

**JOINT ELICITATION OF PROBLEMS:
AN IMPORTANT ASPECT OF CHANGE ANALYSIS**

Göran Goldkuhl
Annie Röstlinger
Department for Computer & Information Science
Linköping University
S-581 83 Linköping
Sweden
Tel + 46 13 28 10 00
fax + 46 13 14 22 31

ABSTRACT

Change analysis is an approach to the initiation of information systems development, with one purpose to avoid IS bias in the analysis. One important part of change analysis is analysis of problems. The paper treats the process of developing a problem understanding within change analysis and as a base for possible information systems development. This is illustrated through the use of a method (CONTACT) for problem analysis/change analysis in an action research project.

1 INTRODUCTION

1.1 How to decide on information systems development

Initiation of information systems development (ISD) can be performed in different ways. In traditional life cycle models (cf e.g. Davis & Olson, 1984) this is done in an initial phase called feasibility study or something similar. An idea of developing an information system (IS) is investigated in the feasibility study. In this approach there is a great risk that one looks at the organization and its problems through an IS perspective. Such a feasibility study may have an IS bias (Goldkuhl & Röstlinger, 1992) and thus IS solutions can be taken for granted and not sufficiently questioned. This life cycle thinking on ISD initiation is implemented in many traditional methods as e.g. Structured Analysis (Yourdon, 1989).

As an alternative to this traditional life cycle approach the *change analysis* concept has been coined (Lundeberg, Goldkuhl, Nilsson, 1978, 1981) and later on further elaborated (Goldkuhl & Röstlinger, 1984, 1988). Change analysis means a phase that is performed before ISD and before any decision on ISD is made (figure 1). The result from change analysis can be a decision to develop an information system. But it can also result in a decision on other kinds of change measures. Change analysis do not take ISD for granted. It takes a critical stance towards IS solutions and other solutions as well.

Change analysis is a concept and an approach to ISD initiation. In order to get these ideas workable in practice they should be transformed into a methodology. There is one well-known methodology taking this change analysis approach: ISAC

(Lundeberg, Goldkuhl, Nilsson, 1978, 1981). This paper presents one part of another methodological approach to change analysis: CONTACT (Goldkuhl & Röstlinger, 1984, 1988). The development of the CONTACT method has partly been based on experiences from use of change analysis/ISAC and a critical analysis of this method. There are some similarities to the ISAC methodology, but there are major differences (Goldkuhl, 1984; Goldkuhl & Röstlinger, 1992). One of the differences is an emphasis on problem analysis in CONTACT compared to ISAC.

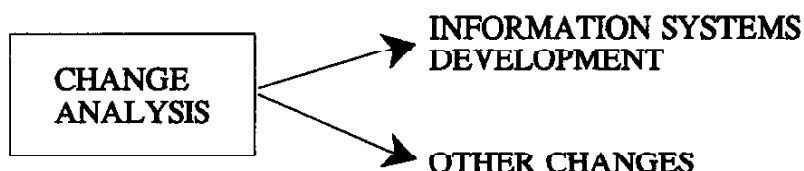


Figure 1 Change analysis as a separate phase before ISD

There are approaches used in the IS area, like Soft Systems Methodology (Checkland, 1981), that contain qualities similar to the concept of change analysis. Confer also Bemelmans & Eloranta (1984) and Sol (1992) about systological design and the Why-questioning.

1.2 Purpose of the paper

The main purpose is to describe, through empirical examples,
 - the importance of developing a problem understanding and
 - ways how such an understanding can evolve.

This also implies that parts of a methodology for problem analysis and change analysis will be shown in this paper. We will describe the character of a "revealing" problem analysis and solving approach, which is relevant to initiation of information systems development.

2 RESEARCH APPROACH

In this paper we discuss an alternative approach to ISD initiation: Change analysis. We put special emphasis on problem analysis and elicitation. The development of this methodological approach has been performed in an iterative fashion. It has consisted of

- empirical investigations on prevalent practice
- critical assessment of methods for ISD initiations
- methodology development
- empirical studies on method use in practice.

These different activities have now been performed iteratively for several years. Much of the empirical studies has been performed on an *action research* basis (cf e.g. Checkland, 1981, 1991; Wood-Harper, 1985; Röstlinger & Selldén, 1983). In the next section we are using an example from one case study. In this study one of the authors participated in a combined consultant and action researcher role. (Cf Gummesson, 1988 about the possibilities and advantages of combining these

different roles). This role combination involved as one part an active change agent and analyst role. It also involved a more research oriented attitude of documenting observations and experiences from the process. All change analysis documentation (including earlier versions) was saved for method analysis. After the completion of the change analysis the participants of the project group were interviewed. There was also a rather active reference group and opinions from the members of this group was gathered through interviews or questionnaires.

The rationale for using this research approach (action research with participant observation as main data collection method) in this situation is:

The nature of this kind of empirical data is subtle: Different problem conceptions and development of problem understanding. To get access to this kind of data it is necessary with *closeness* to this process of change. The "inside" observation will decrease a misinterpretation of different situations. The *participation* of the researcher (his intervention and action) is needed in order to create situations which contain empirical data of interest. (Cf e.g. Argyris, 1970; Gummesson, 1988 and Patton, 1990).

This method for change analysis has been used in many other situations. The reasoning in section 3 is influenced not only by the case study mentioned, but also by these other applications. The actual case study has been more thoroughly described in Goldkuhl (1990).

