

Designing Future Scenarios for Electronic User Manuals

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ABSTRACT

This paper addresses ways of applying new perspectives on the electronic documentation of technical literature. It draws on inspirations from a research project aiming at creating a vision for technical literature that is electronically accessible. The goal was to investigate the potential of electronic user manuals and database user manual production.

We will illustrate how a variety of scenarios were helpful to add on intensive ethnographic field studies, helping developers coordinate design action and reflection. The design and implementation of electronic user manuals is beyond the scope of this paper.

Keywords

System development, ethnographic field study, qualitative methods, scenario-based design.

INTRODUCTION

At the turn of the millennium the Danfoss Company, a major Danish industrial manufacturer for refrigeration, heating and motion controls, became interested in making its catalogues, and related sales material electronically available. This political decision called for storage and management of the company's entire product data and product-related information in one central database.

The project affected the entire existing system of literature production (structure, management and publishing of data). Because the company's product range is based on principles of modularity, there was a strong interest in standardizing literature. But there are local variations in products that differ in nuances. Therefore the literature development process requires a certain kind of dynamism that allows adjustments according to product variations. So reuse of assets across product range was desired.

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The notion of 'across products' was regarded as directly linked to 'processes'. By focusing on processes the company aimed at widening for competitive marketing arguments. Instead of technical and functional product description stakeholders could best imagine literature to be based on a use case model. The latter called instantly to take in to consideration a scenario based design process (Bødker 2000) where users are perceived as co-designers in contrast to usability studies users only role would be to accept or reject a concept tested.

The challenge for designing a system across all products was to seek information about how to employ electronic devices for user manuals and instructions, possibly handheld, and ubiquitous. The question was: What could a possible future information system look like?

The project ran for 6 months from August 2000 onwards. User research with a set of conceptual prototyping experiments was carried out in different work environments in Denmark, Germany and the US. A series of workshop like activities (e.g. best practice seminar, core team meetings, video analysis session) tied the project together.

To explore the potential of using electronic media, we studied current use and recent production of existing technical literature. Research activities and testing prototype concepts ran in parallel to prompt user opinions. Investigations in database production tools were accompanied with the approval of a hands-on pilot database.

PROJECT TEAM ORGANIZATION

The project team actually consisted of three groups of players in the team: The User Centered Design Team, the Core Team, and the Stakeholders Group.

The UCD team was a multidisciplinary team of designers with qualifications such as anthropologist, industrial designer, communications designer, internal rotation engineer, and a design process manager. The User Centered Design team members took the role as process architects who mediated among the players of the game (Horgen et. al. 1999).

Core team members were a marketing consultant, a technical literature engineer, sales & marketing engineer, and a technical literature manager.

Stakeholders were a product support manager for electronic controls and a marketing manager for technical communications.

As it were a fourth team end users (operators, service technicians) participated in the Video Card Game analysis session. They of course assisted in the field providing information and giving insight into their knowledge.

In fact core team members and stakeholders as well were regarded as just another kind of users of technical literature. As mediators of technical documentation they share with operators and service techs an interest in the overall design, just on another level.

Right from the start we decided to regard the entire project team organization as an assembly of multivariate players in the design process. All members ("players of the game", Horgen et. al. 1999) did hold different images of the workplace, pursued different and often conflicting objectives, and sought to protect their respective interests. Core team members and stakeholders came from different divisions of the same big organization, each division having its own tradition and organizational culture. Their institutional roles and their personal styles determined how they saw and solved problems, and how they responded to interpersonal relationships. They have specific roles and positions of authority, and they play them differently.

Thus we early thought best to apply the metaphor of the game for the design team organization and for the design process architecture: A game is a social activity within a system of rules in which multiple actors with defined roles cooperate to achieve a desired outcome (Horgen et. al. 1999:42). Because Horgens idea of a Process Architecture Approach is closely linked to the ideal of a Co-Design Approach, we easily could connect our particular design task with the principles of a User Centered Design Approach.

COURSE OF INQUIRY

Research started out with observing work, and interviewing users. Field research was exclusively conducted with a video camcorder. Video transcripts and field notes were carefully examined to identify common topics and general interaction patterns. All video material was analyzed according to the principles of the 'Video-Card-Game' method (Buur 1999; Sperschneider 1999, Buur/Søndergaard 2000).

For the field study we asked users to carry out their planned duties, while we kept a log of their activities during the

course of the day. If possible the field technique of 'shadowing' informants (Sperschneider/Bagger 2002) was employed: We followed users in their daily routine, and recorded what occurred, e.g. a sudden troubleshooting situation. With this technique we followed the ethnographic ideal of participant observation (Spradley 1980, Wolcott 1995).

At the end of a day, we interviewed the people we collaborated with to ensure a complete log all activities. During these interviews we focused on issues such as the nature of the activities carried out, how long these activities normally take, and the kinds of documents and document-related tools they used.

