

WHEN SYSTEMS LOOSE THEIR IDENTITY

Equivocality and Sensemaking in ISD

Bansler, Jørgen P., Center for Tele-Information, Technical University of Denmark, Building 371, DK – 2800 Kgs. Lyngby, bansler@cti.dtu.dk; havn@cti.dtu.dk

Havn, Erling C., Center for Tele-Information, Technical University of Denmark, Building 371, DK – 2800 Kgs. Lyngby, bansler@cti.dtu.dk; havn@cti.dtu.dk

Abstract

This paper reports a longitudinal study of the design and implementation of a Web-based groupware application. We studied the development of three versions of the application, and the preliminary discussions of the fourth. We adopt a sensemaking perspective to analyze the dynamics of this process and show that improvisational action and bricolage (make do with the materials at hand) played a vital role in the development process, successfully within a small group of people, but less so when more, distributed people became involved. The paper introduces the problem of distributed sensemaking in IS development.

Keywords: Web-based groupware, systems development, sensemaking, improvisation, bricolage

1 INTRODUCTION

As part of a study of development and use of intranets in geographically distributed companies we followed for three years the development and implementation of a web based groupware application, ProjectWeb, in a multinational biotechnological company. The development project was launched in the beginning of 1997, which was early in the history of the web, and the designers could not draw on public available experience with the use of the web technology for groupware applications in other companies. The study gave us a possibility to better understand the two interlaced development processes in a small innovative design team, the process of development of the application itself, and the emergence of the teams understanding of the application and its potential use. We also had the opportunity to study the two development processes when the application was implemented in the company, and the users' reactions flocked in, mainly as requests for changes or supplements to the application.

Our first observation was that the team did not follow any method, though the programmers at least were familiar with IS development methods. Levi Strauss (1962) concept *bricolage* seems to be useful to describe the development process. Lanzara (1999) defines bricolage as a variety of mundane building activities such as small scale practical experiments with recombination of pre-existing components, and extemporaneous improvisations, and he proposes that IT systems in the making may be seen as 'transient constructs' to help resolve the dynamic tension between stability and change in design processes, and he and others (Baskerville, Travis, and Truex 1992; Ciborra 1999; Introna and Whitley 1997; Truex, Baskerville, and Travis 2002) argue that the development process should be based on improvisation as an act of interpretation. These studies focus on the process of making IT artefacts as an amethodical and ambiguous activity before the artefacts, in the words of Lanzara, 'gain stable contours and shapes and before they actually become usable tools' (Lanzara 1999). The process we observed fitted well into this account of IS development practice.

Our second observation, however, was the design team very early in the process endeavoured to give the application an identity, a consensual or shared mental image that guided the development process. The design team had in the beginning only vague understanding of the system, but they knew each other well, and though they had different backgrounds and ideas they were able to negotiate their different visions of the application through the process, and give the application a shared identity. The three first versions of the system were successfully developed by this group of initiators who gave the system a well defined identity that was well received by a limited number of users.

The third version, however, offered facilities that supported more diverse activities within the company, and users with varied tasks made different sense of the system as they used it, and gave thereby the application new identities. It made it difficult to create and maintain a shared understanding of the systems 'usefulness' over time, and the design of a fourth version proved to be a difficult process with many distributed stakeholders. Unlike Lanzara's observations, the system we studied did not get "gain stable contours and shapes" as the outcome of an experiential design process (Lanzara 1999). The system's identity changed continuously even after it was implemented in the organization. Within the emerging organization the application was used in ways not foreseen and to which it had to adapt to survive. Fonseca 2002; Orlikowski 1996; Taylor and Van Every 2000; Truex, Baskerville, and Klein 1999; Weick 1993; Ciborra 2002). When the third and more mature version of the software was implemented in the organization the use of the system initiated a series of local bricolage and sensemaking processes by users, who the designers did not know, and whose responses they did not truly understand. The development process was no longer merely in the hands of a small group of people, but became more and more dependent on a larger and distributed group of people, to whom the designers had no direct relation, and who gradually made sense of the system within their own context, their own work and environment.

When version three was installed the designers of the application got as much feedback from users that they could ever ask for. As a result, however, the system seemed to lose its identity, and to gain a new one required establishing a collective sensemaking process and that was beyond their reach.