A short introductory description of the case: The organization was a rather big food production company. The purchasing department of this company wanted an information system for purchase statistics. The IS manager of the company did not want to start with an ISD project directly. Instead he suggested a change analysis which was performed. The food enterprise consisted of five districts. Every such district involved several local production units (LPU). The district office was also responsible for marketing within its geographical area. At each district office it was a district purchasing manager. At the Head office it was a central purchasing department. The managers of purchasing at Head office were working mainly with negotiations and contracts with suppliers. The district purchasing managers acted as coordinators between the central purchasing department and people at the local units performing purchase.

The project group (of the change analysis) consisted of some persons from the central purchasing department, one district purchasing manager, one systems analyst from the IS department and one consultant/action researcher. In a reference group, which was rather active and involved in the change analysis, there were the other four district purchasing managers and one representative from an accounting department. There were no representatives from the local production units. This can be considered as a shortcoming of the composition of the team.

3 JOINT PROBLEM ANALYSIS AS A BASIS FOR SOLUTIONS

3.1 The nature of problems

Creation of change in organizations is based on some conception of problems, not always an explicit problem statement. Sometimes problems are only implicit and not well articulated. Anyhow, we presume, there are some underlying conceptions of present organizational situation behind most planned intervening changes. This is a reason to take an interest in the concept of a problem.

Problems are often *vague* and *ambiguous* (Schön, 1983; Checkland, 1981). People experience organizational situations as problematic or unproblematic (i.e. satisfactory). A problem is not an "objective fact". It is dependent on a person's perception of a situation and thus on his *perspective* and *preferences* (Röstlinger, 1982). A problem is here defined as a subject-object relation, i.e. a relation between a person and his environment. The person experiences and perceives some part of the environment as unsatisfactory. Problems arise in the meeting between a human being and his situational environment.

Problems are thus person dependent. Different persons may imply different problems. When working with problems we can have different problem descriptions of the same situation. Different persons may have different problem conceptions. Due to differences in perspective and preferences various people perceive one situation in different ways and also which situations are judged problematic. This is not to be considered as an insurmountable obstacle, but rather as an inherent constituent in organizational problem solving and change. Initial differences in problem conceptions should be accepted and even seen as desirable. Different problem conceptions can be important for the possibility to really improve the organizational situation.

A certain situation can both be regarded as problematic and as unproblematic, both at the same time. One and the same situation can consist of several aspects. One aspect is a result that means something positive for the organization and its goals. Another aspect can be a result that means something negative for the organization and the fulfilment of goals. When we want to change a situation we want to reduce its negative (problematic) aspects but not the positive (unproblematic) side.

The very first conception of a problem is often not the most adequate one. It might be vague and thus not very well articulated or even well understood. A deeper problem comprehension is usually necessary to be clear of the relevance and meaning of different problems. Problem conceptions can gradually evolve when penetrating them. We deal with problems that are initially ill-defined and unstructured. This does not mean that it is impossible to continuously get a better understanding of the problem situations. When penetrating problems in a proper way it is possible to reach such an enhanced problem understanding.

Another important feature of organizational problem solving is the existence of many problems. There is not the problem to be solved. It is rather a complex of different problematic situations to be understood and improved.

A short summary of the nature of problems:

- Problem conceptions govern formulation of solutions. Therefore the understanding and definitions of problem are important.
- A problem is regarded as a situation in the organization which is considered as unsatisfactory by one or several persons.
- Different persons hold different problem conceptions due to differences in perspectives and preferences.
- Many problems are initially vague and not well comprehended.
- It is possible and necessary to continuously improve the problem understanding.
- There is not the one and only problem to be found. It is a complex of different interrelated problematic situations to be investigated and understood.

3.2 Development of problem understanding

3.21 Don't take problems for granted

Several persons usually participate in an organizational change process. As has been described above their problem understanding is usually unclear and differing at start. There is a need for a joint development of problem understanding.

We take one example from our case (introduced in section 2 above) for illustration of this need for development of problem understanding. Initially the main problem described was as follows: "Incomplete basis for negotiations about new contracts with suppliers". The personnel at the central purchasing department complained that the suppliers often had better information (even about purchase distribution among the local production units) than they had themselves. They felt to be in a weak position in the negotiations. They had some vague ideas about an information system for purchase statistics that would improve the situation. After some work with problems it became obvious that this stated problem was not the most important one.

Not the most important problem - since it was no such problem in this study - but one very important problem was: "The local production units (LPU) do not purchase from contracted suppliers". Not all purchases from LPU were done in accordance with contracts. Now and then other not contracted suppliers were used. It was known in the organization that this occurred, but not the frequency and amount of it. It was not dealt with. People only complained about it occasionally.

After working with problem analysis for a while it became apparent that it was of no use to improve negotiations about

new contracts if contracts was not followed properly in the organization.

This little example shows a *shift in problem attention* during the problem analysis work. The initial problem focus was inappropriate. To deliberately work with problems and problem formulations will enable such important shift in problem attention. It became obvious for all the participants in the process that the first problems were a too restricted basis for formulation of solutions. The lesson to learn is do not take initial problem statements for granted as an adequate basis for creating solutions. First improve your problem understanding supported by a critical perspective.

3.22 Stepwise refinement of problem formulations

This kind of "problem development" involves also a stepwise refinement of problem formulations; from rather vague to more precise ones. One example of this. One first formulation was:

"LPU purchase wrong".