On other occasions the 'situated interview' technique was used (Sperschneider/Bagger 2002). We conducted interviews on location using qualitative interview techniques. Questions formulated in advance became reformulated according to adjust to the flow of articulations.

Field observations were intended with the objective to identify generally reoccurring familiar situations that could help defining patterns of interaction with paper manuals. These patterns than should serve designing future scenarios.

Users experiences with manuals, e.g. installation and maintenance of current heating and refrigeration controllers, were initially studied over a six-weeks period at Denmark. At the Danfoss Help Desk Center we spent two weeks observing and interviewing service technicians, listening to customer call-ins, and trying to get a clue of all those many frequently asked questions.

At the Danfoss Help Desk Center we learned that there isn't anything existing to be called "frequently asked questions". Each problem has its own context. Therefore each question needs to be reflected in the particular context of its occurrence. Here we learned that the phone is an inevitably vital tool for interacting with manuals. Some operators prepare well before going out for a job. Some don't like to prepare at all. They prefer to be supervised or instructed. Others like to learn from experience, may be trial and error.

At the Danfoss Drives division we studied recent practice of technical literature production. This was a matter of specific interest because DD is a leader in fully automated parallel processing of technical documentation. DD has developed a unique system that generates automatic setup for any literature product desired. This saves much of text editor's time.

To explore the potential of electronic media we invited a number of cutting edge professionals with multiple backgrounds to discuss best practices in applying electronic media for documenting technology. For the Best

Practice Seminar and Core Team meeting the process architects presented the first set of studies on how operators and service technicians actually work with user manuals. The goal was uncover the plain descriptive patterns of work practice.

The persona of users and user perceptions of current technical literature saw three patterns that became important key features for design scenarios:

- Subject oriented feature: The operator as gold-digger, seeking frantically information;
- Image oriented feature: The service technician as visual thinker, remembering visually, communicating via pictures or photos;
- Scholarship oriented feature: The operator as apprentice on new territory, seeking instruction.

Hundreds of post-it notes from the Best Practice Seminar were analyzed with the KJ-method for information structuring and problem solving (Buur 1990): Post-its are grouped in larger and even larger groups of similar subject matter. Finally they are arranged in a graphical structure on large sheets of paper.

Core Team 1 evaluation, which followed the BPS meeting, helped to formulate three prototype concepts as springboards for design scenarios (Bødker/Christiansen 1997):

- The prep-assistant applies electronic media to support situated learning;
- The voice guide uses sound as an alternative to sheets with text and graphics;
- The on-site helper is a mobile computing device with a search machine.

Each prototype concept became embedded into a scenario that served to point at a mutual understanding of problems in current work. Rather than meant to evaluate prototype user interfaces for their usability, they were designed to provoke new ideas and for feedback for design refinement.

User feedback on all three prototypes was gained on further field studies in Germany and the US. In these studies we were sought evidence for the basic principles underpinning the patterns observed in the Danish field. With the design of three contextual scenarios all-around the prototypes we were looking for comparison across the patterns.

User trial and response again was videoed for systematic reflection. The 'Video-Card-Game' evaluation session helped to refine current visions, and evoked a range of both technically and humanely general issues for any electronic documentation system.

Any concept for future electronic user manual formats should consider differences in articulation and distinctiveness for addressing global users. Language suited to service technicians (operators and fitters) in the US should be at a lower grade level of readability than for service technicians at Europe. US service techs are not so well educated, and are less well trained vocationally.

This opened for ideas of designing a simple prototype system for in-house technical literature production. The design on the Danfoss Drives fully automated technical literature production line was carried out as a design-in-context session (Buur/Djajadiningrat/Pedersen/Sperschneider 2002). This allowed a deeper understanding of a whole range of implications and consequences that need to be tackled once a single-source database supports different media. Future manuals production inevitably will change recent roles. Technical writers will become info providers, if not information architects.

Core Team meeting 2 started out with stakeholders and fellow researchers experienced the mock-ups personally in typical workplace settings (heating room, refrigeration room, van for preparation): Core teamer's were asked not only to test the prototypes, but to add on them, thus making them more concrete. The task given was: If this is an idea, what is necessary to turn it into a product? Situated practical understanding (Lave/Wenger 1991) via hands-on experience helped core teamer's and design team members to share users implicit meanings, thereby transforming tacit knowledge into meaningful insights (Nonaka/Takeuchi 1995).

The next and final step in the design process, that could lead to requirement scenarios where pros and cons of a particular design situation would be scrutinized, hasn't started yet.

USER PERSPECTIVES ON MANUALS

The notion of *users* is a very broad category. Users of technical literature could be anyone who deals or handles with them or with controllers. In order to evoke work practice we refer in the following to perspectives of operators, maintenance personnel, and service technicians, thus avoiding the peculiar notion of 'end users'.

