Multimedia Teaching Cases

Ørngreen, Rikke

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Multimedia Teaching Cases

Rikke N. Orngreen ©

orngreen@cbs.dk   **Department of Informatics**

http://www.cbs.dk/staff/orngreen   **Copenhagen Business School**

http://www.inf.cbs.dk   **Denmark**

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My daily Ph.D.-life at the Department of Informatics has gone by in quite a varied tempo. Some days were used for in-depth analysis of the details in the data-set, others for the establishment of overall frameworks and conceptualisation. In both instances, the day to day discussions and encouragements from my colleagues have been worth a lot, whether it was complex research questions I toggled, administrative issues or just airing an opinion that needed a listener. I would like to thank the whole HCI-group and give special thanks to Janni Nielsen for a lot of moral and social support. The name Jacob Nørbjerg, also needs special attention, since he agreed – to co-supervise, when Jan left the department to seek new challenges at the IT University. Both Jan and Jacob have used a lot of energy on my research project, and have provided me with qualified critical reviews to my writings. In September 2001 a pre-defence committee, consisting of the same members, who have now approved the dissertation, gave valuable comments to my writing so far, thank you to Janni Nielsen (chairman, Department of Informatics), Peter Carstensen (the IT University) and Barry Harper (University of Wollongong).

If the reader feels the dissertation actually makes sense, language wise, they might send a friendly thought to Karin Ørngreen-Svendsen (my mother), who read the whole lot and erased quite a number of grammatical errors, and made sense out of my (non-)sentences. And now that we are at the end and at the family affairs, please, allow me to conclude thus: When I began this Ph.D. project I was already married to Mohamed Youssef. When Mohamed and I went to Australia we had expanded the family and brought 3 months old Adam with us. Mohamed took care of Adam in this period, and was also a very present father in the last period of my writing. It has been very wonderful to have you two near!

Thank you, to both of you, my family, friends and colleagues – for being!

Rikke Ørngreen, November 2002

SUMMARY

The summary presents an overview of the dissertation and major findings of my research:

- Research Area, Questions and Design
- Frame of Reference - Domain Knowledge
- Major Findings

Research Area, Questions and Design

This dissertation investigates development and use of multimedia teaching cases, as applied in business education. Teaching cases present companies, and the current problems or opportunities they are facing. (Barnes, Christensen and Hansen 1994, Maufette-Leenders, Erskine and Leenders 1997, Heath 1998, Manninen 1997.) The primary characteristic is that the case is based on real events. Very often the case description follows a decision-making situation. (Mauffette-Leenders, Erskine, and Leenders 1997, Hazard 2000.) The case is prepared by students and then discussed in class. The objective of the class discussion is to analyse the company's situation and come up with viable strategies for the future (Leenders and Erskine 1989, Heath 1998, Orngreen and Bielli 2001). Cases were introduced to business education already in 1910 at the Harvard Business School, and have since then gained widespread use throughout the world (Leenders and Erskine 1989). Traditionally teaching cases have been written descriptions, but the teaching cases in this dissertation are multimedia cases.

The use of multimedia teaching cases is a relatively new phenomenon. Because of the novelty of the approach, research on how to apply these or developing them is extremely limited. Though I investigate both a use and a development perspective, the use dimension is investigated with the purpose to inform development. In particular the dissertation results in a set of roles and tools influencing the development process, which is also seen in my three research questions:

1. Which roles and tools characterise the development and use of multimedia teaching cases for business education?

2. How are these roles and tools applied to the multimedia development process, and how do they support or restrain the development.

3. How are the development roles and tools, and the use roles and tools interrelated, and how do they relate to a development model for multimedia teaching cases?

The dissertation aims at a practical / usable result, but also has the objective to inform research about the development of multimedia teaching cases. The research draws upon empirical data from an EU project named BUSINES-LINC (Business Innovation Networks – Learning with Interactive Cases). In this project 18 multimedia teaching cases were developed in 6 different countries. The six business schools participating in the

project were: University of Cologne (Co-ordinator), Copenhagen Business School, Norwegian School of Economics and Business Administration (Bergen), Rotterdam School of Management, SDA - The Business School of Bocconi University (Milan) and Stockholm School of Economics. Each partner was responsible for developing three of the 18 cases.

The Ph.D. project uses a qualitative explorative approach to research. I researched the BUSINES-LINC project through a grounded and participatory action research programme (Baskerville 1999, Kemmis and McTaggart 2000, Pries-Heje and Baskerville 1999 and Susman and Evered 1978). Grounded theory provides detailed analysis framework, with both formal and informal coding procedures, such as open, axial and selective coding (Strauss and Corbin 1998). As a member of the project and as a researcher at the Copenhagen Business School (CBS) I participated in the BUSINES-LINC consortium, and in the development of the three Danish cases. As my knowledge about the area grew I realised the necessity to investigate the use dimension and its influence on development. This was done primarily through cognitive ethnographic methods and techniques (Ball and Ormerod 2000, Nielsen, J., Orngreen, Siggard and Christiansen 2002).

I found that interaction with the interface was what connected the use and development dimensions in teaching case development, because content, narrative and navigation influenced the interface design and thus the interaction forms. The dissertation is mounted within a system development setting, but applying a human-computer interaction perspective. (Hewett et al. 1996, Orngreen 2001, Preece, Rogers and Sharp 2002 and Rogers 2001.)

Frame of Reference - Domain Knowledge

A "complete" teaching case consists of the actual case description and the teaching note. The teaching note is support material for the instructor using the case in a class. The case description is typically 8-16 pages and may contain:

- Introduction
- Case role and/or plot
- General facts about the company
- Case story or problem area
- Suggestions to solutions
- Exhibits and Driving (guiding) questions.

A teaching case can also be part of a larger case series, as were the BUSINES-LINC cases. A case series is a group of cases, which are developed with the same perspective in mind, i.e. the same type of teaching objectives or problems. It could also be different objectives using the same case supplying company (the company participating in the case, in the dissertation known as the case supplier or case company).

According to the literature the teaching strategy of case-based teaching is rooted in a constructivist and active teaching approach (Gallagher and Stevensen 1998, Dewey 1994, Duffy and Cunningham 1996 and Williams 1992). The belief is that the construction of knowledge is based on the individual analysis of the case content and previous experiences. The real benefit is said to occur in the social interaction between peers about the case in the class discussion. (Hazard 1999 and 2000, Conway 2001a and b.) Relating to real world examples, and discussing the case story with fellow students is believed to simulate the context needed for letting the individual student create his/her reasoning and meaning of the case situation (Schulman 1996). The work practice illustrated in the case follows the case from the company to the classroom.

Different opinions in literature exist regarding the case story, where some researchers engage in deep discussions about the value of narrative elements in teaching cases (Bearman 1997, Herreid 1997/8 and Schulman, L. 1992). In multimedia teaching cases the narrative element becomes a vital element of a teaching case, which should supply historical events as well as a plot that motivates the person(s) to use the case (Herreid 1997/98).

The dissertation uses this definition: A multimedia teaching case is the presentation of information about a company (department or industry) and its opportunities and problems. The information is presented to support the transfer of a message: the case story and the lessons learned, in ways that enhances the student's ability to discuss these messages with peers. The message is conveyed by integrating different types of time-dependent and independent media, like sound, video, and animation with text, graphic and pictures, and by non-linear navigation, interaction and communication. This definition is merely made to put teaching cases into a multimedia context, and should not be taken too literally.

The phases of a written teaching case development project are as follows: lead and contact; collecting; structuring/writing; enhancement and release of case (Leenders and Erskine 1989 and Heath 1998). The organisation (roles) of a multimedia development project is somewhat more complex than a written teaching case project (with only one or two persons). Multimedia development involves a number of roles: subject matter experts, multimedia designers and authors, editors etc. (England and Finney 2002). The phases of a multimedia development model are not significantly different from other system development models, though the tools which are applied are. These tools often originate from the areas of movie manuscript and movie production. (Carroll 2000, England and Finney 2002, Hofstetter 1997, Landay 1996, Molin 2000, Orngreen and Pries-Heje 1999 and Preece, Rogers and Sharp 2002.)

The model used to illustrate this had the following phases in a linear format:

- Change analysis and needs. Tools used are for example scenarios.
- Analysis. Example tools are different forms of storyboards and graphical layouts/sketches.

- Design. Example tools are storyboarding, scripting and (simple) data flow diagrams.
- Production, of text, sound, video etc. Example tools are detailed scripts (ex. speaker- and movie-scripts).
- Authoring or programming, using authoring programs as Director®, Toolbook®, HTML platforms etc.
- Test. Internal test of the system's abilities, and external test according to requirements.
- Finally three phases of Implementation, Operation and Out-phasing, which are not characteristic for multimedia teaching cases.

Major Findings

The key findings in the dissertation consist of four main results:

- The V-model,
- Roles and tools in the use dimension,
- Roles in the development dimension and
- Tools in the development dimension.

The dissertation focuses on development, thus the results in the use dimension reflects issues that informs development. The roles and tools in the development dimension are thus prioritised, and are here described in each a section.

V-model

Multimedia teaching case development was not directly comparable to writing teaching cases or to the development of multimedia systems, but emerged in the combination of the two. Within BUSINES-LINC, a V-model (a model in the shape of a V) was produced, which evolved during the project life cycle. My final version of the model has the following layout: The model contemplates both the use and development dimensions. The development of multimedia teaching cases is represented in the "first leg" of the V, focusing on:

- Leads and contact
- Case analysis
- Case design
- Media production
- Authoring (programming) and
- Release.

The "second leg" of the V looks at the use of multimedia teaching cases, by Test and Evaluation of different levels in the use situation:

- Individual preparation
- Group preparation
- Class discussion and reports

- Assignments etc.

There is a feedback loop between the development and use dimensions, so that experiences found in the application of the teaching case influence the design of the case, and the way the tools are applied. Also, in this situation of a case series the feedback loop is widened, so that use of one case in a series influences the development of other cases in the same series.

Roles and Tools in the Use Dimension

The following set of roles and tools were found to have vital influence on the development of multimedia teaching cases:

Students' Role → The development of cases needed to consider the heterogeneous character of the target group, including different vocational skills and varying experience with the case-based teaching method. The objective of the multimedia teaching case is to support students in reaching a high level of discussion (whether in group or class discussions or for example in written assignments). The level of the discussion was evaluated based on Blooms taxonomy (Bloom et al. 1956 and Kratwohl et al 1964).

Embedded Teaching Strategies → Embedded teaching strategies could be in the form of different design structures (i.e. case information pool vs. case role-playing vs. case simulations). Multimedia teaching cases can include more of the teaching strategy embedded into the case than written cases have done. This is because, when designed to do so, the case structures can mirror the teaching objectives of the case. Embedded teaching roles serve primarily as a motivational factor for the individual using the case at the computer, as when being assigned a position of a consultant or employee. Embedded teaching tools are placed within a case story or as support material to the case story (e.g. an assignment to write a specific or business plan or driving questions). The tools in the BUSINES-LINC teaching cases enabled the students, when analysing the case content to think about the subjects, which in the teaching note were mentioned as important issues, but did not improve the level of the discussion.

Guided Preparation (tool) → I found that multimedia teaching cases need longer preparation time than written cases do. When applied in a traditional teaching scenario very few had prepared the case (about half the students present) and those who had prepared had only done so with minimum effort. Extending the traditional use situation with assignments like writing a synopsis, report, oral presentations etc. guide the students' preparation form and significantly increase the preparation time and effort. It also creates a more active and high level discussion in class.

Instructor's Role → The experience of the instructor in case-based teaching influence the success of the case. This was particular evident in the situations were the instructor adapted the teaching note directly with little considerations for the character of the students in the class. On the other hand, the instructor also controlled the focus of the class discussion. This explained the sometimes missing discussion of issues in the class situations I

observed, which were otherwise mentioned in the teaching note as being important aspects of the case (but which perhaps did not fit the teaching objectives of this particular lesson in class).

Teaching Note (tool) ➔ The teaching note and the instructor's role are related. We chose in BUSINES-LINC to adopt rather flexible teaching notes, which suggested discussions issues, but did not have a "pre-defined" agenda and long debates about how to conduct these discussions in details. The resulting "thin" teaching notes received some criticism from the instructors.

Roles in the Development Dimension

The development team consisted of a core team, student assistants and an extended team. The most characteristic role within the development dimension was the case supplier and the case supplier's influence on the case design and on the development process. One person in a development team may take on several roles. In BUSINES-LINC 2-4 core team members was the norm, where student assistants and the number of extended development team members varied according to the outsourcing strategy chosen.

Project Manager - Core Team ➔ This was a resource that was necessary throughout the project life cycle. It was a management role to communicate with the case supplier on all official issues, to discuss deadlines and milestones within the project at partner and consortium level, to overlook the economy and quality assurance processes in the project, in particular when different forms of outsourcing strategies were used.

Subject Expert - Core Team ➔ The subject matter expert provided theoretical and practical knowledge about the case content and teaching area. The expert participated particularly in the case analysis, applying the analytical case (see later). However, we found many subject experts did not have enough experience with multimedia applications to imagine the use of the media. Thus the multimedia designer was also involved in collection of analysis of material.

Multimedia Designer / Author – core team ➔ The multimedia designer focus on the design of the system and the multimedia author focus on programming (and scripting). The technical framework and the nature of our project as a case series project rather than a single case influenced the multimedia designer/author work. It supported the detailed design, but also restricted the creative process within each case design.

Student Assistants ➔ Students represent fairly cheap labour, and if they are part of the target group, they are also capable of understanding their needs. The assistants at CBS participated in the case analysis and case design phase. They primarily collected data, transcribed interviews and organised the material according to the analytical case template, plus worked with design solutions. However, their inexperience with case development meant they could not fully apply the tools (analytical case and case setup) in a flexible manner (adapt them to the situation at hand).

Instructional Designer – Extended Team → The instructional designer further develops the messages of the case. The tasks in BUSINES-LINC were mainly within the overall design of the case using the case setup, and then in development of the teaching note, for example designing the embedded teaching strategies according to the lessons learned of the case.

Roles for Sound, Video, Graphic etc. Production - Extended Team → The tasks are to produce the different media elements for the case in its final and approved format, which is usually done late in the process. If sub-contractors are used for media production – as at CBS, scripting becomes an important tool for communicating the issues that needs to be produced.

Case Supplier → The case supplier participates in several activities throughout the process and has a very active role in two phases: First, when data is collected within the company and then when approving the case content and appearance. There were three types of information risks associated with the case supplier in our project. Firstly, the demand for changes to the case being developed was often quite large. Secondly, often contact persons got new assignments or changed job, which meant new people with new ideas had to take over and approve content and the case story in general. Thirdly, when a third party company got involved in the case (a daughter company, a business partner or client) a new issue of confidential information and content approval entered the scene, requiring new agreements. As a consequence, we learned in the BUSINES-LINC project, that an approval phase was much more time consuming than that we had expected it to be (typically 3 months).

Tools in the Development Dimension

Confidentiality Agreement and Release Note → Both tools provides a signed agreement that secures a smoother co-operation between the case supplier and the development team. The signed release note also sends a signal that students can rely on the involvement of the case supplier in the case. On the other hand the approval process prior to getting this release, can lead to interesting facts being deleted or subjects changed, as was sometimes the situation in BUSINES-LINC.

Analytical Case → The analytical case is a work document, functioning as a template. It supports the collection and analysis of content to the multimedia teaching case. In BUSINES-LINC it gave the development team (both at the consortium and at individual partner level) a common language or common ground, when discussing the content of cases. The template was thought to work as a structure of headings, which would be filled in with content forming a written document / report. But the analytical case as a written document became bureaucratic to work with. We found it served better as a structure with keywords of content, which were linked to content scripts (see later).

Case Setup → The case setup is a design tool. One of the goals of the case setup work is that the narrative elements of the teaching case, the case story and interaction strategies are designed, so that the students get a feeling of ownership of the problems/opportunities

present in the content of the case. In our case setup's the target group's needs and the teaching objectives of the case were analysed. Then the treatment (or extended scenarios) was applied when designing the overall case story, interaction form, navigation etc. Treatments (extended scenarios) focused on the end use (or future use) of the final product, inspired by manuscripts for movies (e.g. Atchity and Wong 1997 and Frensham 1996). Use of simple storyboards supported the treatment work and opened for the more detailed design decisions. The case setup also turned out to function as the first version of the teaching note.

Technical Framework (Including Prototyping) → The purpose of the technical framework is to improve ease of navigation and allow for a consistent and professional look across the different teaching cases in a case series. The framework was quite useful for the BUSINES-LINC project, since we were developing a case series and used an evolutionary prototyping technique (see Hix and Hartson 1993 and Preece, Rogers and Sharp 2002, as well as Sano 1996 for prototyping web-applications). However, as was the situation with the analytical case, it restricted the creativity of the design of the individual case, when applied too bureaucratic.

Scripts - for Media Production → Three types of scripts were employed in the BUSINES-LINC project: traditional scripts, staged interviews scripts and content scripts. The traditional scripts are communication tools that provided a way of describing the media to be produced to sub-contractors and actors. The staged interview scripts are used as a way of obtaining recordings with employees from the case supplier. The staged script provides a mean to receive higher technical quality and more natural statements. The content scripts serves as filing cabinets for information to be used by the core development team, when working with the analytical case as a linked document (rather than as a written document).

Teaching Note → The teaching note serves as a guide for the instructor, facilitating his/hers preparation, by providing information about the teaching objectives and strategies. The teaching note furthermore serves as a support tool in the development, as it explicates the objectives and use strategies for the development team. In our project it thus functioned as a link between the development dimension and the use dimension. However, our relatively flexible teaching notes failed somewhat in the eyes of the instructors (as already mentioned).

PART 1

1. MULTIMEDIA TEACHING CASES - 3 EXAMPLES

This dissertation begins with enriched descriptions of three cases, which introduce the concepts of multimedia teaching cases to the reader. These three examples should support the further reading of the dissertation, and provide an understanding of why the research area, research design and resulting development process as well as use scenarios looks as they do.

It is difficult to give a comprehensive textual description of something, which is embedded in a multimedia environment. I would therefore encourage everyone, who has access to the multimedia teaching cases, to consider using these for a while, prior to exploring this dissertation. However, as the examples also present arguments for choice of design, this chapter should be seen as an integral part of the dissertation (and not only an add-on to those who do not have access to the cases).

The three multimedia teaching cases were all developed by the Copenhagen Business School within the BUSINESS-LINC project (Business Innovation Networks – Learning with Interactive Cases).[1] The objective of the BUSINES-LINC project was to support innovative business solutions, especially in the electronic commerce area.[2] The multimedia teaching cases are HTML-based and distributed via CD-ROM for use on PC's. I was participating in the project team, researching and developing multimedia teaching cases. The three cases are:

- The LEGO Teaching Case - Direct Consumer Access (in 1.1)
- The ALKA Teaching Case - BPR[3] in the Insurance Sector (in 1.2)
- The Rockwool Teaching Case - E-Business & Customer Relations (in 1.3)

The examples present different forms of media usage and the purposes of these. The first example – the LEGO case – will give details about content and structure, as well as media usage, to give the reader a comprehensive view and to build a frame around the concept of multimedia teaching cases. The two following case descriptions will have a more supplemental nature to expand on this frame, illustrating other ways to engage the user, through navigational interfaces, different structures of the case and different use of the media.[4]

The following three sections present the cases, describing background information, containing the case story and teaching objectives of the case. Following this is a presentation of the user interface, enriched with illustrations, providing a realistic feel for

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[1] Even though the companies did not develop the cases, they have been approved and released by them.
[2] Six European business schools participated in the project. More information about the scope of BUSINES-LINC, the cases and the participants are given in chapter 6.
[3] Business Process Re-engineering (BPR)
[4] I chose the LEGO case as the extended example, as they have a brand name and come from an industry most people are able to relate to. This perhaps makes the case concepts easier to understand, even if the reader is not particular interested in the subject of e-commerce.

the actual case. In the first example, an overview of the material available in the multimedia case is also given.

1.1.   DIRECT CONSUMER ACCESS - THE LEGO CASE

[5]"… The LEGO case is built on data and experience from The LEGO Company. The LEGO Company is one of the 10 leading toy manufacturers in the world, consisting of 50 companies on six continents. The company has one of the most successful Internet sites in the world, targeted primarily at children, the www.lego.com website. In early 1999 the LEGO Company also launched a website for selling LEGO products over the Internet. This site is called the LEGO World Shop.

Case Story

The case takes place in December 1999. The management of the LEGO Company has decided to create a new division called LEGO Direct, which will be responsible for all direct sales and marketing, including on the Internet.

The case focuses primarily on two departments, "New Ways to the Consumer", and the "LEGO world Shop", which deals with branding and selling on the Internet. The case illustrates how the two departments emerged in a rather spontaneous and bottom-up approach. It also shows that once the decision of implementing the sites in "full-scale" was made, the projects became very centralised, and top-down administrated.

The department "New Ways to the Consumer" is responsible for the website LEGO.com. LEGO.com is a site for brand building and marketing of LEGO products. The website started out as a small site, developed by one of the employees in the IT department. The primary target groups for the LEGO.com website are children and teens. It takes a great deal of consideration, when developing websites, which are addressing children in many countries. Not only because of the various preferences in design etc., but because different cultures have different ethical and moral codex's. Thus the balance between establishing virtual communities and hard-core marketing of own products becomes an issue.

The department "LEGO World Shop" manages the Internet shop that sells a selected range of LEGO products to consumers on the Internet. The idea of this originally surfaced in Marts 1996, and in the beginning of June 1998 the decision to launch a LEGO World Shop was made. This enabled a wish to establish a sales channel for the new electronic products: LEGO Mindstorms® and CyberMaster®, and also provided an opportunity to gather useful information about the customers.

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[5] At the ICIS 2002 conference, I had a paper on the LEGO case accepted, which may bear a few similarities to the section marked with "…". However, it is an heavily modified (reduced and restructured text and enhanced illustrations) excerpt of my paper: Orngreen, Rikke: "The LEGO Interactive Teaching Case - Direct Consumer Access", in the ICIS-proceedings of the 21st *ICIS conference* (International Conference on Information Systems, December 10-13 2000, pp. 823-831, Brisbane, Australia, 2000

The LEGO Company, acknowledging having neither the in-house competence nor the willingness to use resources to gain the required knowledge to run electronic commerce of this calibre at such short notice, consequently chose to outsource everything to IBM, except management of the site. When selling the products on the Internet, the LEGO Company places itself in a new link in the supply chain. They face new competitors, who are already selling LEGO products on the Internet, i.e. these competitors are also part of the LEGO Company network of retailers. The situation imposes an interesting dilemma, which is covered in the teaching case from the perspective of the LEGO Company (through interviews) and their competitors (through newspaper articles).

Main Teaching Objectives

The multimedia teaching case aims at showing users the complexity of decision making, and the innovative solutions possible in the field of electronic commerce. One objective is to get the students to reflect on the processes, which the LEGO Company has experienced, and to relate the company's Internet decisions to other companies in the same industrial sector. Another objective is to let the students argue for or against the LEGO Company's Internet strategy to date, and suggest a plan for the future.

