PIE goes corporate

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Abstract

The objective of this master thesis is to test and evaluate the PIE methodology outside the university environment in two aspects. One aspect is to test and evaluate a multimedia-based scenario with role-playing, as a starting point for further learning activities, for participants in a corporate setting. The second aspect is to evaluate the development process that has taken place in collaboration with representatives from a corporation. The evaluation, of PIE as a starting point for further learning activities in a corporate setting, indicates a very positive reception from the participants. The reflections upon the developing process in collaboration with representatives from the organization in this study also indicate a very good result. The research contributes with guidelines for further development.

Supervisor: Urban Nuldén

IA7400, Magisteruppsats, 20p, HT99

Contents

1. Introduction

> *"There can be no knowledge without emotion. We may be aware of a truth, yet until we have felt its force, it is not ours. To the cognition of the brain must be added the experience of the soul."*
> - Arnold Bennett

The above quotation, from a 19th century production by the English author Arnold Bennett, emphasizes the importance of learning through experience. The study in my master thesis is an attempt to create an environment for experience-based learning through the use of information technology.

My main interest is not the learning issues as an isolated topic; instead it is the use of information technology (IT) in a learning context. Therefore I do not give an exhaustive description of the theories of learning, section 2. Instead I highlight major differences among the more widely accepted models of learning.

This is my fifth year as a lecturer in informatics at the University College of Borås and during my years as a lecturer, discussions about education and ways of learning have taken place. What have got most of my intention are the techniques and methods that are and should be developed when IT is used in education.

The lack of human resources, i.e. lecturers in informatics, at universities in Sweden has affected me in my profession. The situation, for my colleagues and me, is far from idealistic; something has to be done. It is important to develop methods and come up with ways in order to increase the efficiency and flexibility of the existing lecturers - in a global perspective.

In most of the discussions with colleagues, the topic has been; separate the students from time and space with the support of IT, i.e. students on distance. From my experience there is a need to turn around the discussion, i.e. lecturers on distance. The importance of the distance issue itself is not to be exaggerated, but

it has triggered an interest in rethinking the way of which the education system is structured. We need to rethink the roles of lecturers as well as the roles of students to achieve efficiency and flexibility.

> *"…When we are building electronic learning environments in higher education we should not aim at replicating the old practice with new tools but instead actually create new cultures of learning in which tradition and new approaches meet."*
> *(Urban Nuldén, 1999, preface iii)*

As Nuldén says we should think in a new manner when building electronic learning environments in higher education. In addition, I believe this applies to almost any learning environment. Irrespective of the learning environment we should create new cultures of learning when we are building electronic learning environments. There is a need for change.

At the Viktoria Institute in Gothenburg, there is research within a variety of areas of informatics. The research group that has got my intention is the Viktoria Interactive Learning group, VIL. When I met Urban Nuldén, Ph.D., at the Viktoria Institute in the beginning of the summer he asked me if I wanted to be a part of a project, the Copernicus project, that was in an initiation phase at that time. Since the project deals with issues such as corporate training through experience-based learning, and group activity with problem solving supported by interactive multimedia I decided to join in.

My master thesis is a report of the current status of the Copernicus project. The project itself is in an early stage of an action research cycle. Action research is discussed in section 5.

With the assumption about learning theories described in section 2 and interactive multimedia, discussed in section 4, as a foundation we have designed an electronic learning activity. The electronic learning activity in this study is multimedia-based scenarios with role-playing.

There are five persons, including me, from the Viktoria Institute that works with the Copernicus project. So far, two multimedia scenarios has been developed and enacted. The first scenario, Project, was developed as a pilot scenario in order to have an example to show for interested corporations and corporations we already collaborate with. Global is the name of the second scenario developed within Copernicus. Global is a result of work done in collaboration between the Viktoria Institute and Volvo Parts. The main purpose of Global is to facilitate better project management with focus on aspects of cooperation and globalization.

Section 6 and 7 describes the two multimedia-based scenarios in greater detail. Section 6 gives the content of the scenarios, while section 7 guide you through the action research cycle that we have adapted.

2. Theoretical background

> *"No man's knowledge can go beyond his experience."*
> - John Locke

In this section the theoretical foundation of my research is described. The purpose is to give the reader an insight in how different ideas and theories have influenced my perspective of the learning process.

The following sections, 2.1 and 2.1.1, are strongly influenced by Leidner and Jarvenpaa (1995) and most of its content can be referred to their article. The overall structure of section 2 is influenced by Nuldén's Ph.D. thesis (1999).

2.1 Theories of Learning

There is a variety of learning models and in order to categorize them in a manageable manner I use the classification of learning theories being either behavioral or cognitive.

The behavioral models view learning as being a transmission of knowledge from the teacher to the learner. This traditional model of learning is also referred to as objectivism, which is based on Skinner's stimulus-response theory. The teacher, who is active, determines what objectives the learners, who are passive, should achieve. These objectives are met when the learner responds in a certain way, based on controlled stimuli. The cognitive models, in opposite to the behavioral models, view learning as individual knowledge construction. In the next section the cognitive model constructivism is described. The form of constructivism is founded on Piaget's theory.

Cognitivists are concerned with the study of individuals' perceptual processes, problem-solving abilities, and reasoning abilities. Cognitive models give learners control by introducing conceptual frameworks, and by relying on both experiential and discovery learning.

2.1.1 Constructivism

The view of learning that stands in contrast with the traditional model of learning is the constructivist model. The methodology used throughout the research in this master thesis has the foundation in the constructivist model. This is the reason why I will leave Skinner and his fellow-believers behind and focus on constructivism.

The constructivists emphasize that learning is a process of constructing knowledge by an individual. Individuals learn better when they discover things themselves and when they control the pace of learning. The educator becomes a facilitator or an instructor for support rather than direction.

2.1.2 Collaborative model of learning

An offspring to the constructivist model is the collaborative learning model. Whereas in constructivism learning is assumed to occur as an individual interacts with objects, in collaborativism, learning emerges through interaction of individuals with other individuals (Slavin, 1990).

The main purpose of collaborative learning is the construction of shared understanding, through interaction with other individuals. Collaboratists assume that knowledge is created as it is shared, the more knowledge is shared, and the more is learned. It is sharing knowledge from individuals through collaborations.

The contribution of different understandings leads to a new shared knowledge, this is the focus of the next two sections.

2.2 Experiential learning

There is a substantial body of research available surrounding experiential learning. From a modern perspective we can trace some of the most influential research back to the philosopher John Dewey, the organizational theorist Kurt Lewin and the psychologist Jean Piaget (Kolb, 1984).

When a person is involved in an activity, reflects and evaluates it, determines what was useful or important to remember and then use this information to perform another activity. According to Dewey (1938), experiential learning has taken place.

There are many models in experiential learning theory. Kolb writes about the Lewinian Model, Dewey's Model and Piaget's Model (Kolb, 1984). Greenaway, on the other hand, writes about learning cycles. He categorizes them after how many stages there are in the cycle. The dominating cycle in experiential learning theory is a four stage learning cycle. According to Greenaway, Kolb's model of the experiential learning cycle is the most frequently quoted (Greenaway, 1995).

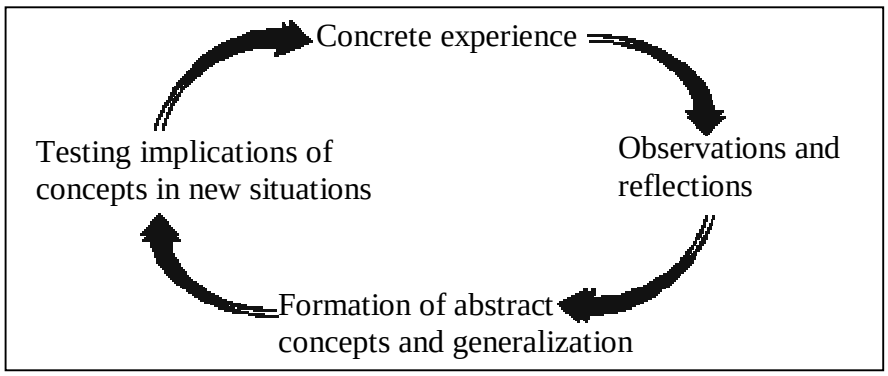


Figure 2-1 Kolb's model of the experiential learning cycle

Kolb's model of the experiential learning cycle or the Lewinian Experiential Learning Model, shown in figure 2-1, are divided into four stages:

1) concrete experience
2) observations and reflections
3) formation of abstract concepts and generalization
4) testing implications of concepts in new situations

From our own experience, we observe and reflect so that we can formulate new concepts, principles and strategies for action. Finally, we experiment and practice them in new situations.

There are numerous definitions of experiential learning, and so are the terms in which experiential learning is referred. Either it is referred to for instance;

learning-by-doing or learning-in-doing (Kolb, 1984) the core of experiential learning remains the same. Experiential learning is all about encouraging learners to observe, think, analyze, evaluate, and apply what they have learnt. It is not just about having practical experiences but using those experiences to move through to higher levels of learning.

> *"Experiential learning is participative, interactive, and applied. It means contact with the environment and confrontation to processes that are uncertain."*
> (Nulden and Scheepers, 1999)

They continue

> *"…The educator is responsible for providing the experiential stimulus. The quality of the stimulus will vary depending on the pedagogical approach applied. Multimedia has often been applied to support experiential learning activities."*
> (ibid.)

Experiential learning refers to work in small groups and some examples of experiential learning are internships, case studies, role-play, games and simulations (Nuldén and Scheepers, 1999).

2.3 Problem based learning

Problem based learning (PBL) is not an alternative pedagogical method, rather it builds on fundamentally different understanding of learning than traditional teaching. It focuses on the learner's interest, activity and responsibility, the learner's own contribution towards life-long learning (Kjellgren et al, 1993).

Teachers using PBL do not perform traditional lectures, instead they become facilitators who guide students' learning, probe their reasoning, and encourage them to become active and responsible learners. The teacher acts more as a facilitator than disseminator of information. Since teachers act as facilitators, the learners are required to take responsibility for their learning (Burch, 1997).

Three fundamental characteristics or processes of PBL (Kjellgren et al, 1993):

1) Process of problem solving
2) Self-directed learning
3) Work in groups

The three processes are parallel and integrated.

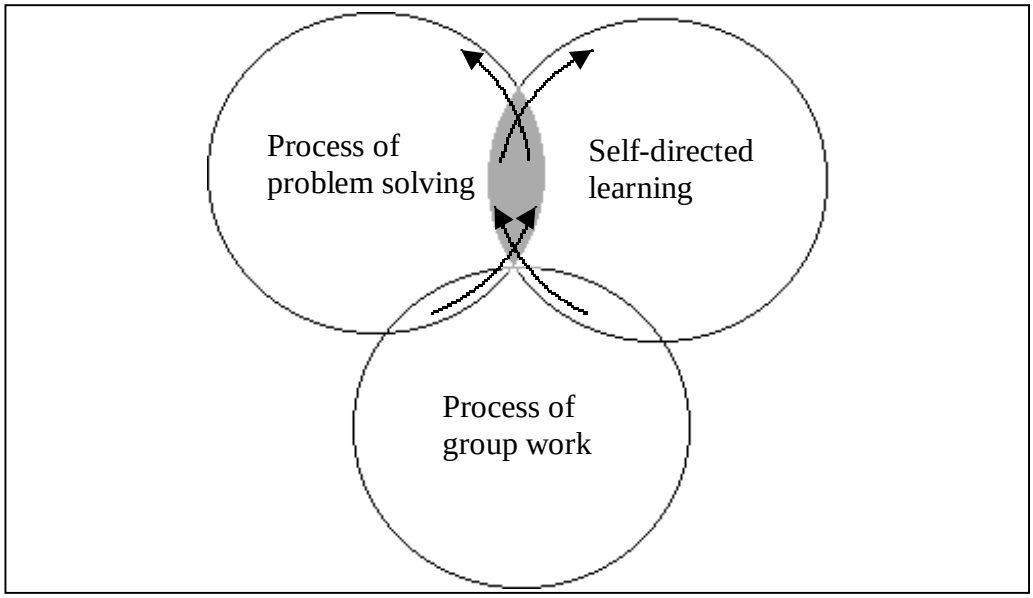


Figure 2-2 Process of PBL (influenced by von Scilling 1988/ from Silén et al)

The grayed area in figure 2-2 represents a crucial point in PBL, the starting point. The starting point in PBL, according to Boud (1985), typically begins with an authentic problem of practice without any prior preparation by learners.

It is the teacher's responsibility to present the authentic problem in a stimulating way, this is done through a so-called vignette. It is of great importance that the problem is relevant to the learners, it should be something they wish to learn more about. In the vignette the problematic situation is identified, defined, and presented to the learners (Nuldén and Scheepers, 1999).

The learner's responsibility is then to identify the character of the problem, and gather information they require and come up with possible solutions (Burch, 1997).

A vignette can take different shapes, for example a scenario, a case study, a brief lecture, some graphics etc. Irrespective of the shape, the purpose is to start the work of the group (Nuldén and Scheepers, 1999).

The group of learners is in PBL referred to as the base-group. There are different models to facilitate the base-group through the process of PBL. The seven-step model described in this section has its origins in a model developed at the Limburg University, Maastricht in Holland (Kjellgren et al, 1993).

Nuldén and Scheepers have divided the model into two phases, where phase one is facilitated by a teacher and in the second phase the learners organize their own work (Nuldén and Scheepers, 1999).

Introduction:

- Concepts central to the session are introduced and made clear through a lecture.

Phase 1:

- Step 1: Read through the distributed vignette. Make clear and explain concepts so everybody in the group understands the concepts used in the vignette.
- Step 2: Clearly define the problem or phenomenon the group wishes to work with.
- Step 3: Take stock of the ideas and opinions about the problem or phenomenon within the group. Divide the problem or phenomenon into sub-problems. Devote ten minutes of brainstorming for each problem found.
- Step 4: Systematize the brainstorming. Find relations, categorize and eliminate irrelevant sections of the brainstorming.
- Step 5: Frame questions to continue working with. Formulate concrete learning objectives.

Phase 2:

- Step 6: Search and gather information and facts. Work with the data to form knowledge in relation to the learning objectives. Work individually or in small groups.
- Step 7: Systematize the new knowledge. Validate the knowledge in relation to the problem. The knowledge should provide an understanding of the questions form step 5.

Figure 2-3. The seven-step model (Nuldén and Scheepers, 1999)

3. Research question and objective

The research question in this master thesis is, how is PIE, as a starting point in further learning activities, received outside the university environment?

The objective of the research is to test and evaluate the PIE methodology outside the university environment in two aspects. One aspect is to test and evaluate a multimedia-based scenario with role-playing, as a starting point for further learning activities, for participants in a corporate setting. The second aspect is to evaluate the development process that has taken place in collaboration with representatives from a corporation.