In what sense did they purchase wrong? A good analyst should not accept too unclear and confused statements. He must ask until he and other arrive at a sufficiently intelligible formulation. One step further was:

"LPU do not purchase from contracted suppliers".

One step additionally was to state:

"LPU do not purchase from contracted suppliers. They buy from other suppliers".

It is important to reach more clarity of problems. We should not stop at vague statements. It is usually possible to try out different formulations and see which one is best representing the current understanding of the problematic situation.

3.23 Contextual problem search

Even if more appropriate problems are focused there might be too much restriction in the problem search. Why did LPU not always buy from contracted suppliers? Those performing purchase did not always use the (manual) purchase register which contained information about contracts. This is expressed in figure 2, which is an extract from a problem diagram representing problem cause and effect relations. Later this will be further elaborated.

This analysis (in figure 2) represents a focus on one cause of "LPU do not purchase from contracted suppliers". It is a focus on an information problem. It is a situation where a manual file is not used properly. For an IS analyst this might be an interesting problem cause, since it indicates the possibility to introduce computer-based information handling. If one restricts the analysis to only this cause it is obvious that there is a risk for getting nothing else than computer-based

systems as change measures. It is important to look for problems of different kind and not only those that suit one's professional knowledge. IS specialists seem to have a tendency, due to education and practice, to direct their attention to problems of information and computing nature in the organization. It is important that the arrangement of the problem analysis work balances this tendency towards IS bias.

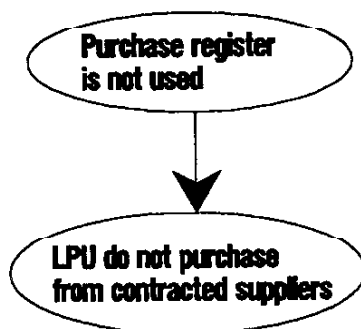


Figure 2 Problem relation

Other possible causes must be investigated. Another complementary way of explanation is: "The purchase is not done according to standard procedures". And this in turn will lead to additional questions and answers. This is described in figure 3 which is a more comprehensive problem diagram. This investigation of causes has so far been directed towards "why do not use contracted suppliers". A complementary question (according to the complete formulation in the text above) is to ask "why do they purchase from other suppliers?". The answers to this question is illustrated in the problem diagram of figure 4.

In the problem development process all problems and even all types of problems are *allowed*. We do not classify the problems in types of problems, e.g. organizational problems, IS problems, personnel problems. To predefine problems in such a way is to direct the thinking towards certain solution areas. It would be to have an - explicit or implicit - solution bias in the problem statements.

3.24 Unravel problems through visualization

Compare figure 2 and figures 3-4. It is apparent that the two problem diagrams (3-4) represent a richer picture. The knowledge behind the elaborated diagrams should be more useful when finding an appropriate set of measures dealing with these issues.

We will take these different problem diagrams as a starting point for discussions on several issues within problem analysis. Different users participating in change analysis will have different problem conceptions. It is important that these different conceptions are taken care of and documented together. This can be done in descriptions like problem diagrams. It is important for the emotional involvement and the

motivation to participate that "I can see that my problems are treated within the group process".

