redesigned, by means of so-called *contextual interviews*, a technique that combines observation and interviewing in a particular way (see below).

After having conducted contextual interviews, the design team gathers for a meeting, the so-called *interpretation session* (see below). Here, the design team members systematically and comprehensively present each other the results of their workplace visits with contextual interviews. This involves that the design team members create so-called *work models* of the five varieties of *sequence*, *flow*, *artifact*, *physical*, and *cultural models* (see below).

Later in the process, the members of the design team gather for the so-called *consolidation* of their models: now they generalize from individual situations, people, work sequences, flows, influences, artifacts, locations etc. to recurring work sequences, comprehensive work flows, comprehensive collections of cultural influences, typical artifacts, typical locations etc. This activity of consolidating proceeds by, again, using modeling techniques, resulting in several so-called *affinity diagrams* and five kinds of so-called *consolidated work models*: the *consolidated sequence*, *flow*, *artifact*, *physical*, and *cultural models* (see the descriptions below).

Subsequently the design team builds further on the data and models: it develops design visions, makes decisions for design directions, designs the new work processes, the system and its interface, using further systematic and creative techniques, e. g. brainstorming, elaborating story boards, and creating and trying paper prototypes.

In this text, the focus lies on aspects of Contextual Design related to the design team, the contextual interview, the interpretation session, the work models and the consolidation activities.

2.2 The contextual interview

In order to assess how the people in the work environment to be redesigned work, the Contextual Design authors propose to apply the technique of so-called *contextual interviews* (see chapters 1 - 3).

The assessing person(s) from the design team follows the working person in question through her/his work activities. The assessing person is instructed to act as a learning, inquiring person, as an apprentice re. the work practices to be assessed, while the working person is conceptualized to be the expert or master of her/his own work, with the expertise gained through the daily experience of executing this work over long periods of time.

The form of the assessment combines observation and interview in a particular way. The working person in focus is encouraged to work just as she/her would do if she/he was not observed. And the assessing person observes - and as soon as something she/he does not understand emerges, she/he as the working person about what she/he is doing.

2.3 The interpretation session and the work models

After the design team members have conducted contextual interviews, the design team gathers for an *interpretation session* (see chapter 7). Here, contextual interview after contextual interview, the

contextual interviewers report in chronological sequence about the work they saw. They use notes, photographs and/or video as aide-memoir. Whatever can serve to characterize the witnessed work, is written down in a file in the form of separate statements. The contextual interviews are assigned interview numbers, and the statements within them are assigned statement numbers, according to where they appeared in the contextual interview's progression.

While reporting about the contextual interviews and asking and answering questions about them, the design team also composes so-called work models of the five kinds of sequence, flow, artifact, physical, and cultural models.

Sequence, flow and cultural models have the form of directed graphs, while the artifact and physical models are schematic depictions of artifacts and physical spaces.

Sequence model

The so-called *sequence model* (see pp. 96-101) serves to display the temporal sequence in which a working person executes certain steps through which the person fulfills a certain work task. It resembles very much the flowcharts by means of which, for example, imperative computer data flows are visualized: it can contain simple sequences of steps, branches or loops as expressive means.

Flow model

The so-called *flow model* (see pp. 89-96) does not express temporal succession - but relations, flows and influences, e. g. of materials or information, between constituents relevant for the work of a person, as sources or targets, i. e. colleagues, other persons, departments, artifacts such as black boards or databases etc. In the sequence model the sources and targets, called "roles" are depicted as bubbles, and these bubbles are connected by annotated arrows, according to the flow, movement, exchange, impact etc. of information, preliminary products, artifacts or materials they represent. The annotation expresses the kind and content of the connection.

Artifact model

The co-called *artifact model* (see pp. 102-107) is a schematic sketch of an artifact that is relevant for a person in doing her/his work. This sketch is recommended in Contextual Design to contain everything that seems relevant to the inquiring design team member; the Contextual Design authors mention both elements of the artifact and purposes/functionality of the artifact or elements of the artifact.

Physical model

The so-called *physical model* (see pp. 115-120) is a schematic sketch of a physical space that is essential for the work of the interviewed person. Examples are floor plans of offices or buildings, sketches of walls with all artifacts that are attached to the wall, and sketches of physical desk tops and things sitting on them. In the sketch, relevant typical paths and movements of the person working in the sketched space are depicted. The Contextual Design authors also propose to depict the relevant elements and the purposes of these elements or the spaces as part of creating a physical model.