4. PIE

Nuldén and Scheepers (1999) propose a methodology for structuring educational activities in modules, using interactive cases. They call this methodology for PIE, which is an abbreviation of *P*roblem based learning, *I*nteractive multimedia and *E*xperiential learning. Previous sections gave a description of different learning approaches, such as PBL and experiential learning. PIE's foundation is based upon those approaches as well as on interactive multimedia, which will be described in the following section. In section 4.2 the PIE methodology is described.

4.1 Interactive multimedia for learning

What is interactive multimedia (IMM)? As the phrase implies there is something about technology and demands, of interactivity, on the user. The technological part represented by the term multimedia, is that information is stored and communicated in a digital form, no matter whether it is text, images, sound, video etc rather than in a variety of analogue formats such as books, photographs, film etc. The first part, interactive, implies that the user interacts with the technology, i.e. getting feedback on action from the media (Trevitt, 1995).

> *"The World Wide Web (WWW) is changing both what we teach and how we teach it."* (Mak, 1999)

In addition to the quatation above: WWW along with multimedia, video, and virtual reality are making impact on teaching and learning.

An educator who has lectured in a more traditional way encounters somewhat the same problems when getting involved in interactive multimedia development as when adapting to PBL or experiential learning. Kennedy and McNaught (1997) point out two problems that the educator faces:

1) How to transform what is already known about what constitutes good teaching practice into IMM.

2) The second involves understanding one's own personal theoretical perspective on learning, a perspective which influences everything one does as an educator.

Computer-based simulations are the first medium to be considering as being interactive, since simulations in this way give the user feedback on their actions (Laurillard, 1993). A simulation in this context is a program that is a model of an aspect of the world. The user makes input to the model, runs the model, and displays the result in form of for example a diagram.

The term simulation is often used in writings about case studies, here the goal is not the result itself rather the way to reach the goal.

In interactive multimedia for learning we can distinguish two types of cases, the interactive case and the case based simulation as shown in figure 4-1.

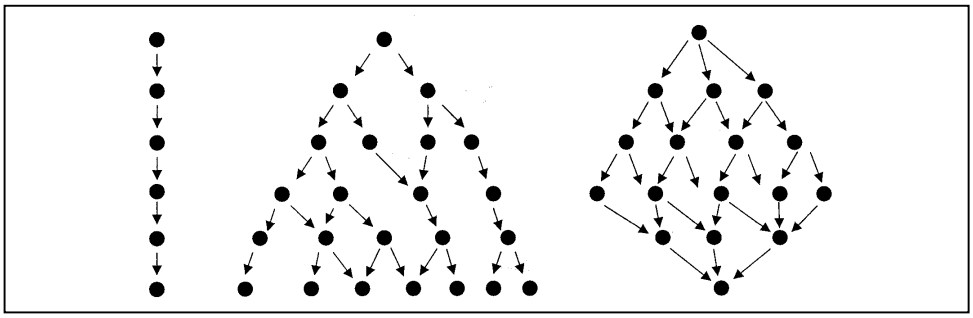


Figure 4-1 Graph of interactive case (left) and two variants of case based simulation (Nuldén and Scheepers, 1999)

In the interactive case, the left graph in figure 4-1, information is presented in a linear fashion, while in the two graphs to the right, case based simulations, the learners navigate their way through the case. The case based simulations differ in the way that one of the graphs has an open ending of the scenario, and the other has a closed ending.

Written, paper based case studies and role-playing simulations guide the learners through the topic in a linear fashion. A non-linear approach, such as a hypertext based case (IMM), allows the learners to explore rather than read the case study.

4.2 Methodology

PIE is an integration of problem based learning, experiential learning and interactive multimedia. The use of information technology is central in PIE in order to enhance experiential learning and problem based learning in education (Nuldén and Scheepers, 1999).

The methodology consists of four activities:

1) Activity one - experience
2) Activity two - individual reflection
3) Activity three - feedback and discussion
4) Activity four (optional) - experimenting

4.2.1 Activity one - experience

This activity is like a vignette in problem based learning, where a problem, or rather a problematic situation is presented to the group. The problem is presented through a case based simulation or an interactive case, henceforth referred to as a scenario. An instructor (facilitator) facilitates the activity to ensure the scenario to run smoothly. Furthermore, the facilitator ensures that the base-group reach the end of the scenario and leave the session with the problem (central issues) on their mind. The duration of this activity is two hours.

4.2.2 Activity two - individual reflection

Activity two is individual reflection and the duration of this activity is one week.

4.2.3 Activity three- feedback and discussion

After a week of reflection the facilitator meets the base-group during a two hours seminar. They meet to discuss the problem presented in the scenario during activity one.

4.2.4 Activity four - experimenting

This optional activity, experimenting, can in an educational setting take the form of an activity such as an assignment that reflects on the experience of the previous

activities. In a corporate training setting this can take the form of experimenting in new situations.

Reflection is an important aspect of the framework for PIE. There are three different types of reflections that apply to the PIE methodology. First there is reflection-in-action (Schön, 1983), reflection that is made during the enacting of the scenario in activity one. Reflection on what happened during activity one, i.e. reflection-on-action (ibid.), is done during activity two and is discussed at the seminar in action three. Reflection-for-action, i.e. thoughts about how to use the knowledge gained by the experience in a future situation are initiated during activity three (Cowan in Nuldén and Scheepers, 1999).

The next section describes an experiment where the PIE methodology has been tested and evaluated.

4.3 PIE in practice

The research experiments took place in education environments in South Africa and Sweden. The goal was on one hand to determine the effect an IMM enhanced vignette has on the PBL activity , and on the other hand to identify the effect the use of PIE and an IMM enhanced vignette had on students' learning and ideas about escalation.

There is plenty more to read about this experiment in the article *Problem based learning, interactive multimedia and experiential learning: the case of escalation* (Nuldén and Scheepers, 1999).

4.3.1 Activity one and three

Activity one through activity three where performed, the first activity for in total 31 students. 21 of them were students at a South African University and the rest were students at a Swedish University. In the third activity an additional of 18 students were present.

The vignette consisted of a case based simulation of a fictive information technology project. The case was about two corporations and their efforts in developing a computer based sale-support system. The project experienced problems and they escalated as the project progressed. The students had to make three types of decisions during the scenario, no matter what the decided the project was predetermined to fail. The students played different roles during the scenario (that they chosed them selves from a given set of roles), i.e. role-playing, to create a personal feeling towards the scenario and it's decisionmaking. This is thought of as making the failure feeling in the end stronger.

After a week of reflection for the South African students, and only three days for the Swedish students, it was time for activity three. Since the students were led to a failure in the end of the scenario it was very important for the lecturer to give feedback about the process to the students.

4.3.2 Evaluation

"This was really exiting, are all lectures going to be like this?" is one of many positiv comments made by students after the activities.

> *"Most students were positive about the PIE methodology they have gone through. It appears as if the combination of PBL and experiential learning is successful from the students' point of view. They perceive the whole process as open and it allows them to use their knowledge in creating new knowledge"* (Nuldén and Scheepers, 1999 p.25).

On the question about if they would prefer a paper version of the vignette instead of the computer version there were comments like: *"The computer version is much more alive, and you get a feel for the situation quicker. "Maybe you could combine the computer version with papers describing the characters and the situation a little deeper, so that you would get a better hold of the person you're*

playing, and the two companies." and *"No, learning is a lot easier and more effective when you have fun during the process."*

As an end of this section I want to point our one problem that Nuldén and Scheepers (1999) sees with the use of an IMM vignette - is the reusability. The effect of leaving the scenario with a certain feeling, for instance failure (Challenger) would probably not have the same effect if the same IMM vignette is reused year after year. The next years students have hear about the end of the scenario and would most likely find it less interesting to experience the scenario.

5. Research Approach

There are different perspectives in scientific research, different research approaches. Professor Bo Dahlbom at the Department of Informatics, School of Economics, Gothenburg University, once spoke at a lecture about the mechanical versus the romantic research, these issues are discussed in the book *Computers in Context* (Dahlbom and Mattiasen, 1990). Others classify research methods into positivist versus interpretivist (Braa & Vidgen, 1997). In general, quantitative methods are used by positivists and interpretivists use qualitative methods.

In a qualitative method the knowledge purpose is primarily “the understanding”, and the purpose of the quantitative method is to explain causes to the phenomena that are objects for the investigation (Ib Andersen, 1998).

My objective is to seek understanding about a certain phenomena and I have therefor chosen a qualitative method.

In figure 5-1 below Braa and Vidgen (1997) visualize different research intentions in the shape of a triangle. The corners of the triangle each represent a research intention, where prediction is aligned with the reduction of a positivist approach, understanding with an interpretive approach, and change with an interventionary approach. Braa and Vidgen have placed different research methods inside of the triangle. In the lower left corner is field experiment, to the right is soft case, and at the top there is action research.

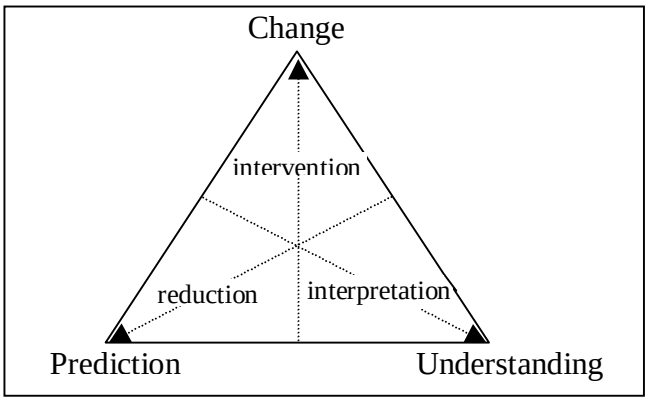


Figure 5-1 Research intentions

5.2 Action research.

The above section provides a base for understanding action research's (AR) place within the research intentions. As shown in figure 5.1 AR is placed in the corner of change, the view of research within AR is that the research should lead to change.

Action research (AR) is known by a variety of names, for example participatory research (PAR), collaborative inquiry, emancipatory research, and action learning. I will use the more general term AR in this paper and focus on how it has been used, instead of explaining the differences of sub-branches of AR.

The below citation by Rapoport (1970) is perhaps the most frequently quoted definition of action research (Susman & Evered; 1978).

> *"Action research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework" (p. 499).*

Another often cited definition is that of Carr and Kemmis (1986)

> *"Action research is a form of self-reflective enquiry undertaken by participants in social situations to improve the rationality and justice of their own practices, their understanding of these practices, and the situations in which the practices are carried out" (p.62).*

AR is a way to collect information about phenomena that would not occur without the action. The situation one wants to observe has to be created by the researcher. From a methodological point of view it is hereby of great importance to describe and discuss what is going on during the research process. AR is most of all a

learning process, where the most important result is experiences and improved knowledge by the participators (Wallén, 1993).

Action research combines theory and practice, as well as researchers and practitioners, through change and reflection in a mutually acceptable ethical framework. Action research is an iterative process involving researchers and practitioners acting together on a particular cycle of activities, including problem diagnosis, action intervention and reflective learning.

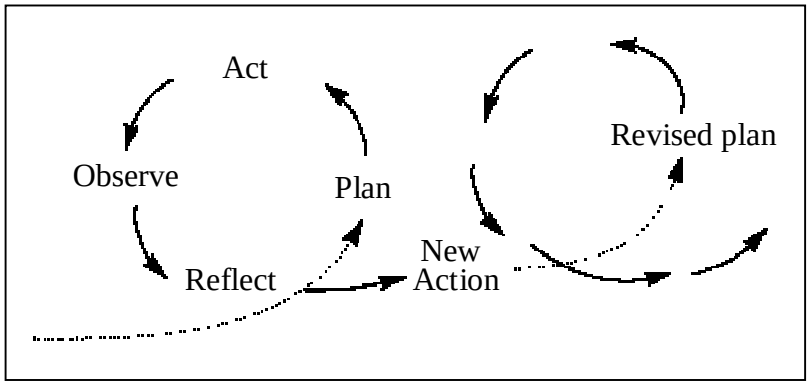


Figure 5-2 Cyclical process of action research.

Figure 5-2 illustrates the cyclical process of AR. The contents of the different steps in this iterative process are according to Kemmis and McTaggart (1988):

The steps in figure 5-2	The content of the steps
Plan	**Initial reflection** on the situation, **planning** an experience or action, reconnaissance.
Act	**Planning** for improvement, **implementing** the strategic plan, involves the consideration of alternative courses of action to attain the improvement or solve the problem identified.
Observe	**Enacting** the plan and **observing** how it works, including an evaluation of the action by appropriate technique. The action taking stage involves the selection and realization of one of the courses of action considered in the previous stage
Reflect	**Reflecting** on the results of the evaluation and on the whole action research process. The evaluating stage involves the study of the outcomes of the selected course of action.

5.2.1 Action Research Techniques

Various methods, which are common in the qualitative research, include for instance, participant observation recordings, questionnaire surveys, informal conversational and standardize open-ended interviews, and case studies (Ib Andersen, 1998). I have used observations, questionnaire surveys, and informal conversational interviews as techniques in my research.

Observations are of great importance, since there is a difference in what people say they do and what they actually do. People doesn't answer on what the really do but of what they are expected to do. During observations the researcher take on different roles, like the "fly on the wall" or as a participant observer (Blomberg et al). There are some factors that should be taking into consideration before the study starts, for instance what is to be observed? When should it be observed? Where is the observation to take place? (Blomberg et al).

> *”Understanding issues from an interviewee’s point of view can be extremely difficult, especially when the respondent himself may not have a clearly articulated view of the answers to the questions posed, or may not wish to divulge sensitive information. It is here that the skills of the interviewer come to the fore.”*

The citation above by Easterby-Smith et al (1991, s.75) emphasizes the importance of interviewing skills.

There are two kinds of interviews, standardize open-ended and informal conversational ones. Interviews in an informal conversational fashion are well suited at an early stage of the study, to let the learners help to form the interview, subjects to discuss etc. Through participation and through informal interviews the researcher gets an understanding that is enough to conduct more structured and systematic interviews (Blomberg et al.). For the study it is an advantage if the

interview is performed at a place where the interviewee is comfortable, for instance at the interviewees office.

5.3 AR in the study

5.3.1 Why AR as an approach in this study?

The action research approach is appropriate when my intention is to be an active part of a research group that runs a project with intervention as an underlying purpose. The purpose of changing learning settings with use of information technology.

5.3.2 The AR cycle in the study

I describe the research in four steps, based on and structured in line with the AR cycle. The definition or content of the steps in the AR cycle are somewhat vague and need further explanation to apply to practice. My interpretation of the content and how it is used in the study is shown in figure 5-3.

