Technical Report **No. 03-2**

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Maj 2003

ISSN 1397 – 9507
V-CHI - Virtuelt Center for Sundhedsinformatik

V-CHI Technical Report no. 03-2
ISSN 1397 –9507

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The present report

The present report "Using case methods to study cultural diversity with the development of telematic systems" discusses a case study method which is an extension of work originally done in Babel, a 5th framework EU project. The report contributes to the discussion identifying operational cultural factors when implementing telematic systems.

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CONTENT

Abstract: The initial question for the present study can be reduced to, how do cultural factors impact decisions in systems development? This kind of research question is adequately studied by the case method, as we are studying on-going activities, where we have some access to the data, but no control over the process. Five different cases were studied, covering the cultural diversity of Europe to a certain extent. The experience from using the case study approach was that it is an adequate approach, but there are a number of difficulties and limitations that must be taken into account in future studies: 1) The researchers themselves must write the cases, to avoid filtering of local cultural values. 2) The case studies must be done in true time – coming back to elaborate on the case story will only distort the data. 3) Furthermore, an adequate theoretical framework is needed to interpret the data and bring further understanding to the research question.

Keywords: Case study, cultural values, system implementation, systems development.

1. Introduction

The Babel (TE 2002) Telematics Engineering Project is investigating the impact of culture on IT-development and integration, with a focus on providing means to alleviate the impact of culture on telematic application projects within the European health care. By culture, we understand the expanding hands-on experience with IT in health care bring attention to the many problems in acceptance, dissemination or penetration of IT-based solutions. One approach to understand part of the background to problems encountered during processes of technology transfer is to investigate cultural issues. At this stage of the deployment of telematics in our society, it is important for developers and producers of telematic applications to understand the impact of cultural factors on product's development and acceptance and to explicitly take into account one of the major set of acceptance criteria used by potential customers.

The Babel Project has extended an existing, operational framework for elicitation of cultural diversity, and a framework for mapping decisions and identification of key issues in the life cycle of telematic applications (Brender et al. 2000; Demeester, 1999). These frameworks form the theoretical basis of the work within the Babel Project.

To gain further empirical insight into the question of cultural aspects in systems development a number of case studies have been carried out. The present study is an extension of the original case studies performed within Babel, however, based on the raw data from these case studies. The purpose is to explore whether one retrospectively could use a dilemma approach similar to the one suggested by Trompenaars & Hampden-Turner in their prospective approach for characterisation of a cultural profile, see (Trompenaars F and Hampden-Turner C, 1997).

1.1 The Case Study Methodology

There has often been confusion about the concept of a case study. Therefore, to avoid the usual pitfall of using the term 'case study' as synonymous with example, we will introduce the definition of a case study (Yin, 1994) that has been an inspiration when designing this study.

The case study methodology used to collect empirical data in this study places itself in the social sciences. However, the method chosen in this study is only one among many social science methods. Yin (Yin, 1994) has a well-argued clarification of why and when it is relevant to choose a case study as a data collection method for field investigation. He clearly states that the kind of social research method one chooses to apply will depend on the questions that are to be answered. If the questions asked are concerned with 'what', 'whom' or 'where', either a survey strategy, analysis of archive material or statistics could be chosen as the methods applied. Where the questions asked are based on a concern for 'how' or 'why', the choice of method may be among experiment, history and case study.

Exactly what method one chooses depends on one's control over - and access to, the object or issue of study. The case study is appropriate when describing conditions where on-going activities are taking place, like it is the case with health care telematic projects. History can be used when the researcher has absolutely no access or control because the events happened in the past. Experiments are used when you are able to manipulate the reality either in a laboratory or through a social experiment.

A case study may include analysis of documents, direct interviews with actors and participant observations, etc. Only the combination of the different sources of data will provide a comprehensive picture of 'how' and 'why'. In other words, a case study is an empirical investigation of a past and present phenomenon that is taking place in its own setting, one in which the researcher is not actively taking part.

A case study is often used to explain causal connections in real-life situations that are too complex to be covered by either surveys or experiments. It is also used to explore situations where the objective is to survey a specific situation rather than to reach for a specific answer or end goal. In an explorative study of a fairly new research field, it is important to use a field investigation method that does not require an extensive knowledge of all the issues before the study can take place. The case study approach is here used to study decisions, why they were made, how they were implemented and what the results were or are expected to be.

This method pulls in an inductive direction. One of the criticisms of the use of the case study methodology has been, that it can manipulate reality in a way not obvious to the reader, if the theoretical or analytical consideration behind the questions asked are not disclosed, but instead appear as issues raised by the informants (Yin, 1994). In Babel's initial case study this was tried avoided by structuring the case studies with a point of departure in the framework presented in (Brender et al. 2000; Demeester, 1999).

The advantage and disadvantage of using the case study method, developed by Yin 1994, can for example be compared to the use of a questionnaire survey. Case studies are well suited for the study of contemporary issues, or when the investigator does not require control over behavioural events. Furthermore, there is an important difference between the kinds of questions the two types of methods are able to answer. Surveys are competent methods to investigate: 'who', 'what', 'where', 'how many' and 'how much' - related issues. They provide immediate but not elaborated answers to questions. In order to design the right questions one must already know the domain for the answer. In contrast, case studies are concerned with the less quantifiable 'how' and 'why' questions of a more explorative nature. When conducting surveys it is necessary to have an extensive knowledge of what you are looking for in order to formulate the precise questions. Here case studies are of a less quantitative and more explorative nature. The present study is concerned with investigating 'how' and 'why' a selected number of health care telematics projects were developed and progressed the way they did. We do not look for a limited number of explanations to 'how' and 'why' the projects developed as they did, but the study is a part of the learning process in the Babel project.

2. Methods

This section includes a description of the foundation for accomplishing the present study, i.e. the theories, approach and material upon which the present study was based, including premises/conditions for the work and the derived conclusions.

2.1 Background of the Original Case Studies and the Basic Data Material

The objective of analysing cases from already existing telematic projects was gradually to get access to the below 3 layers of information about the decisions made in these projects:

I) The "official" decisions: what was done
II) The "practical " decisions: what has been decided, taking real life constraints into account
III) The "confidential" decisions: what has been decided on the basis of hidden agendas, motivation, fears, conflicts….

This material would then serve as raw material in different ways within the babel project. The third layer is normally the most tricky to get hold of. Only those who have to make the ultimate decisions may be aware of these aspects. The information and knowledge is to be obtained from key individuals; hence the idea to establish a case study.

2.1.1 The Selection of Cases

The cases were selected on a combination of criteria: a) an even distribution over a number of known European cultures; b) access to the otherwise confidential information through trusted informants; c) ongoing or recently completed telematics application projects, but not necessarily EU funded R&D telematics projects; and d) from one overall application domain, healthcare, to rule out confounding factors from differences among the domain characteristics.

Five different cases were chosen, partly covering the cultural diversity within Europe. However, only two are reported here for sake of brevity.

2.1.2 The Storytellers

There are three types of actors within the case stories: the participants within the development projects (the cases, i.e. the objects of study), the informants (the 'storytellers'), and the 'researchers' within the Babel project. It was not a requirement that the storytellers should be participants within the projects themselves, in stead priority was given to use experts who were already closely connected (close enough to have access to confidential information and to knowledgeable participants) and possessed a deep insight into 'their' project to be able to elicit the hidden layers of information. Moreover, the storytellers had to be experts within the application domain (healthcare telematics) to be able – under guidance - to filter the potentially significant information from utterly insignificant information.

The approach of letting storytellers write the case stories and re-write (refine or elaborate) their story allowed us to let new knowledge of the information need guide the data elicitation process, and thereby let the investigation evolve from phase to phase.

Thus, to conduct the case studies, a number of storytellers were identified, fulfilling the mentioned criteria. All of these storytellers have an extensive capacity in the field of multinational telematics projects. They are known to the sector and respected for their long time commitment to the development and diffusion of health care telematics. What they did not have though was experience in social science research, hence case study research methods. The names of the actors (including the storyteller) are - naturally - known to the authors, but these are kept anonymous to secure full discretion with respect to any confidential information.