Cultural model

The so-called *cultural model* (107-115) builds on the assumption that there are constituents in organizations that exert specific culturally relevant influences, and that these influences have an impact on other constituents. Accordingly, the Contextual Design authors propose to create a cultural model, containing those constituents around a working person that are culturally relevant, and the

impacts emanating from the constituents. The relevant units are visualized as circles, and the influences as arrows from the influencing to the influenced constituent.

2.4 Consolidation

The individual work models to be generated in the interpretation session are models that capture conditions and practices of *one* individual working person, from the work practices observed in the contextual interview. Later in the Contextual Design process, after the contextual interviews and interpretation sessions, the design team convenes for *consolidating* (see chapter 8). Now, the design team creates so-called *affinity diagrams* and the co-called *consolidated work models* of the analogue five kinds as the individual work models, i. e. consolidated *sequence*, *flow*, *artifact*, *physical*, and *cultural models*.

Affinity Diagram

The co-called *affinity diagram* (pp. 154-163) builds on the numbered statements from the individual contextual interviews as created in the interpretation session. Sheets of papers or cards are made, each containing one statement, e. g. by cutting printed versions of the files with the contextual interview statements in pieces with one statement on each. The design team clusters these statements according to how well they fit to each other and creates headlines for each cluster that express the most important aspects of these clusters' contents. As more and more clusters of statements emerge higher level headlines are invented. Depending on how many statements have to be grouped, more aggregation steps are necessary - until one summarizing headline is created.

Reading the statements that are clustered in this way is meant by the Contextual Design authors to encourage the creation of a story capturing important aspects of the scrutinized work work. The Contextual Design authors encourage the design team to do several rounds of this clustering, coming up with new kinds of clustering the statements, new headlines, new topics and new stories - each round highlighting different aspects of the scrutinized work.

Consolidated work models

The five varieties of work models that are composed as part of the interpretation session refer exclusively to the work of one person. When the Contextual Design authors use the concept of "consolidation", they mean generalization - across people, situations, sequences, individual collaboration patterns, individual artifacts, individual (use of) spaces, individually relevant cultural impacts etc.

The so-called *consolidated sequence model* (pp. 171-178) is about identifying work tasks that recur or can be generalized across people and situations, and they are also about steps for executing the work, that contribute to fulfilling the task and that can be generalized across persons and situations.

To create a so-called *consolidated flow model* (pp. 163-170) means to make a list of all actors and "roles" with their responsibilities that are part of the collaborative system under redesign, plus all artifacts, and all the relations and flows between them.

The so-called *consolidated artifact model* (178-184) is a schematic sketch of all artifacts of a kind relevant for the work observed, and the sketch integrates all kinds of parts and functionalities of these artifacts.

The so-called *consolidated physical model* (pp. 184-190) is a sketch of physical spaces of a kind that are used for related purposes relevant for the work observed. Each consolidated physical model contains all kinds of observed sub-spaces and purposes.

The so-called *consolidated cultural model* (pp. 190-196) contains all bubbles symbolizing sources and targets of cultural influences from the individual cultural models, plus all annotated arrows symbolizing cultural influences between them from the individual cultural models.

3. DISCUSSION

This section contains the actual comment on Contextual Design. It is structured by the two questions:

- In which ways is Contextual Design participative?
- To which extent can Contextual Design serve to understand practices, meanings and areas for improvement in a work environment to be redesigned?

3.1 In which ways is Contextual Design participative?

Two signs that the working people are systematically excluded from taking genuine influence to the design process according to their perspectives and interests in Contextual Design are:

- The working people are not on the design team.
- The working people are not systematically granted direct and genuine influence on the accounts of their work gathered through contextual interviews, neither while the contextual interviews are conducted nor when the data from the contextual interviews are used and interpreted afterwards.

The question is not whether Contextual Design actually *should* be participative. Instead, it is about whether and how Contextual Design *is* participative - or not - and what the *implications* of Contextual Design's approach to participation are. No matter whether one is in favor of far-reaching worker participation or not - there is also a practical aspect of being including or not, which I here treat as the issue of *mandate*. In addressing the question of the mandate of the design team I focus on the design team's activity of collecting data on the work in the environment to be redesigned, by conducting contextual interviews.

The only way in which the people whose work becomes redesigned by means of Contextual Design partake in the design process is by being observed and interviewed as part of the contextual interviews. The working people are, for example, not on the design team. In principle, it would be possible to include the working people into the design team. This possibility is briefly mentioned but not further treated in the Contextual Design book. What is, for example, not addressed by the Contextual Design authors are questions of the kind of representation of the working people on the design team: who represents whose interests, standpoints, perspectives and how; how the relation between the design team members and the other working people should be, etc. (Bødker 1996, Törpel 2000).