2 RESEARCH SETTING AND METHOD

BioCorp is a multinational biotechnological company, which manufactures a range of pharmaceutical products and services. BioCorp's headquarters are in Northern Europe, but the corporation has production facilities, research centres, and sales offices in 68 countries. In 2001, BioCorp employed more than 16,000 people and the net turnover was \$ 2.8 billion. During our field study, the corporate IT department was turned into a separate (limited liability) company. We include this information because the change had a significant impact on the relations between IT staff and users in our case.

The groupware system, which we studied, was developed in-house, as a collaborative effort between people in the Project Management Unit within BioCorp's R&D division and the corporate IT department. The purpose of the system was (or turned out to be) to support communication and collaboration among participants in the company's development projects.

These projects are complex, large-scale, long-term endeavours. A typical project lasts 9-10 years and involves up to 500 people from many different areas within the company (e.g. clinical research, engineering, marketing, and regulatory affairs). Most of the activities are carried out at sites in Scandinavia and Northern Europe, but clinical trials are conducted in the US, Singapore, Japan and a number of other countries worldwide. The fact that a growing number of BioCorp's new drugs are developed in close collaboration with external partners in Japan, the U.S. and Europe further adds to the distributed and complex nature of the projects.

The Project Management Unit (PMU), located at headquarters, is responsible for managing the development process and for ensuring efficient coordination of all the tasks and resources involved in a development project. It combines the skills of a large number of units working in matrix organization set-ups. PMU includes a number of project directors, each of who is responsible for the management of a selected number of cross-functional drug development projects. Each project director has a personal assistant who acts as his/her "right hand." In addition, every project is headed by a group of middle managers – the so-called "core group" – coming from different functional areas.

Although formal as well as informal face-to-face meetings are central to communication and sensemaking within the projects, the dispersed nature of the organization means that project members must also rely heavily on a variety of communication technologies to facilitate various modes of work. At the time of our study these included familiar technologies such as mail, telephone and fax but also more advanced technologies such as ftp, shared LAN drives, e-mail, video conferencing and electronic calendars.

2.1 Data collection and analysis

Previous empirical studies of ISD e.g. (Bansler and Bødker 1993; Fitzgerald 1998; Gasson 1999) have often focused on system development methods and how they are applied in formal projects. Rather than starting from the assumption that formal projects and methods play a key role in ISD, we wanted to observe how the development of an information system actually unfolded in a large, complex organization and track events and activities over a prolonged period of time. We wanted to focus on events in their natural setting and capture the rich array of subjective experiences of organization members during the development process.

Consistent with the focus of our research, we followed an interpretive case study approach (Myers 1997; Stake 2000; Walsham 1993). Interpretive field research is particularly appropriate for

understanding human thought and action in natural organizational settings (Klein and Myers 1999). This approach allowed us to gain insights into the processes related to the development, implementation, and use of the groupware system and, in particular, to examine how different actors' technological frames and organizational priorities changed over time as they interacted with the technology. This enabled us to throw light upon the critical role of bricolage and improvisation. Moreover, this approach is also useful for discovering new insights when little is known about a phenomenon. It allows for casting a new light on complex processes whose structure, dimensions, and character are yet to be completely understood (Myers 1997).

Our field data collection lasted for more than three years and we used several data sources and modes of inquiry (for triangulation). The two primary data collection methods used were interviews and examination of archival data, but we also participated in a number of formal and informal meetings with developers and users. Finally, we examined different versions of the software under development.

Interviews. We began interviewing managers and employees of BioCorp in August 1998 and concluded the last interview three years later, in September 2001. During this period, we conducted 34 semistructured interviews of 60-120 minutes in length. All interviews were recorded and transcribed. Participants represented a diverse array of occupations and organizational positions, and included project directors and project assistants from PMU, members of several large development projects, as well as managers, analysts and programmers from the corporate IT department. We interviewed developers and users throughout the research process.