The Apprentice – I'll better be well prepared

The apprentice taught us to keep an eye on transfer of knowledge, e.g. on how to teach a colleague. The apprentice favors built-in support rather than a paper manual. He prefers typical use scenarios instead of technical explanations.

The Gold-Digger - I know what to look for ...

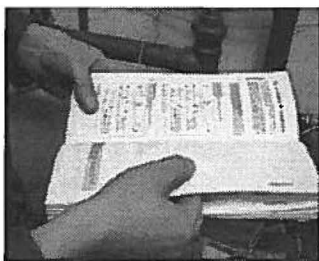
The gold-digger expects skillful expert guidance. This user type calls for the appropriate media, whether electronic or paper. The display of electronic manuals should look like the paper manual. Paper manuals should stay.

The Visual Thinker - I remember what it looked like...

The visual thinker knows what to look for. He favors visualization: 'A picture is worth a thousand words'. Photos, diagrams, illustrations, figures, all are good for straightforward communication.

The quality of paper

Users stress the flexibility of paper documents. Hand delivery enables users to highlight particular sections. With annotation information becomes personalized.



Christian remembers a mark he had made earlier in his very own manual. It is the hand-written cross that he remembers, and that he is looking for while leafing through the manual.

User feedback supported the claim made by Harper and Sellen (1995:10): The argument is not that paper is universally better than electronic alternatives, but the role of paper in fundamental aspects of work practice is misapprehended and under-emphasized (Sellen and Harper 1997). Paper symbolizes importance, and it personalizes the process. Paper stays, digits disappear. The tangibility of paper and its physical presence is a continuous reminder to actions and activity.

PROTOTYPE CONCEPTS AS SCENARIOS

Bødker/Christiansen 1997 take scenarios in design as hypothesizes. Scenarios are qualified guesses about the future (1997:12). These authors see scenarios as a way of referring back to use praxis. But they warn us not to take them as physical entities. Otherwise we might overemphasize aspects of the artifact. However we would like to argue, if co-designed with users, a tool neatly can serve as springboard for further design idea: the tool gives meaning for both designers and users. Tools and artifacts embody design ideas. Thus we assumed they well might help transforming tacit knowledge into explicit knowledge

(Nonaka/Takeuchi 1995), thereby provoking the generation of users' ideas.

Bearing this theoretical reasoning in mind we developed for each prototype a scenario, a 'story' located in time and space, based on our knowledge about patters for typical ways of doing things. Iterative alternation between field research and core team/stakeholder refinement lead the process architects to approve three prototype concepts in the German and American field.

The On-site Helper



The On-site Helper is a paper mockup WAP cell phone. This tool allows both searches by text and search by image. The On-site Helper appeals to both the subject oriented and the image oriented user pattern. As described above for the gold-digger this artifact allows a service technician to find answers himself. The concept is closely linked with the idea of a single-source database.

The Voice Guide

The Voice Guide is a laptop based acoustic instruction guide that works with an earphone. It allows an operator to keep his hands free. The idea for the scenario: the operator gets connected to the manufacturers' web page via modem in the apparatus. He just plugs in his earphone and gets instructions for set up and maintenance and so forth. But voice navigation is far from the richness of visual navigational capabilities (Muller 1990).

The Prep Assistant

The Prep Assistant is a multimedia application on a portable computing device. Video takes commend how to solve relevant problems. Visual navigation may be accomplished through other media, e.g. audio devices. Navigational options may be presented simultaneously in a display. This artifact could be taken along to a worksite, or it could be approved in a van during a lunch break as the scenario suggested.

CONCLUSION

Feedback from both internal and external users implied to link all documentation to one single-source database, using the same information for different media. The database

should contain text, pictures, video and sound elements. Reuse of information, e.g. of earlier products and software is an important issue. Future electronic literature might be based on the computing principles of hypertext and hypermedia. All traditional text is sequential, thus defining the order in which the text is to be read. Hypertext is non-sequential. Hypermedia supports neatly a range of multimedia accessories. Today's principles of manual production shortly before product launch will eventually change. Thinking in terms of audible and visual devices this will result in new roles, and new ways of working. Text writers will turn into coordinators of different media providing information in multiple ways. The information provider of the future will be concerned with data management and web facilitation. The aim of this project was to outline the boundaries for electronic forms of technical documentation, their design, their production and their maintenance. One promising way to employ electronic media would be via an audio-only media space (Hindus et. al. 1996) as exemplified in the voice guide scenario. Information and guidance should be accessible via the apparatus itself, either as download online service or as embedded software. Controllers with online potential will give access to information where information is needed. But any innovative development that considers the optimal care of users must also be capable of including future paper manuals. It became clear that any new electronic user manual concept would give way for new ways of generating technical literature, thereby turning technical writers into media coordinators or information architects. Aspects of database production and of delivery system should be painstakingly considered in a global text writer commission.

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