2.1.3 Writing the Stories

In short, the writing of the original case stories comprised the following steps:

1) Initially, the storytellers were asked to provide an informal and undirected prose story on the design and implementation of the selected project.
2) Guidelines were developed for focusing on actors, problems, conflicts and decisions, and the storytellers revised the cases.
3) The case stories were made anonymous by the Babel researchers and subsequently approved by the storytellers.
4) The cases were then analysed with the purpose of identifying the actors involved, the decisions made and the problems that had occurred.

The process of writing over the case story was an interactive process comprising two main steps. The idea was to let the storytellers write unassisted, but to follow up by asking complementary questions in writing for clarification and later supplementing with additional interviews. There was no direct participation of the researchers in the writing process.

During the process of writing the case stories, the storytellers have made use of different data collection methods, such as the use of various documents, minutes, interviews, participant-observation etc. But the exact source of data is not explicated to the researchers.

Step one:
The first strategic decision was to have the storytellers to tell the story without focusing on particular aspects of how the project had developed, based on the assumption that the tacit, transient and elusive nature of cultural aspects would imply that any template for description would make the respondents change behaviour/reflections. So, initially the storytellers were asked to provide an informal and undirected prose story on the design and implementation of the selected project, both verbally and in writing. The stories were presented verbally at a consortium meeting at an early project stage, where also the first written version was available. At the meeting, the storytellers expressed their insecurity about precise 'what' they should write. During discussions on this meeting it became clear that the reports would have to focus on the crises and decision points that structure a project.

Step two and three:
Guidelines for focus on actors, problems, conflicts and decisions were developed because the storytellers needed a structure in order to move on with their obligations for writing. Five cases were selected for further refinement. The guidelines on how to write the second semi-structured case story were introduced to the storytellers at a joint meeting. The task structure was explained in general terms followed by an exemplification.

The method for data collection (essentially the structuring of the stories) and the case descriptions prepared accordingly are provided within (Bertelsen P. et al. 1998), however, in a confidential form to maintain confidentiality of the information within the cases. Therefore, the prescriptions for the story writing shall be summarized briefly in Appendix I, while the relevant data will follow below. The case stories have further been made anonymous for publication, and the storytellers have approved the anonymous version.

Step four:
Analysis of the collected stories was accomplished by using the analytical framework developed as part of Babel (see Appendix I), and subsidiary when needed, by interrogation with the storytellers to elicit further information. This step is focusing on identifying breakdowns, crises and problems encountered during design, planning and implementation of the projects.

2.2 Theories Applied

2.2.1 The Change Governance Framework

The objective will be to analyse potential relationship between control aspects of decision-making and culture.

The cultural values are resources at our disposal when we are facing a new situation. Cultural values directly influence decisions and decision-making processes. They dictate what we perceive as right, what we have to do, and they result in practical acts. We can look at cultural values as forces that produce an effect. We need to know what are the *application points* of those forces. The function of the *Change Governance Framework (CGF),* which is a core component of the Babel approach, is to provide a structured description of the set of application points of cultural values. The *CGF* describes the set of decisions that we have to go through when deciding to launch or not to launch an important action, for instance in the development of a project (an action which is part of the project life cycle) in terms of a map of the decisions. It focuses on the control dimensions of the decisions, not on their scientific or technical content. The CGF is described in some detail in (Demeester, 1999), and its operationalisation for the present application purposes is described below.

Phase 'Clarify'	**Phase 'Negotiate'**
1.1. Observing and sizing up the new situation amounts to reduce the unknown to the known: we collect information, we make sense out of it, we then interpret it in terms of problems, and we make a conclusion. In each category, the build-up of information goes through three steps: first, interpret information about the environment in order to construct meaning about what is happening; second, create interpretation by converting and combining the expertise and know-how; thirdly, process and analyse information in order to commit to appropriate courses of action. 1.2. Imagining a solution, describing it, and concluding. Proposing a solution necessarily paves the way for uncertainties; solutions are projections in the outside world. 1.3. The group of peoples who is sizing up the situation or proposing a solution. The composition of that group and the way people interact determine both the understanding of the situation and the solution. The team can be made up of a single individual or of many people who play different roles. The team can be made up of developers and customers, or strategists and operational people, or contains the following roles: somebody who generates the great idea (breakthrough), somebody to criticise, somebody to evaluate the consequences, somebody to analyse the needed resources… 1.4. Validating the solution in order to propose a sound one, i.e. warranted by sound knowledge and backed by checking critical details.	2.1. The resources of the organisation, and the capacity to mobilise them for the proposed solution. Those resources represent the material, technical, scientific, financial and human infrastructure (knowledge, know-how, skills) that has been elaborated for years; they include institutionalised dogmas and traditions. They are both opportunities and constraints. 2.2. The resources and constraints from the outside world and the capacity to face them. In addition, as the proposed solution will trigger reactions from the outside and will influence it, the capacity to act accordingly has also to be considered. 2.3. The nature and quality of the interactions between the different categories of people who will be concerned by the solutions, for instance users. They can have a tradition of co-operation, or conversely of competition. 2.4. The capacity of all the parties to absorb the changes in their work practice and in their social relations that the solution will trigger. The negotiation between the proposed solutions and the four components listed above results in adjustments of the solution in order to make it viable. This requires alignment of what the four considered elements are offering and imposing as well as assessing whether the resulting counter proposal to the first phase is acceptable (i.e. whether the modified solution still makes sense).
Phase 'Delegate'	**Phase 'Evaluate & conclude'**
3.1. Stabilising the conditions for effective implementation of the solution: the implementation is to be delegated to some people. Contracting is the key strategic issue. 3.2. Adopting a strategy to face the inescapable evolution of the environment. Internal and external realities are continuously evolving in a way that is not fully controllable. 3.3. Identifying the (right) people who will actually implement the solution and the methods they will use. In telematic applications, implementation usually requires the collaboration of people with different professional backgrounds. Developing teamwork spirit and a common language is essential. 3.4. Identifying the policy and evolution of the organisations to which the implementers belong. These organisations are evolving in ways that are independent from the project and might not be compatible with successful implementation. The delegation required to implement the solution continuously imposes an effort for convergence.	4.1. Estimating the deviance between the probable results of the implementation and the results as expected after adjustment between phase 1 and phase 2. 4.2. Predicting the new state of affairs that will exist when the probable results will be obtained: this new state of affairs is made up of the probable results of the proposed solution and the changes in the environment that are out of our reach. 4.3. Reacting to both the deviance and the new state of affairs in order to decide whether to launch the proposed action or not. 4.4. Exploiting both the deviance and the new state of affair for deciding to propose a new action.

Table I: The main issues at each of the four phases within the Change Governance Framework (Michel Demeester, personal communication, see also (Bertelsen P. et al. 1998))

2.2.2 The 7 Dimension Framework for Characterising a Cultural Profile

The seven-dimension framework outlined in (Demeester, 1999) represents a meta level framework for characterising a cultural profile. The seven cultural dimensions are adopted from Trompenaars (Trompenaars F and Hampden-Turner C, 1997) and Hampden-Turner (Hampden-Turner C and Trompenaars F, 1994) and are expressed as opposing modalities:

1. Equality vs. inequality;
2. Individualism (and liberty) vs. communitarianism (and authority);
3. Simple direct value ascription vs. complex value ascription;
4. Inner-directed vs. outer-directed orientation;
5. Sequential time (and cause-effect concepts) vs. complex time (and complex networking concepts);
6. Universalism vs. particularism;
7. Atomism (or reductionism, analysis) vs. holism;

An alternative framework was constructed as outlined in Appendix 1. The 11 points are specified for characterisation of events within telematic application projects. They can combine with one another and reinforce each other. The hypothesis is that the topics listed in the appendix, when identified in a case may, be correlated back to the seven dimensions, either individually or as combinations. They were therefore presented to the storytellers as a suggested framework for writing the case stories and as inspiration for what to look for.