Archival data. We reviewed public materials such as annual reports and company brochures as well as internal documents such as the company newsletter, organization charts, the corporate IT-strategy, the IT project model, the project manual concerning the discovery and development of new medicinal drugs, the guidelines for organization and management of development projects, and the set of user manuals for the groupware system. This provided general information on company history, structure, core competencies, culture, IT policies, IT infrastructures, and IT expertise, as well as more specific data on the organization and management of the medicinal drug development projects (including formal planning and project management models), and the groupware system itself.

Meetings and informal conversations. We held two meetings with the director of PMU and several meetings with the director of WS. We also participated in a one-day workshop with users and developers in spring 2001. The purpose of the workshop was to discuss user requirements to the next version of the groupware system. In addition to the formal meetings, we had many informal conversations with users and developers during our visits to the company and on the phone in connection with meetings or interviews.

Examination of the application. We had the opportunity to inspect the different versions of the groupware system on several occasions. In addition, when interviewing users we often asked them to demonstrate how they used the system and show us the content of the document base. In this way, we gained first-hand knowledge about the system and its salient features.

We used qualitative techniques to analyze the data, informed by the overall focus on sensemaking, improvisation, and bricolage. We analyzed all data sources in a process of recursive scrutiny to get as complete a picture as possible of the design, implementation and use of the groupware system. This process was "not unlike putting the pieces of a puzzle together, except that the pieces are not all given but have to be partially fashioned and adjusted to each other" (Klein & Myers 1999, p. 79). We endeavoured to place our findings in the context of relevant literature and in interpreting our data we constantly referred to relevant bodies of research on improvisation, sensemaking, information systems development, and so on.

We shared our preliminary findings with key informants in PMU and the IT department, and they provided helpful comments that confirmed and elaborated the identified issues and conclusions drawn. By discussing our findings with the key informants, we explicitly recognize that the participants in the

study – just as much as the researchers – are interpreters and analysts and that the story we tell is a result of our interaction with the participants (Klein & Myers 1999).

3 CASE STUDY

BioCorp started development of its intranet in 1995 and rolled it out in the spring of 1996. In 1998 the BioCorp intranet (named the IntraWeb) served nearly 11,000 employees at over 100 locations around the world, and was an advanced intranet, rich in content with many experimental IS services and an active user community (Bansler et al. 2000). A couple of project directors and project assistants in PMU wanted a web-based groupware application and got in touch with people in BioCorps library, who had developed a prototype of a groupware application in cooperation with people from the basic research division. The development processes we have examined were launched when the PMU people borrowed this piece of software from the library.

In what follows we look at the development and use of the groupware system in the PMU from fall 1998 when the idea was first conceived by people in PMU and until fall 2001, when the third version of the application had been in use for more than a year. Three version of the application were developed during this three-year period.

The first version was developed by people in PMU as a modified version of the software that they had borrowed. It turned out to be virtually useless in practice, because it was technically primitive, and because it was designed for a different purpose. However, it generated enough enthusiasm and inspiration to continue the development process.

The second version was developed in close collaboration with a couple of programmers from the corporate IT department. This version was well received by the intended users and the PMU management decided to make use of the system mandatory for all drug development projects.

The development of the third version was an attempt to turn ProjectWeb into a generic application. By that time, the corporate IT department had been transformed to an independent company within the BioCorp group and saw an interest in turning ProjectWeb into an application, which they could market broadly within – as well as outside – BioCorp.

The fourth version was meant to be a generic system designed on the user's evaluation of the previous version. This design process proved to be far more complicated than the design team had anticipated, and is not yet completed. Only people from the IT department were by then members of the design team.

In the following we discuss the development and use of each version in detail, focusing on the fragmented, ambivalent and capricious nature of the process.

3.1 Version One

It is difficult to pinpoint exactly when the idea of building a web-based groupware system came into existence and who the originator was. In 1997 the idea of using web-technology to improve project communication was discussed for the first time at a meeting in PMU, and a year later was the first attempted to exploit the new technological opportunities. It was a small group of people at PMU – in particular a project director (Carl), his assistant (Stella) and the so-called 'IT-supporter' (Jean, a self-taught IT specialist who assisted PMU's computer users in countless ways) – who were the prime movers in the development of the first version of ProjectWeb.