User Interface

The user will be acting as a consultant in the case. The consultant is hired to assist the management with their new Internet strategy for the department LEGO Direct. Every fact in the case is true, and the employees appearing in the case are real. All that has been added is the role of the consultant, in order to motivate the user of the case to go through the material and to create "ownership" of the problems and opportunities presented.

The introduction begins with a small video sequence with a man ("the consultant") taking a train. This clip is animated with small LEGO figures and sounds from a train station. Arriving at the LEGO headquarters, the perspective shifts to real video seen as through "the eyes of the consultant". The narrator, a professional actor recorded in a sound studio, greets the consultant, as can be seen from Figure 1.1.

This sequence immediately places the user in the surroundings of the LEGO Company culture, by using elements, which are consistent with the company spirit. For example, the LEGO corporate headquarters in Billund, Denmark uses LEGO bricks and colours for their reception, to illustrate their organisational diagrams on the wall etc. The same strategy is applied throughout the multimedia case, as it gives the students an idea of the kind of company they are dealing with. It shows that the LEGO Company gives room for playfulness and creativity. Factors, which seems to be vital, when it comes to the creation of new ideas in the electronic commerce area, implementing them and changing the organisation in accordance with them.

DENMARK, DECEMBER 1999;
YOUR ASSIGNMENT!

"the consultant"

buys train tickets

takes train to LEGO

walks into reception area

Hello ...

The man waiting here is made
out of LEGO bricks, and so
are the diagrams etc. in the
display windows behind him

Narrator:
"Welcome to the LEGO Company headquarters!
You are an external consultant being assigned by
the LEGO Company to assist the LEGO Company
in conducting a major strategic change in the
organisation. Your task is to come up with a viable
business plan focusing on Internet strategies for
the new division called LEGO Direct. You have
been provided a temporary office, where you will
find a detailed description of your assignment in
the blue folder on your desk."

Plain text = my comments
Text in gray box = sound in case

Figure 1.1 - Arriving at the LEGO Company headquarters

The multimedia case is running in an Internet browser environment, which makes navigation easy to most students (if they are in the habit of using the Internet). After the introduction, the screen design also takes on a structure very familiar to Internet users, as the screen is divided into frames. In the centre of the screen, the student first sees his/hers temporary office (Figure 1.2). All items are clickable and a small "Yellow"-tag tells the student what to expect from each item. The "home"-button in the top-frame of the screen will always bring the user back to this office.
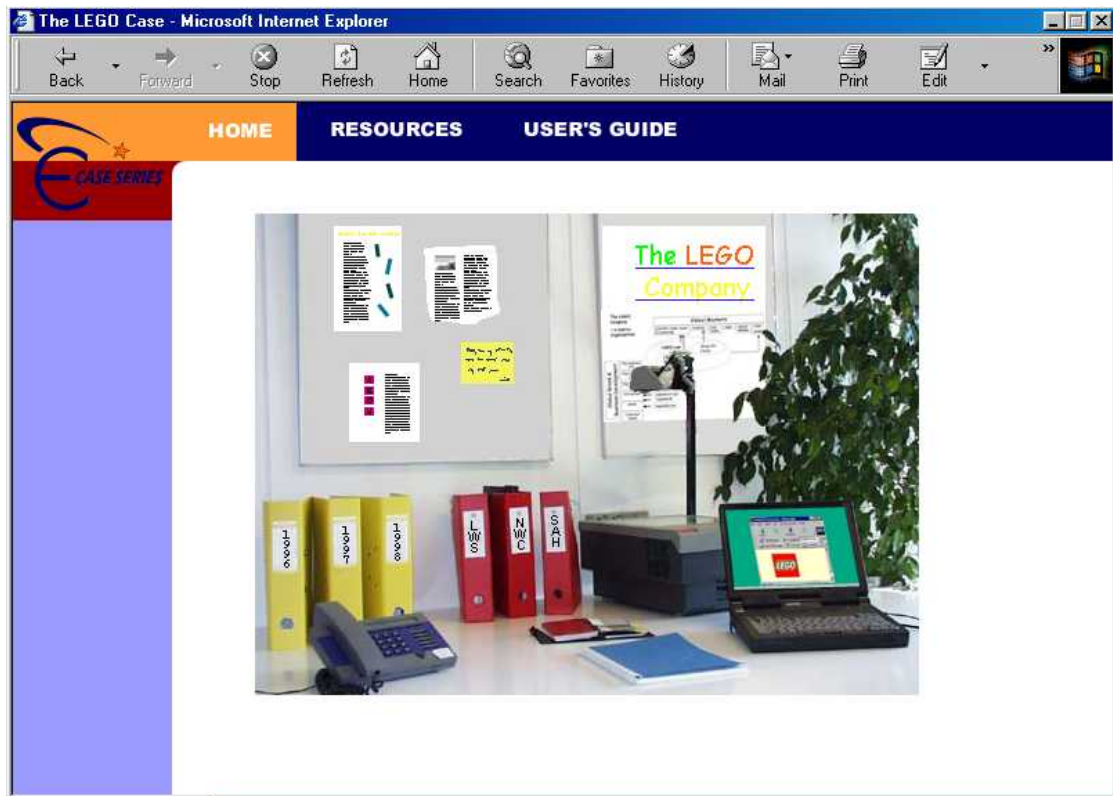
Figure 1.2 - The temporary office

The temporary office contains all relevant material concerning the two departments "New Ways to the Consumer" and "The LEGO Worlds Shop". How they made the necessary changes, which lessons were learned, and the outcome of the decisions made. In order to be able to understand the processes involved and the sequence of events that the LEGO Company experienced with respect to the Internet, certain background information is also provided. This includes organisational structure, financial situation and historical descriptions of e.g. the development within the different business categories.

Choosing the blue folder on the desk leads to a description of the consultant's assignment. In this the consultant will find an overview of the current situation, and the instruction to apply the desired focus as just described. The folder also contains driving

questions[6], which the consultant should answer, when writing his/her Internet Business Plan for the LEGO Company (Figure 1.3).
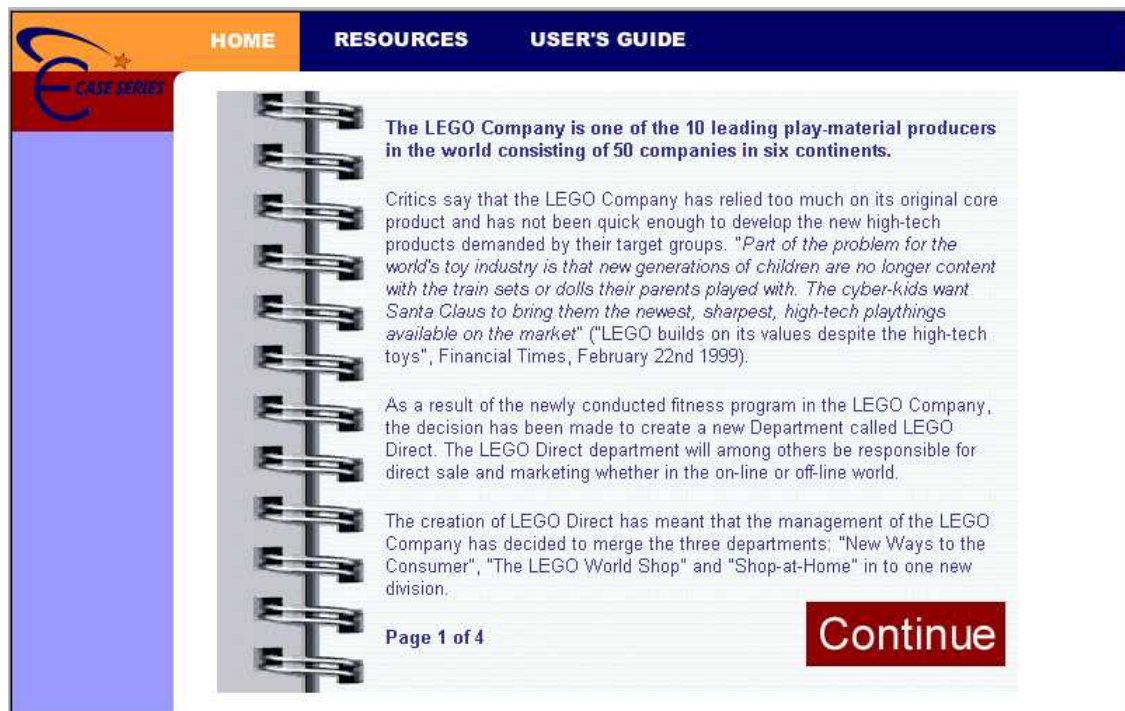
Figure 1.3 - Questions in the assignment folder (example)

Two of the three red folders placed in the centre of the "office" screen contains the descriptions of the departments "New ways to the Consumer" (NWC) and "LEGO World Shop" (LWS). When choosing one of the two folders a small animation begins, turning an enlarged version of the folder around, giving the students the possibility to choose one of the "reports" placed in the folder. The reports are named:

- Change Process
- The Chosen Solution,
- Results and
- Lessons Learned.

An example of one page in a report is shown in Figure 1.4.

In order to supplement the more objective kind of information, which is presented in text, speak and graphics, hyperlinks to interviews with employees at the two departments are placed at relevant points. These links are always provided in recognisable yellow boxes. Also, whenever the narrator speaks, it is possible for the user to stop, pause and replay the sound in the top right corner of the centre frame. (Figure 1.5).

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[6] Questions that supports or guide the students analysis -see 4.1.1
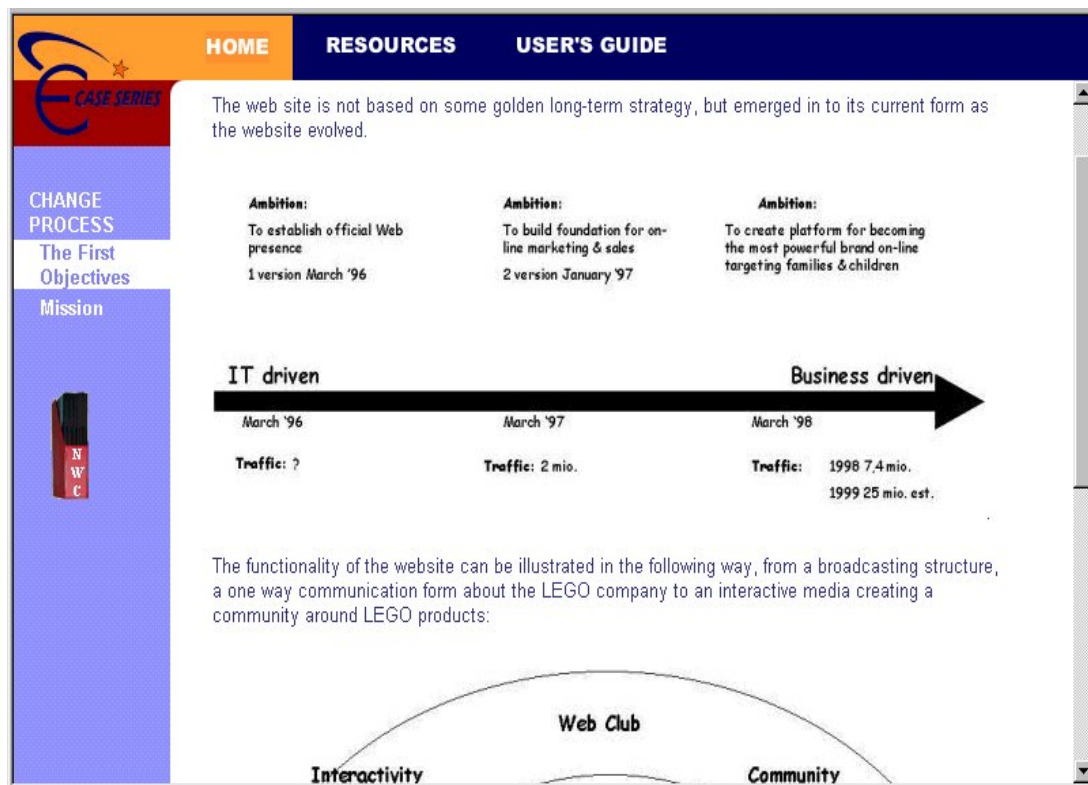
Figure 1.4 - A "page" in one of the "reports"

Figure 1.5 - control of media elements

The consultant (the user) can also perform an interview with the employees, by choosing the "calendar" item in the temporary office. Here the students will find business cards from four employees at the LEGO Company (Figure 1.6). When choosing to perform an interview, the students will get the opportunity to ask several predefined questions (Figure 1.7). The answers to these questions are given in the form of video clips, sound sequences or text quotations (Figure 1.8).
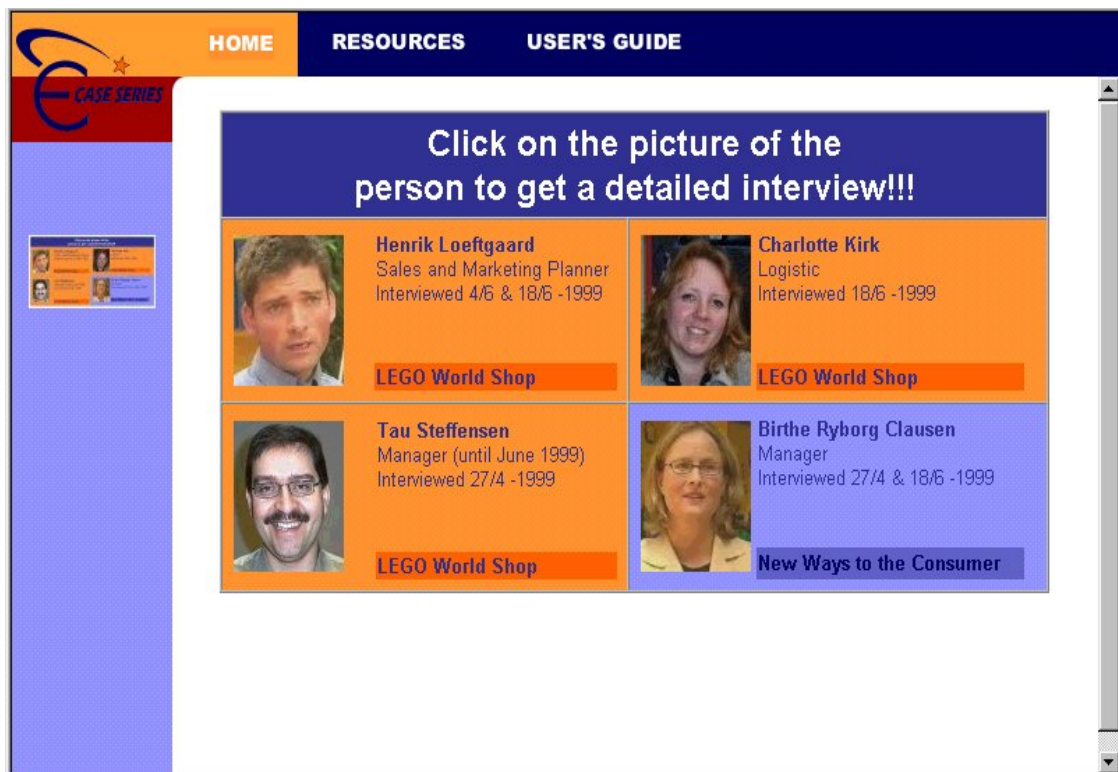
Figure 1.6 - Business cards

Tau Steffensen

Tau Steffensen
Interview 27/4-1999

Former E-Commerce Business
Manager

LEGO World Shop

Pose a question:

1. How did the idea to create LEGO World Shop emerge?

2. Why was it decided to outsource the entire solution?

3. How and when did you start the development of LEGO World Shop?

4. How was the development process managed?

5. Have the amount of orders reached your expectations?

6. What kind of feedback did you receive from the retailers?

Figure 1.7 - Questions the "consultant" can ask in an interview

3. What considerations did you have in relation to the distribution centres?

Charlotte Kirk, Interview 18/6 -1999, Logistic, LEGO World Shop:

- pack the products

- take care of more than one country.

"The hole time we had a major focus on the consumer experience, also there must be no PVC in the packaging. If we have like a few products you have to put them into a bigger box - there will be some space left and you will have to put something in to fill it up in order not to damage the products. So deciding on that issue - was also a major task in this. We also discussed the plastic things you put on top of a box when you send it. You have to have like a plastic thing to put documents in and that should also be environmentally correct, because that is a major focus within the LEGO Company.

We also had an issue about when an order is put into the system and you order different products, where should the deliveries come from? We have two Distribution Centre's (DC) now and they cover countries and not products, so we have to put all different products for all the different countries within the same DC. Right now it is not a problem but looking ahead perhaps, if we get more products that could be an issue for us.

We are "one brand - one company" now. We find that the customer would expect when I do a LEGO order here, then it comes in one package for me as a customer.

Figure 1.8 - An answer to the "consultant"

Material Available in the LEGO Case

In this section I give a relatively detailed overview of the material available in the LEGO case. This is done to give an impression of the type of content found in a multimedia teaching case. The material can be divided into the following six categories:

LEGO World Shop - Presentation of the development of the idea to create the shop as well as the objectives and challenges (barriers and opportunities), which the department had to deal with. The reasons why an outsourcing strategy was chosen, the implemented business system and pricing strategies are described in details ranging from taxation and regulation issues to storage and distribution centres. The target group, competitors and suppliers are introduced and the retailers response (or reaction) to the Internet shop is shown, together with the LEGO Company's achieved results. Finally different "lessons learned" are presented.

New Ways to the Consumer - Just as with the LEGO World Shop, the emergence of the LEGO.com website is described. The mission statement of the department is presented, and as this site has a longer history, the students can here see how the objective of the site has evolved. Unlike the LEGO World Shop, the LEGO.com site is primarily administrated and up-dated through in-house resources, and the case presents the web-team, their tasks and the few suppliers, as well as an overview of the target group and competitors of the site. The results concentrate on three issues. First, the quantitative data / measures from the log files. Secondly, the more qualitative data in the form of a few examples from the 7-10.000 e-mails that the department receives as feedback to the site every week. Thirdly, the consequences the website had internally in the organisation (awareness of the opportunities of the Internet etc.). Getting the attention of top management in a large company as the LEGO Company and ways of recruiting dedicated human resources (representing business, marketing, IT and creative competencies) have been the major "lessons learned".

Newspaper articles - The case includes summaries of 5 articles, which were published in the Danish press, plus a link to the LEGO.com website, where the students can find the LEGO Company's own press releases. The articles primarily focus on the reaction from the retailers to the decision to sell directly on the Internet. There is also an article that discusses the ethical considerations in having a cocktail with the ingredients: marketing, Internet and children.

Organisation - The information provided on an organisational level is material about the LEGO business categories, organisational structure, financial information and the history of the LEGO Company (from 1932-2000). Financial information includes key figures from the annual reports of 1996, 1997 and 1998, as well as a detailed description of the financial situation in 1998.

Shop at home - The material about the "Shop-at-Home" department is rather scarce, since the case does not actually focus on this department. It is however necessary for the students to know a little about the experience this department had in direct sales. "Shop-at-

Home" is the only department within the LEGO Company that has their own large logistic department and distribution centre. The students should contemplate this, when looking into the future electronic commerce possibilities.

Websites - The case also has selected pages from the two websites: LEGO.com and LEGO World Shop. These pages are from the versions launched in March 1998 (LEGO.com) and March 1999 (LEGO World Shop). The pages were downloaded from the Internet late August 1999, however both sites have changed since then. Links to the current addresses of the two sites are also given, so that the students may compare the changes and speculate about the reasons for these. …"

1.2. BPR IN THE INSURANCE SECTOR - THE ALKA CASE

This multimedia teaching case presents the Danish insurance company, ALKA A/S (www.alka.dk), which has completed a highly successful Business Process Re-engineering (BPR) project. The BPR project changed the organisational work processes by substituting a traditional sales process and paper-based claims administration with more efficient processes conducted over telecommunications and information technologies (IT).

Case Story[7]

The case takes place in May 1999. The case illustrates the BPR process from the very beginning, from the emergence of the initial idea and establishment of the project-team, over problems of motivating the employees and implementation of the new processes, to financial results. The case also contains information about project management and the new opportunities, which exist in the e-business sector.

The innovative idea in the company, to substitute a traditional work process with administration and sales over the telephone came about after some years of very poor business results. The idea was entitled 'one-fingerprint' and in broad operational concepts, it was determined that:

- 90% of all referrals to ALKA should be completed by the first employee the customer comes in contact with/ encounters.
- Every ALKA representative should have the competence to sell all products, process all claims, and answer all questions.
- Paper correspondence should be reduced.
- The massive control procedures associated with claims should be eliminated.

However, attempts to let the same person manage both the sales and claims administration processes were unsuccessful, first of all because the two processes

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[7] The text in this section was created partly from restructuring of excerpts from the text that I wrote to the teaching note (a paper supporting the teacher using the case). However, from the beginning the first ALKA paper-based teaching case (not the multimedia case) was not developed by me or the BUSINES-LINC team, but primarily by a co-worker named Jonathan Wareham in another EU project named CEBUSNET.

demanded two different kinds of personality types. ALKA thus re-implemented two different departments into their BPR solution, a sales and claims department, both of which downsized the number of steps (and employees) involved in a sales or claim administration process.

The lack of face to face interaction in the sales process made it almost too efficient, preventing the necessary social aspect and contact. The new communication form also made ALKA invisible to the customer. This was not beneficial for customer loyalty - people simply "forgot" where they were insured, and thus it was easier for new entrants to get their "sales talk" to make a difference.

Main Teaching Objectives

There are three main lessons, which are conveyed to the students. First, how and why the creation of the idea to change ALKA arose. Understanding the reasons for why a BPR approach was chosen, and to understand the designs of the ideal process (the one fingerprint ideal). Secondly, to understand the choice of a top-down managed project strategy for the change project in ALKA. Thirdly, the importance of adjusting the ideal processes to the reality of the daily life of the employees (the two fingerprint reality), as well as finding the balance between business efficiency and employee and customer satisfaction.

User Interface

The design of the case evolves around the change process itself, and the menu is consequently divided into four areas: Company Information, Idea Generation, Management of Change and Organisational Change (Figure 1.9).