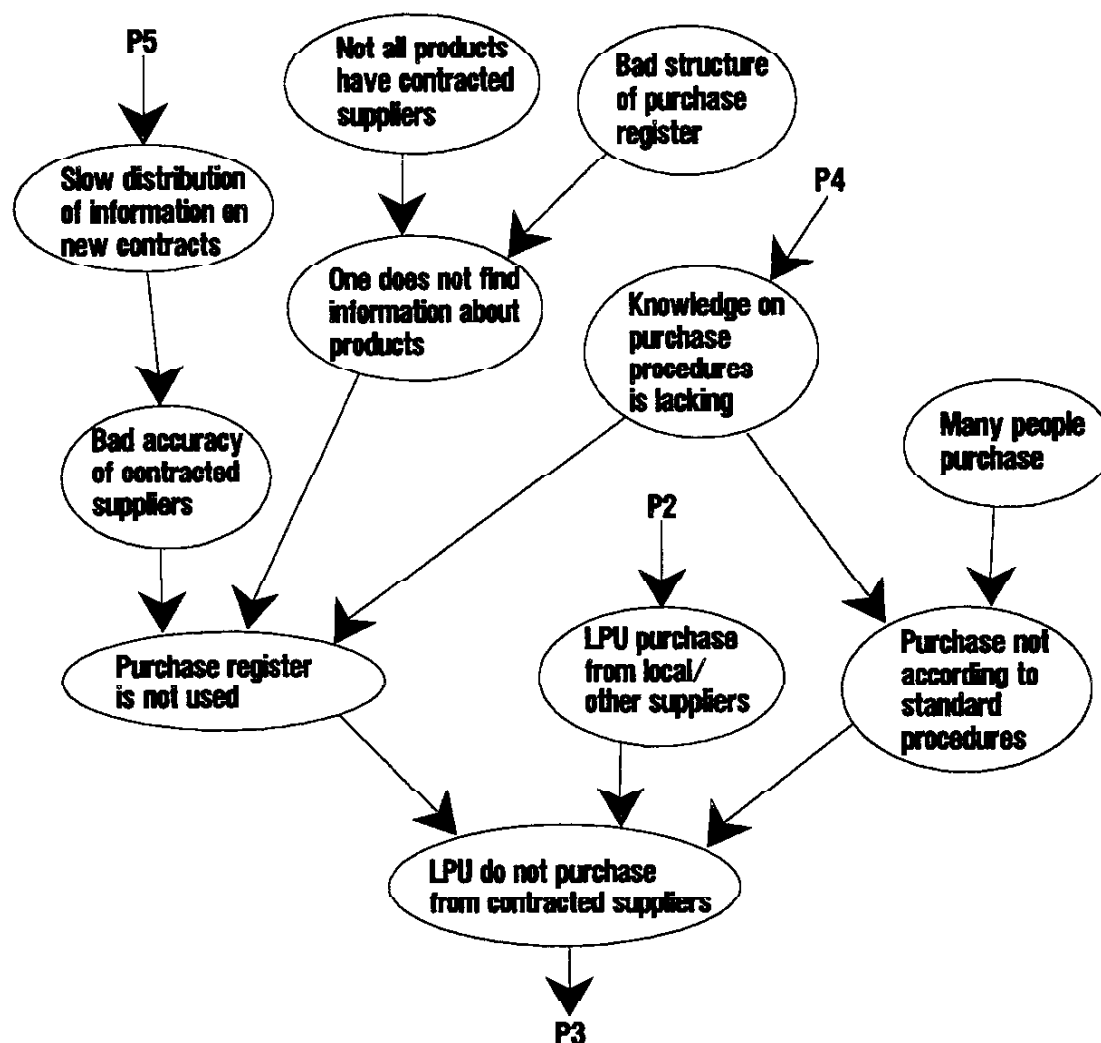


Figure 3 Problem diagram P1

Problem analysis is a process of exploration and unravelling of a problem complex. This is a task of great challenge both concerning social interaction (enhancing communication and active participation and dealing with conflicts) and cognition (treatment of many elusive issues and complex structural relationships). It is nearly impossible to keep in mind many problems at one time and also be engaged in discussions concerning alternative interpretations and relations. Psychological experiments (Miller, 1967) have shown what is evident to us that humans have a limited capacity for comprehension. The standard way for enhancing human comprehension is through using external media; some kind of documentation. Problem diagrams act as an aid to explore and unravel complex problem relations which otherwise would not be possible in such a scrutinizing way. Problem diagrams act as an aid for visualization and illustration of problems. This will enhance the possibilities for active communication and participation in the process. Problem diagrams are very simple

diagrams expressing relations between problems; cause and effect relationships. Perhaps just because of their *simplicity* these diagrams have shown to be a very *powerful* analysis and description tool. The diagrams can be used without any prior education in change work due to their intuitive intelligibility. When using them during problem analysis it is possible to directly record the problem discussions. The problem analysis is performed in the problem diagrams.

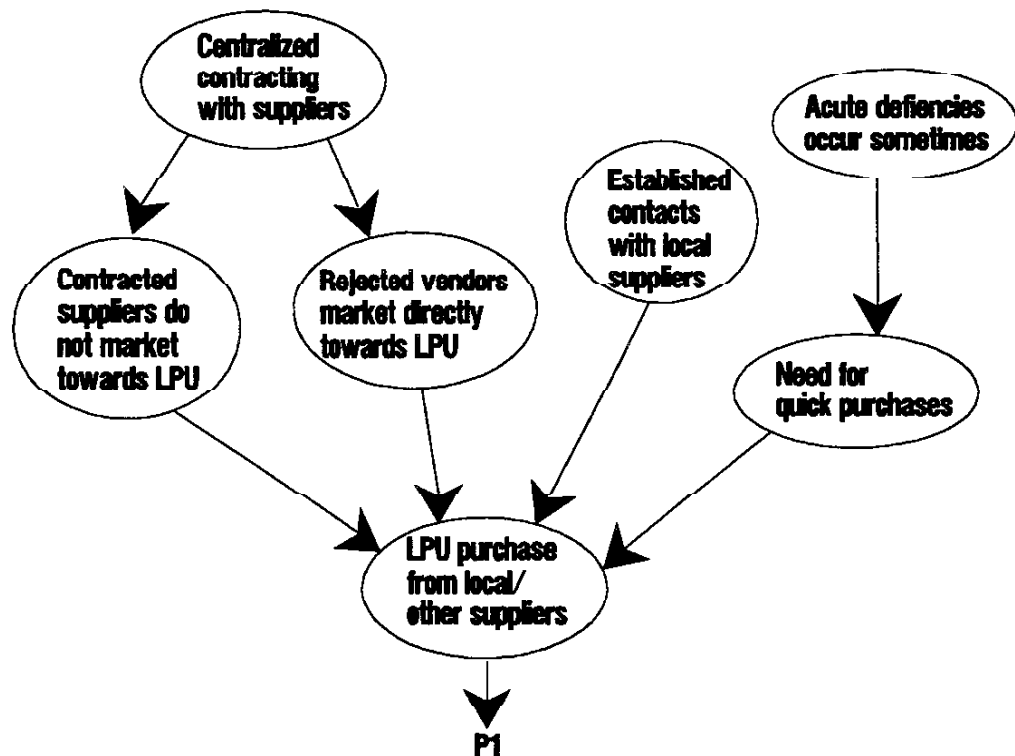


Figure 4 Problem diagram P2

The experiences from this and other change analysis projects are very positive concerning problem diagrams. Some quotations from different participants in the project (from the interviews after the project):

"The problem diagrams are good. They are disclosing. Important to see causes. I believe in problem diagrams but they are a new way of working for us".

