Participative Design With Top Management: Anchoring Visions by the Problem Mapping Technique

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ABSTRACT
This article reports on a project introducing techniques from the MUST method for IT designers in a large international supplier of systems for tax assessment and auditing. The focus is on evaluating the fit between the supplier's system and the customer's requirements, particularly through meetings aimed at aligning top management with the supplier's analysis. The article describes the MUST method's anchoring principle and the technique of problem mapping supporting this principle. This participatory approach resulted in mutual learning processes with top management which is rarely reported on in the PD community. Top management participated by reviewing, challenging, and reformulating the IT designers' central suppositions, assumptions, and hypotheses related to the causal relation between identified problems and suggested solutions.

Keywords
Participatory design, top management, method, MUST, anchoring, problem mapping, supplier, generic system, customer, compliance, tax audit.

1. INTRODUCTION
As information systems development becomes increasingly more industrialized, organizations tend to rely on procuring generic systems that are configured and customized to specific needs and work practices [1]. Customer organizations buy generic software from suppliers – very often large international software houses – who have designed their systems for general use within certain work domains. This entails a system development process that includes a tender and contract with a supplier. Before a contract can be signed, suppliers of large generic systems and their potential customers from the start need to consider if and how the customer's needs can be supported by the offered system. This clarification is in this article referred to as a design project [3]. Such a project involves evaluating the fit between the supplier's system and the customer's overall requirements. This clarification and the customer's decision regarding if and how to further engage with the supplier involves including management from the highest levels. Top management commitment and the development of strong relationships with top management continues to be reported on as the uttermost important challenge within IS projects [7, 9]. The PD literature rarely describes projects where management participation is in focus – on the contrary, the participation of managers has often been restricted intentionally [4].

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This article reports on a project where IT designers from a supplier of a large generic system supporting the compliance domain (tax assessment and auditing) were introduced to a participatory design method (MUST) as part of a method dissemination initiative [2].

MUST has been developed over the past decade by a research team in cooperation with a number of different public and private partners [5]. The case presented in this article focuses on the MUST method's principle of anchoring visions and, specifically, on using the method's problem mapping technique. Problem mapping was used in order to make the line of argument visible with regards to why the customer might benefit from a specific solution offered by the supplier.

The case demonstrates how IT designers from the supplier together with top management from the customer collaborated in a mutual learning process during a full day workshop, where they diagnosed problems using the mapping technique. Management participated by challenging central assumptions and hypotheses of the current state of affairs and situation, as well as by challenging the means for targeting the main goals of the IT project.

In the following section, the MUST method is presented and in particular the anchoring principle is in focus. Section 3 describes the design project, where the starting point is the supplier offering a potential customer a free-of-charge design project. Section 4 elaborates on how the problem mapping technique was used in the design project to support the anchoring principle. A detailed example is provided, demonstrating how the IT designers involved management in using this technique. Finally, the article concludes by examining the results from conducting participatory design with top management.

2. THE MUST METHOD AND THE PRINCIPLE OF ANCHORING VISIONS
The MUST method's application area is the initial analysis and any accompanying design activities within a design project. The parameters of a project span from the emergence of an initial idea for change in a particular organization to the development of a cohesive vision for overall change. The method is not a "recipe" describing step by step how to carry out a design project. MUST is a resource for participative action and a learning tool for IT designers, managers, and users. They can experience and adapt elements from the method in ways that

they find suitable to their specific and current project. The MUST method is presented as providing four types of resources:

- A conceptual framework identifying the basic elements of participatory design in an organizational context.
- Four principles guiding the design project.
- Four phases designed to organize the design project as a stepwise decision making process.
- A broad set of techniques that can be used in concrete activities and based on the IT designers' preferences and understanding of the situation in question.

The project presented in this article focuses on the MUST method's principle of anchoring visions (originally developed by [8]). The following description is based on [3].

The principle encompasses informing about, and the promoting understanding and backing for, the design project's goals, visions, and plans. The target group includes anyone not directly participating in the design team: Management, who decides if and what should be implemented; and different stakeholders, who in various ways can contribute to the implementation or who will be affected by it.