Jean, the IT-supporter, contacted a web savvy person she knew in the corporate IT department who told her that the corporate library had "similar ideas" and that they had created a piece of software, which might be useful. Jean acquired the program from the library and made a few modifications to it before she let two project assistants, including Stella, test it. The library's description of the system sounded very much like what PMU was looking for, but in reality it was different. It was in the words

of one of the initiators at the library “product oriented and not process oriented”. It was designed to help librarians to provide researchers with relevant and updated scientific literature. PMU wanted a project management tool, and they found the existing version disappointing and difficult to use. They “had tasted blood,” however, and decided that the next step would be to develop a more useful tool themselves.

3.2 Version Two

Jean realized that she did not possess the necessary programming skills to develop a better tool on her own and that the corporate IT department had to be involved in the process. Together with Stella and the project director Carl, she persuaded the new PMU manager to fund the project.

Version two was then developed in close collaboration between Jean and Stella from PMU and two people from the IT department, a programmer (David) and a graphics designer (Hal). It was, however, the ‘users’ who had the initiative and set the course.

They took version one as their starting point and added new ideas along the way. It was not a formal or systematic process, but rather a process relying on informal conversations, free exchange of ideas, and extensive use of ‘prototypes’. Though the ‘users’ took the initiative they had very different views of the system or tool they were about to design.

Jean explained that her initial idea had been that ProjectWeb should be a tool to facilitate file sharing in distributed work groups. She saw ProjectWeb a much better alternative to the common LAN drives, which some of the work groups at that time used to share documents.

Stella, on the other hand wanted a communication tool that could help her disseminate all kinds of relevant information to members of a large geographical distributed project group, and to create a sense of belonging, a ‘family feeling’ as she said. She was enthusiastic about what web technology could offer in presenting information in a much more interesting, clear and visually attractive way – e.g. by using different colours, fonts, graphic effects, links, and pictures.

Jean and Stella both had visions, but only vague ideas of how web technology could be leveraged to improve project communication the way they wanted it. It was only during the design process, through the interactions with David and Hal and through their joint exploration of different solutions (prototypes) that it gradually became more clear to them all what the tool should do and how it should be designed.

3.3 Implementation and use

Version two was finished and ready for launch in April 1999. PMU management decided that all development projects should establish an internal web site using ProjectWeb, but refrained from laying down guidelines for the design, content or use of these web sites. As a consequence, each project director and his or her assistant had to figure out how to use the application and for what purposes, and the result was that ProjectWeb use varied significantly from one project to another. One of the directors explained that they did not really know what they were able to do with the new technology, and that they had to “experiment a little with the medium” to explore its advantages and limitations:

...it is about feeling your way as you go. I don't have any clear IT-strategy for my project, and it may suffer as a result, if you look at it as a specialist. But we're in a process where we have to figure out what the media has to offer, and then we'll be able to get the best out of it.

Though the technology did not have a fixed or common meaning it was possible to identify at least three different views of ProjectWeb

Stella was interested in ProjectWeb's role in management and leadership activities within a large geographical dispersed project group, consisting of people who are involved in more than one project. She said:

...but it is not just publication, it is much bigger than that. It has something to do with the leadership in project management. It is a big organization, and you must –though we do not have a traditional line responsibility– create a sense of belonging, a family feeling...and in this ProjectWeb is our most important tool.

Stella knew that some of her colleagues wanted to use ProjectWeb for group work and co-authoring, but she spurns the idea.

It goes out by mail. It goes out by mail. It goes out by mail. You shouldn't use the web for this. There is no reason to put drafts or working papers on the web. ... I know, I've heard it before all that about the flow of documents. But I think – I won't use the word foolish – but I think it is extremely cumbersome.

Sanne, a project manager, and the project assistant Saskia were in a very different situation and had a very different view on how ProjectWeb can be used. The project they managed was a cooperative activity between BioCorp in Denmark and a company in California. They had to live with the limitations of the e-mail system, and wanted to use ProjectWeb within an extranet to support the coordination and work processes.

...we plan to build a ProjectWeb with the US partner...so that the core groups within the project can share information and documents.

However, they did not know how to use the system, yet

We don't have draft versions out there...we could have it, yes...but that depends on what we can do...are people only allowed to read? Who can upload? And who can file a document? or...