An actress, the narrator of the case, reads the introduction to the ALKA case. This introduction uses an altered version of the main menu, to show four areas present in a continuous improvement cycle, which companies should see themselves as part of. The idea about this cycle is to guide the user to go through the information of the case, contemplating the future for ALKA, when analysing the past. (Figure 1.9)
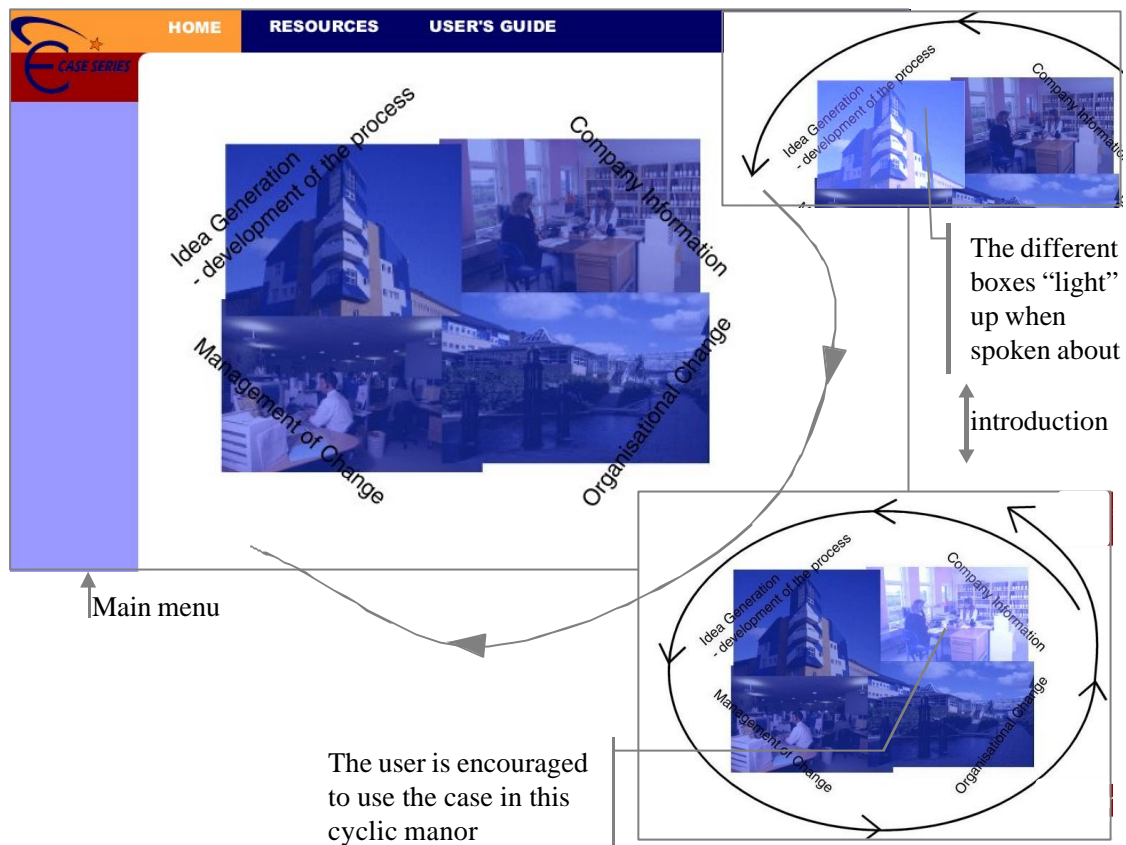
Figure 1.9 - Introduction sequence and main menu of the ALKA case

The case utilises a different communication form with the user than the LEGO case did. It uses a non-personified narrator, text in third person tense and no "roles" to play. This does not mean that the case is detached or impersonal. As the LEGO case, it uses video interviews and quotations to provide a feel for the company culture. The problems that occurred and the adjustments that had to be made during the BPR-process are described through text, illustrations and video-interviews. By using animations, the case demonstrates how transacting with customers through a technology-based media fundamentally changed the company's relationship with them. In Figure 1.10 number (a) and (b), two animated diagrams illustrate the before and after situation of the sales division. There are speak to each new highlighted box in the figure (and sometimes text to underline important statements).

(a) The old sales process

Narrator:
"...In a routine conversation with the customer, all data is entered directly into the system, it thus is possible to generate the policy and..."

Narrator:
"... The sales process was reduced from a maximum of 69 individual steps in the old process to less than 30 in the new..."

Reduced from max. 69 steps to less than 30.
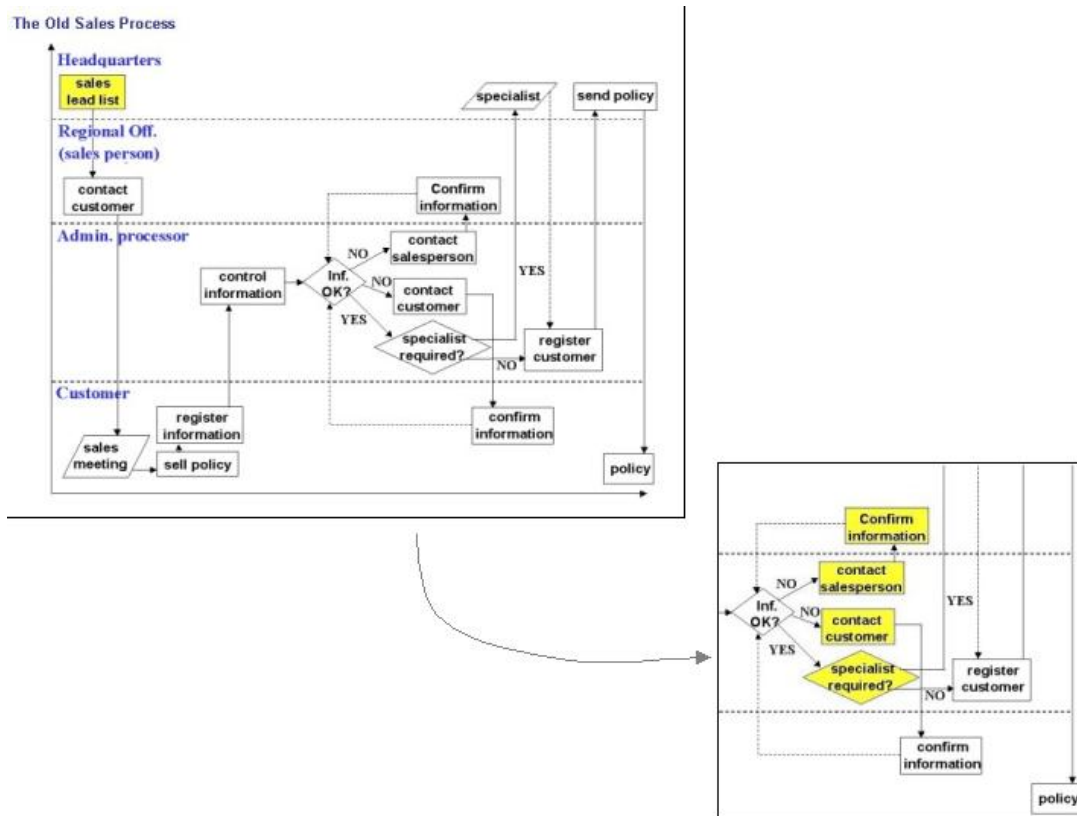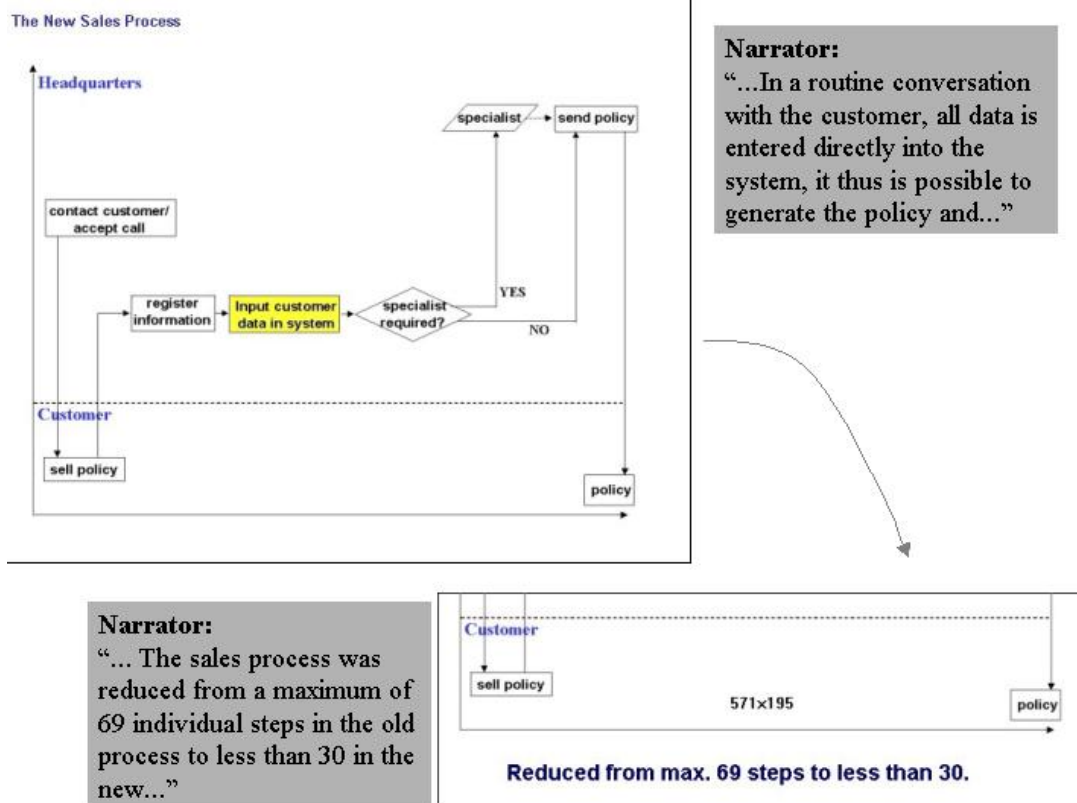
(b) The new sales process

Figure 1.10 - Animated diagrams in the ALKA case

Finally, the ALKA case also uses driving questions to support the user in the analysis. These questions are placed "outside" the case context or case story (unlike the LEGO case, which included them in a folder as an assignment on the desk in the office, because they were part of the role-play embedded in the case). Since this is not the situation in the ALKA case, the questions are only found under the top frame of the screen, under the subject: users guide (see Figure 1.11).
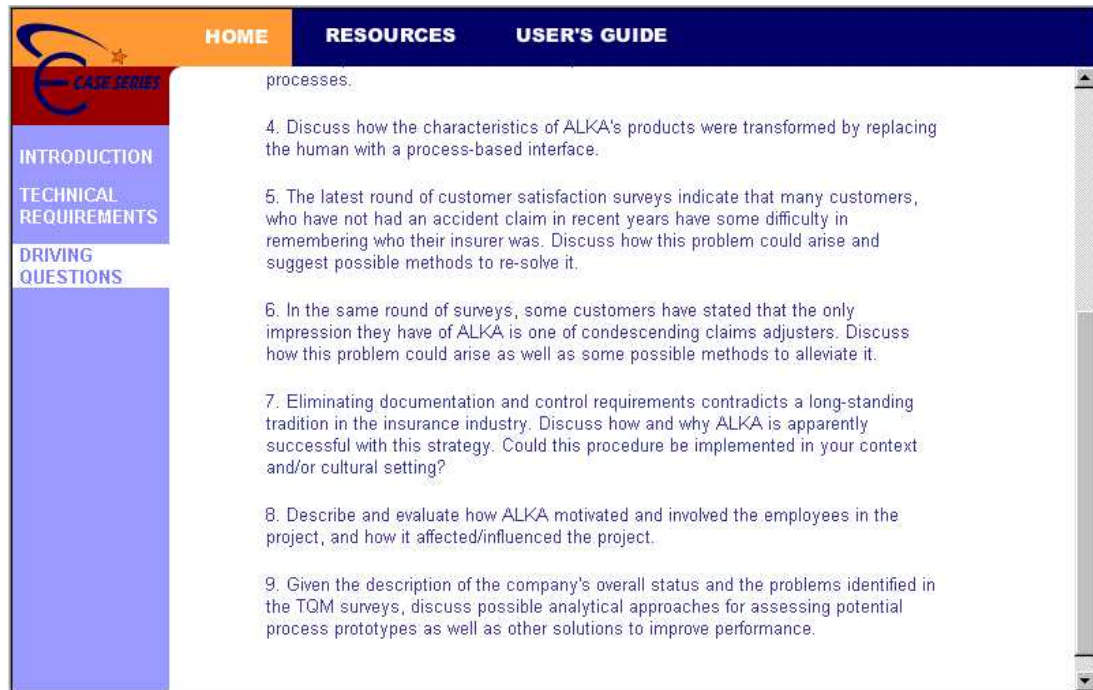
Figure 1.11 - Driving questions found under the user's guide top-menu

1.3. E-BUSINESS AND CUSTOMER RELATIONS – THE ROCKWOOL CASE

This multimedia teaching case is based on the Danish Rockwool A/S Company, a large insulation material producer. The case considers the role of electronic business, in particular its value in customer relation management. The purpose of the Rockwool Internet site is primarily brand building and marketing. The site helps customers determine which regulations they must adhere to, and the appropriate insulation solution. At the end of the case development period, Rockwool considered selling insulation material over the Internet as a natural extension of the development process. This decision provided an entry point to the case.

Case Story

The case tells the story of how Rockwool A/S has provided tools and materials in the form of an Internet site that acts as a support to the company's customers, thereby enabling them to make cost savings. The website has enabled Rockwool A/S to provide their customers with up-to-date information, tools and software, resulting in greater efficiency in the ordering process of insulation material.

The Internet site informs the customer of the building regulations that apply to the project in hand, and of any future changes to the regulations that may be relevant. The service is based on technical digital manuals and software (mathematical calculations, CAD/CAM drawings etc.) provided on-line. This is achieved by helping customers through processes like drawing-up blueprints. The result is that it is a much faster and more effective work process for the engineers and architects than previously.

Prior to the actual e-business project, work had been done internally at Rockwool to substitute paper-based manuals with digital versions. The paper-based manuals are time consuming to up-date and difficult to keep at hand for everyone in the company. The digital manuals should therefore establish a better customer relationship in a highly technical domain, where it is vital to maintain and update expert knowledge.

The case takes place in the fall of 1999. This e-business project began, when Rockwool was contacted by a web-agency, which suggested preparing a more traditional Internet site about Rockwool and their products. As co-operation began, the possibility of providing the manuals on-line, supplemented by software for supporting the work of the architects and engineers was realised. This software would also have the benefit of being able to calculate, not only the amount of insulation required, but also transform this to amount of different Rockwool products (volume and type).

This development project required good work relationships between the web-agency, the technical employees at Rockwool and the P-consultants. P-consultants being the employees at Rockwool, who support the architects and engineers in their work, with the objective of getting more customer loyalty towards Rockwool products. These are the persons who know about the customers' problems.

The students are provided with material on the Rockwool.dk site, such as how approval from management was achieved, which organisational changes were necessary, which lessons were learned, and the outcome of the changes that were implemented. General information on Rockwool A/S is also provided along with a description of the change in customer relations. All this should help the students in evaluating the process and the consequence of the Rockwool.dk site, and in evaluating decision-making on short- and long-term Internet strategy.

Teaching Objectives

Primarily the objective of the multimedia teaching case is to let the students reflect on the process, which Rockwool A/S has experienced in connection with the e-business project. I.e., understanding customer relationship in these specialised environments, and how e-business can support or enhance this. Secondly, the students should reflect on the current process and take into consideration Rockwools desire to extend its Internet service to include selling products over the Internet. Particular attention should be given to the industrial sector in which Rockwool A/S and their typical customers operate.

User Interface

The teaching case begins with an existing member of the e-business project greeting the new employee. The woman suggests that he/she first gains knowledge about Rockwool A/S in general, and then studies the history and results of the e-business project. The new employee is then advised to gain knowledge about the relationship between Rockwool A/S and its' customers (architects and engineers). See Figure 1.12.

I was a member of the e-business group

I will help you get aquatinted with first Rockwool A/S, then the e-business project and thirdly show you how manuals and programs are used by our customers.

But maybe first we should begin with looking at your initial task, the business plan.

Figure 1.12 - Excerpt of introduction to the Rockwool case

The case content is set in "objective" terms through a mix of text, tables and graphics, and "subjectively" through the information provided by the e-business project member and

a P-Consultant continually addressing or commenting on the subjects presented. An example of a content page is provided in Figure 1.13
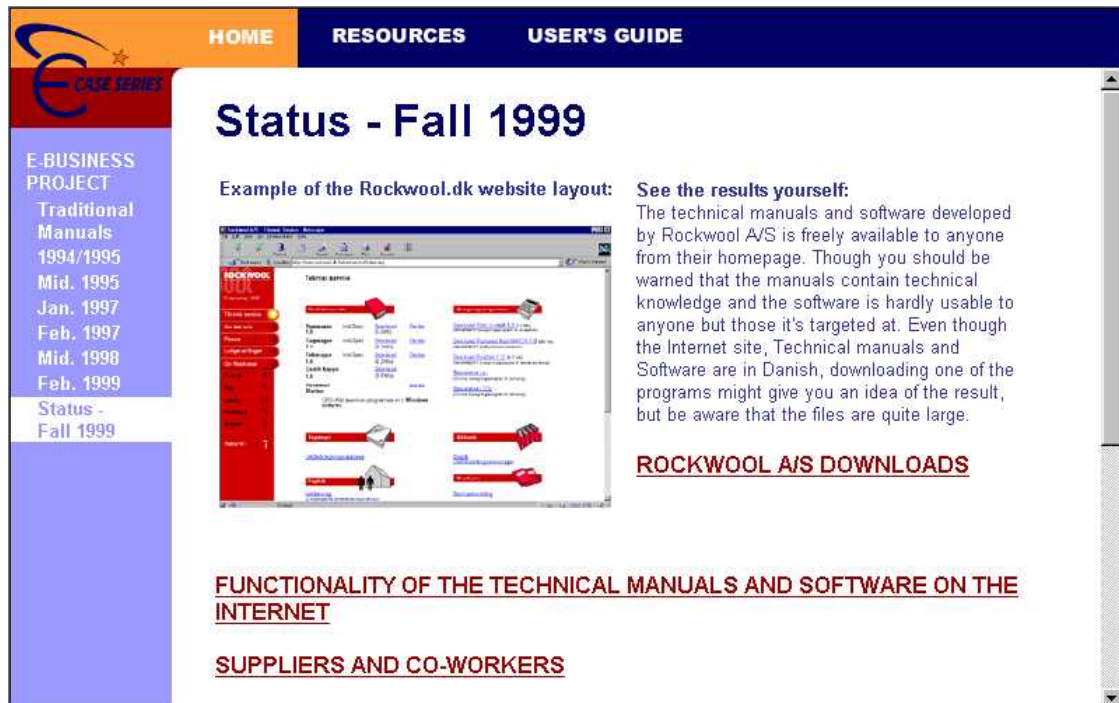
Figure 1.13 - Content page in the Rockwool case

Finally, the case provides a template for the students, on which the business plan can be written. The template is provided to support the students when examining and analysing the case material, because he/she must take the process that Rockwool A/S has already been through and the results they have obtained into account before being able to suggest future plans.

The business plan, which has a layout that resembles a report (with a front page, table of contents etc.), is provided in MS Word® format. The idea is that the students can either print it out or write notes directly into the document and use it as a preparation form for the class. See (a) and (b) Figure 1.14.
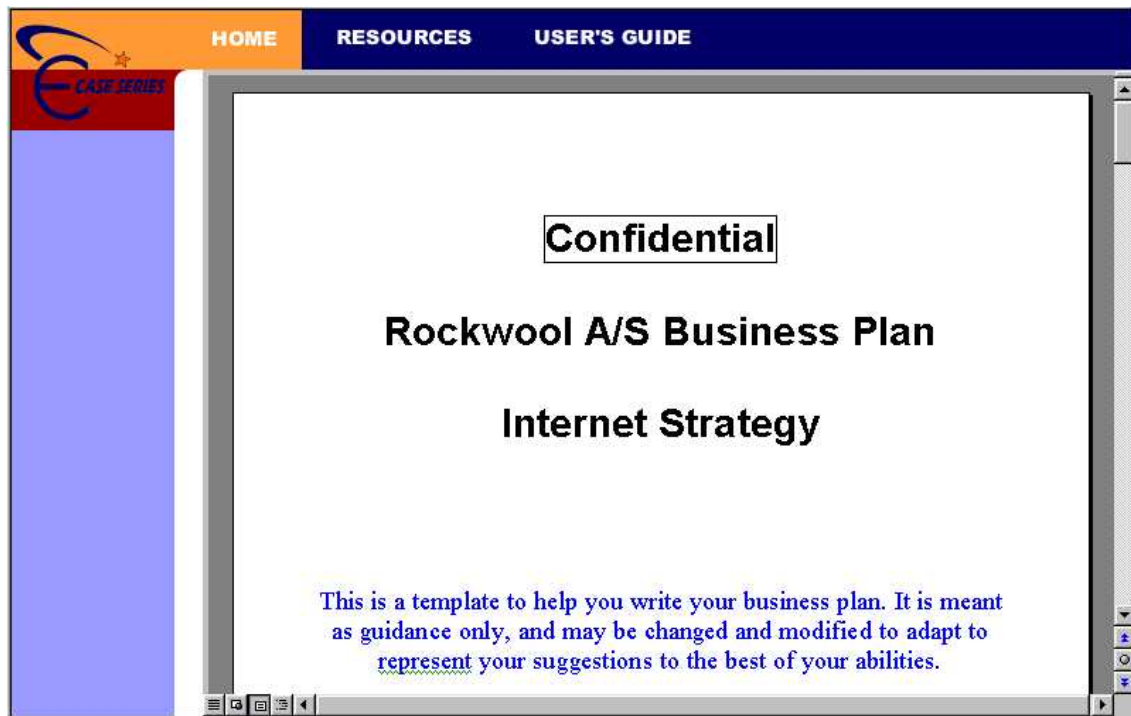
(a) The business plan front-page

Table of Contents

2   Market and Product Analysis

What are Rockwool A/S' core products, and which needs do they cover? What are the market characteristics (homogeneous, heterogeneous…)? What is the market share of Rockwool A/S?

2.1   Environment description: scope and trends

Is the industry in decline or is it growing? Does the industry face any threats (e.g. increases in interest rates)?

(b) The business plan headings and content excerpt

Figure 1.14 - The Rockwool business plan

2. INTRODUCTION

The purpose with the chapter is to provide an overview of the research area and questions, which I have used the last couple of years to explore. That is, argumentation for what I see as the interesting aspects of the research area at hand. The chapter also outlines and gives reasons for the structure of the dissertation.

Section 2.1 investigates the scope of the dissertation followed by an argumentation concerning the interesting aspects of the dissertation in 2.2. In 2.3 the research questions are discussed and in 2.4 a methodological overview is given. My research contributions are briefly investigated in 2.5 before I in 2.6 conclude the chapter by presenting the structure of the rest of the dissertation.

2.1. SCOPE OF THIS DISSERTATION

Teaching cases have existed for almost a century in business education in a written format. Use of multimedia teaching cases is a relatively new phenomenon, which is unexplored and almost no detailed research about the process of developing these exists. The scope of the dissertation is formulated in the sentence below.

The objective of the dissertation is to investigate roles and tools specific for the development and use of multimedia teaching cases. The dissertation aims at providing insight into how the application of these roles and tools support or restrain the development of multimedia teaching cases within business education.