Plan	In this step, of initial reflection and planning an action, the problem is defined. In this case, since a master thesis is written, the problem is the research question.
Act	The actual planning for how to act according to solve the problem defined. In this study, the development process of the mulitmedia-based scenarios and how to implement all the activities in PIE.
Observe	This step is to enact the plan, in this case go through the three activities in PIE. With research techniques, such as observations, questionnaires and interviews, we observe how PIE works in corporate setting.
Reflect	Reflecting on the results of the evaluation and on the whole action research process. The evaluating stage involves the study of the outcomes of the selected course of action. The researcher interprets and analyzes the results, gives explanations and draw conclusions of the research. With the reflections more concretized, in for instance an article, the researcher plan for the next step, i.e. moves into the next

	cycle. The documentation of the reflect step is in this case my master's thesis.

Figure 5-3. My interpretation of the AR cycle

6. Interactive multimedia vignettes with PIE

In section 6.1 there is an explanation of the terminology used in the scenarios, in order to clarify a bit. The scenarios are the same as vignettes or activity one in the PIE methodology. How the vignettes are structured, in practice, is described in section 6.2. The goals and contents of the scenarios are explained in section 6.3 and 6.4. Evaluation of the scenarios will be described in section 7.

6.1 Terminology

Like a theatrical performance, a scenario can be divided into acts. Each act consists of one or several scenes, and each scene consists of one or several pages.

Scenario
- Acts
  - Scenes
    - Pages
      - Objects (texts, videos, etc)

Figure 6-1 The scenario hierarchy

An act is delimited from another by the topics of the acts (topic delimited). Either the topic or time, on the other hand, delimits a scene, from another; for instance it could be a single project meeting (time delimited) or a number of events focused on cultural clashes (topic delimited). A page is a web page with objects like text, sound, video, images, etc.

6.2 Structure

The two scenarios in this study are based on the PIE methodology. As described in section 4.2 there are four different activities defined in the PIE methodology: experience, individual reflection, feedback and discussion, and the optional

activity experimenting. In this study the fourth activity is excluded. In scenario one, named Project, activity one was the only activity performed, due to its purpose. In scenario two, named Global, activity one through activity three has been performed, activity two has varied in length between the different base-groups from 4 days to one week, due to practical reasons. The PIE methodology suggests one week of reflection, i.e. activity two, but we deviate from the framework in this matter. There is also a deviation in activity one concerning the duration of the activity, the methodology suggests a two hours session, but we have worked with a three hours session in scenario two. The complexity of the scenario demands one hour longer duration than suggested.

I will describe each scenario separate, but there is a common part that is explained by way of introduction.

6.2.1 The introduction to the scenarios

A common part of the two scenarios is the introduction; this is a verbal presentation about scenarios, role-playing, and our intentions with the scenario. This is a twenty minutes activity that takes place before the multimedia based scenario starts.

We make a distinction between different kind of role-plays based on their purpose. Figure 6-2 and figure 6-3 shows role-plays with the intention of having fun as a purpose. Figure 6-4 on the other hand has a more serious approach, the purpose is to bring up complex and sensitive issues to discussion. The scenarios in this study use an offspring to the type of role-play in figure 6.4.

Figure 6-2 A fantasy role-play in action, Dungeons & Dragons

In Dungeon & Dragons, shown above, a group of people meets and plays a fantasy role-play. The roles have characteristics such as the wizard who has magical power, the knight who has a sword that can strike throw stone, etc. The whole play is managed and controlled by the *game-master* (the person to the right in the picture to the left), who has *game-instructions* as support (the picture to the right).

Figure 6-3. An Internet-based fantasy role-play in action, Utopia

In an internet-based fantasy role-play there is not interaction with a physical group of people, rather you meet other roles, played by other people, over the Internet.

Figure 6-4. A clip from the TV-series *Dilemma*

Figure 6.4 shows a clip from the TV-series *Dilemma*, which was shown in Swedish television a couple of years ago. During these programs serious and complex issues were discussed in the form of a scenario with role-playing. There was no multimedia involved in this type of scenario with role-playing. In a scenario like the ones in *Dilemma* the role-play is very much controlled by the *storyteller (compared to game-master in* Dungeons & Dragons*)* or facilitator. This is the opposite of the facilitator's role is in this study. The facilitator in this study is facilitating in a discrete manner and controls the role-play only when it requires.

After a presentation of scenarios and role-playing in general, the presentation continues with giving an overall view of the stage of the participants in a multimedia-based scenario with role-playing (Figure 6.5).

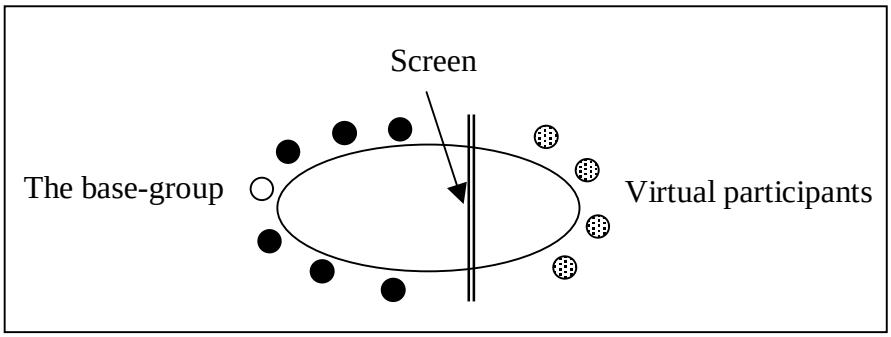


Figure 6-5. An overview over the stage of the participants

As figure 6.5 illustrates, the black circles represents the base-group, the white circle is also a learner in the base-group but he or she does the navigating through the scenario. The navigation should of course be in collaboration with the rest of the base-group. The virtual participants, represented by gray circles, contribute to the role-play in various ways. They are part of our imagine reality and can take the shape of a video-clip or a text.

The introduction part goes to its end with the following quotation from the movie *Tootsie* and is said by the actor Bill Murray:

> *"I like it when people come up to me, the next day or a week later and they say -'I saw your play - what happened!'"*

The play is in our context the multimedia-based scenario. The ending scene of the scenario is meant to be a cliffhanger as the above quotation indicates. Our intention is to leave the learners in the base-group with some unanswered questions and feelings to reflect upon during the following week of reflection, reflection-on-action. The reflection will be either conscious or unconscious, or both. There is a seminar after approximately a week, activity three, the purpose of

the seminar is to summarize and discuss feelings and thoughts, which arose during the multimedia-based scenario.

6.3 Scenario one - Project

The goal of this scenario is to deliver the feeling of being run over by superiors.

6.3.1 Activity one of PIE

The multimedia-based scenario, named Project, is about responsibility and trust. We have chosen to reflect this in a recruit situation. The Vice-President of the corporation, *Elektroguiden*, gives a project team, named *the future team*, the commission to find a new member to their team. The future team consists of persons with positions like: project manager, marketing manager, headhunter and etc. The role-descriptions are handed out to the learners in the base-group in a random fashion. There are different kinds of decisions for the group to make during the enacting of the scenario. There is basically only one decision for the base-group that is in a non-linear fashion and that is to decide whom out of three candidates to hire as their new co-worker. Other decisions are in a linear fashion, for example to discuss and become united in decisions about characteristics they want the new employee to posses. In the inevitable end of the scenario the future team gets run over by the Vice-President of the company, in the way that he has already hired a new member to their group all by himself. Figure 6.6 gives an overview of the scenario's structure.

6.3.2 Participants

This scenario has been enacted at two different occasions for two different groups of people. The first occasion was for colleagues within Viktoria Interactive Learning (VIL). The second occasion was for corporations interested in becoming a part of the Copernicus project and for corporations already involved in the Copernicus project.

Introduction	Introduction	An overall introduction to scenarios and role-playing.
Background	Background	Introduction to what the scenario is about Background about the company Explains the teams part in the scenario - the Future team
Roles	Roles	The base-group get their roles
Presentation	Presentation	The role-players introduce themselves
Scenes	Scenes	Some scenes are played for the group
Project starts	Project starts	The first meeting takes place
Event	Event	The group decides on qualifications that the employee should have
Scenes	Scenes	Pictures, interviews, CV's, recommendations etc about the three candidates
Decision	Event/Decision	Decision about who two to choose and why and why not the third
The end	The end	The vice president tells the team that he has found someone for the job The scenario is over and it's time to step out of the roles

Figure 6-6. The structure of scenario one - Project.

6.4 Scenario two - Global

The main purpose of the second scenario is to facilitate better project management with focus on aspect of integration and globalization.

6.4.1 Activity one of PIE

The multimedia-based scenario, named Global, is focused on issues concerning integration and globalization. We have chosen to reflect this with a corporation, *Infab*, that is integrating two of its business areas. One of the business areas is video-recorders (Europe) and the other is PCs (Asia). The business areas have been two separate and independent organizations, but is in the scenario, about to integrate and globalize their purchasing system. A project team, with

representatives from both areas is put together. The project team's assignment is to integrate the routines from both areas into one purchasing system. The inevitable end in this scenario is that the project team does not get approval from it's superiors in their final and vital decision in the scenario, will be discussed further in this section.

Figure 6-7. Activity one of PIE - in action

The project team in the scenario is a constellation of 5 to 8 persons, depending on how many learners there are in the base-group at the enactment of the multimedia-based scenario. Figure 6-7 is a picture taken during activity one of PIE for one of the base-groups. In the picture, the base-group sits around the table, in front of the screen where the multimedia-based scenario is projected as figure 6-5 illustrates. To the right in the picture is the facilitator of the activity.

During the scenario, built in a non-linear fashion (figure 4.1), discussion concerning a variety of issues about project work has taken place. The base-group has been encouraged, through the multimedia-based scenario, to discuss project work and projects in general, and projects with integration and globalization features. The learners in the base-group were acting according to their assigned roles, but most of the discussions were based on their own experiences.

One of the decisions in the scenario is whether to send a system analyst or to send a mail. The situation is when the project team has decided that they have to gather more information about the purchasing routines in Asia.

Figure 6-8.

This page is a transition between one act to another.

Figure 6-9.

This page shows the decision the group has to do in order to continue the scenario. Depending on which button they push, i.e. which decision they make, there are different outcomes. In this example they chose the system analyst.

Figure 6-10

This page includes a video-clip of the system analyst that just returned from Asia. She has bad news to the project team.

Figure 6-11.

Since the group's decision was unsuccessful, they have to reconsider and make a news decision. No matter what they chose in figure 6-9 they end up here.

Figure 6-8 through 6-11 represents part of an act, but is a whole scene. An overview of the scenario is illustrated in figure 6-12.

The base-group leaves activity one after the ending scene is played and moves into the next phase, namely activity two.

6.4.2 Activity two of PIE

This activity of PIE is the time for individual reflection. The duration of this activity has varied between the base-groups from 4 days up to a week, due to practical issues.

6.4.2 Activity three of PIE

During this activity the base-group was asked to reflect on what they had learned during activity one and how they experienced the scenario. The starting point was to let each learner who sat around the table share their thoughts and impressions of activity one. Before the first learner was done telling his story there was a lively discussion in an unstructured manner. The facilitator did not interrupt the discussion, if it did not go over board, since it is an important part of this activity to discuss and reflect on what has happened.

6.4.3 Participants

All of the learners during enacting of scenario two, Global, origins from one and the same corporation, but from different functions within the corporation. 21 out of 80 employees have gone through these activities so far, i.e. when this report on the current status is written. They all have experience from working in projects, but there is a diversified level of experiences. There has also been a wide range of the learners' ages. All of the learners from the base-groups in the first activity where present at activity three as well. The 21 learners that has participated in the study so far, have been divided into three smaller groups, 7 learners in each base-groups.

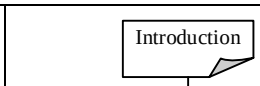
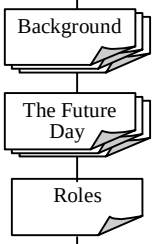
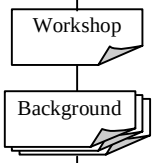
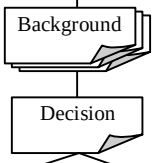
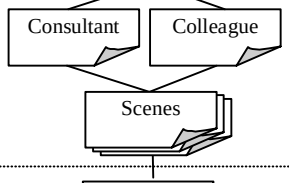
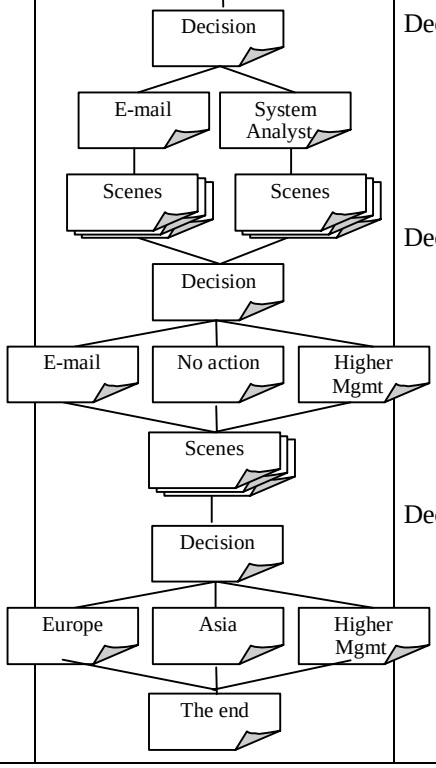
Introduction		Introduction	An overall introduction to scenarios and role-playing.
Act I The Future Day		Background Further background Roles	Introduction to what the scenario is about and background information about the company. Explanation of the task the group is assigned to do. The base-group get their roles
Act II PurNow - meeting strategy		First meeting Scenes	Get more background information, facts A round of presentation, their roles, and the virtual group members. Also a questionnaire about issues concerning projects. Decision-making strategy
Act III Steering Group Chairman		Second meeting Decision	More background facts. Second meeting. Some scenes are played for the group, STG chairman's view of the future, keywords.
Act IV Consultant/ Colleague		Decision Quiz	Consultant or colleague The group has to discuss important issues about project management.
Act V Accomplish the project		Decision Decision Decision	Send e-mail, System Analyst? Based upon which decision the base-groups does some scenes are played. They have to make a new decision, due to the inevitable failure of the last decision. Send e-mail, take no actions, or bring up the problem to higher management The final and vital decision on how to implement the purchasing system Europé, Asia, or higher management The scenario is over and the roles are returned.

Figure 6-12. The structure of scenario two - Global.

7. Evaluation

Since I have used an action research approach in this master thesis the previous section together with this section is more appropriate to call the result of the study. The previous section is the tangible result of our actions and this section describes the way the research has been accomplished. This section is structured after the action research cycle, i.e. divided into four steps; plan, act, observe and reflect. Before the first cycle is explained in section 7.1 there is an explanation to what this study represents in the research project Copernicus.