2.3 The Concept of 'Dilemma'

According to Webster's Encyclopaedic Unabridged Dictionary a dilemma is:

"1. A situation requiring a choice between equally undesirable alternatives.
2. Any difficult or perplexing situation or problem".

In this study we have decided to use the first definition, however, modified to "…a choice between equally *desirable* alternatives", while still including the connotation of the latter that the decision-making is challenging. Note that even if the term 'dilemma' originates via Latin from Greek 'di' (for the number 'two') the definition does not constrain itself to a choice between two alternatives. Neither do we in our application of it.

The perspective behind the Babel case analysis is that behind a specific critical decision there exists a set of alternatives, which form the decision-making basis. Therefore, the assumption is that each critical decision made within a case story can be traced back to a dilemma situation – be it explicit or tacit decision-making alternatives - at the given time and place. In other words, a dilemma takes its point of departure in an identifiable situation and reflects two or more realistic alternatives to the situation.

To be able to talk about having faced a dilemma, one must be able to argue why the choice was A and not the equally likely B or C. If the alternatives are not equally likely (desirable or undesirable, according to decision-makers subjective judgement), the decision-making does not constitute a dilemma. Consequently, the options within a dilemma represent strong decision-making forces.

It is interesting to know the non-chosen alternatives within the dilemma decision-making since they may provide a rich picture of the (culturally determined) preferences in the actual decision-making.

The dilemmas that exist and thus the decisions made by actors originate within a combination of aspects: First, the structural conditions in society (i.e. the social division of labour and the infrastructure conditions). Second, the institutional and organisational setting in which the actors operate, and finally the norms and values prevailing. With the definition of culture

from (Demeester, 1999) it is obvious that the way organisations solve dilemmas (i.e. the characteristics of the solution preferred) is deeply rooted in their cultural background.

2.4 Approach for the Present Dilemma Approach to a Case Story Analysis

All five cases from the original data collection were included in the present analysis, but for sake of brevity only two of them are included in the presentation of the outcome.

The objective was to find out, whether cultural issues can be identified retrospectively from decisions taken in the design, planning and implementation of case studies, based on the hypothesis that the way organisations solve dilemmas is rooted in their cultural background.

Approach:

1. A number of decisions within the description of the design, planning and implementation of the telematic projects were identified.
2. A number of plausible dilemmas were identified.
3. The decisions were placed in different stages of the governance framework.
4. The decisions were analysed by means of the 7 D framework.

2.4.1 Identification of Decisions

Some decisions are made to mirror an organisation's desire to change. Some decisions are not necessarily tied directly to any identifiable actions. They are merely a declaration of intent. For instance, a decision to improve health status of the citizen will remain an objective or aim until a number of other decisions and actions make it possible to monitor whether the health status of the citizen has improved.

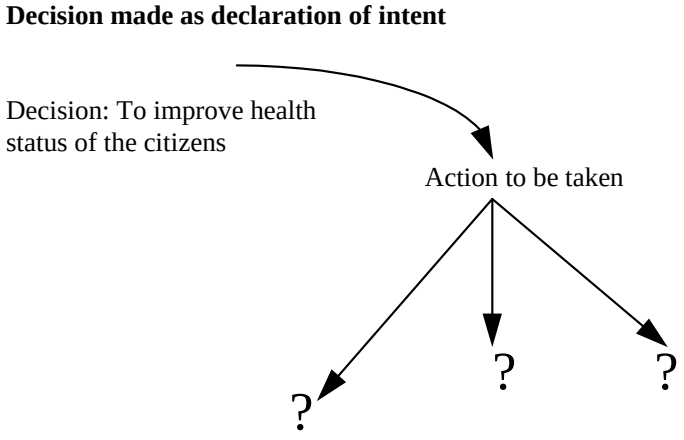

Figure 1: Decision tree for decisions taken during the projects in the cases.

Another type of decisions is related to a direct identifiable action, for example when a community health care organisation decides to use telematic systems for its future changes within the organisation. The action taken after such a decision is to involve the organisation directly in development and procurement, and further look for partners to be involved. These actions (decisions) may be referred directly back to the choice of implementing telematic sys-

tems. The similar later decision to develop a system in a joint venture relationship with a private company might also be identified.

A decision tree was drawn up for each project as illustrated in Figure 2.

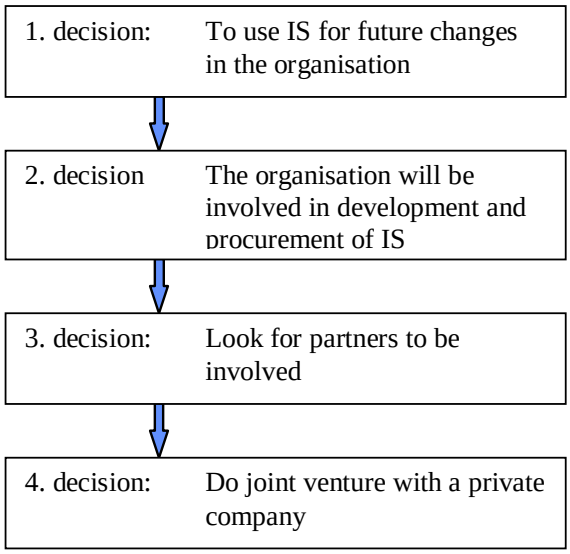

Figure 2: Decision tree for identifiable actions

2.4.2 Identification of Dilemmas

Each decision point was analysed to see whether at least two options for decision-making could be identified behind it. If that was not the case then the decision was more likely to be political or structural rather than a dilemma. Even if political or structural decisions are also based upon cultural values, this basis may be confounded by a number of factors and information not available to us. Therefore, such decisions were eliminated as points of interest for our analysis.

2.4.3 Location of dilemmas within the Change Governance Framework

The decision are organised in four phases:

1. Size up the situation and invent a sound solution, in which the major activity is to clarify the issue/task at stake.
2. Confront that solution to reality (resources & constraints), and propose a viable solution, i.e. a kind of negotiation.
3. Consider the implementation of the solution, and project the probable results, in which the major activity is to delegate.
4. Confront the probable results to the original expectations and conclude to launch the action or not (go / no go), i.e. evaluate and conclude.

These four phases belong to a workflow cycle model, as originally proposed by Winnograd and Flores (Winnograd T. and Flores F., 1986) and further developed by M. Demeester (Demeester, 1999): It represents the dynamics of a conversation. Each phase is connected to the

previous and the next ones by transitions where transfer of information and responsibility take place. Moving to a phase implies acceptance of an obligation. The progress from one phase to another is not necessarily sequential, as counter proposals may force changes in the previous phases. A phase can also be by-passed. A cycle usually starts at phase 1, but not necessarily: e.g. it can start at phase 2, from the conclusion of a previous cycle if, for instance new opportunities or constraints are appearing.

2.4.4 Analysis of dilemmas within the 7 Dimension Framework

The seven dimensions were operationalised as outlined in Appendix 1. The idea was to detect which topic in the list constituted the identified dilemma and thereby reflecting a specific position in the 7 Dimension Framework (7D).

3. Case Studies

The following is the fourth version of the case stories. The storytellers guided by one group of the Babel research team produced the first version, but when we started the in-depth analysis of the case stories it became clear that more precise information was needed in specific areas. The storytellers therefore revised the case stories to satisfy the analytic demands. This second version was finally rewritten and made anonymous by us and returned to the storytellers for approval.

A summary of this final, approved, anonymous version of two typical case stories is presented in the following.

3.1 Case A

A global pharmaceutical company headquarter in US with affiliates in 120 countries has developed pharmacoeconomic models for planning the balance between cost effectiveness of the company's drugs to at least one other drug standard for the treatment of a pathology in virtual patients. The computer models are developed on the assumption that using a resample from a limited and specific reality could generate a model of general application to support the company's marketing activities. The models can be seen as the result of a team effort in which contributions from health economists, information technology specialists and scientific boards are pooled. Data concerning the efficacy of drugs are taken from clinical and pharmacoeconomic trials published in peer reviewed medical journals. The visual and system complexity of a model varies according to the effects of the drug on the pathology it treats, the complexity of the pathology itself, and the pharmacoeconomic measures thought to best capture these effects. The mother company (MC) encourage its local affiliates to utilise its already developed models, and offered to take on the direct charge for the funding that may be needed to adapt the models to the local conditions.