The research presented primarily builds on literature studies and empirical analysis of data collected via an EU (the European Union) project called BUSINES-LINC (BUSiness Innovation NEtworkS - Learning with INter-active Cases). The purpose of BUSINES-LINC was to support Business Innovation Processes within European Companies through the provision of multimedia and interlinked innovation case studies. It may seem paradoxical that the Ph.D. studies multimedia cases, when BUSINES-LINC was developing interactive cases. The claim is that the cases are closer to a multimedia teaching case term than an interactive teaching case term.[8]

I was an active participant in BUSINES-LINC. The project provided me with a network of developers, who were willing to participate in trying out ideas and sharing their experiences regarding their development and use processes with me. 18 multimedia teaching cases were developed within the project, three from each partner. As the cases

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[8] A discussion I take up again later in 4.2.2

became ready for use, I arranged with instructors to use these in different courses, and for students to use it on different stages in their education.

The following 6 paragraphs each supply a short definition and /or clarification of the key concepts used in the highlighted "mission statement".

Multimedia Teaching Cases

Teaching cases, as they are used in business schools, depicts companies, and the current problems or opportunities they are facing (Barnes, Christensen and Hansen 1994, Maufette-Leenders, Erskine and Leenders 1997, Heath 1998, Manninen 1997). A teaching case is typically written by a professor and perhaps one or two assisting students or research assistants at a research department, institution or centre. The case is analysed by the students and then discussed in class. The focus of the class discussion is to analyse the company's situation and come up with viable strategies for the future (Leenders and Erskine 1989, Heath 1998). Traditionally teaching cases have been written descriptions, but the teaching cases in this dissertation are multimedia[9] cases, like the ones presented in the first chapter.

Business Education

The dissertation looks at the development of multimedia teaching cases for business education. I apply a broad definition of the term business education, namely any line of education that would be found on business schools or faculties. This includes a wide variety of subjects like business economics, commerce, marketing, operations management, accounting, information systems and organisational theory.

Even though case teaching is also used in other areas, as law, education and medicine (see for example Ertmer and Dillon 1998, Shulman 1992, Williams 1992) and here also in the form of multimedia cases (see for example Baker 2000, Merseth and Lacey 1993), these areas present quite different approaches to content and teaching objectives. This means that investigated roles and tools are not likely to be completely similar to or directly applicable in other areas, and so a clear distinction is necessary.

Development and Use

Development of multimedia teaching cases has been the main interest of my research. However, the relationship between use and development is one that plays an important part in any software development project, and it has been allowed special attention in this dissertation.

Knowing the area of application should be vital for any system development method and many also contemplate this to some extend. For example the Multiview development model, has its outset in the application area, exploring the people and organisations using

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[9] A definition of the term "multimedia" will be discussed in section 4.1.3

the information system, the human activity system, as the authors of the method call it (Avison and Wood-Harper 1990). Likewise, the Relationship Management Methodology (RMM) for hypermedia design uses another perspective by focusing on a modelling language that the authors call the logical level. This logical level is a mapping of the information domain and the navigational structures. By setting up systematic mapping procedures, this method tries to ensure that the representation of a system, as it was planned to be applied, is also what gets implemented at the physical level (Isakowitz, Kamis and Koufaris 1998).[10]

Use is "*the application or employment of something for a purpose*" (Dictionary.com 2001)[11]. But little is known about the multimedia teaching case use situations. Consequently, it is necessary to analyse the use situations and assess their influence on development.

Roles and Tools

The term role[12] covers both the use and the development dimension. A development role deals with different organisational structures in the development (such as the skills required in a development team and the role of the case supplying company, which the case is about). Use roles include the aspects influencing the use situation, when the multimedia case is used directly (like in the example in chapter 0, when the user of the LEGO case "plays" the role of a consultant) or indirectly (as the case influence how the role of the students and the instructors in class discussions acts or behave).

Similarly, the dissertation investigates tools[13] from both a development and use dimension. Development tools (like storyboards, flow diagrams etc.) are used by the development team in the process of developing the multimedia teaching cases. Use tools (like the driving questions from the teaching case example - in chapter 0) are used in the actual use situation, while working with the material provided in the case.

Support and Restrain

Describing supporting and restraining experiences from the BUSINES-LINC project provides an increased understanding of roles and tools applicability. Knowing the supporting and restraining factors of a tool, in addition to knowing how it looks and functions, makes it more comparable and adaptable to similar development project.

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[10] Multiview and RMM are systems development methods, which I will also refer to later in the dissertation. This is because they represent two different perspectives also used in the BUSINES-LINC project, though within organisational information system development, not educational. Multiview focuses on tools for investigating the application area within the organisation, prior to settling the requirement of the system, Avison and Wood-Harper 1990. RMM use tools that support the process of getting knowledge about the application are integrated into the requirements, but also program structure of the hypermedia system being developed, Isakowitz, Kamis and Koufaris 1998.

[11] Quoted source from: The American Heritage® Dictionary of the English Language, Fourth Edition, published by Houghton Mifflin Company.

[12] "*1. A character or part played by a performer. 2. The characteristic and expected social behaviour of an individual. 3. A function or position.*" (Lexico LLC 2001), Quoted source from: The American Heritage® Dictionary of the English Language, Fourth Edition, published by Houghton Mifflin Company.

[13] Tools is in the Merriam-Webster dictionary defined as: "*Something (as an instrument or apparatus) used in performing an operation or necessary in the practice of a vocation or profession*" (Merriam-Webster 2001)

Figure 2.1 illustrates the key concepts of the dissertation. The multimedia case is developed by a group of people, typically initiated by a research department or centre. These people take on different roles (functions), and use the tools to develop the multimedia teaching case with. The development is based on the needs of their students (from the business education area) by implementing roles and tools. Either directly (by having roles and tools implemented in the case, which the user employs) or indirectly (by providing elements influencing the behaviour of the students or instructor in the class environment). The research investigates all these elements and the supporting and restraining factors of these, as shown in the figure. (Figure 2.1)
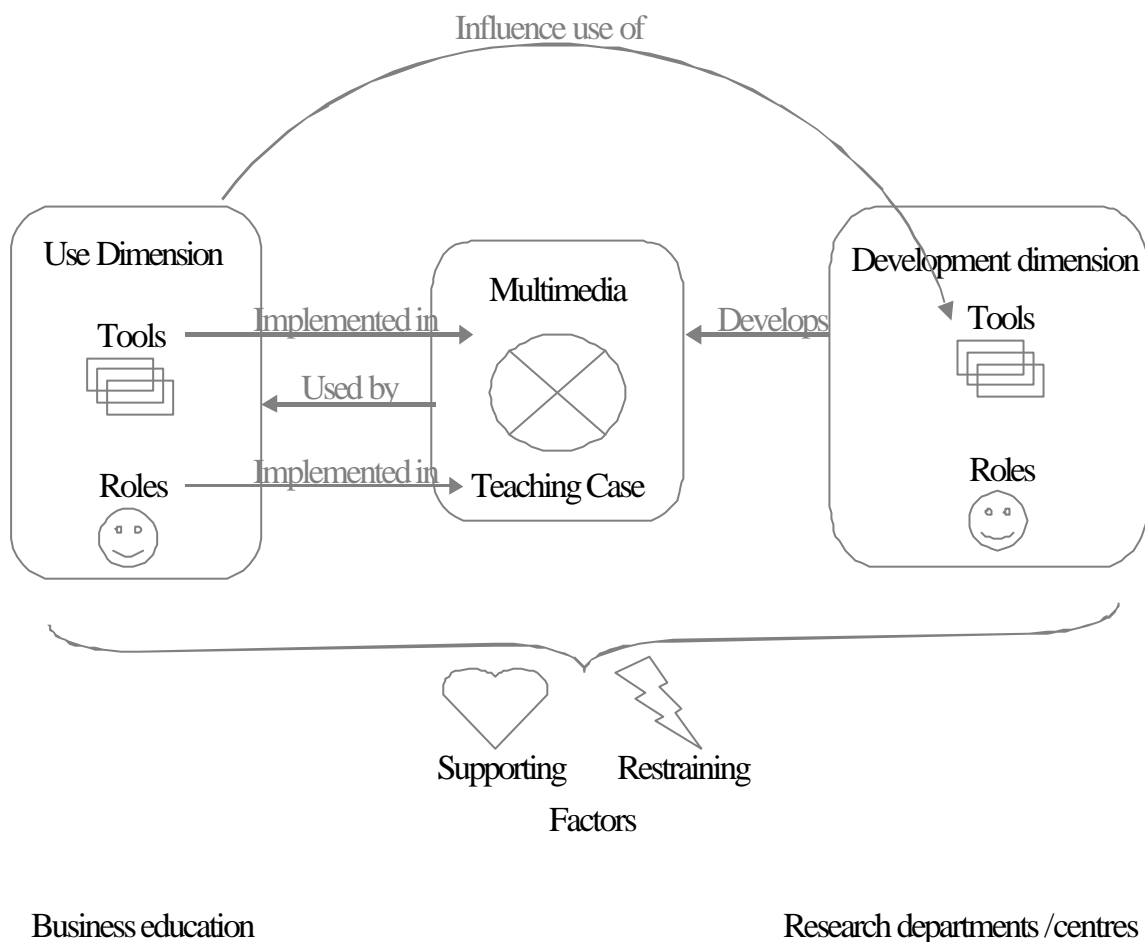
Figure 2.1 - Concepts in the dissertation

2.2. ARGUMENTATION - WHY IS THIS INTERESTING?

Despite the long tradition of teaching cases in business education, multimedia teaching cases is a new unexplored field. Current research is at a very superficial level, and often based on personal stories about what happened, rather than profound research.

The question if use of multimedia teaching cases is similar to written cases has not been investigated. Also, several researchers have called for research within the constructivistic paradigm and the use of information communication technologies, which multimedia teaching cases belongs to.

Literature reviews show that written teaching cases are developed based on a very simple development model, whereas multimedia development is much more complex. Multimedia teaching case development is not directly comparable to writing teaching cases or to development of multimedia systems, but emerges in the combination of the two.

My argumentation for why this research is interesting is based on these three overall perspectives (as presented in each a paragraph above):

- Novelty of Approach
- New or Traditional Use Situations
- Eclectic Development Approach

Novelty of Approach

Within business education written teaching cases has been used for almost a hundred years, as the Harvard Business School introduced the method to their students in 1910 (Leenders and Erskine 1989). Case-based teaching is a teaching method, which has gained widespread use in many different kinds of business programs, from marketing over operation management to information systems. It is also a method, which is used all over the world. This can amongst other be seen in the growing numbers of available databases containing written teaching cases in a large range of subjects. E.g. from the large databases at:

- The Harvard Business School of Publishing (HBSP 2002),
- The Richard Ivey School of Business (IVEY 2002),
- From the smaller databases, which are emerging with a more specialised focus, as for example with the information management cases from The IDEA group publishing house (IDEA 2002).

However, the development and use of multimedia teaching cases are quite new. Over the last couple of years interest in this area has grown, and some digital teaching cases in various implementation models have emerged, especially while this Ph.D. research project has been underway. For example hypertext in web-environments[14], large stand-alone multimedia cases[15] and simulations[16], all of which supposedly belongs to a teaching case paradigm according to their developers.

Furthermore, the development process behind these models are not disseminated to the "public" and assessed thoroughly. For example none of the developers for either of the

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[14] As the Macis case study collection (Macis Consortium 1999), the Pacific-Dunlop case (Upton 1997) or the Readers Inn-teractive (Subrirana and Zuidhof 1996).

[15] Like the Microtonic and Copenhagen Airport case materials made by the Learning lab at the Copenhagen Business School (Microtonic 1996/8, Copenhagen Airport 1997)

[16] Like the Web-TRECS (Parker and Swatman 1999) and DECT (Joyce 1999) electronic commerce simulations from the Deakin University - papers from the BLED 1999, teaching case track.

three types of examples above have written in details about their development process (if they have mentioned it at all - see references in footnotes 14, 15 and 16). The newness of the approach means, that evaluation and empirical evidence of the value and use of the existing examples is also quite limited, though more literature on the subject of use than development is found.

So, despite the rise in multimedia teaching cases, current research into use and development is rather superficial, at an almost anecdotal level, lacking systematic and rigid research designs. The majority of the results comes from researchers reporting either their own or others' experience with multimedia case teaching, but mainly viewed / reported as what they thought happened as instructors or developers. (Merseth and Lacey 1993, Joyce 1999, Parker and Swatman 1999, Klassen, Stone and Vogel 1999.) Sustainable reports based on empirical research and findings (not just from first hand descriptions) from such development projects and use situations have not yet been published.

However, there are clearly attempts to begin exploring especially case teaching effects on learning. For example at the ECCH (European Case Clearing House), three smaller projects were funded investigating the traditional case teaching paradigm. Also, projects like BUSINES-LINC gave input to research papers concerning the subject.

John Burgoyne and Alan Mumford suggests that new or further research is needed to "*Investigate whether the emerging impact of IT based approaches to presenting and delivering case teaching are enhancing the practical delivery of existing methods or creating the possibility of fundamentally different new approaches.*" (Burgoyne and Mumford 2001, p.95)[17] And seen from the special area of e-commerce, this need becomes even greater: "*Because of the infancy of this approach, particular in the context of e-commerce business education very little is known about the way in which to design and deploy a web-based e-commerce business teaching case.*" (Parker and Swatman 1999, p. 499.)

New or Traditional Use Situations

In the literature the teaching strategy of case-based teaching is referred to as rooted in a constructivistic teaching paradigm and active "learning to learn" approach (Williams 1992, Devey 1994, Mauffette-Leenders 1997, Harzard 2000). Constructivist teaching models are seen as promising, when used with information communication technologies, especially those which make use of some kind of hypermedia information (Burgoyne and Mumford 2001, Duffy and Cunningham 1996, Gallagher and Stevensen 1998, Harper and Hedberg 1997, Merseth and Lacey 1993). But the specific model of multimedia teaching cases was quite unexplored.

Understanding the context, in which the system will be used and let this knowledge influence the development of the product (the teaching case), is a perspective I adhere to. This is an agenda, which is researched within: HCI (Human Computer Interaction) field, e.g. in: Interaction design (see Preece et al 2002). Contextual interface design, through for

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[17] This report is one of three reports, generated in the three projects funded by the ECCH, as mentioned in the previous section.

example activity theory (see Nardi 1996 and Verenikina and Gould 1997). As well as participatory design (see Greenbaum and Kyng 1991 and Carroll 1995, 2000 2002). In this Ph.D. project it has been important to relate to both a development and use dimension and to their relations. Though it is the development of teaching cases, which is the motivator for looking at the use situations[18]

Eclectic Development Approach

Literature review and case courses gave me insight into the subject of writing traditional teaching cases. However, due to the focus on paper-based cases, the process they depicted only focused on simple tasks, that an individual can carry out. A researcher, perhaps assisted by some students helping to collect and structure data, typically undertakes the writing process. Put briefly, the phases are:

- Getting in contact with a company,

- Perform interview(s),

- Make first draft,

- Edit and restructure draft until satisfied, and

- Release case.

The descriptions of these phases are primarily concerned with content and structure, and there exist only a few tools, which support the development of the cases (and only few are necessary). (Leenders and Erskine 1989, Heath 1998.)

When it comes to the development of multimedia teaching cases, the process can to a greater extent be compared to other multimedia development projects, where other stakeholders (graphical designers, authors / programmers sound & video editors, perhaps actors and so forth) with different perspectives on the future system are participating. Thus, the organisation of roles becomes a more complex process, where several parties participate. Likewise, several tasks supported by the use of different tools have to be attended to. Tasks that are interdependent, but which also sometimes are simultaneous (like programming the interface, while producing multimedia content). (Hagel et al. 1996, Klassen, Stone and Vogel 1999, Orngreen 1998.)

BUSINES-LINC provided a forum for investigation of the roles and tools in the multimedia development process. Prior to and during the project I investigated multimedia development in general and especially experience from multimedia projects within education. When comparing the literature to BUSINES-LINC experiences it became clear, that the area of teaching cases had some special characteristics, different from other well-investigated multimedia applications. This is why the dissertation focuses in on this area of a development method. The traditional tools used in the multimedia teaching case development process were influenced in new ways by the set of development roles present,

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[18] The foci and levels of analysis of these two dimensions are further clarified in chapter 3.

and also by the kind of use situation, in which the cases are applied, and so far these issues has been unexplored. It is these special characteristics, which are the central issue of the Ph.D. research project.

2.3. RESEARCH QUESTIONS

The following is a description of the research questions, this dissertation seeks to answer, as well as a description of criteria's used for framing the area of the research. Derived from the bold printed "mission statement" presented in 2.1 and the argumentation given above, three main questions can be identified:

1. Which roles and tools characterise the development and use of multimedia teaching cases for business education?

2. How are these roles and tools applied to the multimedia development process and how do they support or restrain the development.

3. How are the development roles and tools and the use roles and tools interrelated, and how do they relate to a development model for multimedia teaching cases?

The purpose of the dissertation is thus to investigate roles and tools, which are characteristic for the development process, as well as roles and tools in the use situations, which have vital influence on the development of multimedia teaching cases. The purpose is not to evaluate the case-based teaching paradigm as such. The use of this teaching model is here seen as given.[19]

In order to answer the question 1, I had to research literature in four areas. These areas covered the subjects of what characterises case-based teaching (written teaching cases) and multimedia teaching, development of teaching cases and development of multimedia applications. Thus when I use the phrase: "which roles and tools characterise the development and use…" in question 1, I will investigate the roles and tools, which can be identified on the basis of these literature reviews and the experience in the BUSINES-LINC project. Also the phrase implies that the research will focus on those roles and tools, which are unique or characteristic for the development of multimedia teaching cases. I.e. I investigate the use situations roles and tools, to improve the characteristics of the roles and

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[19] Case based teaching is just one approach to teaching, similar to lecturing (by use of theory and models presented in an oral presentation by the instructor). When I state that I do not have the intention to evaluate the case-teaching paradigm, this mean I will not go into any consideration of whether this is an appropriate approach for learning, and if it is a more or less appropriate approach to teaching than others.

tools in the development dimension, and I only focus on those roles and tools, which have a significant influence on the outcome.

For example tools used for financial budgeting, which aim at reaching a cost-effective product, should be considered in any system development project. In multimedia development this is a particularly interesting aspect because of the cost of media production. If a high degree of professional media (sound, video, graphic etc.) is preferred, the people managing the development process should consider, if this decision is cost effective or not. However, my data analysis showed that multimedia teaching cases development does not on this point deviate from other multimedia projects in this respect (discussed in 8.2.4). Such issues will therefore be mentioned, but only to an extent necessary to understand, that such constrains are present.

Question 2 suggests further research into the possible ways of applying the roles and tools by identifying and exploring the supporting and restraining elements. E.g. in the investigation of a tool, I will assess factors, which enhances this tools usability and transferability. The research thus takes on a very practical or operational perspective, but discussing both positive and negative effects, not just the application.[20]

There are models for multimedia systems and for teaching case development. Question 3 investigates the development model for multimedia teaching cases. Issues I deal with are, how can the model or development process be presented and which phases are present. When using a development model, it is possible to understand the internal and cross relations between roles and tools in both use and development.

Figure 2.2 below summarises the three research questions into keywords (where references to the research question are given after each keyword). The figurer also shows that the investigation of the three questions results in a set of roles and tools.

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[20] During research in literature describing development processes on how to write paper-based teaching cases within business education, I found that they were not as practical and operational, as I would have wanted. Sometimes examples were shown, but discussions on how to consider the various consequences of different decisions, depending on the setting they were applied in were often left out (see for example Heath 1998).
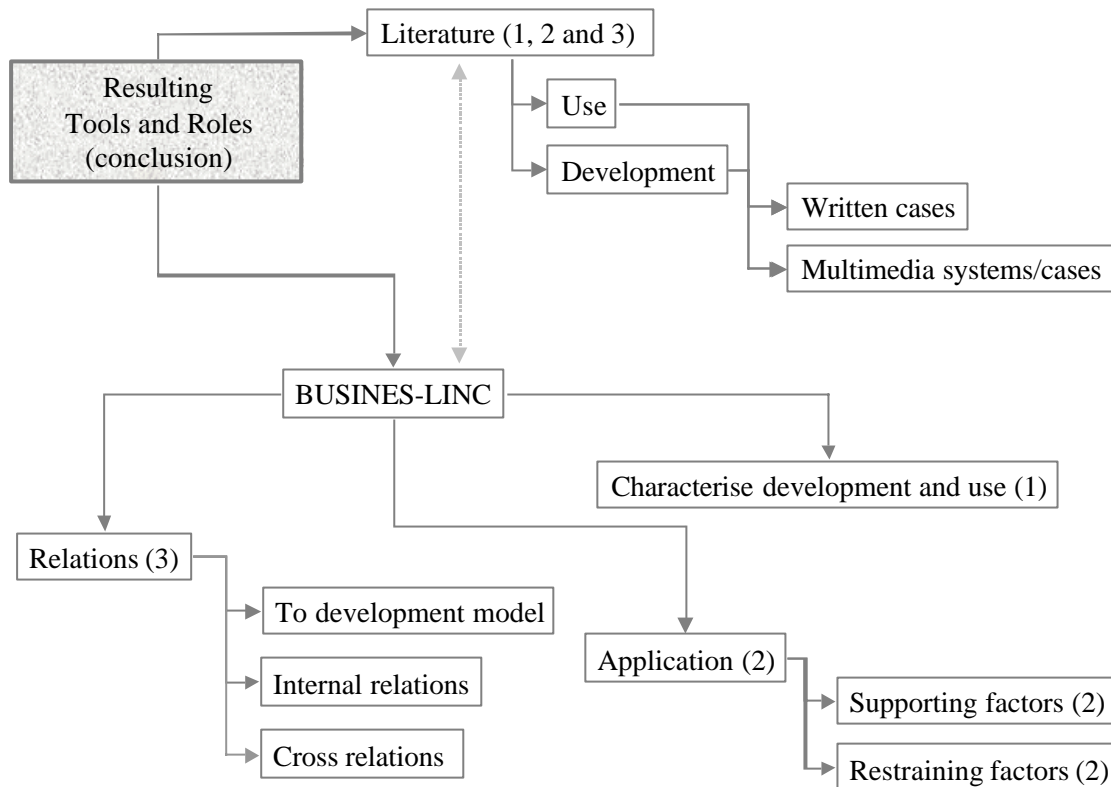
Figure 2.2 - Overview of research questions - keywords

2.4. METHODOLOGICAL OVERVIEW

The objective of this section is to introduce the methodological standpoint, forming the foundation of my research, and name some of the methods, which have been applied throughout the Ph.D. project. This section also seeks to give the first arguments, for why these were the right and valid methods to apply. The choices of methods are based on the novelty of the area being investigated, which made the following perspectives preferable to me:

- A grounded action research programme with the BUSINES-LINC project, in conjunction with
- Video analysis, observations and questionnaires of the use situations using
- A hermeneutic perspective for interpretations and
- An explorative integrative research design.

As BUSINES-LINC was one of the first initiatives, where 18 multimedia teaching cases were developed by the same partners within the same project, it represented an eminent opportunity to experience and analyse the unfolding development process. Due to this being a relatively unknown territory, it has been essential for me to be part of that

process; to get a "feel" for the process; to relate research in adjacent areas of literature and practices to our process; to have a possibility of discussing experiences with peers (in BUSINES-LINC); and to try out new initiatives based on our "new-born" understanding.