Sanne, Saskia, and Stella were not interested in the use of ProjectWeb as document archive for the projects. There were, however, users of ProjectWeb who, like a marketing director, used the system to

...find detailed minutes and reports about this and that...because it is a database, where everything is filed, and I can go in and find whatever I need.

Thus, the user response did take many different directions, but the system was successful in so far as it was widely used by most projects. It was, however, still a rather primitive system, and the project assistants wanted adaptations and improvements as quickly as possible. Stella said:

...so I am sort of taken captive by the many constraints there are right now...and when I talk to the developers and ask them 'can't you do such and such' then they say no. It is not that it is technically impossible, it is just that they accumulate information, and prioritise, and then make a new version once a year...and I think it is very unsatisfactory...because, I mean, and we are so many users.

The developers found these feelings rather onerous:

It is very much the users system... They feel it is their system, and when they hand in some corrections, they expect them to be finished tomorrow.

There were, however, many corrections and minor improvements of version two, but the acquired experiences were, as Stella said, primarily used for the design of version three.

3.4 Version Three

The development of version three started up shortly after the release of version two. It was released in spring 2000 and was still in use when we finished our field study in the fall of 2001. IT-department

had identified other potential users of ProjectWeb and believed that they could turn it into a generic software product, marketable to other business units in BioCorp and even to other companies. Their ambition was to make a substantial profit. As one of the project manager in the IT department explained:

...we thought that if we could make a small generic [software] package, then we could probably earn a lot of money...So, we continued to develop it as a small package, just like when you buy a small software package, just like when you buy [MS] Word.

When version three was designed the IT-department thought they had formed a clear picture of a product that could be used by many organizations. They used an alternate technical platform. Instead of using ASP (Active Server Pages) version three was constructed as an assembly of objects programmed in Visual Basic. The purpose was to obtain a more robust and reliable solution, which would scale up and accommodate large numbers of users without problems. This objective was obviously bound up with the wish to create a marketable, generic product.

The new facilities were the ones the users wanted:

- Facilities to change the look and feel of the user interface (e.g. the colour scheme) and customize menus and toolbars
- Facilities to manage authorization and access control to confidential or sensitive material
- Facilities to create and manage project web sites with external partners (e.g. facilities to handle security and privacy issues)

3.5 Implementation and use

The new features were well received by the organization, but for different reasons, and the project assistants and project members began immediately to explore the new facilities in a variety of ways and. ProjectWeb was now used also outside product development, for instance as department web.

Stella who wanted a “broadcast” medium and an attractive project platform used the new facilities to create more interesting content, for instance by adding more pictures and better graphics, but she experimented also with taking in new services, such as updated GANTT cards, links to the SAP systems etc.

The ultimate ambition was to create ‘the project’s focus point’ and ‘the platform where all relevant information can be found’.

Sanne coordinated a large project that involved a company in California and other countries, and she was enthusiastic over version three, which could be used on the extranet and thereby save the troublesome encryption of each and every email sent to the partners abroad.

...but now we just file them there [in ProjectWeb], and we are very happy...instead of all this encryption, packaging and sending passwords to everybody, now this is really good.

It was, however, the access control and possibility of creating ‘private work spaces’ that gave rise to new experiments with the use of the technology. After consultation with the project management Sanne decided to allow all project members access to control admittance to uploaded documents, so that groups could choose to work within restricted areas. The restricted documents were invisible to all but the members of the group, and only group members could see the name of the other members. Rikke was very satisfied with this facility:

...yes, that what I like about it, that you cannot see something if you don’t have access...you won’t be so curious to know...

The project members experimented with the system to support knowledge sharing and collaboration in smaller work groups, and to store documents in private workspaces on the project’s web site. They began using ProjectWeb to support small-group collaboration – something the application was not

designed for. The project members managed to work around the shortcomings by agreeing on conventions for download and upload of documents to compensate for lack of version control etc.

Sanne soon realised, however, that when groups were formed as private workspaces, the geographically distributed group members used the site to identify the other members who were responsible for the fulfilment of specific a task. Among many other things it became a list of available resources. It was not designed for that purpose, and it caused new problems because, Sanne and the project management had decided that she and some other mangers had access to all workspaces.