"very good aid for the process. I had some difficulties in the beginning, but I learned quickly".

"A good way for eliciting the problems".

Were there no negative opinions concerning the problem diagrams? There were some critical comments, but not concerning problem diagrams as such. One comment was about the choice of perspective: "Head office-perspective in some diagrams. Some problems and problems diagrams are missing from our perspective". (This was a comment from a district purchasing manager).

Another comment was concerning the precision in the diagrams: "Some diagrams are good, some other are not as good - fuzzy. We should have used more time here. It is very important that we have done this problem investigation".

3.25 Problems as causes

The problem diagrams describe problems in terms of causes and effects. We claim that this is very important. Some arguments have been raised earlier in this section, and we continue this discussion here. A basic presumption is: To change problematic situations to less problematic ones, there is usually a need to influence their causes. To do so, one needs to have knowledge about causes. In order to get such knowledge we investigate problematic situations in order to find out cause relations. Starting from one important problem (e.g. "LPU do not purchase from contracted suppliers") one asks questions like "what causes this problem?". These questions are posed in the project group and often also to other people around in the organization. When there is an answer that is accepted (e.g. "Purchase register is not used") this can be documented in the problem diagram. The analysis does not stop there. One asks "Are there any other causes?". There are other causes as you can see from the problem diagrams. To continue this asking is important since it can help us to avoid a too narrow problem focus. This was the core of our argumentation above concerning IS bias in identifying the problem cause "Purchase register is not used".

When we have identified such a problem cause we can also use this as a starting point for further analysis. "Why is not the purchase register used?". There are several answers to this question expressed in the problem diagram (figure 3). By this procedure we can investigate and illustrate complex and long problem chains. Different problem diagrams are connected to each other (cf figure 3-5). The notational rules for problem diagrams are very simple. They are only sketched here. A more proper description including some other notational elements is found in Goldkuhl & Röstlinger (1988).

3.26 Problems as effects

We have here described one way to get a picture of the problem structure: The cause directed questions. But that is not the only way. You can also pose effect questions like: What are the consequences of this problem? What does this problem entail?

The problem "LPU do not purchase from contracted suppliers" has certain effects. These are illustrated in the problem diagram of figure 5. It is important to perform not only a cause oriented analysis. Through an effect oriented analysis it is possible to justify that the problems dealt with are "heavy". The problem "LPU do not purchase from contracted suppliers" has severe consequences in the organization which can be seen from figure 5. Of course the problem diagram gives only a qualitative picture of the problems. It must in many cases be supplemented by quantitative figures. In this case different costs should be estimated.

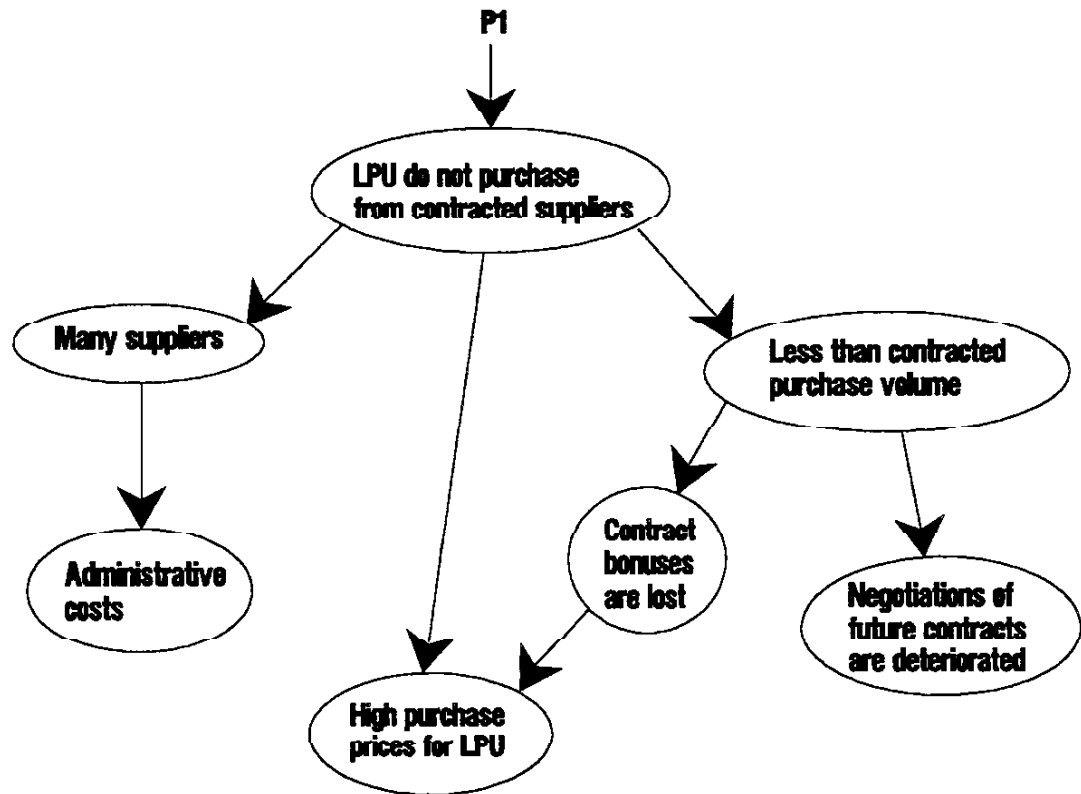


Figure 5 Problem diagram P3

This raises also the general question of *validity* of problem relation statements. Some relations are obvious when identified. Other stated cause-effect relations should rather be seen as hypotheses, and therefore some minor or larger investigation is needed to control their validity.