Undertaking an action research programme (Pries-Heje and Baskerville 1999, Susman and Evered 1978, Argyris, Putman and Smith 1985) is a method, which prioritise the study of (historical) context in the development process, through the researchers first hand impression. I used the grounded and participatory action research forms. In particular a grounded action research programme utilises the rigour in grounded research (of coding an analysing data) to especially generate theory from an action research project, Pries-Heje and Baskerville 1999.[21]

Action research and qualitative ethnographic methods such as observation, interviews, video analysis, and narratives into play, seems to be an appropriate research strategy. It makes more sense to me to qualitatively investigate what happens, when the cases are used and discussed, how the different use roles and tools influence the teaching strategies in various ways, than trying to count the number of ways a case is used in a class situation, or the number of students having this or that attitude towards a case.

I have a hermeneutic and to some extent a phenomenological view to systems development and research (as so adequately described in Winograd and Flores 1986). One of the consequences is that the overall research approach has been an explorative process. The research design and knowledge about the domain in the dissertation were developed in an iterative process. An iterative process of acquiring literature from the main related areas (as mentioned in the previous sections), then getting empirical data and trying to understand, which issues affect this new domain of multimedia teaching cases then returning to literature for further insights into the field etc. However, this was accomplished as parallel processes, so there were no distinct phases of either literature or empirical work (Maaløe 1996).

This explorative integrative process (so named by Miles and Huberman 1994) is what for example the new or supplemental versions of grounded theory contains, as described in Strauss and Corbin, 2nd edition, 1998. Barney Glaser and Anselm Strauss are the two authors known for being the first to describe grounded theory. In their first work theory was created almost entirely from empirical analyses, with no reference to known theories within the unit of analysis (Glaser and Strauss 1967). However this "strictly" applied concept was in 1998 abandoned by Strauss to some extent. Juliet Corbin and Anselm Strauss regard existing theories and literature as an important and even necessary source, when creating the basis for collecting, categorising, coding and making interpretations, which lead to generation of new theories and models (Strauss and Corbin 1998).

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[21] In the presentation of my research design, I will clarify the nature of grounded and participatory action research (in 5)

2.5.   RESEARCH CONTRIBUTION (WHAT AND FOR WHOM)

I believe that the results of the dissertation can be of interest to an audience from both an academic and an applied field. This section briefly discusses these two groups of audiences.

In an applied sense, multimedia teaching case developers can make use of the results of the dissertation, when seeing this as a recommended set of development and use roles and tools. Often the development is initiated by a (senior) researcher at a research institution or an employee from an educational resource centre / learning lab.[22] For such a target group the dissertation supply:[23]

- List of the roles and tools, including descriptions on how to apply them in operational terms,
- Experiences including supporting and restraining factors,
- A discussion on how the phases of a development model can be presented, as well as how the roles and tools are related to these phases and to each other.

It is likely that the majority of teaching cases will be developed at business schools and universities also in the future, be it multimedia or paper-based cases. Consequently, the main group of people, which would have interest in the dissertation, would be people (developers and academic) from such institutions. People using and people interested in evaluating multimedia teaching cases and multimedia applications in general is another (but not primary) target group. Furthermore, it is likely that private companies might consider developing their own teaching cases for in-house training programmes. They may very well see this research as helpful in their projects.

For an academic audience interested in researching this field, the results are some of the first in a seemingly expanding area, and may as such be helpful for gaining insight into the field of multimedia teaching cases. Another value to academics is to use the results as a resource for setting up similar research projects. This is possible, as it contains considerations about and suggestions of how to analyse and evaluate the development process and use situations of multimedia teaching cases (and also when analysing multi- and hypermedia material in general). The dissertation thus provides a practical view, but also contributes to the methods for which multimedia teaching case development and use can be studied.

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[22] For example at the Copenhagen Business School, where I currently resides, researchers from departments or institutions at times write their own cases, but at the learning lab they have also developed very large multimedia company descriptions, which they call case material (Microtonic 1996/8 and Copenhagen Airport 1997).

[23] For a quick overview of the actual results of the dissertation, read the summary of the dissertation.

2.6. STRUCTURE IN DIMENSIONS

The dissertation is structured around nine dimensions. This section will introduce these dimensions and give an overview of where to find the answers to the various research questions.

The different areas of the dissertation can be seen as dimensions. The dimensions do not prioritise a chronological relationship. Thus the chapters should not only be seen as a progressive linear process, but can also be understood as parallel views on the same issue. The issue of multimedia teaching cases, as seen through different lenses.

In general, the research had a large data-set to draw upon and there was a high degree of non-linear material represented in my Ph.D. project, such as the multimedia teaching cases, video and sound interviews, reports from the qualitative software analysis package ATLAS.ti etc. I have tried to represent this data in a manner true to the material and the "stories" behind. For example, by describing the multimedia teaching cases in the first chapter, to give a sense of what the research area is about, and by providing quotes from members in the BUSINES-LINC project, when describing our experiences with the roles and tools. Also, the dimensions are provided in a sequence, which allow the data material to stand out and not be overcome or overshadowed by references and discussions on existing theory. Therefor the dissertation is divided into three parts:

- The first concentrate on methodological considerations, research design and theoretical models in the area.
- The second draw primarily on the data material and
- The third summarises, concludes and looks into the future.

The nine dimensions are illustrated in Figure 2.3, giving a structural overview including the three parts of the dissertation. Table 2.1 provides an elaborated presentation of the content of each dimension, including references to chapters and research questions.

1	Multimedia teaching cases - three examples

2	Introduction

Part 1

3 Analytical Dimension	4 Domain Dimension	5 Method Dimension

Part 2

6 Process Dimension

7 Model Dimension	8 Development Dimension	9 Use Dimension

Part 3

10 Resulting Dimension

11 Future Dimension
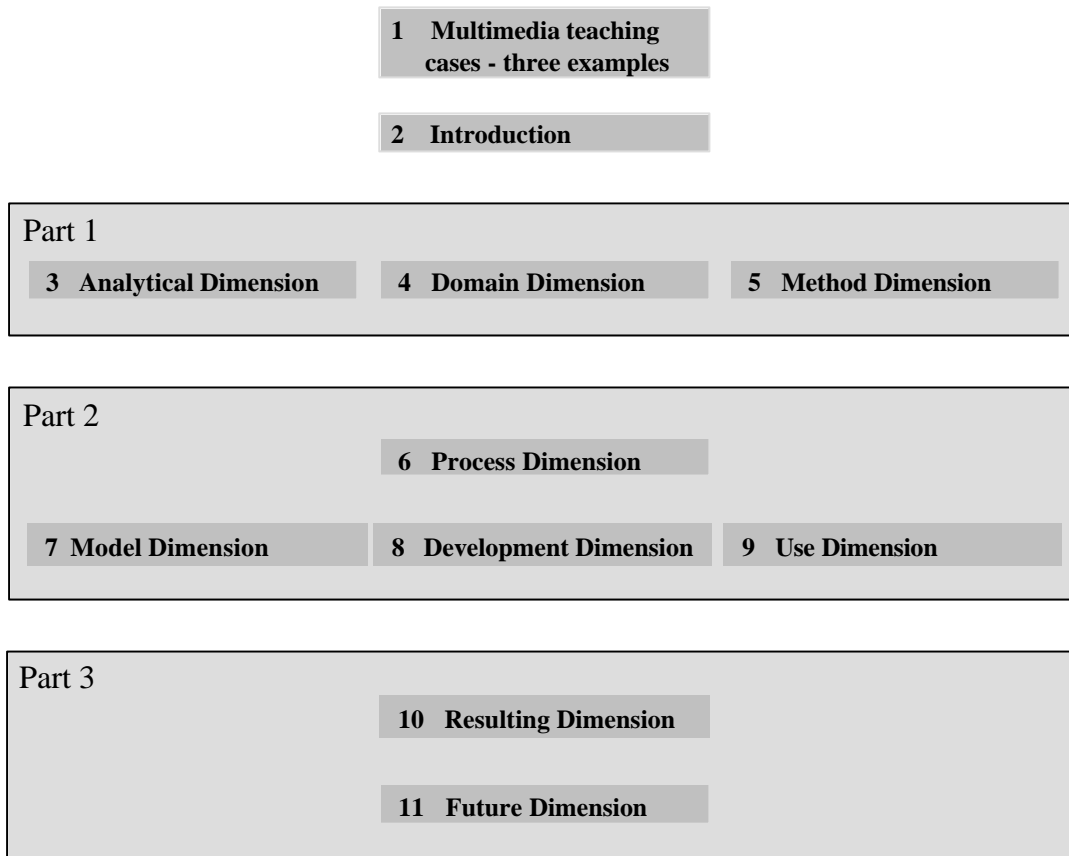
Figure 2.3 - Structure of dissertation

Analytical Dimension - Chapter 3	Discusses the level and unit of analysis of the dissertation by further investigating the use and development relations, by applying a human computer interaction perspective. - This chapter is not directly related to a specific research question, but supplies an analytical perspective to all questions and the use - development relation.
Domain Dimension - Chapter 4	Frames the research area by discussing literature and current practice within case teaching and multimedia development (with written and multimedia teaching cases). - Related to research question number one (1)
Method Dimension - Chapter 5	Describes choice of methods and investigates research design, procedures for collecting and analysing data as well as argumentation for validity and verification of the results. - Again a dimension, which is related to all questions and how they were researched.
Process Dimension - Chapter 6	Outlines the different types of data, which has been collected: what, where, and when - This chapter is provided to present an overview of the material collected, and is not directly related to the research questions, but are seen as an introduction to the two following chapters.
Model Dimension - Chapter 7	Contains analysis and interpretation of the empirical material from the BUSINES-LINC project, focusing on the phases of a development model - Related to research question number two (2) and three (3)
Development Dimension - Chapter 8	Contains the analysis and interpretation of the empirical material from the BUSINES-LINC project, focusing on the roles and tools in the development of multimedia teaching cases. - Related to research question number two (2) and three (3)
Use Dimension - Chapter 9	Contains the analysis and interpretation of the empirical material from use situations, from which characteristic roles and tools are derived. - Related to research question number two (2) and three (3)
Resulting Dimension - Chapter 10	Concluding chapter showing the results of the dissertation, as a summary of the investigated roles and tools, also including their relations internally and to the development model. - Related to all three research questions, (1, 2 and 3)
Future Dimension - Chapter 11	Discusses future possibilities for research in this area and in particular looks at the practical implications of the research. - Not related to any of the research questions specifically, but rather to "new" questions.

Table 2.1 - Dimensions in the dissertation

PART 2

3. ANALYTICAL DIMENSION

When researching development of multimedia teaching cases, it took some time to understand, which were the elements necessary to investigate. For example, when I wanted to evaluate the user interface of these cases, it entailed investigation of the individual use situation. In such instances it was vital to look into issues like: was the teaching case intuitively understood, motivating to use etc. Though, as the purpose of the investigated cases were to motivate and enable students to discuss the content in a class situation, it is not only the individual use, which should be considered; but also the case ability to enhance the discussions they would have in class.[24]

The purpose of this small chapter is to further clarify the focus of the dissertation, the elements necessary (the unit and level of the analysis), by primarily investigating the use and development relations, by applying a human computer interaction (HCI) perspective.

3.1. DEVELOPMENT AND USE - INTERACTING WITH THE INTERFACE

As the opening example of this chapter illustrates, it was necessary to contemplate both an individual level of the use situation and the overall class discussions. Because no sustainable knowledge about multimedia cases were available, it was not possible to only concentrate on one stream. The results of cases, which were only contemplating the individual use, may not be appropriate, when investigating the whole teaching situation. Similarly, the development dimension was investigated throughout the process, and I found the elements and perspectives, which should be in focus by relating to interaction with the interface.

This section discusses different perspectives to interfaces to show the establishment of elements of use and development, which the research has included. The investigation begins by clarifying and comparing a few existing ways of levelling approaches, which are merged to form a four interaction forms with the interface of multimedia teaching case development and use.

Development and Use

There is a need for levelling an interface discussion in a rather structured way, when using it for this objective on getting clear on the level of the analysis. This becomes obvious, when researchers and developers use expressions like "high level" and "low level" interface, without any prior reference to what a high or low level consist of, or at best only very vague indications. An example could be within the same research conference. A conference will to some extend imply that people have a common ground, namely the tradition and historical records of publications to that conference.

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[24] The issue of teaching strategies will be further discussed, especially in chapter 4 and 9.

In the WebNet conference of 1999, some authors referred to a high-level interface, as "hiding" the programming features of a web-system for the users, to make it easier to use. (See e.g. Broll and Prinz 1999, Pilgrim and Leung 1999). On the other end of the axis, a low-level interface for some implied an interface, where the user had access to the raw information (Hughes et al. 1999). And others saw these levels as regarding the analysis of the (user) interface. I.e. they defined high-level interface analysis as focusing on the content segments of the program and Karagiannidis and Tarabanis 1999, identified the icons and menus as low level. Whereas Chen and Forsyth 1999, defined high-level analysis as focusing on the social interaction. So it was not quite clear what exactly a high-level or low-level interface consist of. This could be the reason why some authors chose to write the words "high and low level" surrounded with quotation marks. And maybe even other levels could be identified.

Where the WebNet conference papers from above looked at the interaction with the interface from a use perspective, RMM[25] has a view that considers development of the structures, which support and make up the interface. Here, these three levels are used:

- Presentation,
- Logical and
- Storage.

The presentation level comprises the appearance of a system on the screen (as well as the sound, if such is included). The logical level presents the structures of a system, e.g. a mapping of content, menus and the internal representation of this, inside the system. The storage level includes a description of the physical media organisation, by referring to, which type of software programmes is used (a database or HTML environment etc.) (Isakowitz, Kamis and Koufaris 1998). Unfortunately such a levelling does not deal with the contextual level of the interface, the level, which surrounds the use situation. It only leaves room for that, which is presented on the screen. Generally speaking, this is a system approach, which does not leave much room for a user-perspective, but which shows the importance of (content) representation of the interface in hyper- (and multi-) media systems.

The ACM[26] organisation formulates regularly a computing curricular. These are curricular for computer science, defining subjects and courses, which they recommend within a certain area, including human computer interaction (The joint task force on computing curricula 2001). Back in 1992 a number of people from the ACM SIGCHI[27] group began to define a curriculum for HCI on a much more detailed level, than what had been seen in the general computing curricula. This was done not only to generate a coherent studying programme, but also to form a foundation for a common understanding of the HCI field. The detailed HCI curriculum was again updated in 1996 (Hewett et al.

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[25] Relationship Management Methodology for hypermedia design.
[26] Association for Computing Machinery – see http://www.acm.org
[27] Special Interest Group (SIG) on Computer Human Interaction (CHI) (see http://sigchi.org). The term CHI vs. HCI is merely a phonetic difference, since the abbreviation SIGCHI can be seen as a word, which can be pronounced. However, I could of course claim that there is a signal value in choosing the human or the computer as a starting point.

1996). In this curriculum another type of graduation of the interface appears, through five interrelated aspects. The five aspects are (Hewett et al. 1996.):

- The nature of human computer interaction,
- The use and context of computers,
- Human characteristics,
- Computer system and interface architecture and
- The development process.

According to the ACM SIGCHI team all aspects are connected: "*in a relationship of mutual, reciprocal influence whereby choices made in one area impact upon the choices and the options available in the others*" (Hewett et al. 1996, p. 13). The ACM SIGCHI perspective allows for both use and development to influence each other, but does not provide a way of determining the perspective in detailed levels.

Interaction with the Interface

This is achieved by adding an elaborated version of a terminology found in Nielsen, J., Christiansen, Blincoe 1997. The elaborated terminology uses four concepts, where (Orngreen 2001)[28]:

Over the interface → means looking at the context or the surroundings of the use situation and how to support this in the design of the case.

On the interface → is an investigation of the communication and interaction happening in the actual use situation (on the surface of the interface) and how to develop this.

In the interface → is a way of focusing on the different media elements and their relation and how to develop this.

Under the interface → is studying how the programming structure of the interface effects the use situation and how to support the development of this.

I have used the ACM SIGCHI use and development relations, where I have combined it with the four levels to identify my perspective. This becomes four forms of interaction with the interface and it can be used to see how the supervision of roles and tools, should support the development of this interaction with the interface. The elements and perspective applied in the dissertation is seen in Figure 3.1.

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[28] The work with this terminology was initiated when the HCI group at the Copenhagen Business school developed their first homepage. Here Janni Nielsen – a senior researcher in the group – referred to a project application for a research programme. In this application was written: "*The perspectives may be described as: Above the interface: This perspective is mainly theoretical and methodological. On the interface: This perspective is characterized by aesthetic and graphical design of applications for the Agora. In the interface: This perspective includes work on how we design the interface ensuring a consistency with the underlying model of our application area and logical and physical representation of this.*" Nielsen, J., Christiansen, Blincoe (1997), p. 6. However, these perspectives seem to have both a theoretical and representational foundation that we were not looking for and a revised version became: "*The research interest of the HCI* [Human Computer Interaction] *group is theoretical-methodological and experimental work with design of interfaces. … Where the psychological processes focus <u>above</u> the interface, computer design embodies two other perspectives. <u>On</u> the interface is concerned with the visual aesthetic design as it is presented on the interface. <u>In</u> the interface is concerned with the functional aspects, the structure and the form of notation.*" (Nielsen et al. 1999). Through further revisions and discussions with colleagues (as described in Orngreen 2001), my elaborated version came about. The work of the rest of this section is based on this paper, where a more elaborated version of the four levels of the interface is found, see: Orngreen, R. (2001) "Framing the Interface - Determining the Level of the Interface", from the *WebNet 2001 conference proceedings* (World Conference on the WWW and Internet), Orlando, Florida, USA, October 23-27, 2001, pp. 957-958.

I found that it was necessary to investigate all these areas of the development and use dimension, as formulated into to the three research questions (see 2.3). This was because the knowledge about multimedia teaching cases were so vague that it was not possible to make liable assumptions about one area of use or development and then exclude it from the investigation. For example it was not possible to only look at how to design the elements of the interaction strategies, and just rely on assumptions about how the interaction form are used and what they communicate to the user.

The perspective utilised has been on the supporting roles and tools, not the actual task. For example, when I investigated the facets of the program under the interface, it was not the programming, which interested me as a researcher. It was to find the roles and tools needed for the developer to perform the programming - not the task of programming. Likewise: the task of teaching with cases was investigated, by looking at different teaching strategies, but the purpose was to find tools that support the teacher.

The development elements presented may at first look very similar to traditional system models, as when applying analytical, design etc. phases or requirements to a multimedia development project. It is however not a relationship of time, which is illustrated, in this figure. E.g. the decisions regarding program platform have to be contemplated prior to the actual development of the media elements. Also, overall interaction strategies and content design needs to be found at the same time as final teaching strategies are developed. The figure merely shows the perception of use and development that I have applied to the research questions, by focusing on HCI perspectives. (Figure 3.1).

To investigate:	Roles that participate and tools that supports when:
over	applying the case teaching strategies framing the context (U) developing the case to support use of these teaching strategies (D)
on	communicating and understanding the case story (U) designing interaction strategies, plus overall content and narrative story (D)
in	using and analysing the detailed media elements and their relation (U) developing the detailed design of the content, structure, navigation etc. (D)
under	working with the case technical features (platform, plugins etc.) (U) developing the program structure of the case (D)

(left axis label: Interacting with the interface)

(U) = use   (D) = development

Figure 3.1 - Researched perspective: interaction with the interface

3.2. APPLYING AN HCI PERSPECTIVE TO DEVELOPMENT

Contemplating both a user and developmental view within the development process is not new or innovating at all, though the Scandinavian development tradition is remarkable.

It contemplates a dialog between the developers and users. Today this perspective of participatory and dialog design, as found in the HCI field, seems to be more universally acknowledged (on a "world" and not just a Scandinavian fad). (Dirckinck-Holmfeld, Nielsen, J. and Danielsen 2000, Greenbaum and Kyng 1991, Schuler and Namioka 1993.)

Research within HCI emerged from the observation that many computer systems were difficult to use. As a consequence basic research areas, especially cognitive psychology, were used in the 1980'ies to model and disseminate design criteria's. According to Yvonne Rogers, parts of the HCI field today are changing in a direction towards a more tool and technique oriented level (Rogers 2001). That is, tools which can be applied within system development. One example is found within interaction design (Preece, Rogers and Sharp 2002). Rogers says about interaction design: "*Interaction design is also increasingly being banded about in place of human-computer interaction, as a way of focusing more on what is being done (i.e. designing interactions) rather than the components it is being done to (i.e. the computer, the human).*" (Rogers 2001, p. 3.) It is with this focus, the result of my research has to be seen. It is mounted within a system development setting, but applying a HCI perspective.

One concept, the concept of "design", might cause confusion, due to this twofold focus on software development considering HCI issues. The confusion arises because design means something different in the two dimensions: design as a process or as a product. In a development process (the concept of) a design process or a design phase has the same connotation as an analysis phase and programming phase. Whereas the use dimension, a product (a system, which have been developed) can be said to have a certain design. Just like when we refer to furniture with the words "I like the design of that chair". Hereby we seldom agree to the process of making the chair, but rather the appearance (how it looks and functions). Bo Fibiger related this to the difference between "to design" and "a design", the verb and the noun (Fibiger 1997).[29] This difference may seem quite simple, and not worth "wasting" so much time on as done here. However, this is where I have found that researchers and practitioners within software development and human computer interaction misunderstand each other, even quite a bit, since they each adapt their own version of the term.

3.3. CONCLUSION

Interaction with the interface was what connected the use and development dimensions in teaching case development, because content, narrative and navigation influenced the interface design and thus the interaction forms. I.e. different ways of developing content material and narrate a case story influenced interaction and navigational strategies as well as the relation between content and the structure of the system.[30] Also, ways of using the cases, according to the teaching case paradigm influenced, which type content and narrative were designed in the cases. It is a dual relation.

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[29] Translation of the two Danish terms, "at designe" and "et design".
[30] This relation was particular researched in the early 90'ies, as the "era" of hypermedia systems began (as opposed to earlier hypertext systems). See for example Chua 1991, Laurel, Oren and Don 1992 and Nielsen 1990.

Four forms of interactions with the interface were used to find the perspective within the dissertation. It was found that the research should focus on supporting all forms of interactions, and apply a communicative and HCI perspective to development and use. I.e. the roles and tools, which support and restrain the development and use process, rather than only focusing on the tasks or phases necessary. These perspectives are all reflected in the research questions (see 2.3).

4. DOMAIN DIMENSION

The objective of this chapter is to investigate and discuss current literature and practice within the four main areas constituting the field of multimedia teaching cases. That is, I will investigate written and multimedia teaching cases from a use and development perspective, as illustrated in Figure 4.1.