...and that means that you cannot tell if people actually work in a particular group, or we just have access to see what they do.

It caused at lot of confusion, and Sanne felt quite disturbed about this problem

...and you cannot choose to define yourself as an observer, to come out shaded or grey to make clear...that you are just an observer...[We] found several limitations with ProjectWeb, that we could not find solutions for. I can always make requests, for sure...but if I want something specific, everybody is going to have it...and sometimes it can be difficult to get the trimmings that match exactly what I want.

3.6 Version Four

It was increasingly difficult for the designers, by then only people from the IT department, to get a clear picture of ProjectWeb. The design of version one and version two happened in a small group of creative designers and users, that had at least a similar image of the product they were about to develop. This image, however, eroded when the system was implemented in the organization. Other ideas were imposed on the designers, coming from activities in the company they knew very little about.

The system was not primarily used as a document repository and publication platform. A wide range of functions seemed to be relevant and in request, functions that the designers could not possibly contrive in advance. Their response was to attach importance to the systems flexibility. One of the designers said,

...it must be even more modular. That at least we have learned. To make it easily expandable, we need a core that we can build on by inserting new modules. It must be a very modular system that we can enlarge and modify continuously.

As a result of this approach the ProjectWeb evolved into a kind of a buffet or supermarket.

That is the problem today...if we make a new function we cannot fence it. It is available to everyone, but it is only pasta to most of them, and only a handful of people need such a function. So, what we do is to place it at their disposal, so they can just pick whatever they need.

Jean realized that their original image of ProjectWeb disintegrated, and she argued in favour of seeing ProjectWeb as a personal portal.

When you begin making such modules, in which you toss in all these different things, then you really enter the personal portal...

The system designers focused on modularity and user interfaces to attain flexibility and to comply with the user's needs. The outcome, however, was that the development process lost speed and eventually came to a halt. The designers needed to visualize the system, and the idea of a 'personal portal' was apparently too ambiguous to help them envision what they were doing, and to help them regain the initiative in relation to the users.

The designers invited a large group of users to a meeting to present the new idea of ProjectWeb version four as a portal. It was a failure. They had nothing substantial to present, and some of the users

were very disturbed, because they realized that nothing had happened for some time. The designers tried to attain an image of a system that could meet all the requested functions by searching the market for generic systems. They did find one, that looked promising to them, but it was rejected by the users as being too difficult to use. In particular, the users disliked the user interface, which to them seemed nearly incomprehensible.

The development of ProjectWeb continues, but at a slow pace, and as an upgrading of the already known functions. A version four was planned to be launched in autumn 2003, but has been deferred.

4 DISCUSSION

The case of ProjectWeb recounts the story of *improvisation* and *bricolage* in IS development, much in line with stories told by Lanzara (Lanzara 1999), Ciborra (Ciborra 1999; Ciborra 2002) and others. It was a constructive activity based on transforming and reshaping what is already in use, or creatively rearranging components to fulfil new purposes.

The notion of *improvisation* implies that attention and interpretation rather than intention and decision making drives the process of designing. From this perspective, ISD is more an act of interpretation rather than an act of decision-making. The people involved improvise to make sense of unexpected possibilities and constraints that emerge. They are never in full control of the development process, but continuously challenged by having to address the unintended effects that are so commonplace in development projects. As a consequence, people are forced to revise their sense of what is happening and what can be accomplished. These revised interpretations are what guide action, and not the initial decisions (Weick 1993). Since the only things we can sense are enacted events that have already taken place, attention rather than intention becomes central to the design process.

The French word *bricolage* means, 'to use whatever resources and repertoire one has to perform whatever task one faces' (Weick 1993). The key to understand the nature of bricolage as an innovative activity is Levi-Strauss's statement that materials 'are not known as a result of their usefulness; they are deemed to be useful or interesting because they are first of all known' (Levi-Strauss 1966, cited from Weick 1993).