An important means involved in anchoring is for the design team to openly communicate their interpretation of the existing situation in the organization. This can be achieved by systematically discerning among the information the design team has gathered, and the assumptions and hypotheses it has made. The design team's view of the organization's existing situation builds on the gathered information, for example information registered in documents, observed events, quotes and statements from interviews, etc. Such information is indisputable in the sense that it "exists," for instance in the form of quotes from past reports on business strategy, from statistics on the frequency of errors in a business procedure, from interview statements, etc. Using the collected information, the members of the design team piece together a general image of the existing situation. This may give the impression that an overview of the situation has been obtained, and that the majority of relevant needs and problems have been revealed. Those IT designers having a great deal of experience within the work domain of the design project (as in this case) need only very little information (for instance from a short series of interviews) in order to develop a convincing generalization of the situation, which identifies and characterizes relevant problem domains. Their image of the situation is tied together by a string of assumptions and hypotheses generalizing the information in a manner that covers the situation as a whole. Assumptions and hypotheses are often implicit and typically take the shape of patterns of explanation and interpretations of the gathered information.

Anchoring visions includes the design team focusing on getting feedback from and comments on the information it has gathered as well as on its assumptions. Accordingly, this also means confirming or rejecting the assumptions and hypotheses on which the design team has built its representations of the existing or future situation.

The MUST method suggests two basic anchoring rules:

1. Separate suppositions from the information gathered. Continually be aware of what can be traced back to various documents, audio or video recordings, notes from interviews and observations, etc., and what the design team's suppositions (assumptions and hypotheses) are.
2. Test considerations, assumptions, and hypotheses, not just conclusions. Be open to all such suppositions, while bearing in mind the importance of challenging and testing them. Visualize the considerations by forging a coherent argument from the identification of the problem to the solution proposals.

3. THE DESIGN PROJECT

The supplier had over a period of more than ten years been developing an IT system supporting all major processes within the work domain of compliance, i.e. tax assessment and auditing, including private assessable income (payee tax), company revenues, VAT, etc. The system is a generic system organized in modules that can be configured and customized in a variety of ways. The system is used by governmental tax audit authorities worldwide, i.e. their customers are the tax authorities of an entire nation or state. The system may be compared to large enterprise resource planning systems (ERP's), since it is comprehensive and expensive and potentially entails large organizational restructuring and changes in work practices within the user organization. The system has proven to give a sufficiently higher level of effective administration, and it has given tax authorities substantially higher revenues.

When the supplier interfaces with a new potential customer, it is seldom clear at first to the supplier or the customer, how the customer's requirements relate to the functionality and the possibilities offered by the system. It needs to be clarified if the customer is in a situation where he could benefit from implementing (major parts of) the system, i.e. whether there is sufficient overlap between the customer's needs and the system's present and projected functionality. The supplier offers free-of-charge performing such a clarification in the form of a design project.

In the case reported on here, this design project lasted three months and involved three visits at the customer site. The supplier invested two man-months of resources plus travel expenses. The supplier's design team included three senior IT designers, all of whom had more than 10 years of experience with conducting numerous similar design projects within the compliance domain. The focus of the requirement analysis is on the customer's overall problems and strategic needs, including clarifying business and IT strategies, identifying which parts of the compliance cycle and processes that need IT support, and the existing and projected IT architecture and their potential relations to the supplier's system.

During the visits the supplier's IT designers interviewed 13 selected employees representing different areas of the customer's organization and compliance processes. At each visit, they also had meetings with eight top management representatives, including the CEO, CFO, CIO, and five vice presidents[1] (VP) representing the nation's different tax regions. This management group had to decide if and how they would sign a contract with the supplier. Thus, strategic and economical aspects were a prime consideration. Even though the management group might only have limited understandings of relevant work practices (e.g. performing a company audit), this was not considered as being a problem: The decisions (for now) were focused on if and where to invest in IT (e.g. based on political considerations, business strategies, overall organiza-

[1] The European term for this level of management is Assistant Secretary.

tion of work, statistics of revenues, etc.) and postponed more detailed considerations on how to support specific work practices with IT.