The area of teaching cases from a use perspective, will be researched by primarily addressing case-based teaching in business education (in 4.1), including teaching with multimedia applications, where advantages and disadvantages of going from a paper-based to a multimedia teaching case are investigated. Multimedia teaching case development will also take its offset in the more traditional teaching case development approaches of written teaching cases, hereafter the area of multimedia system development is investigated in some detail (in 4.2). Finally, a conclusion to the whole chapter is given, investigating multimedia teaching case development contemplating use (in 4.3). (See Figure 4.1)

	Written Teaching cases	Multimedia systems
Use	- Teaching cases in business education - Teaching case paradigm	- Multimedia teaching cases (multimedia experiences applied to teaching cases)
Development	- Writing teaching cases for business education	- Multimedia roles and tools - Software and multimedia development

⟶ Multimedia teaching case development contemplating use

Figure 4.1– Four areas of literature and practice.

4.1. USE OF TEACHING CASES

The objective of this section is to provide a thorough description of the traditional (paper-based) teaching cases, and begin the first discussions on how such a tradition can be "transferred" to a multimedia setting. The first section (4.1.1) describes teaching cases as they are used in business, and discusses teaching strategies used. The following section (4.1.2), investigates the paradigmatic assumptions behind case-based teaching. It also looks briefly at other areas, where teaching cases are used and related teaching approaches (for inspirational purposes). Then in 4.1.3 I define the term multimedia teaching case in details, and finally a discussion looks at advantages and disadvantages of multimedia teaching

cases, when comparing theory and practice within the two areas teaching cases and teaching with multimedia.

To give an impression of the teaching case area and its influence on business education, the following subjects will be discussed:

- Diffusion of Teaching Cases,
- Overall Teaching Objectives,
- Elements in a Teaching Case and
- A Typical Teaching Scenario

Diffusion of Teaching Cases

As mentioned earlier cases were introduced to business education already in 1910 at the Harvard Business School (Leenders and Erskine 1989). To give an idea of how much the method is used today, Table 4.1 lists the number of cases, which can be found on three of the largest databases containing cases for on-line purchase. The largest single case publisher is the Harvard Business School Publishing (USA), and the second largest the Richard Ivey School of Business (Canada), HBSP 2002, IVEY 2002. These are also the schools at which much quoted authors within case methodology reside, such as Louis Barnes, Roland Christensen and Abby Hansen from Harvard and James Erskine, Michiel Leenders and Louise Maufette-Leenders from Richard Ivey. The European Case Clearing House acts as a distributor for several publishers as well as individual universities and business schools and is the largest teaching case clearinghouse in the world. Their database COLIS provides access to over 16.000 case titles in total, including the two other schools mentioned in the table - that is 6.400 excluding the two schools. (Table 4.1).

Name	Origin of database	Number of cases listed
HBPS	Harvard Business School Publishing, at the Harvard University, USA (HBSP 2002)	~7.500 cases in April 2002
IVEY	Richard Ivey School of Business, at the University of Western Ontario, Canada (IVEY 2002)	~2.100 cases in April 2002
COLIS	The European Case Clearing House (resides at Cranfield University, UK)	~16.000 cases in April 2002 ~ 6.400 (- HBPS & -IVEY)

Table 4.1 - Number of teaching cases published

When looking at multimedia teaching case titles available from these three databases, it becomes clear that it is an expanding area. However, there are still only few multimedia cases compared to the total number of cases. In the beginning of 1998, when I began the BUSINES-LINC project, only a couple of multimedia teaching cases were available, and they were difficult to find. Now both Harvard Business School Publishing and the European Case Clearing House have different "themes" in their case collections (denoting

space and a menu for individual promotion of multimedia and Internet cases). At that time (1998) it was not possible to find any digital cases in the COLIS collection, but now (April 2002) 30 items are found – excluding the IVEY and HBSP cases. It is however noteworthy that from these 30 items, 17 are from the E-case series. The E-case series is the name of the cases from the BUSINES project[31]. (HBSP 2002 and COLIS 2002)

It is not only the number of teaching cases, which indicates increased use of cases; also the teaching case method is mentioned in the curricula and pedagogical strategies for many a business school and faculty. For example at the Copenhagen Business School (CBS) where I reside, the Pedagogical Service Unit (now known as the Learning Lab) has written a pedagogical report / white paper, named "A distinct CBS pedagogic – a discussion paper". This paper includes many references to the characteristic use of teaching cases and case-based teaching (CBS - Pedagogical Service Unit 1998a). Similar, the approved principles for the CBS-pedagogic state that: "*We attach great importance to case-teaching in all educations*". (CBS - Pedagogical Service Unit 1998b, p. 2)

Overall Teaching Objectives

The teaching case typically contains a description of an existing company or of smaller segments like a single department, as well as processes used or decisions taken in the company. These descriptions are read and analysed by students and are intended as starting point to discussions at class sessions. At times the case also covers larger areas like a whole industry. The primary characteristic is that the case is based on real events. Very often the case descriptions follows a decision-making situation, where the problems and opportunities of the company are illustrated (Mauffette-Leenders, Erskine, and Leenders 1997). According to Heather Hazard the case should be structured in a way that: "*engage the imagination of the participants, and it [the case] must contain many possible directions and solutions so as to generate strong debate from which everyone can learn.*" (Hazard 2000, p.6.)

In other words, according to these authors, the cases may contain solutions to some problems the company have faced during a period of time, but should always make the students consider the issues, which the company is currently facing. Issues to which no correct answer exists; a sort of open-ended teaching case.

There is not much difference in the overall objective and format of teaching cases depending on the type of topics they are used for. Cases are used primarily for "softer issues" within a strategic and managerial nature. It can be used in a large number of topics or courses, like accounting, manufacturing, administration etc. (Erskine, Leenders, Maufette-Leenders 1998). The objective is to improve the students' situational analysis skills (Hagel et al 1996). However, it is also possible to teach more "hard or technical issues". E.g. when a case cannot be analysed without prior calculations, using a specific technique or model (Ip 2001, Heath 1997).

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[31] "Only" 17 cases of the 18 developed are currently available from the database, as one partner experienced difficulties in delivering the all three cases (which each partner were responsible for delivering) due to technicalities unknown to me.

Elements in a Teaching Case

A teaching case consists of two parts. The actual case description, which is handed out to the students, and then the (so-called) teaching notes, which is support material for the instructor using the case in a class. The teaching case is typically between 8-16 pages long and may contain:[32]

- Introduction
- Case role and/or plot
- General facts about the company
- Case story or problem area
- Suggestions to solutions
- Exhibits
- Driving questions
- Teaching notes
- Case series

Introduction → Contains an overview of the case content and/or the case role

Case role[33] and/or plot → Some cases uses a kind of role-play situation, where the student plays a role of an employee in the company, a consultant or similar – as in the LEGO and Rockwool cases in 1.1 and 1.3. This information will typically appear early in the case, and the rest of the case will then have a format, where it is written in direct first hand language. Otherwise a more indirect third person language is used – as in the ALKA case in 1.2.

General company facts → Depending on the teaching objective, a case contains different kind of general company information. This could be quantitative data like the number of employees, solvency status, volume in production etc., or more qualitative, strategic information like organisational structures, if this is relevant for the case. An additional perspective could be details about the surroundings of the company, like market information, competitors, government regulations or similar, whatever information necessary to discuss the case on a relatively realistic level. A rather short case, i.e. 8-10 pages, do not leave a lot of room for additional facts, and so the amount of company information has to be limited, but should still give a picture of the organisation presented, to ensure that realistic solutions to the problems presented can be discussed.

The case story or problem area → An important goal of the case story is to let the students feel they own the problems or opportunities presented. This helps the motivation and enhances the involvement necessary for a productive discussion. A case story is developed by using two elements: real-world examples and narratives.[34] Often the real-world example is described as an urgent problem, which needs immediately attention. The cases that use a case role will typically place the problems or opportunities on "the shoulders" of the roles

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[32] The following bulleted list is one that I have produced after reading a large number of cases, many from the COLIS database (COLIS 2002) and from reviewing the literature on business cases as referred to in this chapter.

[33] The term "case role" is one that I have created, in order to have an easy usable term, as compared to Leenders and Erskine 1989, who uses the term "*the point of view of the decision maker*".

[34] The area of narratives in teaching cases will be investigated in more detail later, during the paradigm discussions.

given to the students. It is interesting to note, that during my reviews I found that in many of the cases presenting a failure (i.e. a business idea that did not work or similar) the case supplier were often disguised in some way or other. A case can be disguised in many ways, for example by changing the name of the company, its size, profit, volume produced, and its location.

Suggestions to solutions → The majority of especially North American / Canadian cases are open-ended cases, but there are cases, which presents the solution the company chose to the problem. Others include suggestions to different solutions, to get the students started in a discussion, where they may evaluate the benefits and costs of each.

Exhibits → Using exhibits can be a source of more case specific facts, but may also serve a guiding purpose. I have seen cases where for example a flow diagram in an appendix to the case had such a character that it was easier to see, what were the core issues at stake, than from the actual case description. (Whether this was the explicit intention or not, I do not know.)

Driving questions → Other ways of guiding the students in the discussion is by use of so called driving questions. Driving questions are given to the students either by the teacher / instructor, when handing out the case, or they are often written into the case itself. The questions are formulated according to the teaching objectives of the case (or class), to ensure that the students prepare and analyse the subjects, which are seen as important. (Thus the name *driving* questions.)

Teaching Notes → There are many different types of teaching notes. Some are short and serve only as an appetiser for the instructor, with indication on how the case can be used, and in which classes (subjects and target groups). Others are more in depth descriptions, containing outlines of argumentation and discussions, which the instructor may try to initiate during class They may contain additional case information, most probably even information about the actions taken by the company in order to solve the presented problems.

Case series → A relatively new phenomenon is teaching case series. A case series is a group of cases, which were developed with the same perspective in mind. A case series could be different teaching cases about the same company, but more predominantly (and perhaps usable) are a case series, which consist of different cases based on different companies, but within the same area. The 18 BUSINES-LINC cases are seen as a case series, as they relate to e-commerce and in particular innovative solutions within e-commerce and they are developed using the same models and theories, when data was collected and analysed.

According to a model by Leenders and Erskine 1989, the difference between the cases presenting (or including) a solution and the open-ended ones is a sign of different levels of difficulty. In their model, named The Case Difficulty Cube, it is suggested that cases containing little or no information about possible solutions to the presented problems are

the most difficult ones to use. Table 4.2 presents the model and the three dimensions, the analytical, the conceptual, and the presentation dimension. Each consisting of three levels, making a set of nine different types of cases. The three dimensions are defined as:

The analytical dimension → relates to the presence of a solution. 1. A problem and its solution are given. (The easiest type of case according to Leenders and Erskine 1989, where alternatives may be considered in the discussion) 2. Only a problem is presented. 3. Through analysis both the problems and possible solutions have to be fund by the student.

The conceptual dimension → looks at how difficult the case is to prepare for a group (class) of students. 1. Everyone understands the concept. 2. The content will require further clarification through class discussion. 3. Extensive clarification and instructor involvement is necessary.

The presentation dimension → is based on how much information is given and how clearly it is presented. 1 Only little extraneous material, and data is presented neatly. 2. Average amount of information, some extraneous material. 3. Large amount of extraneous material, and a less organised case.

The Case Difficulty Cube is cited in all three books of Erskine, Leenders and Maufette-Leenders (the learning with, writing and teaching with teaching cases books)[35], but is also referred to by other authors (for example Szpiro and Neufeld 1996). There are clearly advantages in using the framework, when wanting to decide the type of case to develop or use. But the necessity to divide into such details, is not easy to see, as it becomes very difficult to determine if a case is a 1,2,3 in each of the three dimensions or a 2,2,3. Also, when comparing for example the BUSINES-LINC cases from the first chapter with the analytical dimension they are both 1 and 3 type of cases, since they do provide the solution to some of the problems discussed, but also leaves other areas open.

The authors present the difficulty cube, so that a difficult case with 3's in all three areas, is seen as a positive thing. Such a teaching case would be the most difficult to prepare and use, and one which can be used at higher levels of education (Leenders and Erskine 1989). But is it a good thing that a case is difficult to use and get an overview of? (I will look more into this issue in 4.1.2 and 4.1.3).

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[35] Mauffette-Leenders, Erskine and Leenders 1997; Leenders and Erskine 1989; and Erskine, Leenders, and Maufette-Leenders 1998

CASE DIFFICULTY CUBE

AXIS	DIMENSION	RANGE
X	ANALYTICAL	1 - 3
Y	CONCEPTUAL	1 - 3
Z	PRESENTATION	1 - 3
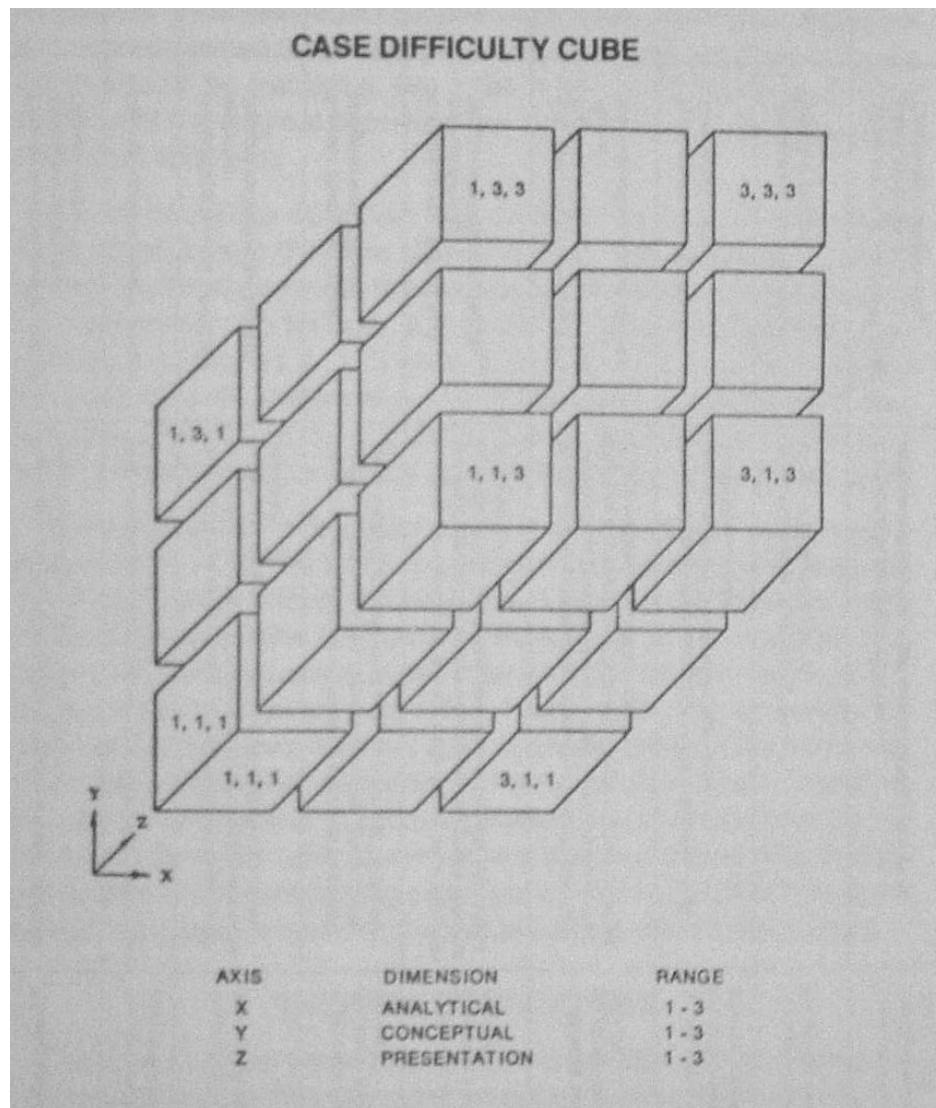
Table 4.2- Case difficulty cube[36]

A Typical Teaching Situation

Often case-based teaching follows this routine: The case is given to students, who prepare it alone. Then the students will meet in smaller groups, and discuss the assignment or driving questions provided in the case or distributed by the instructor. Finally, the students meet in class for a discussion guided or facilitated by the instructor. This teaching situation is sketched in Figure 4.2. It is a typical use situation extracted primarily from Barnes, Christensen and Hansen 1994[37], Erskine, Leenders and Maufette-Leenders 1998 and Heath 1998. By typical I refer to the most frequent or common use of cases, but I would like to add that other use scenarios also are promoted, such as game playing, written assignments etc.

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[36] Re-drawn from Leenders and Erskine 1989, Exhibit 11-5, p. 119.
[37] This book contains a number of testaments, mainly from instructor's experiences with the case method.

Most authors of case-based teaching in business education highly recommend small group discussions as part of the process. However, if the instructor has not planned this activity, i.e. it is not a scheduled event as such, students are more reluctant to actually perform the group discussion. Thus on the figure, this box is only outlined with a dotted line.

The students analysis of the case is sometimes mentioned as iterative: "*an understanding of the big issues invites an analysis of details - then the details may restructure the big issues and invite the analysis of other details. In some cases, getting to the "heart of the matter" will mean just such iteration*" (Bruner 1999, p.5). The case has to be able to support this iterative process. E.g. it should be relatively easy to get an overview of the case, so that the student can easily re-find information he/she want to have access to.

There exist numerous guides referring to the physical surroundings of the classroom. E.g. to the maximum size of the class, how the student should be seated (phasing each other) etc. For example the following format has been suggested at CBS: "*a distinct CBS-pedagogic must imply a principal rule about conducting case-teaching on small teams. In this way the students' learns to master theories and methods in relation to practical problem areas.*" (Pedagogical Service Unit – CBS 1998, p. 5.)
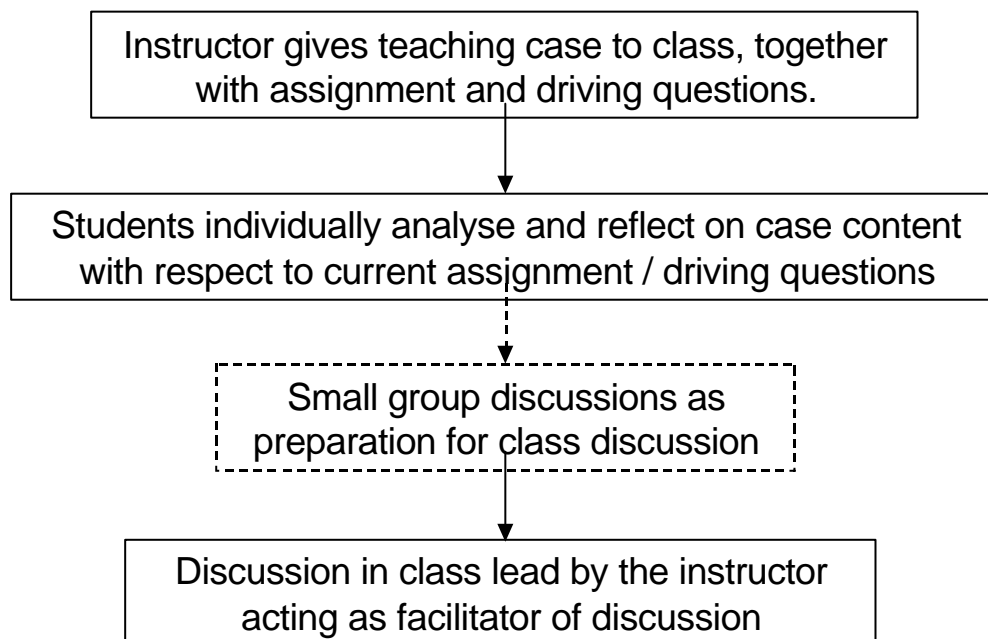
Figure 4.2 - A typical case-based teaching scenario in business education

4.1.2. TEACHING CASE PARADIGM

Since the case-based method is taken for granted in this dissertation (other approaches will not be considered), and the focus is not on evaluating case-based teaching, but rather

on developing multimedia teaching cases, I will not present deep discussion on the appropriateness of this method. However, I believe it is not enough to understand what a teaching case is, (or what it has evolved to be over the years). It is necessary to include the beliefs/assumptions of the case-based method in order to fully appreciate the reasoning behind my analysis and interpretation of the data material. I will briefly investigate the following aspects:

- Constructivism and the Case Method
- Narratives and the Case Method
- Criticism of the Case Method
- Other Areas of Applications
- Similar Teaching Approaches

Constructivism and the Case Method

According to the literature the teaching strategy of case-based teaching is rooted in a constructivist and active teaching approach (Gallagher and Stevensen 1998, Dewey 1994, Duffy and Cunningham 1996, Williams 1992).

As opposed to the cognitive inspired theories, where the underlying assumption is that knowledge can be received in a passive transmission fashion, constructivists does not believe, that delivering content through e.g. an oral presentation implies that the people hearing and seeing this presentation have learned the content. In constructivism, as the word implies, the individual has to build his or hers own meaning of the content, by relating and acting upon the content.

When authors mention that case teaching is an active teaching approach (e.g. Hazard 1999 and 2000, Conway 2001a and b), they often do so by relating it to Kolb's experiential learning cycle. In this cycle, individuals are acting in the world, which gives them a collection of specific experiences. The individual reflects upon these experiences, and this process forms internally subjective interpretations of the happenings. Such interpretations lead to formulation of personal concepts that explain the world, as this individual experience it. Over time these concepts become a mindset and beliefs, which leads the individual to behave and act in certain ways. This will then again lead to new experiences, and so forth, thus making a cycle of actions based on previous experiences. (Kolb 1984)

Though Kolb is addressing experiences, when interacting with the real world (Kolb 1984), the potential of case-based teaching should be similar to the experiential cycle, when the students prepare and discuss the case. That the construction of knowledge is based on the individual analysis of the case content and previous experiences (based on the social, cultural and educational basis of that individual). The real benefit is said to occur in the social interaction between peers about the case in the class discussion. (Hazard 1999 and 2000, Conway 2001a and b.) It is this social interplay, which Duffy and Cunningham identifies as the difference of being a cognitive constructivist or a sociocultural constructivist. I.e. according to the case paradigm construction of knowledge cannot

happen in a vacuum, which is what the so-called cognitive constructivism is criticised of. (Duffy and Cunningham 1996.)

It may seem like a contradiction to emphasise the social aspects of constructivism and situated teaching, when case teaching happens in a classroom. It would be natural if such a claim lead to a conclusion that teaching can only take place in the true context. For example teaching at the work place, in the given situation, which the content applies to. However, the instructors using the case method do not agree with such a statement. Relating to real world examples, discussing the case story and trying to come up with viable solutions to the problems or opportunities presented, is believed to simulate the context needed, for letting the individual student create his/her reasoning and meaning of the case situation (Schulman 1996). The work practice illustrated in the case follows the case from the company to the classroom.

Narratives and the Case Method

"A good case tells a story. *It must have an interesting plot that relates to the experiences of the audience. It must have a beginning, middle, and an end. The end may not exist yet; it will be what the students need to supply once the case is discussed*" (Herreid 1997/8, p. 164). This rather simple phrase manages to capture the essence of what narrative means to a business case: providing the historical events, sequences and tempo, as well as a plot that motivates the person(s) using the case.[38]

It is interesting that some researchers engage in deep discussions about the value of narrative elements in teaching cases (Bearman 1997, Herreid 1997/8, Schulman, L. 1992). The argument is that narratives trigger our memory, and that humans by remembering and recalling the story of the case, also recall the lessons learned. As opposed to be able to recall only the abstracted general lessons, which could be deduced from the case and would apply to all companies of this type. (Bearman 1997, Schank and Cleary 1994 and Schulman 1992.)