3.1.1 The European Affiliate in Country XX

In early 1990's, the XX government changes its health policy with the purpose to rationalise health care expenditures, starting with drugs. The decision was that drugs would no longer be reimbursed unless they belonged to a category approved by the ministry. Pharmaceutical companies in XX have always looked for ways to increase customer loyalty by appeal to the personal needs of physicians by setting sales incentives for high prescription similar to those used with the pharmaceutical sales people.

This new political situation made the MC include XX on the lists of affiliates to benefit from their development of the pharmacoeconomic computer models. The changes in the country's health policy made it attractive to encourage XX's practitioners to assess drugs by the use of information technology (a computer model that compress the clinical and economic

effects of alternative drugs). The thought was that XX's physicians would welcome new and interactive ways to solve the dilemma of which drugs to prescribe using the combined criteria of clinical efficacy and economic value. However, compared to the situation in the US the XX's practitioners were at that time not very familiar with IT.

3.1.2 Adapting existing models

According to the US supervisors, adapting an already existing model should be a very straightforward process. It involves paying some experts to provide the corresponding XX data in XX's language, inputting it in the model by the local PE person and collaborating with them to sort out any technical details or assumption included in the model. In their timeline, this process would only take months.

The MC discovered a need to identify a senior expert to give name and status to the process nevertheless the work was performed by junior experts.

3.1.3 The use of local experts

It had to be decided who should be the expert. The choice would stand between a locally well-known and respected practitioner (as it is the custom in XX) or a scientifically and international recognised local expert (as it is the custom in US). In contrary to US a contract based system where the expert deliver by payment does not work in XX. Therefore how to approach the expert was an issue of different opinion between MC and the affiliate.

After having produced the local data needed for the adjustment of the models, the pharmacoeconomic person (PE) from the MC had to do the inputting into the model. Here there was a lack of common ground between ability of expert and of PE staff. The PE further had to collaborate with the experts to sort out any technical details or assumption included in the model.

3.1.4 Barriers for diffusion

To start the process of diffusion of the PE model a sales force training had to take place. The MC had sponsored adaptation of three models and two more were initially planned for. However the diffusion faced a number of barriers:

i) In the XX view a patient is a unique entity; the way a pathology impacts a patient's health is uniquely linked to the patient's intrinsic functioning of his organism in the environment where he lives; likewise, how a drug impacts a patient's pathology depends on an unknown mix of characteristics.
ii) During the adaptation process, the assumption should be changed to fit the XX system, reflecting its organisational, cultural and cost structure
iii) XX's physicians would trust more the word of opinion leaders than a machine.
iv) Collaboration between non-clinical and clinical professionals is problematic as they lack a common ground and language.
v) In XX the company does not have a strong image in general and certainly not in pharmaeconomic where other companies have been quicker at establishing a respectful reputation, meaning that marketing strategy can not be the same as in the US

The strategy chosen was to publish the knowledge about the models in medical journals and distribute these articles to XX's physicians, and not immediately to get it on sales rounds, fairs or conventions.

3.1.5 Future dilemmas

After completing three models the MC and its affiliate are considering whether it is too cumbersome to continue further with development in XX or whether it would be more beneficial for the MC to move the implementation of the next models to another European country. The dilemmas they face are:

i) Should the development of models take place in US or in Europe (localisation versus general application)?
ii) Is it worth for the local affiliate to invest in training of the sales force and physicians to use information technology?
iii) Should the local affiliate distribute articles developed by other European affiliates instead of expanding their own sales efforts?
iv) Should they develop their own models?

3.2 Analysis of case A

The result of the analysis of the decisions made in case A is shown in Figure 3.

The technology transfer project: Critical decisions made

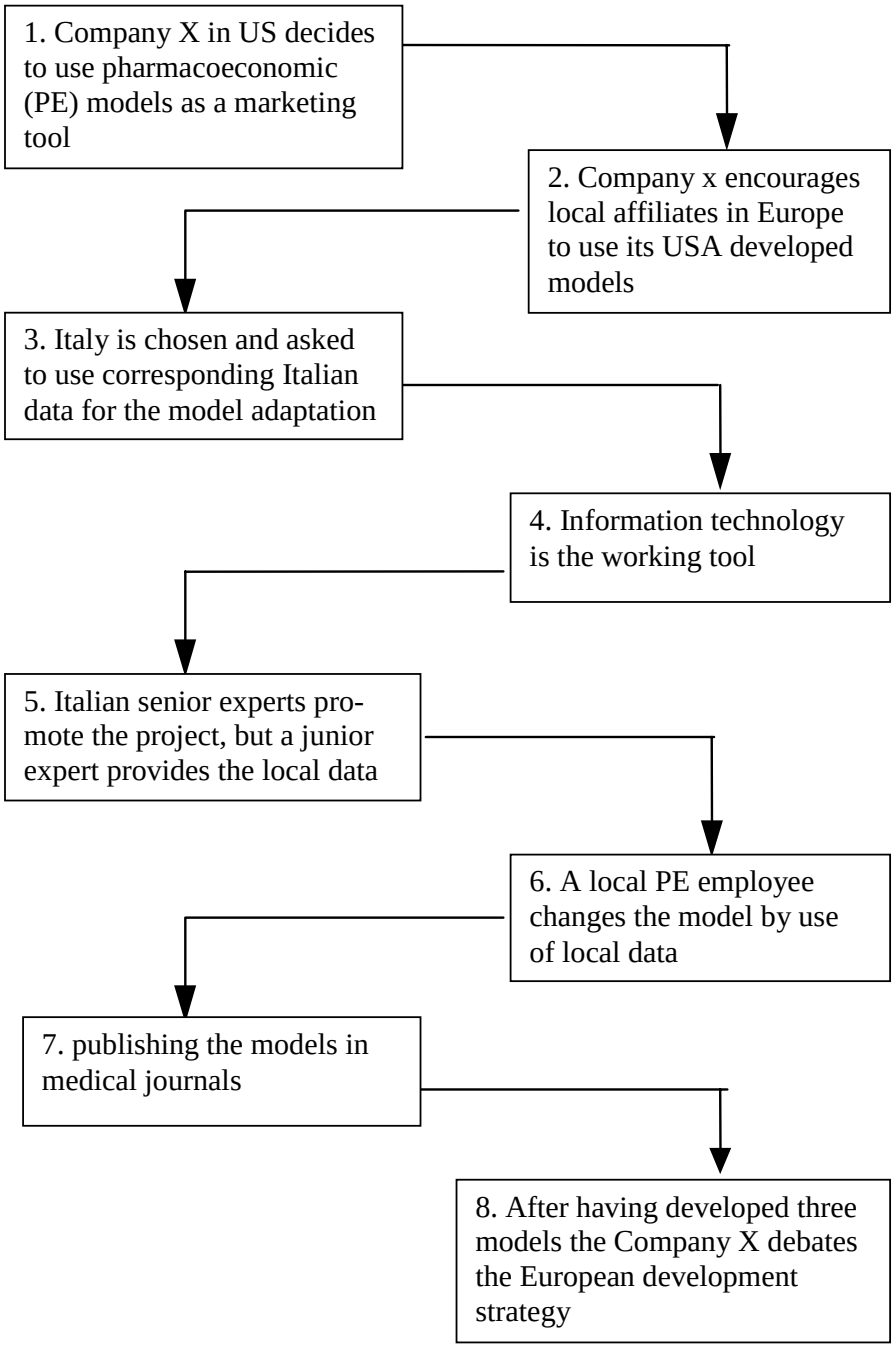

Figure 3: The Decision-tree for case A

Subsequently, the dilemmas behind every decision in the tree were extracted. The dilemmas behind decision 2 and 4 are shown in Figure 4 and Figure 5.