Problem analysis work usually has an iterative character and it should be performed in this iterative way. The cause and the effect questions should be put alternately. One does not arrive at an appropriate problem diagram at once. Usually several versions must be drawn. A good metaphor for this active problem diagrams work is "problem kneading". Working in this fashion we can arrive at a rich problem picture.

3.27 A strive for intersubjectivity

One of the most important rationale for this kind of problem analysis is the observations from this and other cases, that

- a deeper problem understanding among the participants can gradually evolve
- an intersubjective sharing between the participants on problem conceptions can be reached

This kind of problem analysis will usually be intensive communication processes. Different participants share their problem conceptions. They have to express their opinions about different situations in the organization. Are they problematic or not? When including a pressure of recording parts of this

communication in a structured documentation (like problem diagrams) the discourse can step by step be more precise. People come to understand each others problem conceptions better. They can no longer take their own problem conceptions for granted in the same way, since they often become questioned by other participants. There are possibilities to arrive at an *informed and well grounded consensus* on problems (Habermas, 1979; Lyytinen, 1986; Hirschheim & Klein, 1989). There can of course be severe conflicts in the organization that make any consensus impossible. There can be different groups with differing interests and goals and thus great difficulties in cooperation (Thompson, 1967; Mintzberg, 1979).

We have anyway observed situations which at start tended to be divergent, but later on become convergent in respect to problem conceptions. In the purchase case our judgement is that the participants arrived at a well established intersubjectivity on problems. It was not a total consensus, which usually is very hard to achieve. One of the quotations above from a participant shows that there still exists some controversy between one district office and the head office.

We claim that problem intersubjectivity is very important as a basis for further development work. If different persons hold very divergent opinions about problems this will affect the following work in infelicitous ways.

We also refer to the *principle of cognitive participation* by Berger (1976). Since solutions are framed by the ways people define problems, it is necessary not only to participate in decisions concerning solutions, but also in the process of problem definition.

3.3 From problems to solutions

As mentioned before IS analysts often find IS solutions when solving problems. And when IS solutions are suggested as change measures within an ISD context few arguments will be raised against this type of solution. But if we want to establish a problem solving process based on *critical rationality* we cannot take IS solutions for granted. Problems can often be solved in many ways. And one way can be an IS solution but this is not always the best solution. Other types of solutions can be more adequate for the current situation.

To solve a problem or a complex of problems we often require several different solutions. The different change measures are often of different kind. IS development and other types of solutions, e.g. personnel measures, are related within a change measure program. Every solution has its own function but the different solutions must fit together within the same program. The change measures must cooperate in order to achieve a good solving of the complex of problems as a whole.

In the purchase case there were several measures within a change program. To give some examples from the change measure list:

- Renewed purchase manual

- Formulation of policy and work procedures for follow-up of purchase activities
- An integrated information system for purchase functions; support for order, delivery control, invoice handling and purchase statistics
- New routines for contracts administration

The result was a much broader change program than was anticipated before the change analysis. The managers of purchasing asked for an IS for purchase statistics and instead of only that they got involved in a process of change which included major improvements of the whole purchase function. Perhaps the IS manager was the most happy one, and expressed it in this way: "It is good that they develop their own activity first, instead of we messing it up with an information system that would not fit in at the moment. It is also good that they understand this by themselves and that we do not need to tell them to develop their own activity first".

This change analysis approach takes a critical standpoint towards changes including information technology. Pure IS enthusiasts may dislike it for that reason. It should however be noted that the proposed information system was much more comprehensive than anticipated. Using change analysis is a good way of investigating IS opportunities.

The more we know about the problems, goals and the organization the more and better solutions we can be able to create. To decide on solutions we must develop a good problem understanding of what is going wrong in the organization. The organizational setting and people's problem conceptions constitute the basis for changes in the organization. To know the basis for changes is a prerequisite to develop the most adequate change actions.

A certain solution which is right from one problem conception is perhaps not right from another problem conception. One way to learn about the problems and the organization is to perform a problem analysis.

To formulate change measures is a quite creative process. But the whole creative process does not begin with creating solutions. The complete change analysis is a creative process. A creative process is often described as consisting of four phases: Preparation, incubation, illumination and verification (Harman & Rheingold, 1984). To perform the problem analysis and to analyse goals and organizational activities are parts of the creative problem solving process. These parts form together the preparation phase in the creative problem solving process. Appropriate analyses and descriptions of problems, goals and organization and its activities form a basis for creation of (possibly) innovative solutions in the later illumination phase.

The more we know about the problems, goals and organization the better is the possibility to decide on the most adequate solutions. When choosing and deciding about solutions we have to examine and problemize which are the most appropriate

solutions in the current situation. We have to get an adequate prediction on the effects of the solutions. For every solution we have to determine the possible effects on fulfillment of goals and reduction of problems. This is a part of the *verification* phase of the problem solving process.