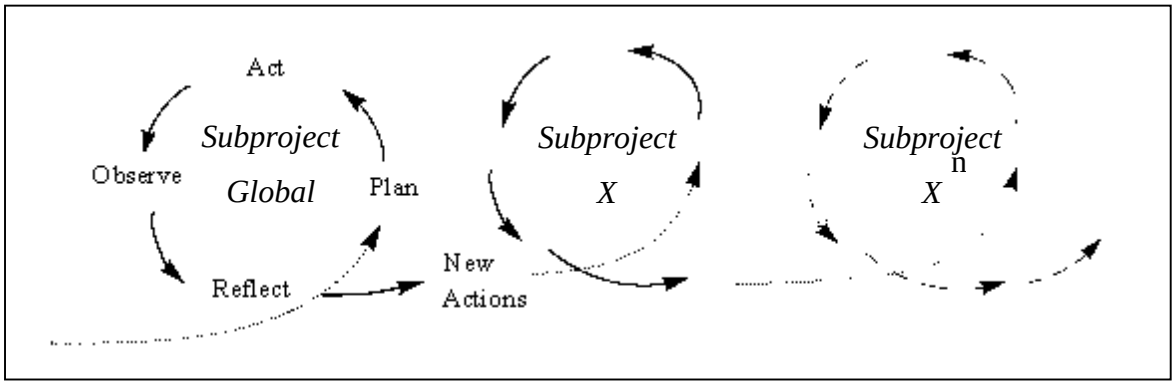


Figure 7-1. The action research cycle of Copernicus

The cyclic nature of the action research makes it responsive to the situation. The early cycles influence us, the researcher within the Copernicus, in deciding how to conduct the later cycles.

Figure 7-1 illustrates that each subproject, or new scenario, developed is a new cycle in the AR cycle. A subproject is also divided into different cycles, every enacting of the scenario can be represented in a new cycle. In the description of the study in this section three enacts have taken place, but are described in one cycle. Even though there has been changes to the scenario based on reflections during activity one I describe everything in one cycle. The reason to this is that we have reasoned that we want to test and evaluate activity one through activity three in a couple of base-groups before we summarize all of our reflections and take new actions. The changes that have been made have been of the nature of correcting misspellings, adding voice-over sound where it was missing, and replaced some sound files with low quality.

As mentioned earlier, the Copernicus project is still in an early stage, and my master thesis is a report on the current status of the project. So far, two multimedia-based scenarios with role-playing have been developed, and the second is still running and being evaluated.

The research project has consisted of 5 persons form the Viktoria Institute and 3 persons from a multinational, manufacturing corporation. The developing process differs between the two multimedia-based scenarios in the aspect of parties being involved. The second scenario has been developed in collaboration with the manufacturing corporation and the first without any collaboration from parts outside the Viktoria Institute.

7.1 Plan

With an interest in the use of information technology in learning contexts and the belief in the need for change in learning environments we entered the AR cycle. Extensive research has already been conducted in the field of using interactive multimedia in learning environment (Schank, 1997; Park, 1996). In order to narrow the research fields, lets focus on the methodology PIE. Studies have been accomplished with PIE, but only in a university environment. How is PIE received outside the university environment? This is a question defined as being relevant in this research. With this perspective we entered step two, described in the next section.

7.2 Act

In the first activity in PIE there is a multimedia-based scenario with role-playing. Very early in this stage we established the goals of the scenarios. The goal of *Global* was discussed, but the representatives from the corporation came up with the suggestions. They are the expertise when it comes to their corporation, and its needs.

The whole AR-cycle, from planning to reflection is of an iterative nature and so has the work within each step been as well. In the beginning no details were

documented, the general picture was discussed (brainstorming phase). As thoughts were worked through and the process proceeded there was possible to distinguish some categories of parts in the development: introduction, roles, background, stories and intrigues, and ending scene. The categories made it easier for the different actors in the research group to undertake the responsibility for a certain category, or part of a category. The different categories and scenes in the scenario have been revisited in an iterative manner all through this step.

To structure this step, of an ad hoc nature, in a readable manner I have explained the development process of the different categories in separate sections. Introduction in section 7.2.1, roles in section 7.2.2, background, stories and intrigues, and the ending scene under section 7.2.3 with the heading *Acts*. There is also one section of a reflection, section 7.2.4.

7.2.1 Introduction part to PIE

How should the multimedia-based scenario with role-playing be introduced?
What is important to inform the base-group of?

Our awareness about different opinions that people has towards role-playing made us deal with this issue. We wanted to play down about role-play, in order to achieve that we decided to show and talk about different kinds of role-plays that exist.

We wanted to introduce them to our learning philosophy, our intentions with scenarios and the following activities. Make sure to let them know that the scenario isn't an isolated happening. From our part it ends after the second meeting, after a week of reflection, but it doesn't end there, it is of great importance that it is followed up by the concerned corporation.

The introduction should inform the base-group that there are three types of roles during the scenario; the learners' roles, the virtual participants and a facilitator.

7.2.2 Role-descriptions

How much information should the learners in the base-groups get about their role? What kind of information should be given?

When the type of roles were determined, the next thing to do was to give them a description. The base-group are assigned roles and thus need a role description. We tried to include matters, such as area of responsibility, education, work experience, age, personal goals, and inside information (they might know some secret about others). The gender of a role was information we thought of as unimportant and without that information a role is more flexible.
We were concerned about the balance of acting in the scenario. How much should they act from the role description and how much should they act out of own experiences in the scenario?

We decided that the role description and a summary of the other roles should fit on one page.
How should the role descriptions be handed out to the base-group? Randomly, choose a specific role or be given a certain role? We decided to hand them out randomly and evaluate this afterwards.

Should there be more information about the roles that the facilitator can give out if necessary? We haven't done anything to this issue at this point but that is something to evaluate before the next cycle.

7.2.3 Acts in the scenario

To the content of the acts the participant corporation has made a major contribution. Contributions like; what kinds of decisions are important for the base-group to experience, which topics are important to include in the scenario etc.

Implementing those ideas into actual web pages has been a time consuming part. In order to make a scene with a video clip, a manuscript is written and then there

are several recordings of the scene. We have used friends and colleagues as actors and even for the voice over sounds. The balance of video, pictures, and text in the scenes is something we have discussed a lot. The survey will answer if we have a reach a good balance.

A difficult task has been to achieve good transitions between acts, scenes and pages.

7.2.4 Reflections on this step - Act

There have different kind of reflections during this step. To generalize, reflections on things that run smoothly and on somewhat problematic issues. I will only describe the problematic issues since I believe they can help in further development.

There is a need for establishing the terminology that is used in the development process. As the case was now, we literally talked in different languages. This complicates matters in various ways. At occasions we all thought we agreed upon the same thing but in the reality we were not. This is very important in the cases where a new person involves in the group. We have to work on how to involve a new person in the action. Terminology is one aspect, another major difficulty is to get familiar with the overall picture of the scenario and the underlying web pages with all its objects.

A scene overview is useful for modeling and discussing the scenes, transitions and overall content in and the purpose with each scene. An overview over the file structure and develop some norms for how to name all the files. It would save a lot of time to find a way to store and name the files in a scenario with great complexity. An overall picture makes further development easier.

It is necessary that the work is divided amongst the group members and that the communication between individuals or subgroups function satisfactory.

It is important to continuously check and confirm the scenario against its goals. It is very easy for the scenario to become something else than intended.

7.3 Observe

In order to evaluate the activities, observations have been made during the different sessions and the base-groups have been given questionnaires to fill out. Questionnaires have been filled out at two occasions, one right after the ending scene of the scenario (activity one), and one as the last part of the seminar (activity three). The last questionnaire has been followed-up by interviews over telephone. Both of the questionnaires have a reply frequency of 100%, i.e. 21 persons.

7.3.1 First questionnaire

The first questionnaire was handed out to collect spontaneous impressions about certain matters. The questionnaire consisted of four open-ended questions. A summary of the answers will now be presented.

Question 1: …The introduction, i.e. everything before the start of the scenario

The answers contained comments like: *"Well structured, relaxed" and "Enough information to know what it is all about"* and *"Good, more information isn't necessary"* and *"Good, but perhaps some guidelines to help the group understand how much time one can spend on each activity"* and *"Good, arouse interest"*.

Question 2: …The actual execution i.e. the interaction within the group and with the multimedia-based scenario during the role-play.

The answers contained comments like: *"Good. It went relatively fast to understand 'the case' and the interaction was good. Felt realistic"* and *"It was hard to keep track on the other members' roles, and to play the role assigned to you."* and *"Interesting…intriguing with different roles - perhaps a little bit difficult to live out the role when you don't know more about the personality"* and *"A good way to emphasizes existing problems in both business and system*

development. Everybody gets opportunity to ponder upon the problems" and *"Fun with multimedia. Please give us more comments on our decisions "*.

Question 3: …The support throughout the scenario, i.e. role descriptions, facilitator and etc.

The answers contained comments like: *"It was easy to find 'your' role in the scenario"* and *"good, maybe it is that we are not used to role-play that made the scenario to halt sometimes"* and *"The role-descriptions could be a little more detailed, the directives the role characters have to follow or from project directives"* and *"Good that the group basically handled all the actions among themselves - controlled the course of events"* and *"If it is important for the result that one lives out the given role - more weight ought to be put on getting into them. Otherwise, the support was enough"*.

Question 4: …Otherwise

The answers contained comments like: *"It is Fun!"* and *"Very positive. Liked the material. A lot was similar to the questions we deal with within our organization."* and *"Would be interesting to 'rerun' real projects in this way to learn from the mistakes "* and *"More information about the role is necessary to play the role"* and *"This is learning! "*.

7.3.2 Second questionnaire

The second questionnaire was of a greater extent and was followed up by telephone interviews. There was a combination of both questions in which the learners' opinions were captured on a scale from 1 to 5 and open-ended questions.

Question: Did you find the scenario (3h - 1w - 2h) to be a meaningful learning activity? The learners indicate their opinion on a scale from *"absolutely not"* (1) to *"absolutely"* (5).

Mean	SD	Min	Max
4.3	0.8	2	5

Question: Would you recommend this learning activity to your coworkers/others? The learners indicate their opinion on a scale from *"absolutely not"* (1) to *"absolutely"* (5).

Mean	SD	Min	max
4.7	0.5	3	5

Question: Did you find the scenario suitable to your needs? The learners indicate their opinion on a scale from *"absolutely not"* (1) to *"absolutely"* (5).

Mean	SD	Min	Max
4.1	0.9	1	5

Question: Did you find the scenario suitable to your organization's needs? The learners indicate their opinion on a scale from *"absolutely not"* (1) to *"absolutely"* (5). (One of the learners did not answer this question.)

Mean	SD	Min	max
4.2	0.8	1	5

Question: How do you want the roles to be assigned to you?
(One of the learners crossed all three alternatives because he/she thinks it depends on the purpose of the education. Another learner has crossed two of the alternatives, randomly and assigned a specific role.)

Randomly 75%
Chose a role 12,5%
Assigned a specific role 12,5%

Question: Do you have any previous experience of role-playing in an educational setting? The learners indicate their opinion on a scale from *"not at all"* (1) to *"a lot"* (5).

Mean	SD	Min	Max
2.2	1.2	1	4

Question: If prior experience exists, how does it differ from the multimedia-based scenario with role-playing you have been a part of?

The answers contained comments like: *"The multimedia scenario controls the course of action which creates situations where decisions has to be made from the information you have at the time of the decision - good."* and *"Multimedia adds an additional dimension."* and *"Multimedia is new and exiting. It differs a lot from earlier experiences. The alternatives and choices give a fresh reality feeling with sometimes surprises"* and *"People played their roles much tighter than this time"* and *"Multimedia makes it more viewable"*.

Question: How did you experience the layout of the multimedia scenario for instance; text, video, sounds, and navigation?

The answers contained comments like: *"A good way to educate, to emphasize at solving problems and to start a so called neutral dialogue between the learners and to find solutions together"* and *"Overall, it was good, but the sound could be better"* and *"Ok, good balance of text and sounds. It was good that we handled the navigation in the group ourselves, the group did not have to stress through the scenario"* and *"Good enough. It was absolutely ok for the performance of the scenario. We would very much like to have an ending!"* and *"Good "*.

Question: How could this learning activity be improved for future base-groups, i.e. your colleagues?

The answers contained comments like: *"The structure was good, the introduction was good but older learners might not have heard about the kind of role-plays the youth is playing and can then feel far-fetched"* and *"A more active facilitator, who tells us a little bit more during the scenario. More about the virtual participants"* and *"If there is more time and a more detailed scenario discussions concerning how to solve problem could have taken place. More discussions about soft issues concerning projects"* and *"More background information in the role-description, possibility to ask questions to the steering-group"* and *"Better control of the role-play, it is easy to slide into other roles"*.

7.3.2 Interviews

To follow up the second questionnaire and the activities performed telephone interviews have been made. The interviews have been conducted in an informal conversational fashion, which is well suited at this early stage of the study. From these informal interviews and the observations made more standardize and systematic interviews can be conducted. The intention was to interview two out of three base-groups and then evaluate the outcome before taking new actions. The goal has not been reached, due to practical factors. So far, 8 out of 14 intended learners have been interviewed. The interviews lasted from 15 to 30 minutes and all of the interviewees have been at their offices at the time for the telephone call.

A majority of the interviewees have previous experiences of role-playing in an educational setting. The found the multimedia based scenario with role-playing to add an extra dimension to the activity. *"This scenario was more 'alive'"* and *"The group controls the course of events - more enthusiasm"* and *"A multimedia scenario is exciting and new which arouse interest and curiosity"* and *"A multimedia scenario makes it more fun, easier to adopt" and "Would choose a multimedia based scenario before anything else"* were some of the comments made during discussions about earlier experiences versus *Global*.

In the second questionnaire there was a question if they found the scenario, activity one through three, to be a meaningful learning activity. The mean of the question was 4.33 (scale 1 to 5) and in the interviews the interviewees explained

why they thought that way. *"Because of the experience, experience based learning, interactivity with the group and the media. The multimedia made the engagement to arouse at once. It was possible to control and take responsibility for ones own learning"* and *"Important learning activity to exchange experiences. It gives a lot to those who don't have a lot of experiences"* and *"The time was well invested"* and *"It was possible to control ones own learning by using the role"* and *"Very good to discuss in a group in this way, everyone becomes engaged and in a way equal - despite how much experience you have or don't have. That is usually not the case"* and *"A good starting point in further education since discussions starts in a way that usually don't happen" and "Suited the organization well, recognized the problematic issues well"*. Most of the comments were about the importance of group activity, discussions, exchange of experience and how the multimedia scenario with role-playing encourages that to happen.

The third activity, the seminar, is of great importance for the starting point. *"Without the seminar the whole thing will come to nothing. Important to meet and discuss what happened during the scenario, bring up reflections made during activity one and two"*. They all thought of the seminar to be important, but it was little bit of a disappointment to the learners who thought they would be given all the answers to the problems that occurred in the scenario. "*What happened to the future team*?" It was not our intention to give answers to the problems rather to bring them up to discussion. This is, as said before, a starting point in further education. Thoughts about what to do next were discussed during the seminar and also during the interviews. *"A net-based continuation sounds very interesting and necessary - would like to be involved in the work of finding forms for a net-based continuation"*.