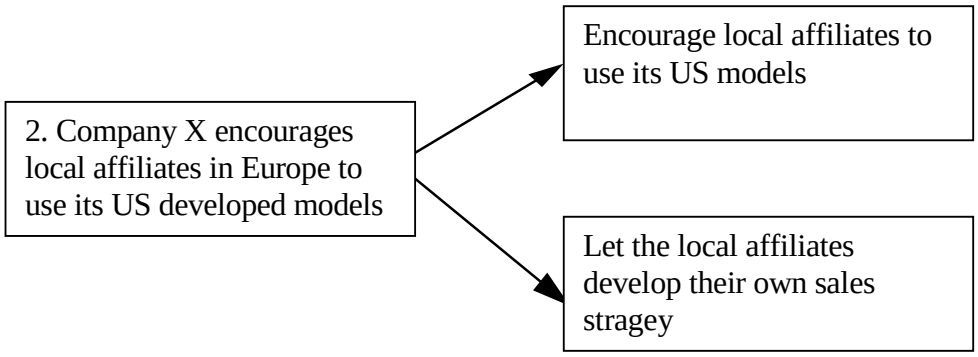

Figure 4: Dilemma for decision 2 in case A

In stage 2 in the decision tree, company X decides to encourage local affiliates in Europe to use US developed models. The choice that the PE model marketing strategy, developed in US, is applicable for the European market must have been based on some considerations. An equally sound alternative could have been to ask the affiliated companies in Europe to develop new marketing strategies without giving out the answer on how to do so. Not to tell them to use the Company X developed model marketing strategy seems to be part of the dilemma that Company X was facing.

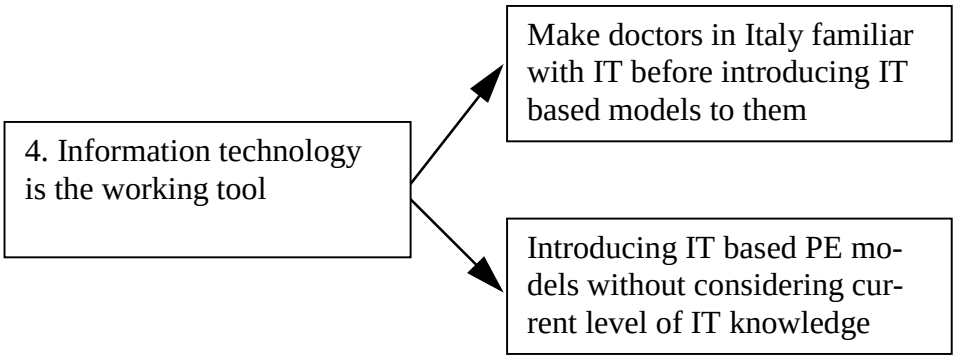

Figure 5: Dilemma for decision 4 in case A

In stage 4 it is decided that information technology is the working tool. To use the PE models in the clinical work the doctors need to have knowledge of IT and be customised to the use of PC. This was not the case in XX where the use of computer technology is not developed to the same level as in US. Considering the ability to use IT as a precondition the dilemma may have been whether to include Italy if the required use level is not available or to combine the

introduction of the PE models with an IT training programme for the doctors. Other alternatives may have been considered before the choice was made not to consider the current level of IT knowledge as important for the use of PE models.
The next step in the analysis would have been to detect which topic in the list of statements in Appendix 1 constituted the identified dilemma and thereby reflecting a specific position in the 7 Dimension Framework (7D). However, the case stories never reached a level of systematic structure and depth adequate for a reliable identification of these factors.

3.3 Case B

Beginning in the mid-eighties, the old 'in-house' Hospital Information System (HIS) continuously became difficult to maintain and to further develop. Many procedures had drifted away from the primarily administrative HIS system. Among other things, the end users had discovered the PC and started to implement their own department specific requirements.
In 1988 the Board of Directors (BoD) asked the Information Service Department (IDS) to perform a market analysis of alternatives to continue developing the existing 'in-house' HIS, however a decision to completely abandon the old system had not yet been made.
What became the CLIFF-project started to take off in 1990 with the report comparing the old HIS with state-of-the-art HISs. It was never questioned whether the organisation would be experienced enough to buy and run the suggested SER-system. The objective of the CLIFF project was to establish an efficient, maintainable system that makes several inefficient routines in the primary process obsolete: essentially no more paper work to do at the ordering of all kinds of things, no more phone calls or visits to various places in the hospital to request for results because such activities were to be carried out on-line.

The preconditions for introducing a new HIS were:

- Before 1990, by the use of formal system development methods (SDM) the old HIS had gradually been extended by the 'in-house' experts. Policy development was ad hoc and done by the same experts. (ISD performed a consultant's role to the BoD together with the involvement of an external company). There was some experience in dealing with suppliers of major software packages of applications not directly supportive to the primary care process.
- By 1990, problems on the organisational level made the hospital prepare for an organisational restructuring. The 150 old departments were clustered into 10 primary and ancillary divisions. Three management levels were thus created; BoD, divisions and departments.
- The ISD department had no re-usable documentation on existing systems; it was all personal staff experience.

3.3.1 Design and implementation of CLIFF

The decision to buy a SER-system was taken by BoD on the basis of their commitment at the divisional management level. It was decided that there had to be commitment from the 'shop floor' level, and nurses and doctors were send to see various SER-sites. The feasibility study was conducted by broadly composed team chaired by the director of nursing and with only 2 out of 12 participants from the ISD department. SER gave demos directly at the wards and medical specialities, and talks were given by a clinical specialist from the only other hospital within that country that had bought the SER toolkit and applied the SER way of working.

Due to the re-structuring of the departments, the larger ones of the rather autonomous divisions started to develop their own policy and information support services. Further, the finance of the project began to be an issue. SER has developed a 'SER cost-benefit analysis method' and the BoD asked the divisional managers to accept in advance that half of the potential savings gained after implementation of the 'SER-methods' will be cut on the divisional budgets after some time.

In 1994 contract negotiation with SER started. A majority of parties agrees on the necessity of changes (7 out of 12). There is a complete agreement on the required nature of any new system. Nine votes for SER but have various remarks. Seven have serious remarks to whether cost reduction can be achieved. The financial contribution from the divisions is considered fair by 6 but the period proposed (3 years) is considered too short. 10 years is requested and the level has to be negotiated. 50 % of the cost is considered too much.

The responsible people within the hospital seem to be confident with their own experience with project management, and the control resulting from the standard change course as it is defined by SER. No external third party is considered; no explicit method can be identified from the documents. There is only one division that believe project costs have been seriously underestimated. Only when the last version of the contract was to be signed where there sign of awareness that there might be serious risks attached to the project. External lawyers checked the contract extensively with respect to its juridical quality before the director of ISD signed it.

The main point in what will be available:

- SER delivers a toolbox with templates and various techniques, and a wide spectrum of standards HIS functions plus experience from other hospitals, all to be tailored to the needs of the hospital.
- SER delivers experts for a 'mirror' team that will train the hospital developer team, and assist them in taking decisions.
- The hospital delivers a team of developers and all the domain expertise needed.
- A detailed implementation plan with project organization and timetable.

A Steering Committee (reporting directly to the BoD) headed the project team. The role of the Project Team was primarily to do the project. This team is composed of people from the hospital, which have disciplines, and experience that is prescribed by SER-method. There is a 'mirror' team on the supplier side that trains and guides the project team along the lines of the contract. The project team does the 'data collection' with end-users in an active, participatory role. Task groups decide with the project team on what information and other requirements that are needed. The hospital has organised different taskforces and within every department a few specific key contact persons for each of the taskforces do the actual data collection on forms prescribed by the SER personal. There is no test of integration of the system parts on a functional level in the project plan because of the sometimes still incomplete and informal nature of specifications that result from the way data collection and specification has actually been done. Formal evaluation is absent.

To avoid problems of miscommunication it was decided to have a senior respectable physician to lead the project team, but it proved difficult to find one that was prepared to take the risk of having to take up their own clinical work/role again after end project. The final solution was a ½ time senior physician and a full time junior physician. The project was finally launched on September 1st 1995.