To create alternative solution ideas is one condition to find adequate solutions. To choose one solution is also to reject other solutions. It is important to know several alternative solutions if we want to make the decision process as rational as possible. In that case we must have the opportunity to consider both solutions to choose and solutions to reject.

To generate solution ideas is a creative process based on problems, goals and organizational knowledge. The adequate solutions are thus based on, but not formally derived from, knowledge of problems, goals and organization. But when we have created the proposed solutions, then we have the possibility to check the congruence of the solutions. We can examine the solutions and check that they are in accordance with earlier statements on problems and goals. By this examination we can rank and give priority to the solutions. In this way the produced descriptions of problems and goals have the function of being the *arguments* for choosing or not choosing a certain solution. We arrive at a *reconstructed rationality* of proposed change measures.

Problem, goals and the proposed solutions must together form a *transparent basis* for decision making on change measures. A transparent decision basis is a necessary condition for good user participation and influence as well as for critical rationality in the decision process.

4 PROBLEM ANALYSIS AS A PART OF CHANGE ANALYSIS

We have described the process of problem analysis, and accompanying this an implicit method description. Problem diagrams mentioned above (section 3.2) are only one part (but an important one) in this methodology for change analysis. The methodology is called CONTACT (CONTEXTUAL ACTIVITY analysis). A comprehensive description of the methodology is found in Goldkuhl & Röstlinger (1988).

Change analysis/CONTACT consists of five areas. They are depicted in figure 6. Each area consists of work procedures and documentation techniques. The methodology as a whole is based on an underlying framework. Some parts of this framework have been treated in this paper. (Cf Avison & Fitzgerald, 1988 on the concept of a methodology. Our use is in alignment with their definition).

Below we describe problem analysis in some detail. The other areas are only roughly characterized.

Problem analysis starts with a *delimitation of the area to investigate*. The first delimitation will be preliminary, and probably revised later in the process if new insights indicate a required shift in attention. It is important to have

delimitation in order to get a directed analysis, but one should still be open-minded for other aspects. Problems are identified and formulated. They are documented in a simple problem list. The problems are continuously reformulated during this process of problem learning. An analysis of problem relations (causes and effects) is performed and documented in problem diagrams. Usually several problem diagrams are made and they are interrelated to each other to visualize complex problem chains. The two main forms for documentation during problem analysis (problem list and problem diagrams) are used iteratively throughout the process.

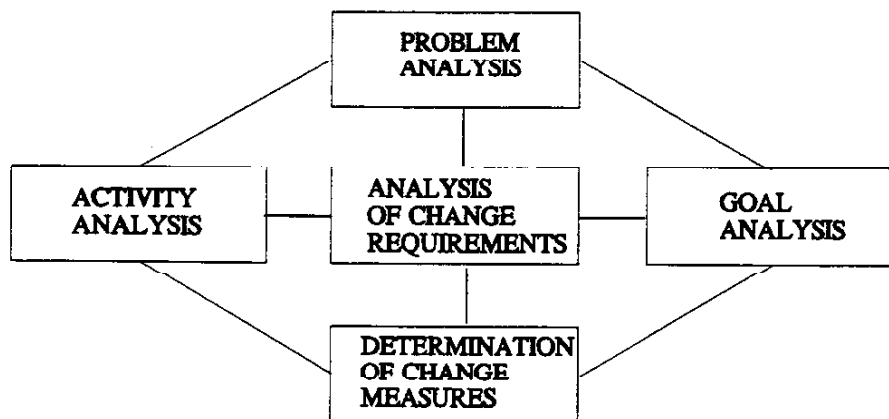


Figure 6 The structure of change analysis/CONTACT

Goal analysis means working with goals and objectives in the area of investigation. Goal analysis consists of goal identification, analysis of goal relations, goal evaluation and goal determination. Two forms for documentation are used: Goal list and goal diagrams. Analysis of organizational activities is performed in a contextual way, using Action diagrams (Goldkuhl, 1992). The analysis of problems, goals, and activities is summarized in formulation of change requirements. These change requirements form a basis for generation of proposals for changes. These proposals are evaluated before choice.

5 CONCLUSIONS

This approach to problem analysis within change analysis is characterized by some certain features:

- recognize the vagueness and ambiguity in problems
- stepwise refinement of problem formulations
- do not take problems for granted
- shift the attention between different problem areas
- contextual problem search
- avoid solution bias in the problem statements
- unravel problems through visualization
- investigate problem causes
- investigate problem effects

- a strive for intersubjective understanding of problems
- recognize problem analysis as part of a creative process
- use the deeper problem understanding to generate change proposals of different kind

This approach is an attempt to avoid IS solution bias contained in traditional life cycle models. It is also an attempt to avoid a rationalistic problem solving contained in traditional models for decision making (cf e.g. Simon, 1957). This kind of decision models have been criticized for being over-simplified, too individualistic and mechanistic (cf e.g. Pettigrew, 1973; Mintzberg, 1978; Schön, 1983; Ciborra, 1984; Winograd & Flores, 1986). The rationalistic model does not seem to take into account the specific features of this kind of decision situation (when investigating and choosing ISD as a change measure): Different persons (with different backgrounds) dealing with a complex problem and goal situation (March & Olsen, 1976). Besides this, these kinds of situations also contain organizational and technological aspects which are intertwined in complicated ways. This necessitates an explicit and appropriate problem definition phase (Jones, 1970).