The outcome was a report comprising the analysis of the customer's overall requirements as well as the recommendations for a subsequent implementation project. A strategy for a subsequent development and implementation project was described where other managers and employees representing specific work practices in the chosen areas of compliance were to participate. The customer later signed a contract with the supplier for an IT project with a starting budget above 10 million US$.

4. PROBLEM MAPPING AS AN ANCHORING TECHNIQUE

Problem mapping (originally developed by [6]) is a technique that supports the MUST method's anchoring principle. Problem mapping can be specified as both diagnostic and virtual mapping. Diagnostic maps outline the structure of arguments diagnosing a problem (or need) by identifying its causes, the (undesirable) consequences it leads to, and the ideas for its solution. Virtual maps use as a starting point one of the ideas for a solution and then list the actions needed to be performed, the results of these actions, and an evaluation of the effect.

All interviews made at the customer site were recorded. After the first visit the IT designers listened to all the recorded interviews and scrutinized the documents they had received (brochures, strategy plans, systems documentation, descriptions of production processes, etc.). In the process, they made notes of their observations using keywords. All the keywords from the interviews and the document studies were reviewed, discussed, and scribbled on colored adhesive notes (post-its). These were organized on diagnostic maps with the following headings: "problems" or "needs", "causes," "consequences", "ideas for solutions". They were also organized on virtual maps with the headings: "ideas for solutions", "actions", "results", and "evaluation".

The IT designers learned three lessons in the process of organizing their interview notes by using problem mapping.

1. *Their focus moved from reflecting on solutions to diagnosing the problems and needs that the solutions should solve and fulfill*. Typically their reflections on the interview data focused on how to solve observed needs by means of their system. This, when organized on problem maps, brought notes to the virtual map but left the diagnostic map empty and open. This led to reflecting on the diagnostic part, as this map is the starting point for the solution outlined in the virtual map.
2. *Suppositions related to interview observations were made explicit*. Their interview notes only partially formed the arguments on the maps and they where thus supplemented with new notes. Most of the notes made for the maps did not originate from direct observations noted from the recorded interviews. When making a note as part of the map the question "did you get that from your interview notes?" usually had the answer, "no – not directly, but...". This revealed that a new note was actually a supposition based on impressions from the visit as well as from past experiences. Refining the line of argument on the problem maps, and especially on the diagnostic maps, led to even more explicit suppositions as the list of interview observations were emptied into the maps.
3. *A priority could be made with regard to the assumptions that were critical to the overall design.* The resulting maps gave an overview of each problem/need at stake as well as how grounded a line of argument was in the interview observations. From this overview, the entries on the maps were prioritized, assuring that the most critical diagnoses were reviewed and evaluated with the customer.

The IT designers presented the results of their problem mapping at the full day workshop with the eight management representatives. The workshop acquainted the management group with each of the selected, prioritized problems and needs, as well as with the arguments for the possible IT-supported solutions presented in the diagnostic maps. Every participant at the workshop had a handout representing all the maps that the IT designers had prepared. Figure 1 presents one (out of 20) diagnostic maps from this handout.

Problem/ Need	Causes	Consequences	Suggestions for solution
0-yield rate is too high (especially for VAT)[2]	Random selection No revenue estimates when selecting Third party information not used Inaccuracy (and non-availability) of data Filtering is not effective	Wasted resources (wrong taxpayer[3]) Risk of tax payer harassment	Make prioritization of cases based on estimated revenue possible and easy Improve receiving and filtering of returns <Local system> fully operational or DB-access improved

Figure 1: A map of one of the problems presented at the mapping workshop.

Each problem and need, as well as the argument for the possible IT-supported solution, was then discussed one at a time. As the managers discussed and commented on an entry on the map, the suggested revising and rephrasing were noted on post-its, which were then put on flip-overs in the meeting room (see figure 2).