In enterprises it is very common that teams from design consulting firms are hired by the top management with the aim to rationalize as part of the larger aim to maximize the organization's profit. When this is the case, then conflicting interests between efficiency enhancement for profit maximization on the one hand and a good daily work of the workers are very common, and these conflicts emerge in forms specific for the local work environments with their specific constellations and situations. Contextual Design is exactly such consulting approach.

When a design team as part of applying Contextual Design visits workplaces and conducts contextual interviews, then the design team members' mandate is either unclear - or the working people have reasons to assume that the contextual interview and the Contextual Design process does not happen in their own interests for a good daily work. Contextual Design in itself does not contain procedures that help align perspectives of design team members and non-design team working people.

Hence, it can not at all be taken for granted that those working people visited by contextual design team members and subjected to a contextual interview naively display what they work and how they go about it. If this is the case, then the status and meaning of the collected data is unclear - the fundament on which Contextual Design modeling and design are based possibly has a totally different meaning than assumed by the members of the Contextual Design team. In the typical consulting-rationalizing constellation the data produced are very likely about some kind of avoidant or resistant practice. And the working people do not even have the possibility to intervene in the process of modeling, which means that the very modeling and designing activities very likely are grounded in severe misinterpretations.

3.2 To which extent can Contextual Design serve to understand practices, meanings and areas for improvement in a work environment to be redesigned?

If the contextual interviewers could be sure that they met authentic work practices instead of practices of avoidance and resistance, then there was a chance that the combination of observing and asking that makes up contextual interviews could help reconstruct practices, meanings and challenges in the work scrutinized. But there are severe restrictions regarding the possibilities to understand practices, meanings and areas for improvement inherent in Contextual Design.

The data collection via contextual interviews and the subsequent discussion, interpretation, modeling and design, as it is actually conducted in real-life settings, takes place in concrete relations of power. In order to meaningfully gather and work with the data these relations of power need to be understood, the actors' roles clarified and, possibly, modified. This is not part of Contextual Design.

The very principles expressed in the Contextual Design concept of "consolidation" suggest a particular approach to generalization: an approach that assumes recurring, typical or stable tasks, execution steps, responsibilities, material/information flows, cooperative structures, patterns of cooperation, division of labor, physical spaces-in-use and cultural influences for consolidating cultural models. Contextual Design hence assumes work and organization as highly stable instead of flexible/dynamic and unified instead of diverse. It is hence unlikely that practices of flexibility or diversity could be discovered and promoted as part of Contextual Design.

Contextual Design itself rests on a division into those who hire consulting firms for rationalizing their organizations, people who execute the daily work and the external consultants who do research and elaborate redesign solutions. This division expresses a particular view on the division of labor and responsibilities that is not necessarily timely and certainly does not guide new forms of work and organization, at least not if they include diverse and flexible ways of working and dynamic organizations.

Flexibility and diversity in work and organization actually have been important issues on the agenda for Information Systems in the Mediterranean regions, because the collaborations spanning regions include super-regional organizational formations and geographically distributed work, very likely in conjunction with diversity and flexibility.

An issue Hartswood et al. (2002) point out is that the process proposed by Contextual Design only includes steps until the new system is introduced. According to Hartswood et al., Contextual Design in this way does not respond to the necessity to handle changes in work after redesign steps have been taken, maybe even changes in work that emerged because of the new system. Hartswood et al., hence, conclude that Contextual Design is not an approach that is suitable for a continued co-development of technology, work and organization. At the same time Hartswood et al. remind the reader that there always is an interplay in the development of technology, work and organization and that it is a good idea to consciously take beneficial action in this interplay, guided by suitable concepts and procedures. And I am additionally arguing that such a conscious co-development of technology, work and organization is essential when work and organization are (to be) diverse and dynamic.

4. CONCLUSIONS AND OUTLOOK

So far in this text, Contextual Design has been introduced and confronted with two questions, the questions of 1. how participative it is and 2. its potentials for understanding practices, meanings and challenges in work to be redesigned.

Contextual Design in itself is not a participatory approach. Rather than becoming equal co-designers, e. g. as members of the design team, the "normal" working people in Contextual Design are conceptualized to be mere sources of data in the service of rationalization efforts.

The exclusion of the working people from the design team indicates that the Contextual Design proponents have a view on technology, work and design where politics, conflicts and interests either

do not play a role or where the conflicts are to be settled according to the premises of those who hire design consultants.

Using Contextual Design as a design approach can appear neat and disciplining, in a way that Contextual Design practitioners are supported in ignoring redesign consulting realities and conflicts, and appropriate ways of dealing with them. Particularly, Contextual Design appears to provide a good opportunity to avoid consciousness and debate in constellations of power, submission and antagonistic interests providing the frame for (re-) design consulting.