Though almost all authors of case methodologies agree to the situational value of a teaching case, and the way it supports the students in understanding complex and ill structured situations / organisations, fewer researchers within business education who publish case writing emphasise (the importance of) narratives (Bearman 1997). Instead, when writing up the case story they use terms as 'structuring the raw data', 'summarising interviews' etc. For example Leenders and Erskine 1989, in their 156 pages book on writing teaching cases, use about 1 page to specifically address the issue of narratives. They even then seem to be scaling down its influence, for example by setting the narrative description next to a subject as '*selecting material from a situation*', and keeping out personal judgements of the case (p.49). Even though they obviously use narratives themselves, and emphasise the ownership of a problem using case roles etc., it seems they try to work very hard on making

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[38] Though Clyde Freman Herried comes from a natural science background, he has the last couple of years turned his interest towards the methodology of teaching cases. He has extensively researched different educational areas use of this approach, and this quote is quite appropriate for representing narrative in business education teaching cases.

a teaching cases stand out from other teaching approaches, as something very factually reported.

In Leenders and Erskines defence it should perhaps be noted, that if they re-wrote their book today, narratives might get a higher influence. Simply because this is becoming a field that gets much more attention than a few years ago. (Also within organisational development and organisational learning has narrative become a buzzword.)

Lee Shulman summarises the influence of narratives on the experienced-based learning of cases to: "*A case is the re-collected, re-told, re-experienced and re-flected version of a direct experience. The process of remembering, retelling, reliving and reflecting is the process of learning from experience.*" (Shulman 1996, p. 208.)

Criticism of the Case Method

It is remarkable, how little criticism is presented about the case method compared to the purely positive effects stated, often even without any solid proof (Ertmer and Dillon 1998 and Shulman 1992). However, a few projects containing critical reflection based on comparative research and observations do exist.

According to Williams 1992 the most frequently reported objection to the case method in law education is the unsupportive environment, which is created in a class discussion. This is the exact same criticism Chris Argyris raises in his survey of education of business executives. He finds, case teaching can generate fierce competition between the students, trying to guess the right answer (of the case), which the teacher is holding back until the end of the session. Furthermore, he finds that the executives only rarely relate their own work experience to the case. This is otherwise often mentioned as a major benefit of the case method. Thus it was often the faculty member, who dominated the discussions, by asking questions to which they had prepared a "answering-map" of how to understand and relate problems and decisions in the case. A map they usually did not convey to the students until the end of the session. (Argyris 1980)

In the instructors eagerness to promote their own view of the case (though perhaps not as a conscious act), instead of listening to the students and their arguments, the faculty members generate a tense environment. This might count for the (observed) problems of getting some students to actively participate in the discussions (Erskine, Leenders and Maufette-Leenders 1998, Heath 1997, Williams 1992).

Another point of criticism originates in the low priority theoretical models and frameworks are given in the case methods. In a case course, the students often read the theories related to the course at home, without guidance from the lecturer. This means that very few expert models are given to the students, prior to doing their analysis, and the students may find it difficult to judge, which theoretical framework they should apply by themselves. (Williams 1992.)

Other Areas of Application

In addition to business education, case-based teaching has been used intensively in both medical and law throughout the last century. More recently faculties of education have also begun teaching especially instructional design courses by using the case-based teaching method. Even though the teaching case term is used, the method and content of a case-based teaching model vary in the different areas, mainly due to different teaching objectives and curriculum. It is not within the scope of this dissertation to present or even compare the many approaches, but a short overview of some of the common approaches in law, medicine and education are briefly outlined.

Teacher education primarily uses an approach to teaching cases that deviates a bit from the typical business teaching case. Typically, a case describes what has happened in a given teaching situation - whether a classroom session or in a project group etc - and includes analysis and commentaries of the case situation. The student assignment is then to consider, what actually happened, focussing on discussions of what went right, and what went wrong, and why. During this session they also provide criticism to the analysis and commentaries. The case should engage the students to contemplate their own teaching situations, and trigger analogies as to how and what they could do in a given situation. (Kagan 1993, Schulman 1996.)

In law a teaching case most commonly portrays a case that has been presented at court. The case story ends just prior to the verdict, or maybe even earlier (before a lawyer has been contacted).[39] The discussion is concentrated on the procedural actions that the lawyers may use in the described situation, and which verdict or settlement is likely. The teacher also has the opportunity to introduce the students to what really happened in the case. Similarly, in medicine a teaching case explains the symptoms a patient may have. It is then up to the students to diagnose and suggest treatments for the patient. (Teaching Human Rights On-Line 2002, Williams 1992.)

Thus the teaching cases in law and medicine focus more on argumentation about the right verdict/procedure or diagnosis than engaging students in open discussions. Also, unlike business education, there is always a "right" verdict or diagnosis, namely the one given to the client/patient. (Parker, J et. al 1996, Teaching Human Rights On-Line 2002, Williams 1992.) The same could be said for business education, that the right solution is the one the company chose, but a company could have chosen another solution, which would give other outcomes. If a brain tumour is diagnosed as something else, the patient may die, but of course the issue of treatment may be open for discussion in some circumstances.

Figure 4.3 shows an example of a multimedia teaching case for medicine, illustrating the very short and factual type of case, a medicine case can be. The figure shows how the case consists of only two HTML pages. The first page contains a short presentation of the

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[39] The latter is often the situation in cases, where there are no actual court-order, but the lawyer play a negotiating role, like in many divorce cases. The factual result of the case, the verdict or settlement, are then described in the teaching note (or case brief as it is often called), which the te acher at the end of the discussion sometimes presents to the students.

patient and the patient's medical condition (illustration (a) and (b)). And for diagnostic reasons discussion of the likely interpretation of these illustrations is given on page two of the case (illustration (c)).
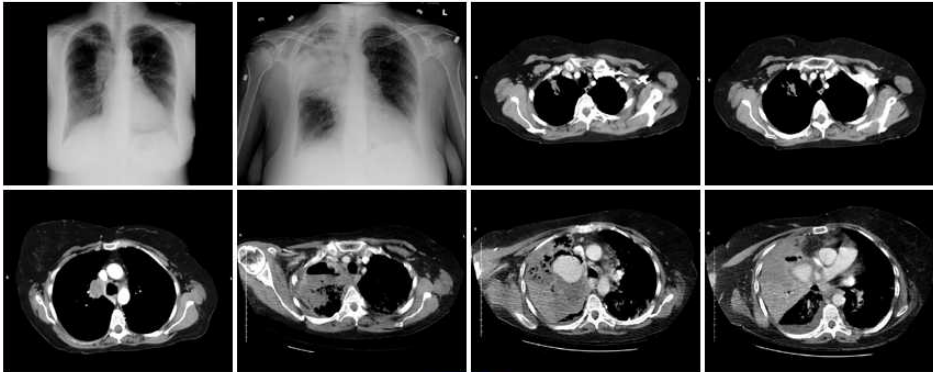
(a) First page - case illustrations

History: Patient with multiple myeloma with history of allogeneic transplant. Presents to emergency department with cough.

Image 1: PA CXR; Prominant right hilum with right upper and left upper lobe nodules/densities; Also notice less distinct right lower lobe nodule.

Image 2: AP CXR; Now with progession of right upper lobe disease to consolidation; Notice air fluid level that is well visualized in right apex.

Image 3,4,5: Irregularly shaped nodules in right upper lobe with right hilar mass.

Image 6,7,8: Progression to consolidation in right upper lobe as well as air fluid level within cystic structure; Contrast filled mass represents pulmonary artery pseudoaneurysm.

Discussion:
Aspergillus causes a variety of clinical conditions in both healthy and immunocompromised hosts. Aspergillus species appear to be unique in the wide spectrum of pulmonary disease they can cause. The spectrum includes: (1) a variety of allergic reactions in hypersensitized hosts (eg, allergic bronchopulmonary aspergillosis);
(2) saprophytic colonization of preexisting cavities (eg, aspergilloma); (3) noninvasive or superficially invasive necrotizing tracheobronchitis in mildly compromised patients; (4) chronic progressive and destructive pulmonary disease (eg, chronic necrotizing pulmonary aspergillosis); and (5) rapidly progressive, invasive infection in severely immunosuppressed patients (eg, acute invasive pulmonary aspergillosis), particularly those with acute leukemia.

High risk groups include patients with hematologic malignancies, history of bone marrow or organ transplantation, or HIVinfection.

ANSWER

(b) First page - patient description

55
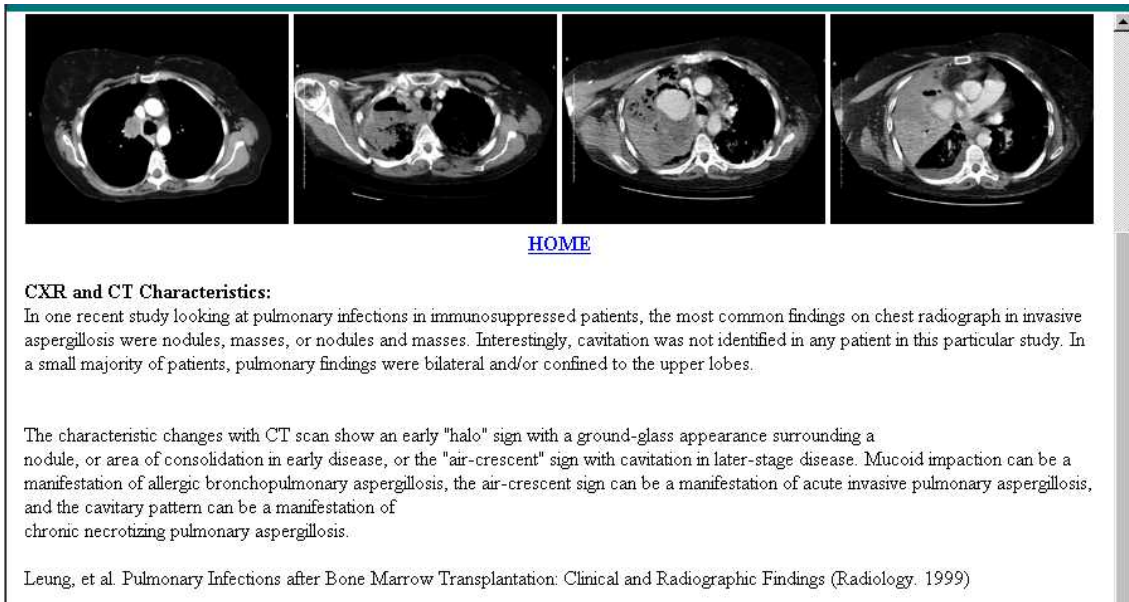
(c) Second page - case answer

Figure 4.3 - An example of a medical multimedia teaching case[40]

Similar Teaching Approaches

Besides being used in different fields, the case teaching method also re-assembles several different teaching methods. There are especially three approaches, which I will briefly mention here, because they illuminate ways of broadening the perspective to teaching cases. These methods are:

- Case studies,
- Problem-based learning and
- Role-playing.

The case method has many similarities to a case study. Conducting a case study is an increasingly recognised approach to research within the social sciences. (Yin 1994.) Robert Yin identifies a case study as an empirical inquiry that: "*Investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.*" (Yin 1994, p. 13) Some faculty/researchers see the case study as a possible teaching case, and even use the concepts "case study" and "teaching case" as interchangeable (for example Hagel et al. 1996, Heath 1997). Others regard them as something completely incomparable (for example Hudspeth and Knirk 1989, Shulman 1992, Yin 1994).

Where Hudspeth and Knirk 1989 believe the difference is that a case study is larger (more volume and higher complexity in the information provided) than a teaching case; Shulman 1992 believes it is a matter of pedagogic. I.e. a teaching case can be a case study research project, which has been edited for teaching purposes. Yin states that the rigour of the analysis and detail of information and empirical evidence that have to be part of a case study, will not and is not seen in a teaching case (Yin 1994). This is because Yin

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[40] Source: Figure 2b from Parker, J et. al 1996, p. 184

differentiates between research case studies and making teaching material. The consequence of statements like Yin's, has been that many of the instructors I have talked with during this research project, refer to Yin and other researchers within case studies, when stating that they did not contemplate the work spent when researching a teaching cases as "real research". This may be one of the reasons for the lack of credit given at faculty level to teaching case producers / writers.

I would claim that a teaching case can contain as much rigour and detail as a research case study - even though it may not be the practice today, it should be something we strive at. I guess this is also what is meant with research based education. The same need for change in attitude towards the rigour of teaching case development is seen in Hagel et al. 1996.

Case teaching is often compared to problem-based teaching as well as goal based scenarios, as identified by Roger Schank (Schank and Cleary 1994). Problem-based teaching (or problem-based learning, as this is mainly investigated from the learning perspective) does not have to obtain the same relevance to work practice and real-life accuracy as business education teaching cases do. Problem-based teaching/learning is thus applicable in a much larger range of fields and courses than a teaching case, as they are often "made" to fit a problem relevant for the subject at hand. The problems often have less detailed descriptions, and tend to be a "one-right-solution-only" scenario. (Neo and Neo 2001.)

The third and final method that I will here mention is role-playing. Role-playing is seen as an approach, which also can be used to supplement teaching cases, rather than a comparative method. Either embedded into the case as described earlier (so that the student preparing the case will get a case role assigned) or as an approach used during the class discussion. Each student (or a group of students) will be assigned a stakeholder role, which he/she/they have to act out during the class discussion. (Heath 1997 and Ip 2001)

What strikes me is, that when case teaching authors (like Heath 1997) mention role playing as a supplement to the class discussion, the act of debriefing a case teaching session becomes much more apparent. Reflecting on the different roles behaviour, actions and decisions, using video-recordings to "seize the moment" for further analysis, using one or two of the students to observe the role-play etc. are mentioned, and even highly recommended (se for example Heath 1997, p 41). But in the teaching case literature for business education in general, very little is said about debriefing, but quite a lot about the process of grading students for their participation. Evaluation chapters in Erskine, Leenders and Maufette-Leenders 1998 are thus more about ways to get silent persons in a group to speak up, and "shut-up" the more persistent "talking heads" (over-achievers), than about ways to talk to the students about the case discussion.

In role-playing the objective is often to teach behavioural as well as strategic and decision-making abilities. As a consequence debriefing is more important and plays a more dominating role as in teaching cases. Debriefing is seen as an explicit chance to reflect on

the process the students has been through. So if the behavioural objective is important in a teaching case (I have seen examples of this), then maybe de-briefing should be to?

4.1.3.   MULTIMEDIA TEACHING CASES

This section discusses the meaning of the term multimedia, contemplating multimedia used for teaching cases. Then I look at what is implied when transferring teaching cases to a multimedia environment, contemplating both negative and positive issues.

Definitions

Multimedia systems is often defined broadly as a term used to describe a system, which uses a combination of several types of media, like text, graphic, video etc. (Hemsley 1997, England and Finney 2002). Sometimes the systems ability to provide non-linear navigation is added as a requirement to multimedia systems (like Nielsen 1995, Hall 1994, and Waterworth 1991). Today these definitions would include almost any system with a graphical interface. Others like Hofstetter 1997 use a more narrow definition, which considers navigation, interaction, creation and communication as vital aspects of a multimedia system.[41]

The abbreviation BUSINES-LINC (Business Innovation Networks – Learning with Interactive Cases) indicates that in principle my research does not investigate (data material from) multimedia teaching cases, but interactive cases. But this term was generated to create a good phonetic and attractive name. Looking at the project program it is clear that it is in fact the multimodel qualities of multimedia system, the consortium (the members of the project) wanted to try. In a narrow definition of multimedia (as Hofstetter's 1997), interactive elements are also contemplated.

There are several definitions of interactivity that implies that an interactive system should change in some ways due to the interaction with the user (Laurillard 1993). That interactivity is only happening, when the user of the system is able to manipulate a lot of the information present (as in a simulation, where different variables can be changed thereby altering the result of the simulation). (Harper and Hedberg 1997.) Very few systems would meet the requirements according to such a definition Hagel et al 1996 argues that in teaching cases it may be a different form of interactivity, which is necessary, one that does not manipulate the case content or process. For *"precisely how much interactivity should one incorporate into a case before the integrity of the case material is compromised?"* (Hagel et al 1996, p. 270.)

Karin Levinsen argues in a similar way, and suggests an alternative view on interaction, that encompasses (the more) "lower levels" of navigation in a multimedia system, to also be viewed as interaction. Her resulting model, contemplates that the level of interactivity

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[41] Fred Hofstetter writes that *"Multimedia is the use of a computer to present and combine text, graphics, audio and video with links and tools that let the user navigate, interact, create, and communicate."* Hofstetter 1997, p. 2

should be designed according to the need of the system being developed (Levinsen 2002). For example one interaction form identified in her "examples of interaction" as *a work* is similar to that interaction happening in multimedia teaching cases. "*A work - fiction, dissemination, education etc.: The user interacts with the work by interpreting while "reading" the work. The user interacts with objects in the interface in order to access the work…. The user will think of the application as an environment or universe.*" (Levinsen 2002, p. 6.)

In the previous two sections (4.1.1 and 4.1.2) I have proven that an important aspect of case teaching is interaction between peers. Even though such interaction could happen on-line in a virtual environment, there is no reason to incorporate such facilities in the multimedia case itself, since many standard educational systems (like WebCT or SiteScape)[42] would be able to support this.

It is thus not a high level of co-operation between students that the multimedia case should support; rather communication with the individual student about the case story and the lessons learned in the case. In this connection it is vital to use the multimodel abilities of the system to present content in ways that trigger motivation to listen to the lessons learned in the case. Getting the student to navigate in the case content, and thus letting the case "communicate" the lessons learned are the main objectives of the case. A similar conclusion is reached by Karin Levinsen in her concluding remarks to the interaction model about the interaction form in "a work": "*The author/designer's personal communicative intentions are especially relevant in relation to works (fiction, dissemination or education). The users intention and needs are always relevant.*" (Levinsen 2002, p. 13.)

By focusing on transferring a message, I look at how the users generate meaning/knowledge, but focus on the objectives of the system (the messages) rather than the different perceptions / understandings the users get of the system. To conclude, the following definition could be used: *A multimedia teaching case is the presentation of information about a company (department or industry) and its opportunities and problems. The information is presented to support the transfer of a message: the case story and the lessons learned, in ways that enable the student's ability to discuss these messages with peers. The message is conveyed by integrating different types of time-dependent and independent media, like sound, video, and animation with text, graphic and pictures, and by non-linear navigation, interaction and communication.*

This definition is merely made to put teaching cases into a multimedia context, and should not be taken too literally. It is important not to prevent interesting ideas from being implemented, because of a too narrow definition.

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[42] See http://www.webct.com and http://www.sitescape.com.

Advantages and Disadvantages of Multimedia Teaching Cases

In the left column of Table 4.3 and Table 4.4 I have summarised some of the most advantageous and disadvantageous features of using multimedia (web) applications. This list is produced on the basis of a thorough literature review and previous experience from multimedia projects. In the right column I have related the advantages / disadvantages to teaching cases according to the two previous sections about teaching cases in business education and the teaching case paradigm.

Advantages from literature / practice	In a teaching case perspective
Using different media forms to enhance ways of expressing and supporting the written word.	The use of animated graphics, video and audio can support the students, in the process of understanding what occurred in the case company. According to Mauffette-Leenders, Erskine and Leenders 1997 a case method is highly suitable to teach managers – present and future - to handle new complex situations. Using multimedia in a teaching case can show the complexity of a situation and the dynamics of the organisations (Hagel et al 1996).
Use of audio and visual media to better show emotions.	Also in Mauffette-Leenders, Erskine and Leenders 1997, students are asked to remember that the people described in cases often had a lot emotional issues to handle (pressure, maybe putting their career on the line, etc.) as well as the more pragmatic decisions. Visual and audio elements can convey a feeling of the culture and people in the organisation. This helps the students to identify with the situation. For example in a video of a manager in a case company, it is possible to better understand the man behind "the job description". (Saito et al 1995). Understanding and identifying the emotive aspects of the situation and case roles might make the students feel a stronger closeness and ownership of the problems presented.
Using hypermedia, to support a non-linear use process.	Similar to using different media types, hypermedia can also show the complexity of a situation. On the other hand it can also be used to link information together to provider an overview of, which information belongs together and provide new perspectives to the case, Nielsen 2000.
Access to external information by using links to the world wide web.	Getting further information about the company participating in the case or about the market/industry as a whole, is seen as a way to expand the preparation of the case (especially in the instances where a teaching case is used as an assignment, report or examination) (Heath 1997).
Using an internet application opens for the possibility of on-line teaching.	According to the European Case Clearing House there is an increasing demand for educational material, which can be used in some sort of virtual, or at least digital environment, but that many fail to design these. (ECCHO 2001). Providing material, which is not "just" a digitised version of one media (video or text), but which is intentional integration of several media formats, should attend to this need.

Table 4.3 - Advantages of using multimedia applications in education

Disadvantages from literature / practice	In a teaching case perspective
Less reader friendly interface	Jakob Nielsen and Ben Shneiderman are two of the authors who put large emphasis on the readability of the text on the screen. For example Jakob Nielsen guess that it will take another 5-6 years before the screens are of such a standard, that it is possible to read as fast as from paper. (But it will probably take even longer before such screens are available for everyone (read in the right prise range). (Nielsen 2000) It is likely that teaching cases will contain text of some sort. And as long as the research departments and centres are new to this area, the cases may very well contain a lot of written material. Thus much consideration of the layout of "text-heavy" cases are necessary.
Technical abilities of the user & Technical requirements of the user's computer equipment	Since cases are used for a relatively short period (unlike for example a teaching system being used throughout a semester), the case has to be easy to use from the beginning. Also, it is important for the success of the case, that the users are able to execute the system on their computer (whether it is their own hardware or at university laboratories).
Lost in hyper-space	When hyperlinks are used to a high degree, using non-linear navigation in teaching cases, can mean that the user looses sense of direction, and does not know where he/she is. (Hagel and Mahoney 1998). Thus, in complex problem areas as cases, using non-linear navigation may have the opposite effect than intended.
Repeated information, using different media to say the same message.	Many multimedia authors and spokespersons of the use of multimedia in business education that repeating a fact using different forms of media benefits the recollection of this fact (by for example having the same text written and read aloud), see for example Bielli 2000, Hofstetter 1997. Though that may be true to a certain degree, users seem to be bothered with too many repetitions. They become irritated or just bored with the program, and this may reduce their motivational level. A low level of motivation might be the worst thing that can happen in such a teaching case sequence. Having the media supplement each other are more interesting (by having for example keywords written and the context read aloud). (Rogers and Scaife 1998.)

Table 4.4 - Disadvantages of using multimedia applications in education

4.2. DEVELOPMENT OF TEACHING CASES

The objective of this section is to provide insight into teaching case and multimedia development and come "closer" to an understanding of the development process, as well as the roles and tools, which could be used to develop multimedia teaching cases. First I investigate the paper-based teaching case development process. I look at the tasks of a teaching case writer, and the possible development strategies available (in 4.2.1). Then multimedia system development is framed using information systems development for the sake of comparison, highlighting similarities and differences (in 4.2.2). Section 4.2.3 investigates the typical roles in the team, and tools used by the team in multimedia development.