In this paper we have presented parts of a problem solving approach which we claim to be appropriate during change analysis because it is

- sensitive to the character of this kind of decision process
- not taking IS development for granted
- considering the social nature of this process and the need for participation

ACKNOWLEDGEMENTS

Parts of this research has been financially supported through a research grant from the Faculty of Arts and Sciences, Linköping University and a research grant from The Swedish Association of Local Authorities.

REFERENCES

- Argyris C (1970) *Intervention theory and method. A behavioral science view*, Addison-Wesley, Reading
- Avison D E, Fitzgerald G (1988) *Information systems development. Methodologies, techniques, tools*, Blackwell Scientific, Oxford
- Bemelmans T (Ed, 1984) *Beyond productivity: Information systems development for organizational effectiveness*, North-Holland, Amsterdam
- Bemelmans T & Eloranta E (1984) On systelological design of information systems, in Bemelmans (1984)
- Berger P L (1976) *Pyramids of sacrifice. Political ethics and social change*, Anchor Books, Garden City
- Checkland P (1981) *Systems thinking, Systems practice*, John Wiley, Chichester

- Checkland P (1991) From framework through experience to learning: the essential nature of action research, in Nissen H-E, Klein H, Hirschheim, R (1991) *Information systems research: Contemporary approaches and emergent traditions*, North-Holland, Amsterdam
- Ciborra C U (1984) Management information systems. A contractual view, in Bemelmans (1984)
- Davis G B & Olson M H (1984) *Management information systems. Conceptual foundations, structure and development*, McGraw-Hill, New York
- Goldkuhl G (1984) ISAC omvärderad, (In Swedish/ISAC reconsidered), in Nissen HE (Ed, 1984) *Systemutveckling - av vem, för vem och hur?* Arbetarskyddsfonden, Stockholm
- Goldkuhl G (1990) *Förändringsanalys av inköpsverksamhet - erfarenheter från en verksamhetsöversyn*, (In Swedish/Change analysis of purchase activities), Dept of Computer & Information Science, Linköping University
- Goldkuhl G (1992) Contextual activity modelling of information systems, in proc of 3rd Int Working Conference on Dynamic Modelling of information systems, Noordwijkerhout
- Goldkuhl G, Röstlinger A (1984) The legitimacy of information systems development - a need for change analysis, in *Proceedings of IFIP Conference Human-Computer Interaction*, London
- Goldkuhl G, Röstlinger A (1988) *Förändringsanalys*, (In Swedish/Change analysis), Studentlitteratur, Lund
- Goldkuhl G, Röstlinger A (1992) *Change analysis to decide on information systems development*, Dept of Computer & Information Science, Linköping University
- Gummesson E (1988) *Qualitative methods in management research*, Studentlitteratur, Lund
- Habermas J (1979) *Communication and the evolution of society*, Heinemann, London
- Harman W, Rheingold H (1984) *Higher creativity*, Tarcher, Los Angeles
- Hirschheim R, Klein H (1989) Four paradigms of information systems development, *CACM* vol 32 nr 10
- Jones JC (1970) *Design methods*, Wiley-Interscience, London
- Lundeberg M, Goldkuhl G, Nilsson A (1978) A systematic approach to information systems development - I. Introduction; - II. Problem and data oriented methodology, *Information Systems*, Vol 4, p1-12, 93-118

- Lundeberg M, Goldkuhl G, Nilsson A (1981) *Information systems development - A systematic approach*, Prentice-Hall, Englewood Cliffs
- Lyytinen K (1986) *Information systems development as social action: Framework and critical implications*, Jyväskylä University
- March J G, Olsen J P (1976) *Ambiguity and choice in organizations*, Universitetsforlaget, Bergen
- Miller G A (1967) *The psychology of communication*, Basic Books, New York
- Mintzberg H (1978) Beyond implementation. An analysis of the resistance to policy analysis, *IFORS Conference*, Toronto
- Mintzberg H (1979) *The structuring of organizations*, Prentice-Hall, N.J.
- Patton M Q (1990) *Qualitative evaluation and research methods*, Sage, Newbury Park
- Pettigrew A M (1973) *The politics of organizational decision-making*, Tavistock Publ, London
- Röstlinger A (1982) Problem analysis - a methodological outline, in Goldkuhl G, Kall C-O (Eds, 1982) *Report from the fifth Scandinavian Research seminar on Systemeering*, Department for information processing, Chalmers University of Technology, Göteborg
- Röstlinger A, Selldén J (1983) How to perform an empirical study on a change analysis method, in *Proceedings from 6th Scandinavian Research Seminar on Systemeering*, University of Bergen
- Schön D (1983) *The reflective practitioner - How professionals think in action*. Basic Books, New York
- Simon H A (1957) *Administrative behaviour*, Macmillan, New York
- Sol H G (1992) Information systems development: A problem solving approach, in Cotterman W, Senn J (Eds, 1992) *Challenges and strategies for research in systems development*, Wiley, Chichester
- Thompson J D (1967) *Organizations in action*, McGraw-Hill, N.J.
- Winograd T, Flores F (1986) *Understanding computers and cognition: A new foundation for design*, Ablex, Norwood
- Wood-Harper T (1985) Research methods in information systems: Using action research, in Mumford E et al (Eds, 1985) *Research methods in information systems*, North-Holland, Amsterdam
- Yourdon E (1989) *Modern structured analysis*, Prentice-Hall, Englewood Cliffs