The indications given during the interviews are that they are all very pleased with this kind of starting point in a learning activity. Most of them are very interested in helping us to develop different scenarios and to take part in further research of activity four in the PIE methodology.

7.4 Reflect

The research team, at the current status of the Copernicus project, has not accomplished this part in the Action Research cycle. Although, I will in this section summarize my reflections.

One aspect of the research objective is to test and evaluate a multimedia-based scenario with role-playing as a starting point in further learning activities for participants in a corporate setting. The survey shows a very positive result. Why has it been received in such a successful way? I believe the most important success factor is that the content of the scenario was very relevant to the learners. Relevance is of great importance for the learners to feel motivated and engaged. I don't think we can take credit for all of the success of this learning activity. The multimedia stands for something new and exciting, which has yield a positive result in itself, i.e. Hawthorne effect (Berglund et al, 1998).

The second aspect of the research objective is to evaluate the development process that has taken place in collaboration with representatives from a corporation. This part has also been successful. The representatives from the corporation in this study have come up with relevant topics and problems to include in the scenario. Without this expertise the scenario would most likely not have been as relevant to the learners as it has been. Working in collaboration with a corporation has at some points been somewhat problematic for instance time frames and terminology. Reflections upon the development process are discussed in previous section 7.2.4.

8. Conclusion and further research

In this master thesis I have described two different multimedia-based scenarios with role-playing in aspects of content and development. The evaluation, of PIE as a starting point for further learning activities in a corporate setting, indicates a very positive reception from the participants. The reflections upon the developing process in collaboration with representatives from the organization in this study also indicate a very good result. The research contributes with guidelines for further development and I identify three areas where I suggest further research.

First, the need for methods in order to develop multimedia based scenarios in an efficient way. This includes for instance ways to organize the work efficiently and establish a terminology

Second, further research concerning activity four in the PIE methodology. Since activity one through three is a starting point in further education, it is important to research about the fourth activity - the continuation. The interviews have shown that there is a potential in a net-based continuation. Net-based seminars are one possible area to do further research in.

Third, further research in the area of a net-based PIE version. A multimedia-based scenario over the Internet is an interesting area, which would make it possible for a multi-national corporation to share experiences with co-workers from around the world.

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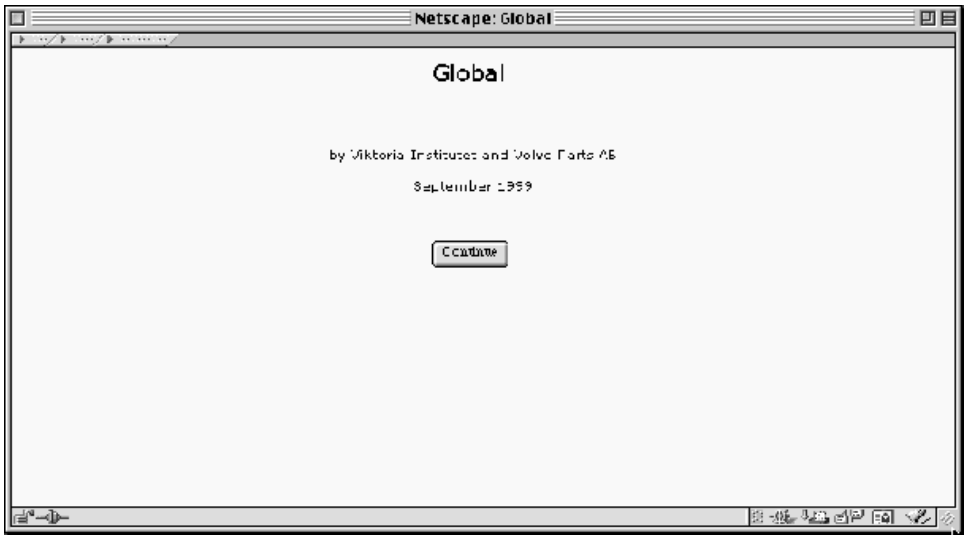
Appendix A - Scenario Global An Overview

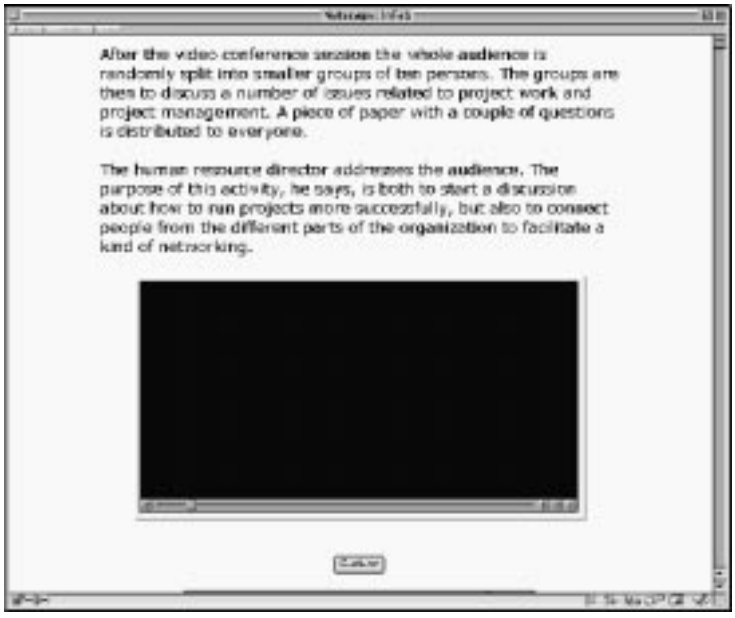



Infab in the next millennium
The board of directors at Infab has decided to launch a company-wide program to start a process of organizational change at Infab in the next millennium. During this fall Infab will arrange a series of activities to initiate the change process. One of the activities is the "Future day". The president of Infab is here preparing for the day.
President Johan Leifsson during the preperation for the Future Day.


The day - commonly known as the Future Day - begins with a series of short talks by Infab representatives. There are also some colourful persons with different views invited to share their ideas. Their aim is to invite the audience to rethink some aspects of organizations that most people seem to take for granted. People from both VCR and PC are participating and there are about 300 persons present in the large assembly hall.
The president of Infab opens the day. He talks for ten minutes about the large potential among the employees.


The first guest speaker is the well-known William Gates. He is a colourful speaker with many, both provocative and innovative ideas. His main message to the employees of Infab is: "There will be only one company in Infab's business area in the future. Will it be your company?"


Next out as a guest speaker is professor Dahlbom who is participating through video conference link from Stromboli, Italy. The quality of the connection is remarkably good. His speech is in Swedish and it concerns "organizing work as projects". He concludes that projects are problematic in many ways, and we seem to do the same mistakes over and over again.


After the video conference session the whole audience is randomly split into smaller groups of ten persons. The groups are then to discuss a number of issues related to project work and project management. A piece of paper with a couple of questions is distributed to everyone.

The human resource director addresses the audience. The purpose of this activity, he says, is both to start a discussion about how to run projects more successfully, but also to connect people from the different parts of the organization to facilitate a kind of networking.


While the other groups are composed randomly among the employees at the Future day, your group is put together for a specific purpose. As you all know, you are to work together on the Purlion project which is to start soon. In other words, the project group is together for the first time.

How many of the Purlion project members are participating today?

Please state how many


Take five to ten minutes to read about your role in Purflow.
• Project manager VCR
• Project coordinator VCR
• Sub project leader (supplier contact) PC
• IS / IT responsible VCR
• Project Controller VCR


Take five to ten minutes to read about your role in Purflow.
• Project manager VCR
• Project coordinator VCR
• Sub project leader (supplier contact) PC
• IS / IT responsible VCR
• Project Controller VCR
• Process Owner PC
• Central Procurement VCR


Take five to ten minutes to read about your role in Purflow.
• Project manager VCR
• Project coordinator VCR
• Sub project leader (supplier contact) PC
• IS / IT responsible VCR
• Project Controller VCR
• Process Owner PC
• Central Procurement VCR
• Purchasing Asia VCR


Take five to ten minutes to read about your role in Purflow.
• Project manager VCR
• Project coordinator VCR
• Sub project leader (supplier contact) PC
• IS / IT responsible VCR
• Project Controller VCR
• Process Owner PC


Workshop
Fill in the this form. All the other 50 groups at the Future day will also fill in the forms.
1. Project plans are often too optimistic.
Agree 1 2 3 4 5 6 Disagree
2. Projects are the most efficient organization form.
Agree 1 2 3 4 5 6 Disagree
3. A project without exploit goals is guaranteed to fail.
Agree 1 2 3 4 5 6 Disagree
4. In the near future, permanent employment will not exist. It will only be project based employment.
Agree 1 2 3 4 5 6 Disagree
5. Measurements and clear project gates are necessary to monitor project progress.
Agree 1 2 3 4 5 6 Disagree


The other groups answers are compiled and this is the results of their discussions:
President Johan Laflazon is very pleased with the Future Day. He concludes that he is really looking forward to the next activity which is taking place later this year. The topic is not yet decided but will be as exciting as today.


Until recently the two business areas have been two separate and independent organizations with a Group office in Sweden.
However, a number of factors have increased coordination and joint activities. It has now been decided by the Group Board that the purchasing routines from VCR and PC shall be:
Integrated
and
Globalized


You are looking forward to the next Inlab activity.
However, now there are other things to focus on. The Purflow project is starting. First let's look at the background again.


The changes of Inlab will be implemented through the project Purflow, where you will play an important part. Inspired by the Future Day you want to do your very best from the beginning of this project!
During the first formal project meeting there is a discussion on how decisions in the project should be handled. Jack Murphy, the experienced teamleader, implies that all decisions should go through the chief project manager. Susan Atkins is of the opinion that all project members should have the authority to make decisions within their own area of expertise.
You as a group will now have to decide on one way to handle the decisionmaking in the Purflow project.


Background
Infab is a multinational company of Swedish origin.
They are producers of Video-recorders (VCR). Infab is one of the top-companies in a stagnating market. Europe is the strong base both for development and marketing of the VCR products of Infab.
Over a number of years Infab has created another business area for PCs and computer devices. It is growing rapidly and has a majority of its operations based in Singapore and has no manufacturing outside Asia.


All decisions must go through the chief project manager (CPM).
All project members should have the authority to make decisions within there own area of expertise.
A few executives within the project group should have the power to make decisions.
PurNow


Jack Murphy is pleased with the decision and he thinks that this project will continue smoothly.
He starts to work with great energy.
PurNow


Jack Murphy is furious with this decision. "There is no way this project will be successful. I can not possibly work under these conditions. I will personally take this issue to higher management!"
PurNow


"I will only consider decisions made through the Chief Project Manager" says Jack Murphy. "Who will decide who executives should have the authority to make decisions? This will only create anarchy!"
PurNow

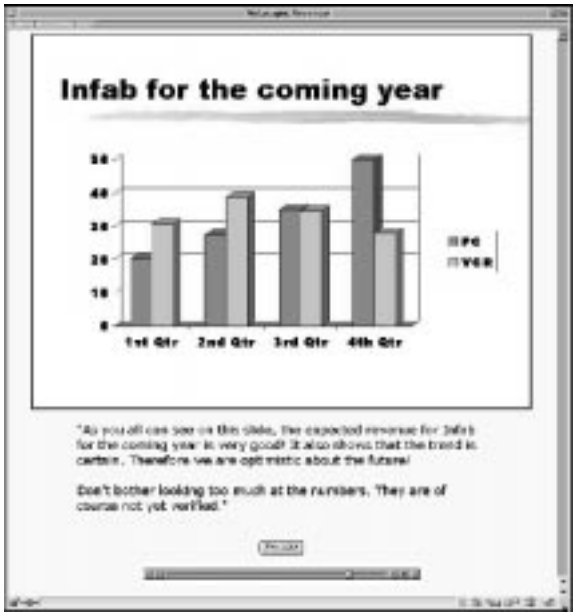

After the discussion about decision making, you look into the extensive background material from the analysis conducted so far.
The material shows how the VCR and PC purchasing organizations are different, for example in dimensions such as:
• Ways of working (responsibilities, systems...)
• Organizational structure (size, hierarchy, location...)
• Process scope (interactions, partners...)
The material also shows how the suppliers of Intab are becoming more global in both business areas. The suppliers are also different in terms of technology, geographical representation, size, type etc.


Infab
See specific data about the purchasing organizations.

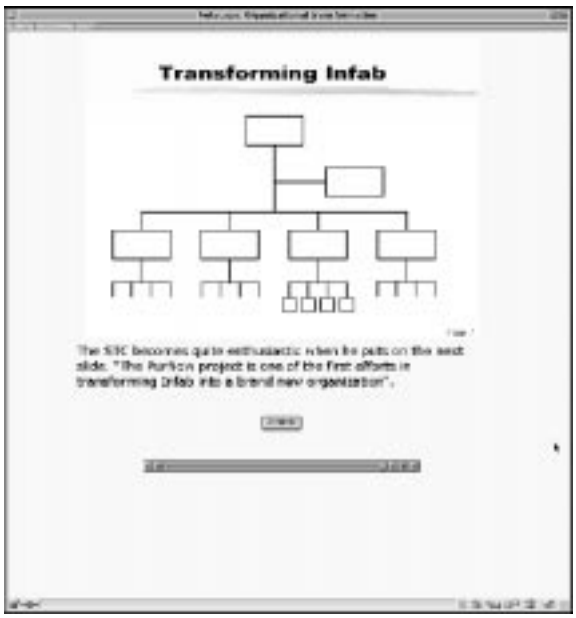

facts about the Purchasing Organizations

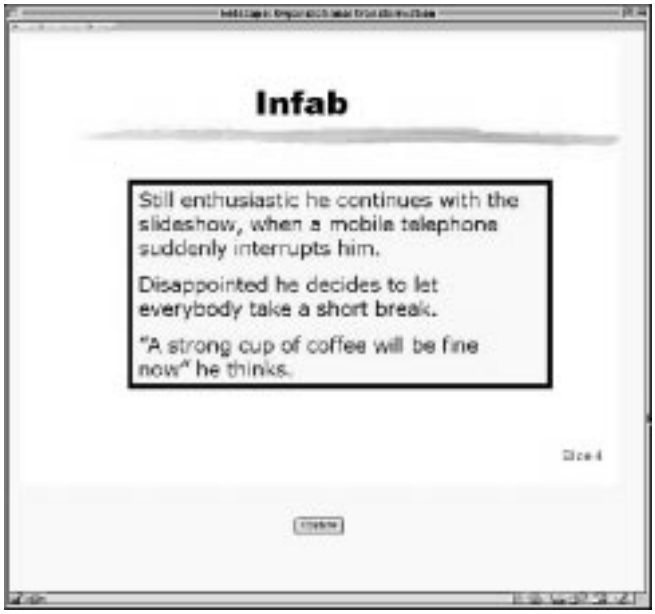

Project meeting
The distributed material is extensive. The team therefore decides to spend the rest of the day reading through the documentation from the analysis that is conducted so far.