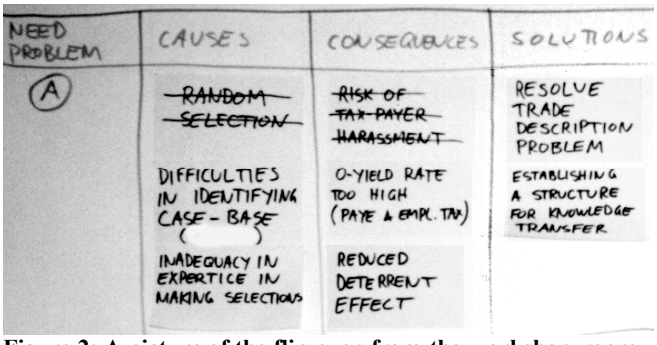

Figure 2: A picture of the flip-over from the workshop representing the *changes* made to the map in figure 1.

[2] This means that often times an audit is made, with the result that no errors were found and thus no more taxes are to be claimed.

[3] "Wrong tax-payer" refers to an audit that did not result in additional revenue, in other words, the tax payer made a correct return.

As an example of the results from this workshop, consider the map represented in figure 1 and then the changes to this map in figure 2. The following changes can be highlighted:

- The problem "0-yield rate is too high (especially for VAT)" was moved to consequences, and "especially for VAT" was changed to "Payee and employee tax". Problem A was then rephrased to "Selection time-consuming and tedious" (not shown in figure 2).
- The cause "Random selection[4]" as well as the consequence "Risk of tax payer harassment" were rejected (crossed out in figure 2). These assumptions were false according to the managers.
- Two causes were added ("Difficulties in identifying case-base" and "Inadequacy in expertise in making selection"), one consequence was added ("Reduced deterrent effect"), and two suggestions for solutions were added ("Resolve trade description problem" and "Establishing a structure for knowledge transfer").

The example above demonstrates firstly how management became acquainted with the IT designers' diagnosis of the current state of affairs. Secondly it shows how management participated in a structured discussion of each line of argument related to an identified problem or need. And lastly the example demonstrates how the IT designers involved management in challenging central suppositions, assumptions, and hypotheses related to the causal relation between problem and solution.

5. CONCLUSION

The participatory approach illustrated here demonstrates how a customer and a supplier collaborate in a mutual learning process where the supplier openly "laid the cards on the table" with regard to his understanding of the customer's situation and the customer's comments and arguments were received in a quite constructive atmosphere. The discussions were considered as being honest and insightful and disclosed the IT designers' experience and knowledge within the compliance domain.

The problem mapping technique supported:

- A focus on diagnosing the customer's problems and needs.
- That the suppositions and assumptions were made explicit especially with regard to the causal relation between a solution and the problem/needs it addresses.
- Reviewing and commenting on critical assumptions.
- Obtaining an overview of all identified problems/needs as a basis for prioritizing.

In this way, the technique made the line of argument visible with regards to why the customer might benefit from a specific solution offered by the supplier, and it thus supported the principle of anchoring visions with the management, who in the end decides on the IT investment.

As a workshop technique, problem mapping sets the agenda for the discussions, and it might in this way also be used by the supplier in a strategically and instrumental way. For example, it can illuminate the supplier's strengths and demonstrate the competitor's weaknesses. This was also the case.

The suggested solutions "Make prioritization of cases based on estimated revue possible and easy" and "Improve receiving and filtering of returns" (see figure 1) pointed to solutions where the supplier's system had specialized modules supporting exactly these two tasks. The third suggested solution in figure 1, "<Local system> fully operational or DB-access improved", refers to a system developed by the customer's own IT department (managed by the CIO), and represents a competitor to the supplier. The IT designers knew that the CEO was very skeptical about whether the CIO could develop an effective local system. The map thus addressed a weakness with the CIO and his IT department.

The fact that the mapping workshop succeeded in involving management in formulating lines of arguments, where needs were related to solutions, as demonstrated in figure 2, were deliberately used by the supplier. The given comments and rephrased statements were very carefully noted and reworded with precision in the final design report. In this way the customer's management could recognize their own arguments with regard to how to address their problems and needs by means of the suppliers' suggested IT-based solutions.

6. REFERENCES

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[4] This means that companies are selected for an audit randomly. The supplier's system supported a prioritized selection of companies in order to maximize the potential for receiving additional revenue.