ProjectWeb, version one, was a modified version of a program, which Jean had borrowed from the corporate library; and important elements of version one were again reused in version two. Thus, ProjectWeb is a good example of the general phenomenon that 'new systems are built, sometimes literally, on the ruins and with the ruins of old systems' (Lanzara 1999, p. 346). Pieces of past code became 'building materials' and were used – together with available commercial software components (in this case e.g. a web server and a DBMS from Microsoft) – to construct new systems, which then became more or less coherent assemblies of mixed components. The resources the designers had were heterogeneous and less well suited to the exact project than they would prefer, but they were all there was. The materials were not project-specific, but, instead, they did represent the contingent result of all of the previous uses to which those items had been put.

As we have tried to draw attention to in this paper, the case of ProjectWeb, also tells a story of *sensemaking* in IS development (Weick 1995). Sensemaking is a process where people strive to convert a world of experience into an intelligible and meaningful world. It 'is about sizing up a situation, about trying to discover what you have while you simultaneously act and have some effect on what you discover' (Weick 1999). It is an attempt to grasp a developing situation – in our case the design and implementation of an innovative information system – in which the observer affects the trajectory of that development. Because applications like ProjectWeb are equivocal and thus open to multiple, and even conflicting interpretations, all of which are plausible, the development of the system requires ongoing sensemaking (Weick 1990).

For instance, it is striking how little the key 'designers' of the first three versions of ProjectWeb (Stella and Jean) knew about what they were doing at the beginning of the development process. They did not

have a clear goal or a precise idea about what they were designing or how it would fit into people's work practices. On the contrary, it was difficult for them to make sense of the web technology and their first attempts to conceptualize the emerging system relied on comparisons with older, more familiar technologies (LAN drives and email). It was not until they started experimenting with the design that they began to develop more detailed and sophisticated technological frames (Orlikowski & Gash 1994), and mental models of the technology. It was then they discovered what they wanted to do with it. Their understanding of the technology and their design goals evolved gradually and interactively as they developed the first versions of the system in close collaboration with David and Hal (from the IT department) and tested it in practice together with their fellow users in PMU.

At the heart of sensemaking is the idea that understanding lies in the path of action. Action precedes understanding and focuses interpretation and become 'sense-making as manipulation' (Weick 1995). Sensemaking by means of manipulation involves acting in ways that create something that people can then comprehend and manage: 'Manipulation generates clearer outcomes in a puzzling world and these outcomes make it easier to grasp what might be going on. Manipulation is an operationalization of the advice, 'leap before you look' or the advice, 'ready, fire, aim.' Manipulation is about making things happen, so that a person can then pounce on those created things and try to explain them as a way to get a better sense of what is happening' (Weick 1995 p. 168). The design of ProjectWeb was an example of 'sense-making as manipulation' It was by developing 'prototypes' and trying out different versions of ProjectWeb in practice that Stella and Jean (and David and Hal) began to discover what their emergent system design meant and where they were heading.

4.1 ProjectWeb in use

The development of ProjectWeb was a sensemaking process, and so was also the use of the system. It was the difficulties of communicating the outcome of local sensemaking processes within a distributed group of people that caused hindrance for further development, when the organization started using the application.

Bricolage, improvisation and sensemaking are local activities, dependent on the local environments. The development process went well, as long as it was confined to a small group of people. They managed to design a system that people in the company found useful for what they did. The usefulness, however, initiated many very different sensemaking processes. Though improvisation and bricolage people found ways to use the system, despite the shortcomings it had from their perspective. The use of the groupware system emerged over time in each of the local settings,

These local settings had, however, only little connection to each other. For instance, colleagues from other projects had barely heard about the project team that experimented with ProjectWeb to support knowledge sharing and collaboration in small work groups. Version three was also used by some local departments, but how and why they did it, was not known outside the departments.

Many users had invested time and effort in the sensemaking process, and they showered the developers with suggestions for improvements. Most of the users had no direct access to the developers, and they forwarded their ideas through others, who acted as mediators. The developers found these suggestions confusing and cumbersome, because the proposals differed so much from each other, and were so different from what they had expected. The designers thought they had developed a well defined generic system that just needed refinement, and they had a commercial interest in maintaining this idea.

The feedback they got showed unmistakably that this was not the case. The use of the application had initiated processes, which its designers did not know about, and did not really understand. The system they had developed, and of which they had a clear image, gradually lost its identity as the user's feedback came through. The creation of a new identity would require forms of collaboration and communication within the distributed organisation that was beyond what they could possibly initiate.

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