The following day ...
The meeting starts quite early. Everybody is a bit tired after reading through the documentation last night. The Steering Group Chairman (SGC) is participating in the meeting and informs the group about the situation and the new organizational plan that you in the Purlow project shall implement over the next nine months.
Overall responsible for Purlow is Mr White (the SGC).
"There are a couple of slides which summarize the main ideas and the core points. The presentation should not take more than a few minutes to go through" he says and puts them on.


Infab for the coming year
1st Qtr
2nd Qtr
3rd Qtr
4th Qtr
"As you all can see on this slide, the expected revenue for Infab for the coming year is very good! It also shows that the trend is certain. Therefore we are optimistic about the future!
Don't bother looking too much at the numbers. They are of course not yet verified."


Major changes of Infab
A brand new organization
Customer focus
New central purchasing structure
Target orientation
E-business
New career possibilities
Decrease of employees
New reporting system
Flat organization
Even though Mr White told us that this presentation would only last for a couple of minutes, we realized quite soon that he was time optimistic when he was talking about a cleared subject.
And this was a slide he really liked!


Transforming Infab

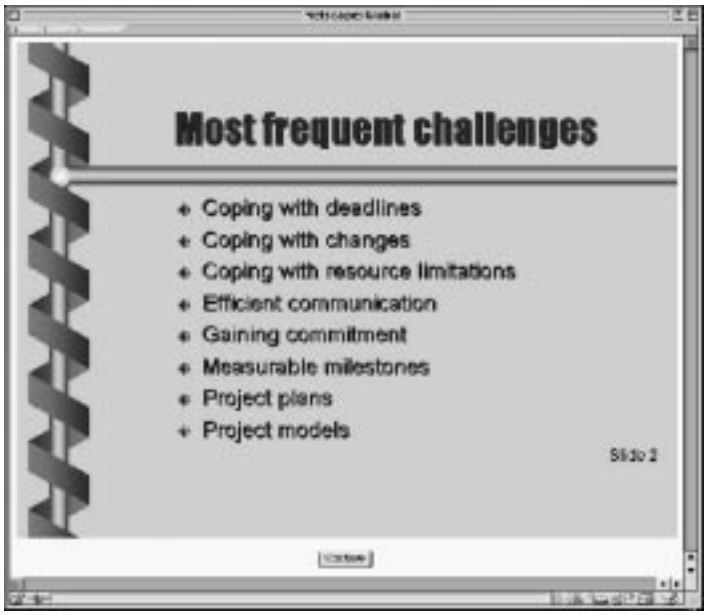

Infab
Still enthusiastic he continues with the slideshow, when a mobile telephone suddenly interrupts him.
Disappointed he decides to let everybody take a short break.
"A strong cup of coffee will be fine now" he thinks.


When you return after the short break, all of you are keen on starting working.
You all feel that this project is important, both for you as a group, but also for the company. Therefore you suggest inviting a guest to the next meeting.
A consultant maybe, or why not a colleague? Who would you like to invite?
Please choose one.
a consultant ...
a colleague...


"Before I start, I've got a question to the project manager. What is your opinion about work with the well-known white-book ? Please pick one of the following alternatives."
It is necessary
It is time-consuming
It is a way of learning
It is management control


Project management is a difficult task.
On Tuesday, January 28th, in 1986, the NASA Challenger space shuttle mission lifted off. Sixty seconds later the shuttle went up in flames.
When the investigation about the Challenger crash was undertaken, they did not find any mechanical mistake. Instead it turned to be complacency and mismanagement.
One of the manufactures ignored the warnings from their engineers, just a couple of hours before Challengers tragical and last mission.


"A question to all of you. What do you consider as the biggest risk in projects?
Discuss this in the group for a couple of minutes.
Please write down a few keywords."

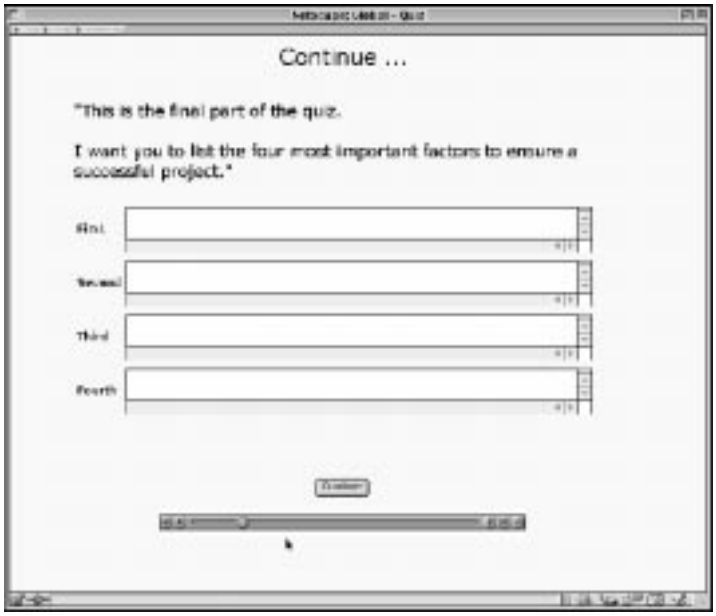

Most frequent challenges
Coping with deadlines
Coping with changes
Coping with resource limitations
Efficient communication
Gaining commitment
Measurable milestones
Project plans
Project models


Projects
One big problem in projects is commitment.
Without commitment the hard work which is necessary, never will be done and then you do not have a project...
...but when commitment leads to fixation to a certain policy or when there are decreasing benefits or increasing costs, commitment is a problem.
This makes commitment problematic.


Some questions about projects ....
"Next activity is a short quiz that I have put together. I want you to answer as a group. There are multiple choices and there are open-ended questions.
There are of course no right or wrong. Take your time. I'll comment your answers when you are done.
OK. Let's start!"


"What's your opinion about the following statements"...
1 agree --- 6 disagree
1 2 3 4 5 6
1 2 3 4 5 6
1 2 3 4 5 6
1 2 3 4 5 6
1 2 3 4 5 6


"How do you think success in a project should be rewarded? Individually or as a whole group?
And what sort of rewards do you suggest?
Please write down your opinions about this issue!"


Continue ...
"This is the final part of the quiz.
I want you to list the four most important factors to ensure a successful project."
First
Second
Third
Fourth


Lisa Nilsson looks through your answers, but because time is running away, there is no time left for further discussion. You thank Lisa for her time.

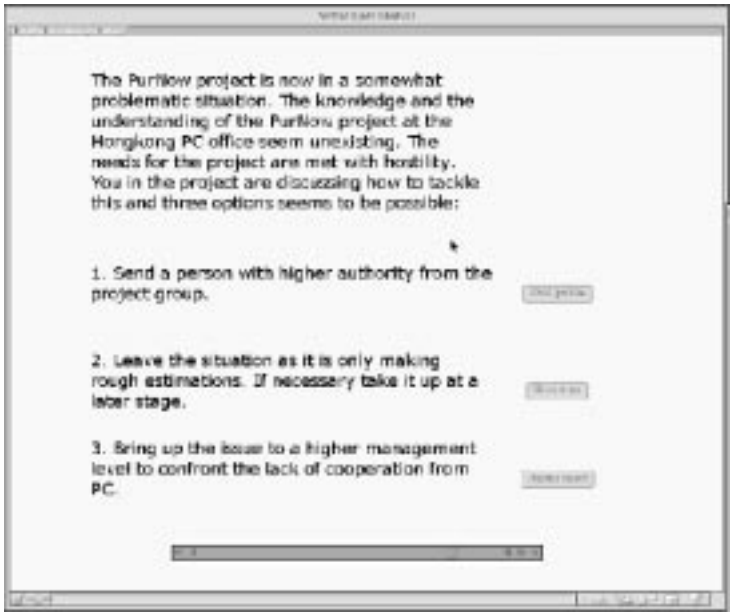

The second project meeting is over and you feel prepared to begin with the project. But during the following month the progress is the project is limited.
9
8
7
We return to the project after one month.


One of the challenges in the Partflow project is to integrate and globalise the purchasing strategies of VCR and PC.
To do this you have decided to gather all information about PCs purchasing routines and their computer system. You must decide upon whether to request the information by mail or to send a person to collect it.
The tight time schedule urges the project to get a quick response. The alternatives are either to mail the purchasing director of the Hongkong office and ask for details, or to send a systemsanalyst to go through the system structure.


The following mail was sent by the project manager the following morning.

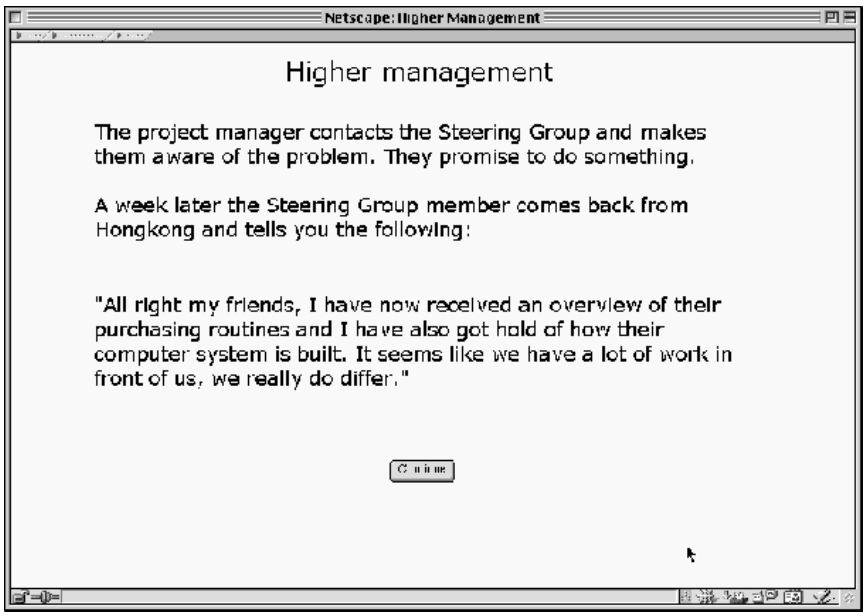

Netscape: Global
The systemsanalyst returns ....

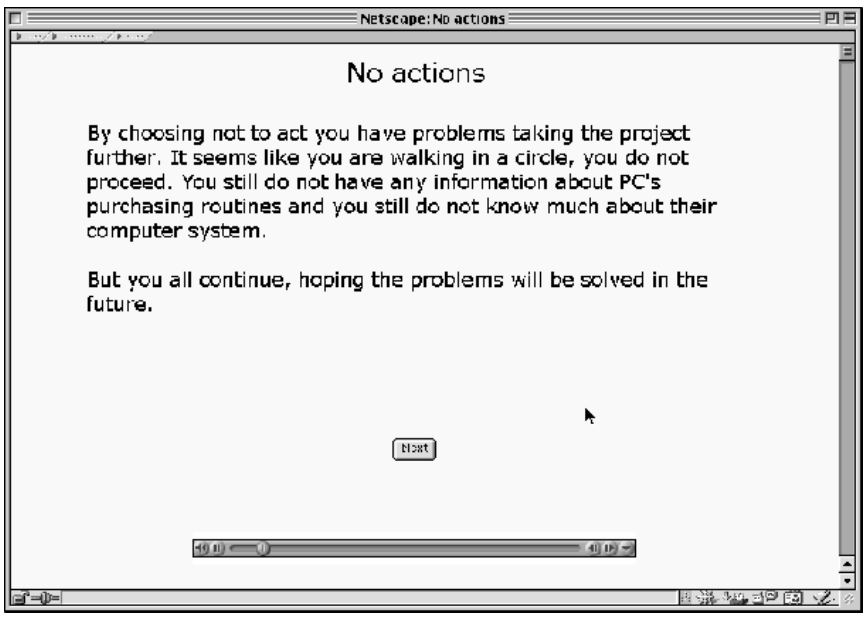

A week later.

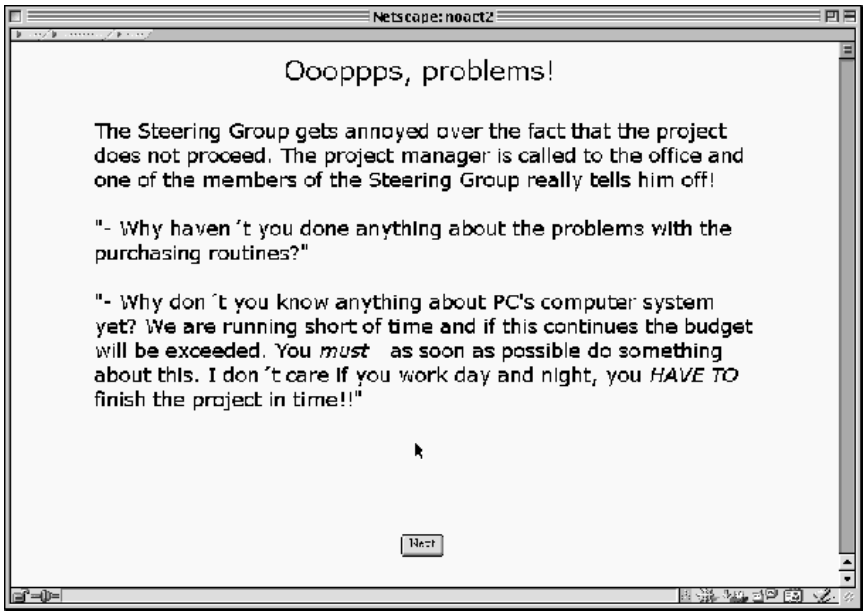

The Purflow project is now in a somewhat problematic situation. The knowledge and the understanding of the Purflow project at the Hongkong PC office seem unexisting. The needs for the project are met with hostility. You in the project are discussing how to tackle this and three options seems to be possible:
1. Send a person with higher authority from the project group.
2. Leave the situation as it is only making rough estimations. If necessary take it up at a later stage.
3. Bring up the issue to a higher management level to confront the lack of cooperation from PC.