3.3.2 What had been realised and what was the experience?

The data collection phase resulted in the functional specifications. These are available in print and changes since the actual coding and testing of the system have been documented.

A large community of users were trained using computer based training facilities. A network of so-called super-users, responsible for the education of the average end users, was established.

A conversion was carried out, based on a detailed script on how to convert data from the old HIS, import it into the new one, and how to proceed from hour to hour, switching things on and off, checking proper functioning of all bits and pieces, etc.

There was hardly any attention for what-if-type of questions before the ‘big bang’ day.

In the first week a lot of outpatient clinics were closed giving personnel the opportunity to enter data into the new system, and catch up with the training duties. The on-line availability of the system appeared lower than expected. The system when down on that Monday because the workload could not be handled given the parameterisation of the system. And it continued going down for a couple of times during day hours, and data entry for new patients had to be restricted to period outside office hours. In addition, as a consequence of conversion a number of errors became visible.

The introduction of CLIFF meant a fundamental change in the way especially doctors and the hospital are working: previously, the entry of orders was done ‘orally’, meaning that e.g. the doctor had assistance to fill forms, take notes, make phone calls to other departments, etc. Now the doctor and the nurse, etc had to enter all orders directly into the system. Training thus became crucial. The experience after the first three month was that CLIFF have been loaded with incidental work, and that orders to various departments could not yet be given through the system because the roll-out had not yet taken place. The performance expectations in general may have been too high. A clear impact is that the old era in which a relatively happy (specialised) few people were able to use the HIS I definitely is over. There is hardly anybody in the hospital that is not involved in nor has an opinion on the transition process, and almost everybody is very aware of the painful and costly nature of such processes!

3.4 Analysis of case B

The result of the analysis of the decisions made in case B is shown in Figure 6.

The technology transfer project: Critical decisions in a HIS project

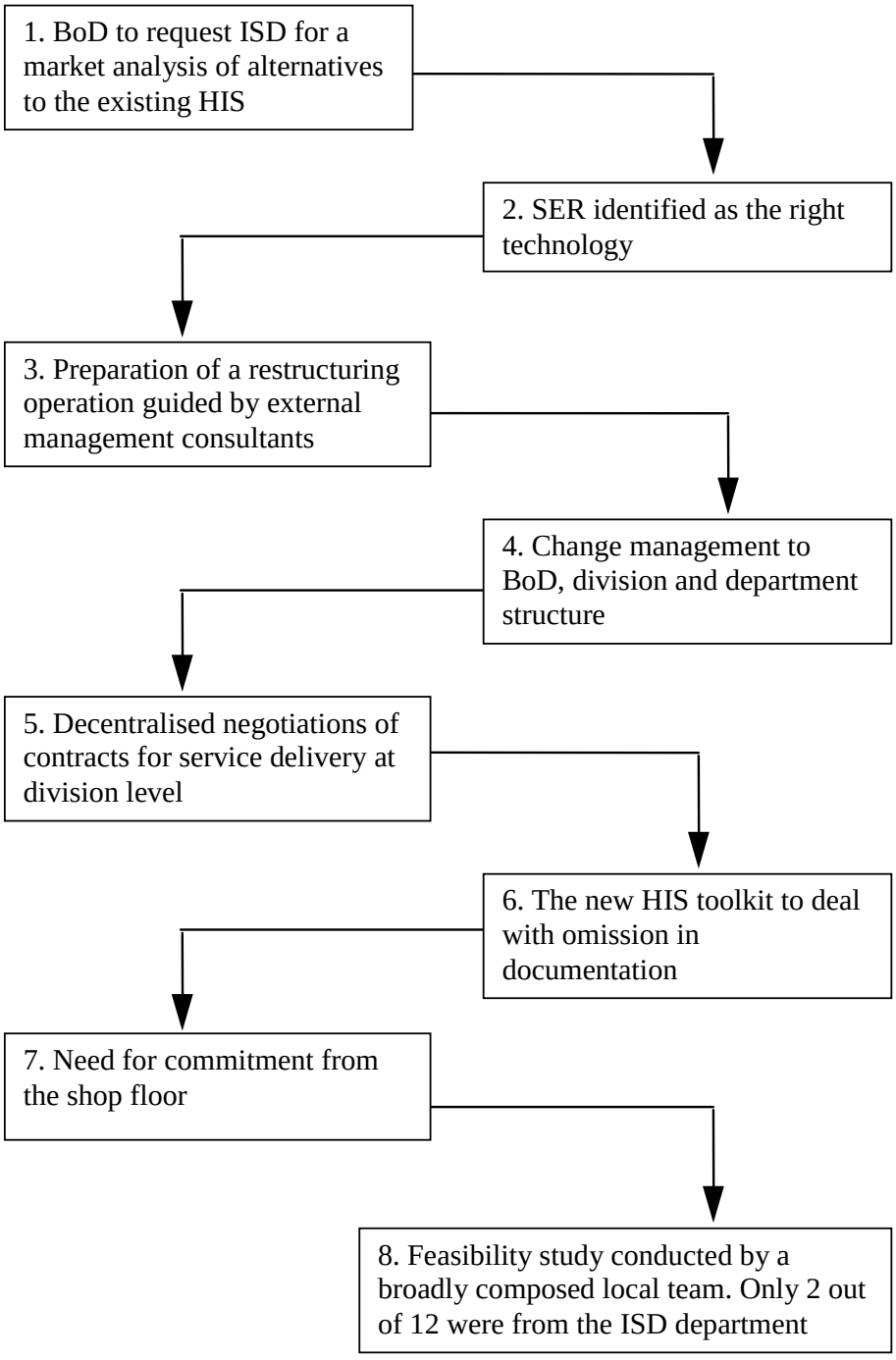

Figure 6: The Decision-tree for Case B

Subsequently the dilemmas behind every decision in the tree are extracted. The dilemmas behind decision 3 and 12 are shown in Figure 7 and Figure 8.

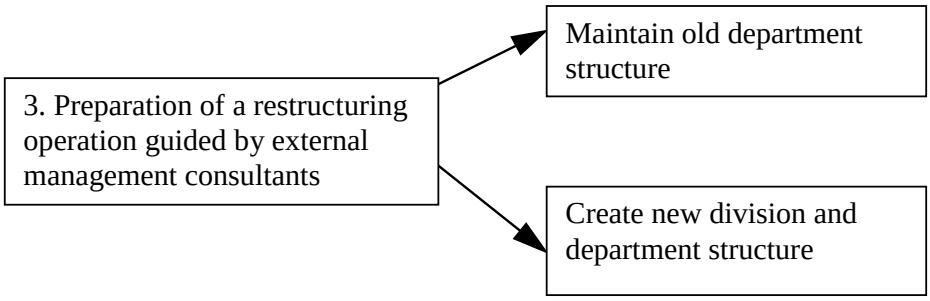

Figure 7: Dilemma for decision 3 in case B

In stage 3 in the decision tree it was decided to prepare a restructure of the management. An external management consultant recommended that there was a need to change the management structure of the hospital before any new HIS was implemented. Therefore, a new division and department management structure was created changing the old department structure.

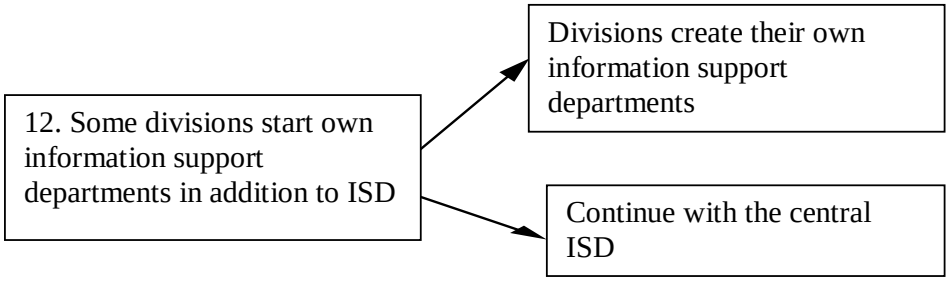

Figure 8: Dilemma for decision 12 in case B

In stage 12 in the decision tree some divisions decided to start their own information support departments. The new management structure opened up for changes whereas some of the divisions started own information support departments in addition to the central ISD instead of continuing to rely on the service given by ISD.
Again the next step in the analysis would have been to detect which topic in the list of statements in Appendix 1 constituted the identified dilemma and thereby reflecting a specific position in the 7 Dimension Framework (7D), but the level of systematic structure and depth in the case stories never reached a adequate for a reliable identification of these factors.