Before trying to interpret data, creating work models, it needs to be clear what the data are about, e. g.: avoidance/resistance or daily work. Whether Contextual Design has a chance to become useful or beneficial - as opposed to useless, missing the point or detrimental - is totally dependent on whether the working people have a reason to really show what they work and how. Such a situation can only be approximated if there is a particular kind of exchange and understanding between people who usually have the responsibility to design for other peoples' work and the working people. It needs to be a relation of non-threat, a relation of support. Procedures promoting exchange, understanding, mutual learning and mutual trust in a supportive interplay between designing and working people is exactly not part of Contextual Design, it is a blank space in Contextual Design. This blank space has been filled in other areas, namely within Participatory Design, in various ways that have been tried and debated (see e. g. Schuler & Namioka 1993, Kuhn & Muller 1993, and the proceedings of the biannual Participatory Design Conference PDC).

Differences in how Contextual Design is actually practiced according to the diverse local settings with their specific characteristics are to expect, e. g. in different kinds of organization and in different countries. Contextual Design in practice will be something specific in the form of localized Contextual Design practices that somehow make up local or specific versions of Contextual Design. Most likely, Contextual Design can in practice be, and has been, supplemented by practices, procedures and rules that create the basis for the working people to display, explain and discuss their work practices.

But if there is reason to trust in a good interplay, then outside consulting, including Contextual Design, might neither necessary nor a good alternative in relation to other established approaches, such as co-design approaches where interests, practices, meanings, practices and problems are reconstructed, and improvement measures taken. Possibly established approaches would even be obsolete, because the right steps could be developed in open discussions and emerging collaborative design practices.

When relations of power are either not clarified or when they are clearly antagonistic, then the chances are low that practices, meanings, problems, challenges etc. can be reconstructed through workplace visits with contextual interviews. But even if the Contextual Design modeling can build on data that capture daily work practices and not resistant/avoiding action etc., then another source of problems becomes relevant in Contextual Design practice: the assumptions inscribed in the work models that make it difficult to express a whole range of characteristics and challenges by those models - and make them amenable to appropriate design. The assumptions inscribed in the Contextual Design work model formalisms do, for example, not really allow for diversity, flexibility, variation, non-determinism, development possibilities etc. in work and organization.

In terms of future Contextual Design practice and research, case studies of how Contextual Design has been utilized are necessary, so that it can be reconstructed what Contextual Design can achieve and contribute in local settings, where exactly it should and can be supplemented by further measures, where it should and can be modified, and where it needs to be rejected and replaced by other kinds of design procedures and method frames.

References

Beyer, H. & Holtzblatt, K. (1998). Contextual Design: Defining customer-centered systems. San Francisco, CA: Morgan Kaufmann.

Bødker, S. (1996). Creating conditions for participation - Conflicts and resources in systems development. Human-Computer Interaction, 11(3), 215-236.

Hartswood, M., Procter, R., Slack, R. M., Voß, A. & Rouncefield, M. (2002). 'The Benefits of a Long Engagement: Some Critical Comments on Contextual Design' In: Proceedings of the second Nordic conference on Human-computer interaction (NordiCHI). New York, NY: ACM Press, 283-286.

Kuhn, S. & Muller, M. (eds.) (1993). Special Issue on Participatory Design. Communications of the ACM, 36(4).

Schuler, D. & Namioka, A. (eds.) (1993). Participatory Design: Principles and Practices. Hillsdale, NJ: Lawrence Erlbaum Associates.

Törpel, B. (2000). Self-employed labor meets codetermination - Participatory Design in network organizations. In: Cherkasky, T., J. Greenbaum, P. Mambrey & J. K. Pors (eds.), Proceedings of the Participatory Design Conference, Nov. 28 - Dec. 1, 2000, in New York, NY, USA. Palo Alto, CA: CPSR Press, 184-191.

Törpel, B. (2006). The design game in Participatory Design and design education - Chances, risks and side effects. In: G. Jacucci, F. Kensing, I. Wagner, and J. Blomberg (Eds.): Proceedings of the ninth biannual Participatory Design Conference 2006 Vol. I (PDC'2006), Expanding Boundaries in Design, August 1-5, 2006 Trento, Italy. Palo Alto, CA: Computer Professionals for Social Responsibility(CPSR), 77-86.

Törpel, B., Pipek, V. & Rittenbruch, M. (2003). Creating heterogeneity. Evolving Use of Groupware in a service network. In: Andriessen, M. Hettinga & V. Wulf (eds.), Computer Supported Cooperative Work - The Journal of Collaborative Computing, special issue on "Evolving Use of Groupware", 381-409.