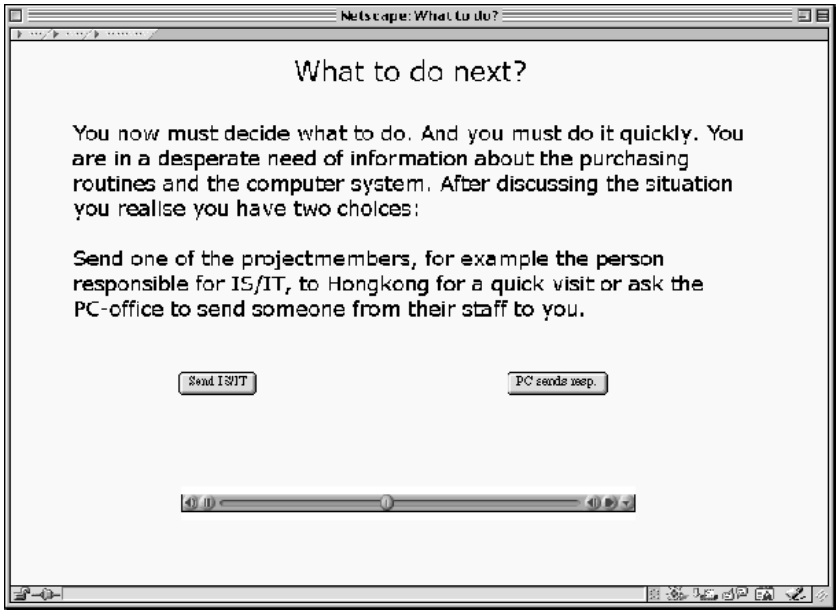

Send person
The project group decides to send the person responsible for IS/IT.
A week later he comes home again and it has been very successful. He is telling you about his experiences in Honkong.
"All right my friends. I have now received an overview of their purchasing routines and I have also got hold of how their computer system is built. It seems like we have a lot of work in front of us. We really do differ."
...and he continues talking about the great bargains he made...

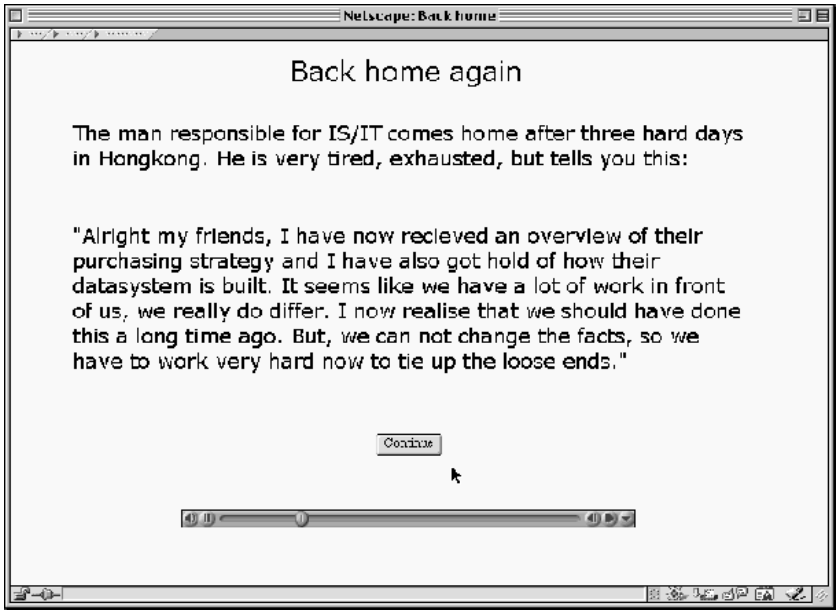

No actions
By choosing not to act you have problems taking the project further. It seems like you are walking in a circle, you do not proceed. You still do not have any information about PC's purchasing routines and you still do not know much about their computer system.
But you all continue, hoping the problems will be solved in the future.


Netscape: Higher Management
Higher management
The project manager contacts the Steering Group and makes them aware of the problem. They promise to do something.
A week later the Steering Group member comes back from Hongkong and tells you the following:
"All right my friends, I have now received an overview of their purchasing routines and I have also got hold of how their computer system is built. It seems like we have a lot of work in front of us, we really do differ."


Netscape: No actions
No actions
By choosing not to act you have problems taking the project further. It seems like you are walking in a circle, you do not proceed. You still do not have any information about PC's purchasing routines and you still do not know much about their computer system.
But you all continue, hoping the problems will be solved in the future.
Next


Netscape: noact2
Oooppps, problems!
The Steering Group gets annoyed over the fact that the project does not proceed. The project manager is called to the office and one of the members of the Steering Group really tells him off!
"- Why haven´t you done anything about the problems with the purchasing routines?"
"- Why don´t you know anything about PC's computer system yet? We are running short of time and if this continues the budget will be exceeded. You *must* as soon as possible do something about this. I don´t care if you work day and night, you *HAVE TO* finish the project in time!!"
Next


Netscape: What to do?
What to do next?
You now must decide what to do. And you must do it quickly. You are in a desperate need of information about the purchasing routines and the computer system. After discussing the situation you realise you have two choices:
Send one of the projectmembers, for example the person responsible for IS/IT, to Hongkong for a quick visit or ask the PC-office to send someone from their staff to you.
Send IS/IT
PC sends resp.

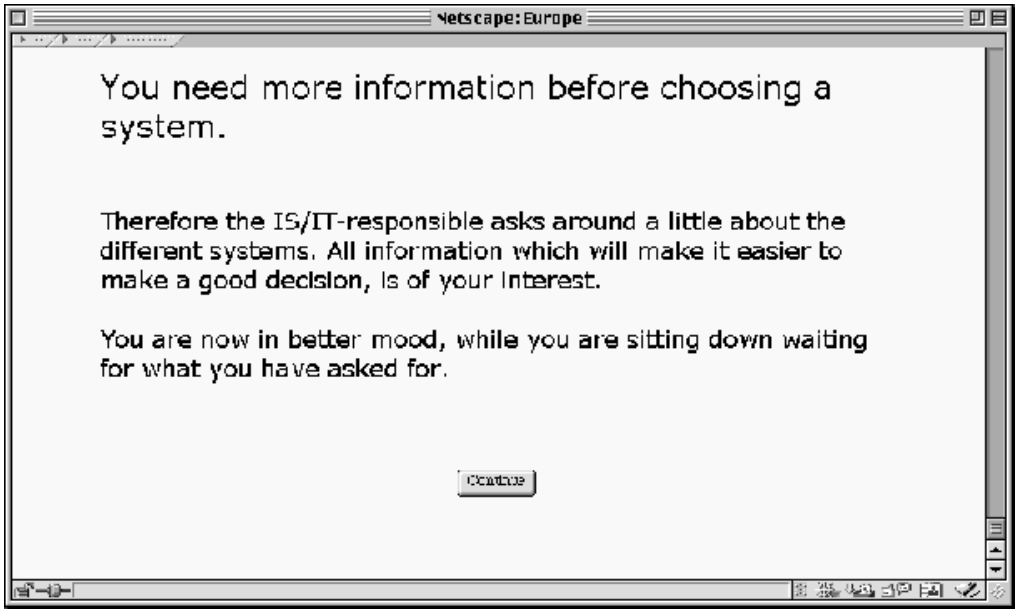

Netscape: Back home
Back home again
The man responsible for IS/IT comes home after three hard days in Hongkong. He is very tired, exhausted, but tells you this:
"Alright my friends, I have now recieved an overview of their purchasing strategy and I have also got hold of how their datasystem is built. It seems like we have a lot of work in front of us, we really do differ. I now realise that we should have done this a long time ago. But, we can not change the facts, so we have to work very hard now to tie up the loose ends."
Continue


The representative from PC arrives after ten days. In the beginning, PC is not very positive towards sending someone, but some pursuasion they agree. The person from PC shows you how their computer system and their purchasing routines work.
After a couple of days of hard work the project manager says:
"Alright my friends, we have now recieved an overview of their purchasing routines and we have also got hold of how their computer system is built. It seems like we have a lot of work in front of us, we really do differ. I also realize we should have done this much earlier. But, we can not change the facts, so we have to work very hard now to make ends meet."


A colleague ...


INFAB NEWS
How common is cultural clashes?


Cultural differences
Today we all know that PC and VCR differs in many ways.
The current computer systems are developed in two specific cultural environments which have made them quite different. Understandings of different types are embedded in the systems. The routines for operating the systems are also very different. The access to the systems varies a lot.
We can say that the cultural differences have created two computer systems with little in common, but still with a common overall functionality. The European system has many levels for completing a task, while the Asian has a more compact and complex interface.
The Purlov project has to decide on which computer system to use company wide, and in the long run, global for all purchasing units of Infab. Should you use the Asian or the European as the starting point? Or should you design and develop a new purchasing system (from an already existing standard system)?


Netscape: Europe
You need more information before choosing a system.
Therefore the IS/IT-responsible asks around a little about the different systems. All information which will make it easier to make a good decision, is of your interest.
You are now in better mood, while you are sitting down waiting for what you have asked for.
Continue


Netscape: Europe
Five days later you have still not heard from anyone.
You cannot afford to wait any longer so you all meet again to reach a decision!
Continue


Cultural differences
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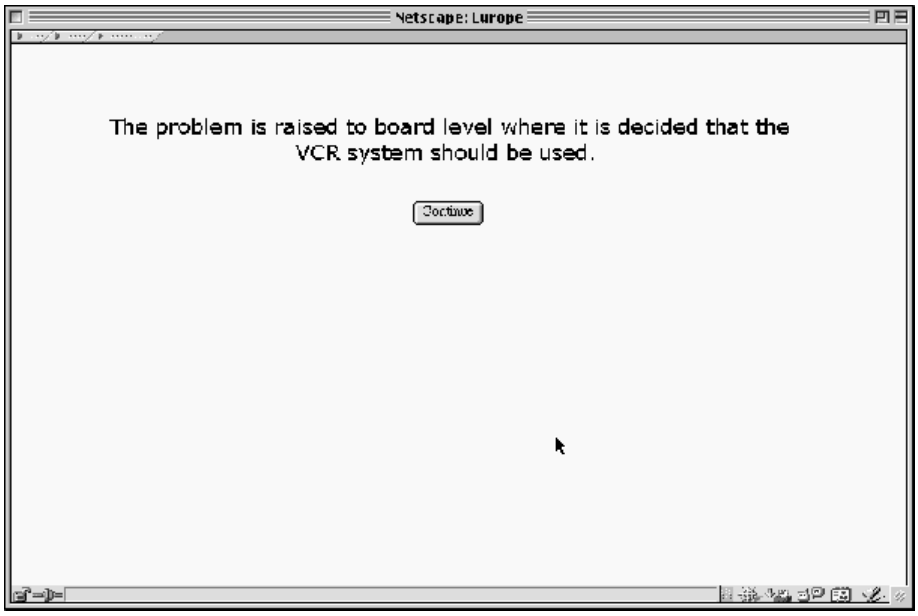
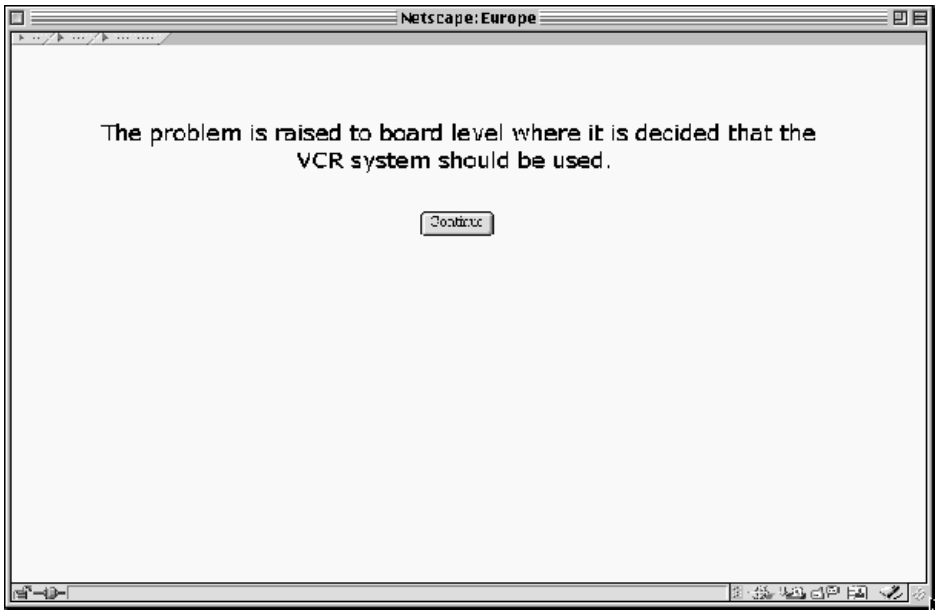
The current computer systems are developed in two specific cultural environments which have made them quite different. Understandings of different types are embedded in the systems. The routines for operating the systems are also very different. The access to the systems varies a lot.
We can say that the cultural differences have created two computer systems with little in common, but still with a common overall functionality. The European system has many levels for completing a task, while the Asian has a more compact and complex interface.
The Purflow project has to decide on which computer system to use company wide, and in the long run, global for all purchasing units of Difab. Should you use the Asian or the European as the starting point? Or should you design and develop a new purchasing system, from an already existing standard system?


Senior management can not approve of the decision to use the routines and systems from PC. One reason is that it is far too costly to train the much larger number of employees at VCR.


Netscape: Europe
The problem is raised to board level where it is decided that the VCR system should be used.


Delevop a new?
Senior management can not approve of the decision to develop a new system. This would probably be the most efficient in a longer perspective, but it is beyond the economic frame of the project.

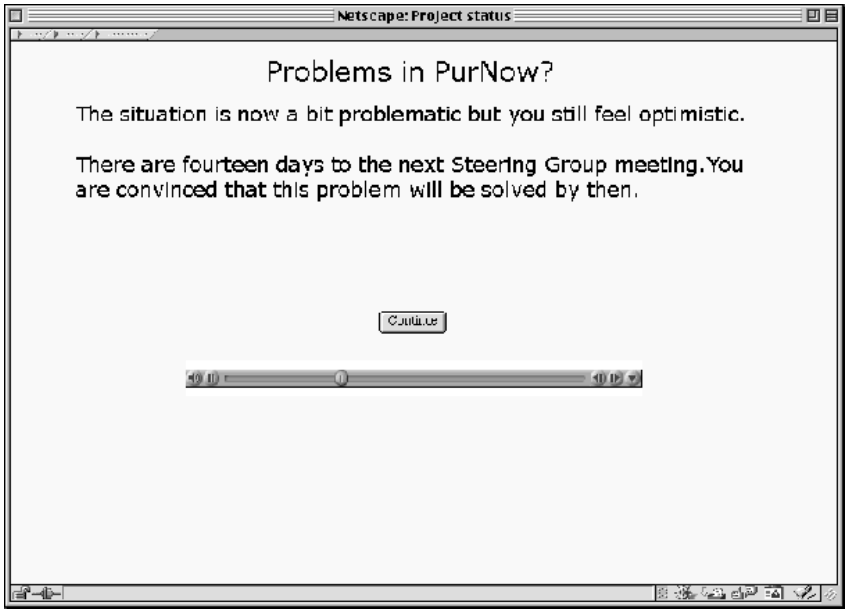

Netscape: Europe
The problem is raised to board level where it is decided that the VCR system should be used.