4. Discussion and lessons learned

A number of lessons shall be discussed. First, when the case studies were performed the Babel project had reached a stage where empirical insight was needed. The development of the 7D and the CGF had reached a stage where it could be useful to confront it with empirical data. On the other hand, when the storytellers had to be chosen the Babel team were not so far in the process that they could be selected on a rational basis in agreement with the later realised information need. In this case the inflexibility in the contract with the European Commission restrained our possibilities to either alter the subcontract to alternative storytellers or simply to delay the analysis till the necessary theories were sufficiently matured or till we really knew what information was needed or till we could establish more beneficial approaches to elicit the information needed.

Second, in this case study different levels of participants have appeared. The *researchers* have directed the process, identified the decisions and extracted the dilemmas. The *case storytellers* have authored the case stories and adapted them to fit the general guidelines made by the researchers. Finally, the *informants* (objects of the study) who made the actual "cultural" judgements and prioritisation and acted upon decisions have only been involved in the cases as third persons – some of them without knowing.

An alternative would have been for the Babel researchers to travel around Europe to elicit and write down the case stories in a similar sequence of phases. However, the case studies go beyond the mere abstract influence of cultural preferences; they introduce other "soft" factors such as the power games behind any decision making involved in a technology transfer process. The Babel project team would have had difficulties eliciting such topics through an interview survey and/or by digging into the project material. It would have been more difficult to identify the relevant parts of the project material, to get access to the right people with the right information and perhaps even more difficult for an outsider to get access to the layer(s) of hidden information.

The study design could have been improved if the researchers had produced the data by interviewing and maybe used the storywriters as consultant to the data collected. In this way a proper triangulation would have been more feasible and a detailed protocol and description of data collection methods used to generate data, would have been documented "objectively" versus "subjectively".

Third, the CGF was originally developed as a prescriptive tool to be used before a project is planned or before important decisions are taken. In this study the framework was applied as guidelines to the storywriters. Moreover, it was applied as an analytic tool for the analysis of the case story reports from already implemented and in some cases terminated projects. This proved to be difficult, because it is hard to distinguish organisational and technical driven change on the "trailing edge" - what is information technology adaptation, what is a consequence of management/policy and what is culture-related? Furthermore, the contents within the first phase of the CGF does not change as often as that of the other three stages, but is maybe undergoing some minor corrections. The big changes at the different stages in the project development takes place in phase 2, 3 and 4.

The 7D turned out to be unworkable as an analytic framework for the case analysis. The 7D is designed to characterise a cultural profile on a national level, which appear to be a rather abstract level in analysing development and implementation of telematic systems in a specific organisation. The analytic framework could have been substantially improved, if the 7 dimensions – which are characterising a meta level - had been operationalised and specified

on a meso level. This meso level should be the connecting agent for the concrete analysis on a micro level of the case stories.

The cases are old and some already history. Many of the respondents are no longer available as actors. This was a problem because it was not possible to get further information and/or corrective input during the analysis. The strength of the case method is best appreciated where the researchers have adequate access to the data source during the research process. To ensure a proper internal validity it is crucial to do triangulation either of the data sources, among different investigators, of perspectives of the same data set, or of methods.

Third, compared to traditional case studies this project has analysed a large number of cases. This was a difficult trade off because of the ambition to cover the main cultures within Europe. The relative large number of cases made it difficult to stay in close touch with all the writers to get unclear aspects elaborated. It also proved difficult to develop guidelines that were strict enough to produce homogeneous stories, and at the same time loose enough to let the case stories cover the unforeseen cultural diversity.

Studies are often evaluated by means of the *validity* and *reliability* of the study. In this case it is difficult to be explicit in such an evaluation. Validity aspects can in this case not be evaluated quantitatively, but can only be assessed by judgement.

The *construct validity* is concerned with whether a given study actually investigates what it is intended to investigate. In this case, the intention is to study cultural factors' impact. Culture is in this project conceptualised in the 7D framework (Brender et al. 2000). However, this conceptual framework proved to be very abstract (prescriptive rather than analytical) for the case studies. A stringent elaboration of the 7D framework defining culture on various levels – *national* culture, *organisational* culture, and *professional* culture could possibly improve the construct validity.

The *internal validity* is critical due to the various levels of actors in the case study process, and the lack of control of the authoring. It is very difficult to see to which extend the detected cultural impact are due to the factors accounted for in the study design and cases selected, rather than other factors. In some of the cases it is difficult to see whether the problems and difficulties are to be understood as caused by the information system implementation or because of a simultaneous change in the management structure of a hospital or the political climate in a region. A further complication has been that the researchers at a later stage had to identify the decisions and extract the dilemmas. The study design could have been improved if we had been able to ask the informants about the decisions made at different stages of the project implementation and then made a follow up interview about the dilemmas that may have been behind the decisions. However, the cases are somewhat old and already history. Many of the actors are no longer available.

The *external validity* is evidently non-verifiable in cultural studies, and will as a consequence be limited. This is however not the same as saying cultural studies have limited value, but it is difficult to evaluate to which extend the results of a study may be generalised beyond the subjects of the study to other settings. Thus, the need for very high construct validity is evident.

To evaluate the *reliability* of the study is in this case not relevant.

If we were to re-do the case studies, one change would be to improve some of the results of the case studies by putting more emphasis on triangulation (Yin, 1994). Triangulation can be made in four different modes: Data-, investigator-, theory-, and method triangulation.

Data triangulation can improve the reliability in the study. In the present study the case stories from five different projects in Europe were chosen by availability. An option would have

been to use alternative cases, chosen to fit the specific purpose of providing input for improving the theoretical framework. A third approach would have been to supplement the qualitative analysis with a questionnaire survey of central themes.

Investigator triangulation can improve the internal validity. The case stories were written by the storytellers who wanted to remain anonymous and the case analysis were done by the research team. Another source of evidence could have been obtained by collecting the data to the cases by interviewing the resource people. This would have allowed the researchers to follow up on specific issues immediately.

Theory triangulation can improve the construct validity. The main theoretical structure has been the 7D framework, which in its original form focus on *national cultural* phenomenon, and the change governance framework, which primarily is developed as a prescriptive tool. Alternative approaches would have been to focus on *organisational culture* (Edgar H.Schein, 1992) (Hofstede G., 1991; Gullestrup H., 1992) and object-oriented analysis/design (Mathiassen L. et al. 1997). Furthermore attention could be paid to *professional culture*, recognising the fundamental difference in the way physicians and nurses perform in the health care system. A formal literature search would reveal several references.

Methodological triangulation is related to data triangulation and would contribute to convergence of the study. The case studies were mainly based on identifying decisions and dilemmas. A more formal and structured literature search and review could have added depth to the study. A method – although difficult to perform – could have been the anthropological observational approach.

5. Conclusion and recommendations

The research issue in Babel has many elements of basic research. In a basic research process it is necessary to have some degree of freedom in the execution of the research work. Some times a development of a conceptual framework will take longer than originally planned and a deadline will consequently have to be postponed. This space for incremental action is difficult to achieve within the EU Commission framework contracts.

The study design must include triangulation. Whether it is method-, data-, or researcher triangulation or combinations will depend on practical issues.

The study must be carried out in agreement with the methods chosen. Changing the approach during the research process will only dilute the validity of the results.

In relation to the Babel project this study have documented the need for a conceptual framework for analysing cultural issues on a micro level.

6. Acknowledgement

This work was accomplished within the Babel (TE 2002) Telematics Engineering Project, which is partly financed by the European Commission under its Fourth Framework Programme.

Further, we would like to thank the storytellers for their huge efforts in providing us with the necessary material for this analysis.