PC are not cooperating as planned...


... not cooperating ...
For you who did not understand Yi-Min Wang. This is what he said:
The whole situation is not acceptable. I am spokesman of, I would say, everybody in the local purchasing organization. We have routines and a computer system we find very suitable for our purposes. We do not need anything else. What's the point in giving us new systems? Maybe we need some new servers, but that's all.
Yi-Min Wang gets the question whether he thinks this problem will solve itself.

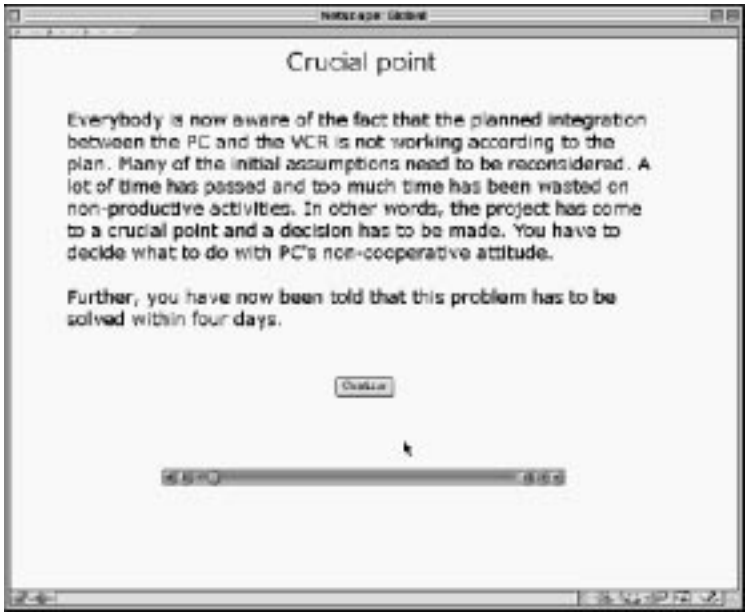

Yi-Min Wang continues ...


Yi-Min Wang ...
Yi-Min Wang's answer is No.


Netscape: Project status
Problems in PurNow?
The situation is now a bit problematic but you still feel optimistic.
There are fourteen days to the next Steering Group meeting. You are convinced that this problem will be solved by then.
Continue


A telephonecall from Mr White - the SGC - to the project manager.


Mr White - the SGC

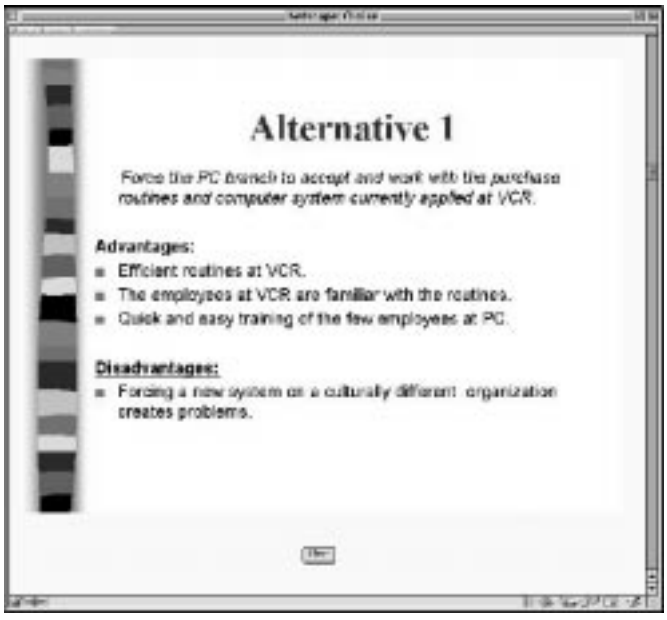

Crucial point
Everybody is now aware of the fact that the planned integration between the PC and the VCR is not working according to the plan. Many of the initial assumptions need to be reconsidered. A lot of time has passed and too much time has been wasted on non-productive activities. In other words, the project has come to a crucial point and a decision has to be made. You have to decide what to do with PC's non-cooperative attitude.
Further, you have now been told that this problem has to be solved within four days.

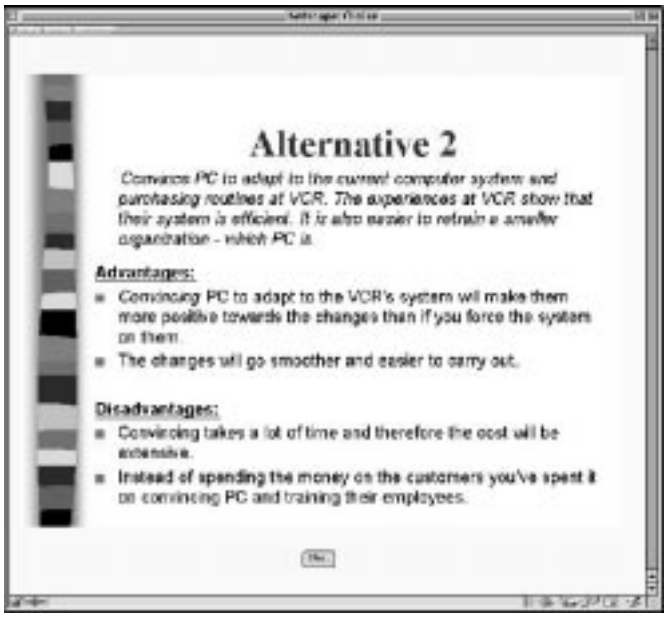

The following day
The following day at the office is chaotic!
Susan realizes that something has to be done. And that's soon! She decides to act by herself. She approaches a friend at another business unit and asks for advice.
They begin an e-mail correspondance.

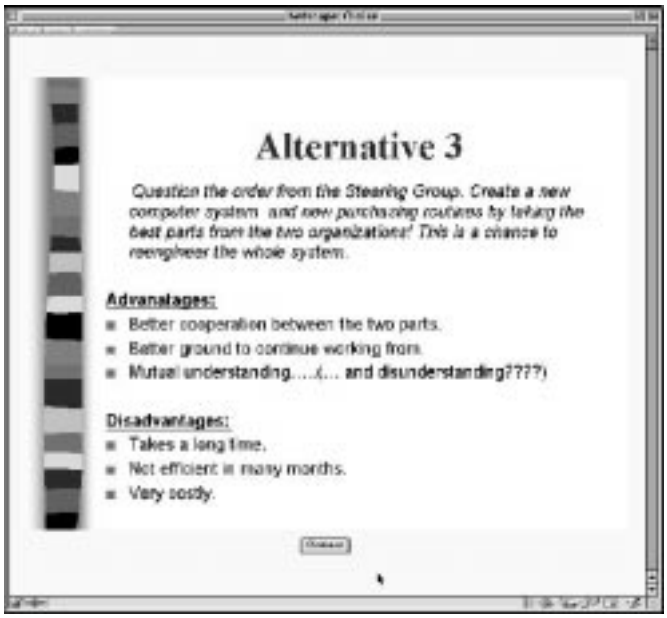

Susan sends a mail to a colleague because she is concerned about the problems in the project.


Attached file with the PurNow decisions.
This is a listed attempt to give you some more information about the situation in our troublesome project....
• The planned integration between PC and VCR is not working according to the plan.
• Because of a lot of cultural differences many of the initial assumptions need to be reconsidered.
• Too much time has been spent on discussing how to do instead of acting.
• PC has got a non-cooperative attitude.
• We also must solve this within four days!!!

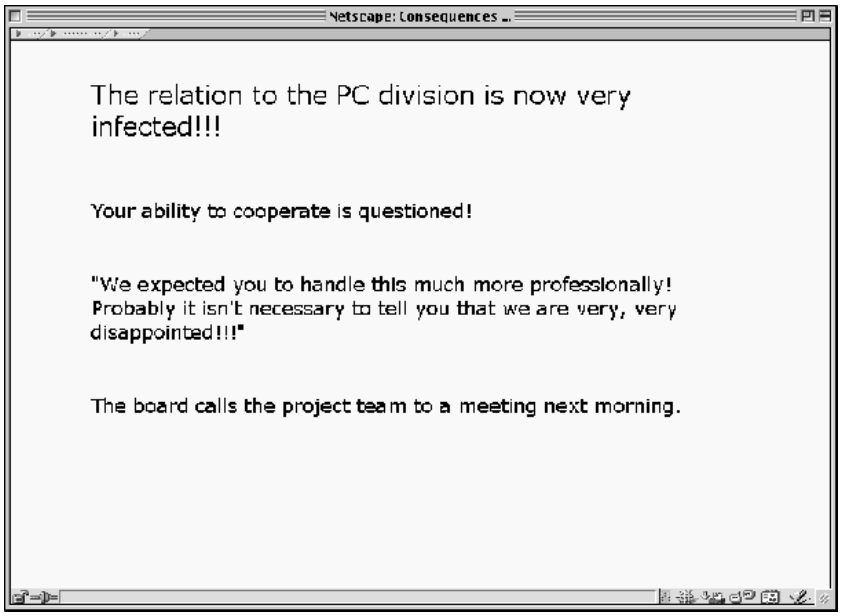

The colleague answers by suggesting three alternatives.

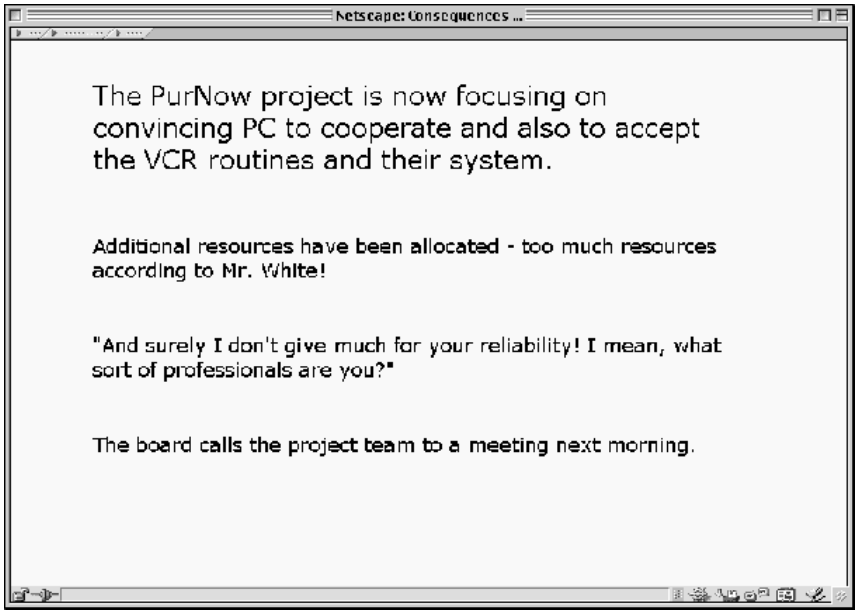

Alternative 1
Force the PC branch to accept and work with the purchase routines and computer system currently applied at VCR.
Advantages:
Efficient routines at VCR.
The employees at VCR are familiar with the routines.
Quick and easy training of the few employees at PC.
Disadvantages:
Forcing a new system on a culturally different organization creates problems.

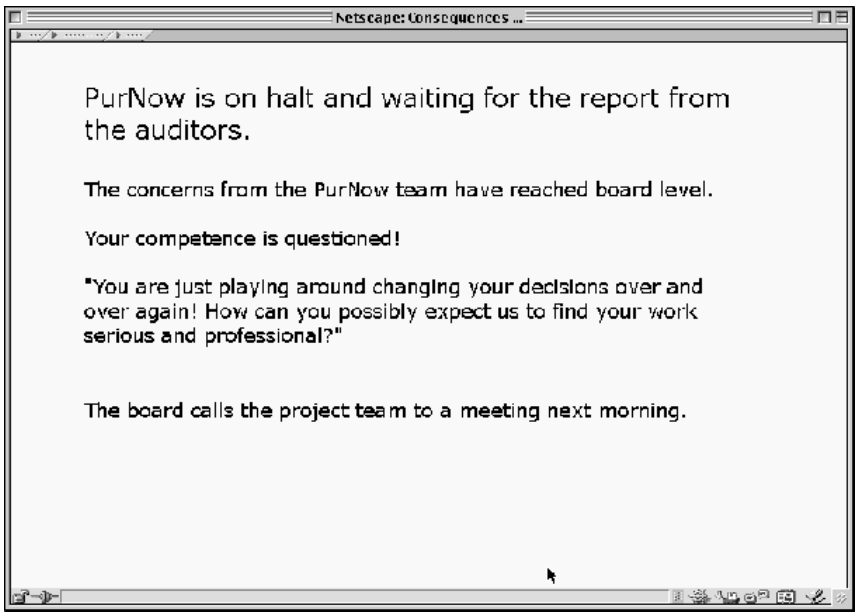

Alternative 2
Convince PC to adapt to the current computer system and purchasing routines at VCR. The experiences at VCR show that their system is efficient. It is also easier to retrain a smaller organization - which PC is.
Advantages:
Convincing PC to adapt to the VCR's system will make them more positive towards the changes than if you force the system on them.
The changes will go smoother and easier to carry out.
Disadvantages:
Convincing takes a lot of time and therefore the cost will be extensive.
Instead of spending the money on the customers you've spent it on convincing PC and training their employees.


Alternative 3
Question the order from the Steering Group. Create a new computer system and new purchasing routines by taking the best parts from the two organizations! This is a chance to reengineer the whole system.
Advantages:
Better cooperation between the two parts.
Better ground to continue working from.
Mutual understanding.....(... and disunderstanding????)
Disadvantages:
Takes a long time.
Not efficient in many months.
Very costly.


Susan is very upset when she comes to the next meeting.
After telling the rest of the group about how she feels, you look at the three alternatives again.
1. Force PC to accept the VCR system and routines. Just continue to do what the Steering group has decided.
2. Convince PC to adapt to the current VCR system. Try to use the experiences at VCR to show them that the system is efficient.
3. Question the decision from the Steering Group and instead create new routines and a system which is harmonizing the two areas.


Netscape: Consequences ...
The relation to the PC division is now very infected!!!
Your ability to cooperate is questioned!
"We expected you to handle this much more professionally! Probably it isn't necessary to tell you that we are very, very disappointed!!!"
The board calls the project team to a meeting next morning.


Netscape: Consequences ...
The PurNow project is now focusing on convincing PC to cooperate and also to accept the VCR routines and their system.
Additional resources have been allocated - too much resources according to Mr. White!
"And surely I don't give much for your reliability! I mean, what sort of professionals are you?"
The board calls the project team to a meeting next morning.


Netscape: Consequences ...
PurNow is on halt and waiting for the report from the auditors.
The concerns from the PurNow team have reached board level.
Your competence is questioned!
"You are just playing around changing your decisions over and over again! How can you possibly expect us to find your work serious and professional?"
The board calls the project team to a meeting next morning.