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Appendix I: The Guidelines to the Storytellers

From (Bertelsen P. et al. 1998):
"In this paragraph, in agreement with the method for the elaboration of the cases by the story-tellers, we will focus on:

- telling the story as a cascade of decisions
- reflecting on the strategy behind the story
- reflecting on specific questions related to telematics applications

We will explain each of these points in a more formal way as follows:

5.1 Telling the case story as a cascade of decisions

The case story is structured into phases ("defined segment of work") following one another in a logical manner; in reality, they overlap and their chronology may differ from their sequential order.

There are three groups of phases: the *preparation* (idea and preconditions) of the project, the *governance decisions* (change governance and means) and the *execution* (output and return, objectives and expectations) [1]of the project.

In writing up the case stories, we propose the following phases:

1. ***Idea*** of specific action for change: principles and technology
2. ***Preconditions***: availability of a core expertise in that action domain
3. ***Change governance:*** hypotheses i.e. demand for power and re-invention of governance (accountability, controllability, and value for money, regulation of risks, quality **assurance, and reaction to environmental pressure…).**
4. Today, the re-invention of governance is often concerned by making effective the control of the organisation by the market, the increase of regulatory initiatives and changes in the inter-organisational control.
5. ***Means:*** the implementation of specific processes derived and expanded from the existent core expertise.
6. ***Effects:*** the consequences of applying those processes and exploiting their results, i.e. output and return.
7. ***Confrontation to the objective and expectations***

This description of the different actions to be taken by the experts in order to write the story, could be summarised as in fig. 9.

[1] ***Output*** *= the results that can be guaranteed by the project as a consequence of its activities*
Return *= the benefit that is foreseen from the output of the project*
Objective *= the effect which the project is supposed to achieve if completed successfully and on time*
Expectations = the consequences expected from the successful achievement of the objective.

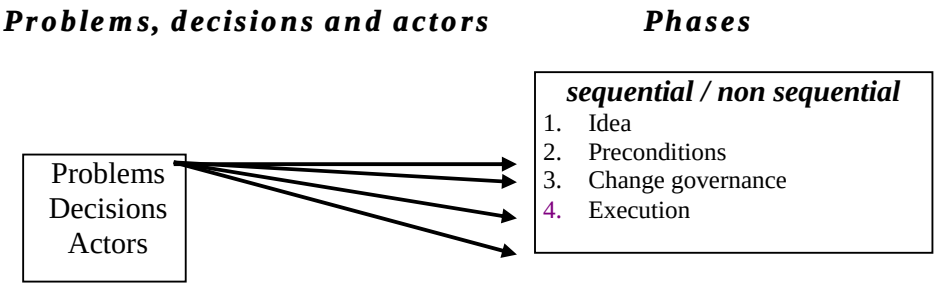

Figure 9: Concepts looked for at actions within the case.

5.2 Reflecting on the strategy behind the story

At each phase, the main problem, the main decision and the key actors contributing to shaping the project are identified and examined, and the way people perform is summarised [2]. Whenever possible, the alternative decisions are indicated. Who are the actors/stakeholders involved? We distinguish between the core group who shapes the project from the other group who will be consulted, or informed, or involved at specific stages.

5.3 Reflecting on specific questions related to Telematics applications

From the stories and the identification of the main problems, actors and decisions taken by people involved in the cases, some general issues will be tackled. We all meet them in telematics projects in particular and each time science and technology get out of the laboratories and enter the social world.

The goal is to reflect on specific questions related to Telematics applications. This work will carried out by the Babel team at a later stage but could be prepared by the "story tellers", through reflecting on a number of points: *how do they react to the following statements?*

Importance of
(1) Knowledge-information-data

- Functional value, i.e. what is required just to succeed here & now?
- Long term potential value: has to be nurtured & accumulated as efficiently as possible in order to be reused
- How is it managed?
- How is complexity managed: successive focus on essentials, or broad approach
- Made up of the accumulation of facts, pieces of local expertise dependent on particular individuals or teams, or is it abstracted & transformed into universal rules independent from their inventors? How is this dilemma addressed?

[2] *As Bruno Latour has demonstrated, a scientific theory is not accepted because it is true: it becomes true because it is accepted (B. Latour, Science in Action. How to Follow Scientists and Engineers Through Society, Harvard University press, Cambridge, MA, 1987). Similarly, a product is not successful because it is good: it is good because it is successful. This means that ideas proposed by the initiators of a project are modified through discussion with friendly key people. They are enriched and shaped so that they become acceptable by an increasing number of people. They are the core group: the identity, qualification, functions… of those people actually creates the boundaries and content of the project.*

- How is this fundamental issue addressed: in telematics we need to schematise & standardise all kind of knowledge, but how can standardised references capture a knowledge system (made up of both universal & particular dimensions, quantifiable & qualitative components,…) : this explains the fallacy in the Electronic Medical Record.

(2) The economic unit

- Its size, organisation: the competing individual, work team, department, institution, country, …
- Its relation with the other units:
  - nature of the exchanges (knowledge-information-data ; responsibilities)
  - intensity, importance
  - individual or common decisions
  - quality control of the (knowledge-information-data ; responsibilities) exchanges

(3) The authority above

- What is it?
- Nature: the community, social pressure, specific individuals or roles
- How does it influence the economic unit: vertical, horizontal influence
- Proximity: remote or close control; universal knowledge type of expertise vs. first hand professional expertise

(4) The values

- How are they build up? What for?
- Or, no effort is wasted to invent them, as the only thing worth doing is to be successful, whatever the domain, means, …

(5) The direct actions vs. the external events

- Force the events to occur, through direct action
- Exploit the event as it occurs
  This implies developing very different kinds of expertise
- Model the future, plan, translate hypotheses into actions at an increasing degree of granularity, create artificial references (workflow, activity diagrams, time tables, milestones, …), to control the progress of the action
- Develop ways & means to observe, collect & process information, launch pilot actions to test & explore, create the infrastructure to take advantage of favourable circumstances, …[3]

(6) Time & complexity

- One or multiple objectives
- Distinguish cause-effect relations that are under our control from what is out of our reach: output / objective / impact or return / expectation / prospect. The first series are the effects of what we have done, although escaping more & more from our control. The second series is the way we expect to exploit those effects

(7) The relation to power: change governance

[3] *This is not the usual Western view; nevertheless remember von Clausewitz : the benefit of a victory is not the victory as such as an abstract "bonus", but it is how it is exploited during the hours, days & weeks following the victorious battle.*

- The change governance elaboration, negotiation, presentation & its translation into a project are the key event that turns hypotheses into a real project: from there on it appears in the open light.

(8) The use of analysis & reduction

- As a means to get a clear mind & a clear view of the situation: we can master only a limited number of independent pieces of information at the same time; our memory is also limited, …
- As a means to put the other party under control, i.e. as a means to control the other party through the following mechanism: more & more detailed prevision is transformed into more & more detail prescription; prescription then becomes obligations: these become a complex network of commitments with control points, hence possibilities for judgements & sanctions. A lot of effort is invested in contract making, in imposing the rules of the game in many details, in imposing standards for minute & technically irrelevant things, … but this amounts to create numerous check points

(9) Quality control

- To do what? To improve the quality of knowledge, know how, practice?
- As a means to increase control?
- As a means to legitimate decisions: "this is done according to best practice"; so the responsibility of a decision is transferred to a process, to a universal rule & taken away from fallible human being.

(10) Standards

- To capture knowledge
- To facilitate common understanding
- To cancel out logistics details for communication
- Or as a way to impose those rules of the game some people are more familiar with, & can therefore better exploit while competing with others!

(11) Failure

- Has a cost. Is just ignored?
- Is it possible to develop approaches that are failure-proof, or in which failure cannot play a decisive role: multiple (unpublicised) objectives, modest planned outputs, exploitation of intercurring events, combine the power of competitors, …
- Invest in the exploitation of the results & of uncontrollable events

These topics can potentially be traced back to the seven dimensions, either individually or as combinations. They combine with one another & reinforce each others."

(End of citation from (Bertelsen P. et al. 1998))