Three types of case writing approaches are used within business education:

- Field researched: based on research in organisations via interviews and observations.
- Desk researched: based on publicly available material like newspapers, company reports, etc..
- Armchair case: based on the case writer's own experience.

The names adopted here are those given by Heath 1998, p. 61. However, according to Leenders and Erskine 1989 an armchair case could even be made up entirely to serve a certain educational objective. A Field Researched case is what is contemplated here in the case writing process. It should be noted, that a field researched case also contains elements of a desk researched case, as such public information are valuable foundation for carrying out comparisons (to the companies statements, or to other companies and industries).

Despite teaching cases "long life" in business education and many books and papers on teaching with cases (as for example the much quoted Barnes, Christensen and Hansen 1994, whose first edition came in 1975), little was said about writing cases. The first persons to provide explicit structure to the case writing process, by providing a framework and tools, were Leenders and Erskine 1989, with the book: *Case research: the case writing process*. According to them the case writing process was until then only taught by use of the apprenticeship system. Nine years after, Heath in 1998 published: *Teaching and writing Case Studies - a practical guide.* Even though there are other papers about the case writing method in business (for example Huff, Jelassi, Cash and Pifko 1995) they all refer to these books, using their tools etc. Putting Leenders and Erskine 1989 and Heath 1998 experiences and the many testimonies of interviewed people from their books together, the following picture of a case writing process is evolving (see Figure 4.4).

On the figure a flow in time from left to right is shown, where the two top and the final boxes contains tasks that should only be done once, in the case process. Whereas the collecting of information, structuring and writing and developing case enhancing material, have a more iterative nature. (Figure 4.4). Below, I will give an overview of these phases.
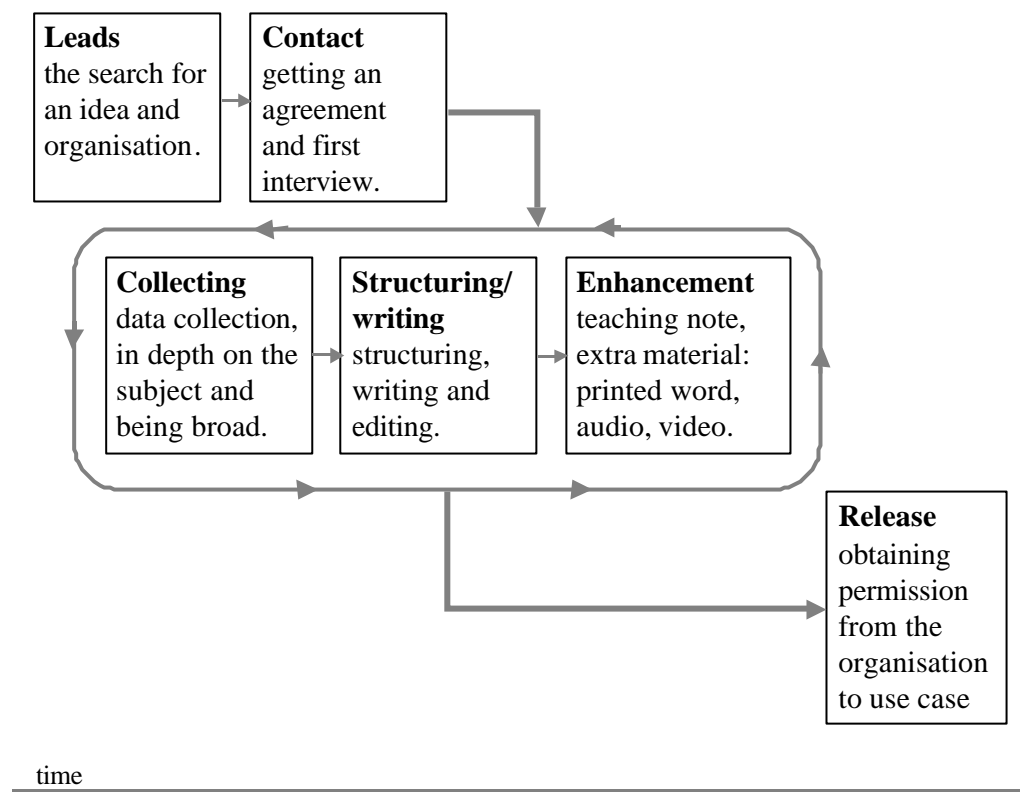
Figure 4.4 - The phases of a case writing process[43]

Leads and Contact

Leenders and Erskine1989 emphasise the importance of being prepared already at the first meeting. That is, prior to the first contact / interview, the case writer should try to obtain as much information about the organisation and the area he is interested in as possible. This is why the collecting (and to some point the structuring) of information in the figure is placed to show overlapping in time with the leads and contact phase. It is usually a senior researcher, who take the initiative to write a teaching case, and it is also them, who participate in the first meeting (if not all of them), getting all the administrative issues in place. The administrative issues are things like: the case projects time-line, who should participate from the company in interviews, which kind of data material is needed, etc.

Collecting

Both Leenders and Erskine 1989 and Heath 1998 have generated lists to be used when preparing and conducting research in the organisation for teaching case development. For example John Heath has a series of questions, a case writer may ask him-/herself, when

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[43] Derived from especially Hearth 1998 (see for example p 61) and Leenders and Erskine 1989 (see for example p.7)

preparing to collect information about the organisation. In Table 4.5 this list is given. Similarly, Leenders and Erskine 1989 use a so-called "case plan", which should force the case writer to communicate a time-schedule and the objectives of the case, as well as to identify the subjects he/she wants to collect data about. Again, the case plan is shown in Table 4.6.

The main method of collecting data is through interviews, though Heath 1998 also points to questionnaires, observations and other means depending on size and scope of the case. (Techniques, which are all quite similar to those employed when conducting case studies.) Leenders and Erskine 1989 have made their book on the basis of numerous interviews, and many quotes about how to write teaching cases are given. The interviewed people discuss the number of visit to the case provider (for example on p. 38), and it seems three visits of half to a full day duration are the average. Some also mention telephone interviews for getting the (last) details as an option.

Intended case

1. What type of case do you intend to write? (see Section 1.3)
 	
     a) Incident case(s)
     b) Background case
     c) Exercise case
     d) Situation case
     e) Complex case
     f) Decision case

2. What are the main issues (three or four) that you want the case to raise?

3. What teaching/learning objective do you have in mind? What learning do you want to bring about whit the case? What do you want students to?
     know
     and/or
     be able to do (or do better)
     and/or
     have formed an opinion about
 as a result of working on the case?

Participating organization
4. Has contact been made wit the subject organization?
5. Does this person know what a case study is and how it is likely to be used for teaching purposes?
6. Does your contact have authority to approve and release the finished case for teaching purposes?
7. Is your contact clear about the precise nature of the cooperation you are seeking? Has the organisation agreed to cooperate on this basis?

Data collection
8. Have you decided what data you wish to collect for the case?
9. Can some of this be collected from published sources to minimize the direct demands you will make on the subject organisation?
10. How do you propose collecting the data you need from within the subject organisation? a) Questionnaire? b) Interviews? (recorded?) c) Direct observation? d) Perusal (or photocopies) of internal documents? e) Other?
11. Is the subject organisation agreeable to your collecting data in these ways?
12. Have you considered how you will introduce yourself, and the purpose of your case research, to your various respondents within the organisation?

Table 4.5 - List of questions, to support the collection of material[44]

The "case plan" has five parts:
1. The opening paragraph.
2. The brief statement of teaching objectives.
3. The proposed organisation or outline of the finished case by sub-titles.
4. The data requirements list (by sub-titles identifying data already available and additional data to be gathered).
5. The proposed schedule.
Each of these five parts will be discussed in detail further. The case plan depends on the following three major assumptions:
1. The largest percentage of case quality can be determined by the choice of plan for case format and content.
2. the plan can be written within a very short period of time.
3. A carefully written communication between case writer and supervisor and between them and the cooperation managers is useful early in the game to establish for all parties involved a thorough understanding of expectations, role and task involvement.

Table 4.6 - Case plan to support the collection of material[45]

Structuring/Writing

The structuring and writing tasks are kept together as one phase, as they seem like very intertwined tasks. It is usually one or two persons who write a teaching case. A researchers, who contemplate to use the case in their courses. And if sufficient funding is present, a

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[44] The table is re-written from a list of questions in Hearth 1998, p. 137-139.
[45] The table is re-written from the case plan in Leenders and Erskine 1989, p. 114-115

research assistant may participate as well. Some even has access to editorial assistance. In such situations the researcher "only" supervises the case collection and structuring of the material, until a draft version of the case is ready. This draft will then usually be re-organised and re-written by the researcher. If a researcher does not have the funding, but still wants to produce a considerable amount of cases, or just do not have the time and energy to collect material him/herself, another solution is to engage his/her students in the work. Though the experience is that these processes require a lot more supervision by the researcher. (Heath 1998, Leenders and Erskine 1989)

There is some disagreement to whether the analysis of the case material should appear in the final case or not. As can be seen from the Figure 4.4 there is no analysis phase, but structuring the collected information is part of performing analysis on the data collected. The testimonies from case writers in the two books, and in Barnes, Christensen and Hansen 1994 show that some think the case should be as objective as possible, and only report the facts "found" in the company.

Heather Hazard gives the following advice to faculty experienced in research, but writing teaching cases as a "novice": First to conduct their empirical study in the company, analyse and interpret the situation, and write up their case study. Then taking two different colour markers, mark every sentence which contains the history, facts and problem area of the field with one colour, and their own interpretations with another, and separate these two into two different files. One could then almost directly be named teaching case, the other teaching note. Hazard 2000

Others believe that such divisions into facts and interpretations are not possible. Since selecting facts to be represented in the case from all the material collected, and deciding how to represent them, is already an interpretation in itself. Heath 1998 refers to that a case should be grounded in thorough research, and that the resulting case study should bear evidence of this research, the analysis. This is similar to the discussion in 4.1.2 about the difference between a case study and a teaching case, (if any).

I am not sure a strict separation between objectively and subjectively interpreted information is advantageous, as Hazard 2000 suggests. I agree that research case studies might contain more in depth analysis of what has happened in the research of the case study, and that a case made for teaching should be edited to the teaching purpose. But experiences especially within teacher education show it is possible to write teaching cases, which have this analysis, and still discuss it, using critical reflection on the analysis. It depends on the teaching purposes (see 4.1.2 and Conway 2001(a)).

Enhancement

There are many different ways of enhancing a case by supporting material; probably the most common form is by having supplementary spreadsheets, containing different kinds of financial information. Another relatively frequent approach, but expensive, is video recordings. In fact, quite a number of teaching cases are made in this media. For example at

the Kennedy School of Government website, under their "new media cases" menu, I found 25 cases of which 10 were video exhibits to written cases, and 7 were "pure" video teaching cases. (KSGcase 2002.)

The most important supplementary part to develop, may be the teaching note. There are two dominant attitudes, which seem to lead the development of the teaching note. Those who make a teaching note while writing the case, and who regard it as part of a development tool. They also see it as an important communication tool between the case writer and the teacher, giving a chance to relay their motives for making the case and the learning objectives, as well as providing guidance in using the case (at more or less detailed level). The second group believes the teachers have to work with the case themselves to decide, for what and how it can be used. Teaching notes would only limit their vision, since they contain "pre-digested" analysis, preventing them to see other perspectives, which the case may offer their courses. (Leenders and Erskine 1989.)

Release

The final phase ha s a practical character, the issue of releasing a case. Ensuring a case is officially released (with a signed release-document) protects the organisation against misinterpretation of what happened, and unrightfully use of confidential material. It also secures permission to use the material for the case writer and his/her organisation. (Leenders and Erskine1989)

4.2.2. SOFTWARE AND MULTIMEDIA DEVELOPMENT

Over the years people have asked me to explain the difference between multimedia and software development. Well, in my mind there is no difference, since multimedia development is software or system development. However, when talking about these two development types, development of organisational information systems supporting work-processes is often contemplated, and in comparison to this there is a difference, but also many similarities. This section discusses the multimedia development process, primarily by comparing it to work-place information systems, and the phases present in both multimedia and information systems models.

Before being able to compare the two development models I need quite narrow definitions of both, enabling to clearly pinpoint differences and similarities. If I used broad definition, there would be no differences to identify. Therefore, applying the narrow definition of a multimedia teaching case would be appropriate, when turned in to a more general multimedia systems definition: A multimedia system is the presentation of information to support the transfer of a message, by integrating different types of time dependent and independent media, like sound, video, and animations with text, graphic and pictures, and by non-linear navigation, interaction and communication.[46]

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[46] I used a somewhat similar definition of a multimedia system in my master thesis some years ago (Orngreen 1998).

Using the same (quite narrow) definition of information systems as applied by soft system analysts from the Multiview approach, could be using Davis' definition: *"an integrated man/machine system for providing information to support the operations, management and decision making functions in an organisation. "* (Davis 1974, and as quoted in the first Multiview book, by Avison and Wood-Harper 1990, p. 3.)

The important aspect to pay attention to in this definition is the information systems objective to support activities in the organisation. This means the two types of systems (multimedia and information systems) originate in different objectives. Information systems focus on the support of work processes, multimedia on the transfer of messages. I would like to stress that I do work with these narrow definitions, where a multimedia system here focuses on the transfer of messages (like educational or awareness and marketing applications, as information kiosks etc.). If I did not work with such a narrow definition, a multimedia system might just as well be a work-place related information system. Likewise, there are information systems, which at times also work with the transfer of messages. This is seen in the Rockwool case (in 1.3) where Rockwool's web-site both supports the architects in their work, and also communicates the message that Rockwool products are reliable of high quality etc., for branding reasons.

Lennart Molin (Molin 2000) gives a thorough comparison of the two systems development models. Through interviews he was able to show that the differences in the two models are due to the use of different terms, covering the same areas. However, as I see his comparison, it is not so much the different use of the same concepts rather the difference lies in the level of abstraction. His comparison of the information systems development process focuses on phases, and the multimedia development process on the representation and tools used (as shown in Table 4.7). It is therefore difficult to compare the two models, but it is possible to see that the tools used in the multimedia development model focuses on narrative elements and media production, with manuscript and authoring tools, to a much higher degree than the information system development model does.

I would propose the following. Enhancing the level of details, to encompass for phases at the top level and suggestions for production/tasks and tools at the second level (to ensure comparison of the same levels of abstraction). The alterations to the phases in the multimedia process originate from multimedia literature in general (such as Impact 2000, Barrett 2000 and Staylor 2001). Likewise the Information Systems development model has been enhanced with examples both from the Multiview method, which focuses on the softer issues in the first phases, and from more traditional software engineering approaches (Avison and Wood-Harper 1990, Conallen 2000, Sommerville 1992). These changes can be seen in Table 4.8.

Information System Development	Multimedia Development
Change analysis - the work is initiated with a study of the company's problem and opportunities.	Need - the work is initiated with a study of the needs and ideas of the customer (could be a company)
Analysis - requirements to the system and how it can be integrated into the company.	Manuscript - plans for the project is made and described in details in the form of a manuscript, the most central document in the process.
Design - determining the (technical) solution and data-structure to the given requirements.	
Programming - programming of the structure and data.	Production - text, sound, video and other material needed is produced and collected/authored into the wholeness planned for the system.
Implementation - installing the program at the company and beginning to use it (training etc.).	
Operations - administrating, running and maintaining the system.	After-production - after test and approval the product is installed and taken into use.
Out-phasing - when the system is out-dated, handling the (confidential) information is necessary.	- most multimedia products do not go through any process of out-phasing, but the use simply just stops using them.

Table 4.7 - Comparison of development models as viewed by Lennart Molin[47]

[47] Summary of Molin 2000, page 5-8.

Information Systems Development	Multimedia Development
Change analysis and needs	
- the work is initiated with a study of the company's problem and opportunities, in off the shelf development many companies are needs are contemplated - example: in Multiview, rich pictures are used to uncover the problem area, resulting in a root definition (Avison and Wood-Harper 1990)	- the work is initiated with a study of the ideas from the customer (could be a company) and the needs of the users. - example: scenarios and storylines (Carroll 2000)
Analysis	
- requirements to the system and how it can be integrated into the company. - example: using conceptual and functional models (simple flowcharts), Use Cases (Sommerville 1992, Conallen 2000)	- content gathering, interaction, navigation and communicative concepts of the system are contemplated according to target group analysis, and technical requirements - example: storyboards and graphical layouts (England and Finney 1996, Hofstetter 1997)
Design	
- determining the (technical) solution and data-structure to the given requirements. - example: (sophisticated) dataflow, CASE tools, diagrams, entity modelling, function and event matrixes	- determining all content and the final functional and aesthetic look and feel. - example: storyboarding, scripting, (simple) data flow diagrams
	Production - text, sound, video and other material needed are produced. - example: detailed scripts (ex. speaker- and movie-scripts)
Programming - programming of the structure and data - example: c++, visual basic, database platforms incl. SQL procedures, and/or newer languages like HTML, XML.	Authoring - programming of the structure including the produced parts - example: authoring platforms and/or using newer programming languages like HTML, XML.
Test	
- internal test of the systems abilities, external test according to requirements	
Implementation	
- installing the program at the company and beginning to use it (training etc.).	
Operations	
- administrating, running and maintaining the system.	
Out-phasing	
- when the system is out-dated, if any (confidential) information handling is needed.	

Table 4.8 - Alternative comparison of development models

As the table shows the majority of the phases are equivalent to each other, as well as the overall objectives about what have to be done. The main difference is found in the tools applied in the analysis, design, production and programming (authoring) phases. In the analysis and design phases, there is more focus on information and functions in information systems. In multimedia, however, content, interaction, navigation and the plot, which shall motivate the user, are in focus. Due to this focus on a story, and the explicit

use of several media to create the right feeling or atmosphere to capture the audience, multimedia developers have looked at tools and strategies from the film industry. For example various forms of scripting have been applied in the development process. (Molin 2000, Staylor 1994.) I see three reasons to use these scripting tools: First, they can capture the emotions, attitudes and opinions that are present in the story, and which functional descriptions can not embrace. Secondly, these tools enable the developer to work with several forms of media, at the same time. I.e. a storyboard can show animations as well as textual content and their relations in time, in one page/screen. Finally, in multimedia all the content material usually has to be in place before the system is finished, whereas an organisational information system often only have a shell, with data-flow structures, menus etc., like a database, where data will then be entered. Scripts serve as excellent input to the production phase of the content - like a movie script, or speaker scripts etc. (Staylor 1994 and 2001).

The production phase is a phase, where production of the different media parts in the system takes place (thus the name). For many multimedia companies this entails going to sub-contractors to rent actors, sound studios etc. Using sub-contractors for content generation requires that a number of people from "outside" the development team needs to understand vital elements of the design strategy, and to accomplish this, scripts are necessary. More formal tools for managing sub-contractors are also vital (Orngreen 1998). The authoring phase is quite similar to the programming phase, but is named so due to the story like nature of multimedia systems. Authoring platforms have a set-up, which focus on the representation. So instead of programming a structure determined by the flow of data, as information systems developers would, the programming is determined by narrative elements, but in fact the phase could have the same name, and is as such comparable. (Hofstetter 1997 and Impart 2000.)

Quite often multimedia development is mentioned as being more complex and challenging than other forms of system development (England and Finney 2002, Molin 2000). According to Molin 2000 multimedia development is demanding more of co-operation, communication and knowledge within the development team, and he states that an information system development group is often more homogeneous (Molin 2000).

In 1997 James Hemsley stated that the multimedia development arena was immature, thus pointing to the field of software process improvement, by measuring the maturity of a company's development methods (Hemsley 1997). I made the same experience and in 1998 my master thesis looked at empirical experiences with structuring and controlling a multimedia design method by using elements from one software process improvement method, the Capability Maturity Model (CMM) (Orngreen 1998). Lennart Molin (Molin 2000) reached a similar result and explains the overall CMM model (though without the use of empirical evidence or reference to literature o its appliance in multimedia). And these are not the only examples. Donaldson and Cowderoy 1997 made similar references to the software process quality but using ISO compliant strategies (international standard for quality management) and so did the MediaNet 1997 project. However, MediaNet

concluded in their final report concerning software process improvement methodologies applied to multimedia development, that that these methodologies "*may be insufficiently rich to describe the multimedia industry and its processes*" (MediaNet 1997, p. 23).

To conclude: There are many similarities in the two systems processes, but due to different objectives, different roles and tools are needed. Multimedia projects are not more demanding, but rather the practice of such projects has been to manage them in a rather ad-hoc way. Therefore and as in any software development project, managing the multimedia development process is of outmost importance. As a final note, neither model shown in Table 4.8 are thought as linear processes. Multimedia development may be more linear than information systems development in some phases, but much more about this in chapter 8 and 10.

4.2.3. MULTIMEDIA ROLES AND TOOLS

In this section I will describe elements from the "typical" multimedia development process, as introduced in the previous section, more thoroughly by focussing on the tools used, and the roles needed to carry out the tasks of the development process. This description will later form the basis from which the roles and tools used in BUSINES-LINC were extracted and for the categorisation of the data material. At first I will give an introduction to the roles needed in multimedia development. Then I will give an idea about how the narrative and interactive/communicative elements are analysed, designed, produced and authored, by briefly investigating a set of tools. These tools are known in the literature as characteristic for the multimedia area. Thus the outline of this section is as follows:

- Roles
- Scenarios
- Storyboards
- Prototyping

These roles and tools will show that the developers in this area often take the HCI perspective of development as their starting point, the representations of the system rather than the process. They are product-oriented tools.

Roles

The range of skills needed for the development of multimedia systems is wide, and the skills are acquired from many different fields, which ranges from programming over video producing skills to instructional design. To demonstrate how there have been an increasing recognition of the detailed skills needed when composing the roles for a development team, I have shown three historical examples that present the roles necessary for a multimedia project team (Table 4.9 and Table 4.10). Table 4.9 shows Bergman and Moore

from 1990 and England and Finney from 1996. Table 4.10 illustrates a view, which is yet another six years later, namely here in 2002, and again from England and Finney.

Bergman and Moore 1990 (Chapter 3)	England and Finney 1996 (Page 25)
project manager & project director	project manager
project sponsor	
application/ instructional designer	agree on the content and treatment with client and members of the team
author / programmer	someone to program
graphic artist & art director	someone to produce the computer graphics
managing producer & video director & video personal & audio personal	someone to arrange and manage the audio and video production
administrators	
	supporting roles: assistants cartoon authors animators copyright helpers video graphic artists translators specialists programmers technical consultants (authors state that this is not a full list, just their examples)
end user	

Table 4.9 - Identified roles in a multimedia development team 1990 and 1996

Even though the number of roles depends on the kind of project to be developed, it is obvious that the amount of details in these three books has risen, for example, from three distinct video roles in 1990 to seven in 2002. However, it is also possible to see that multimedia authors are becoming aware that such a high number of roles could be involved in many system development projects (and that new ones will emerge over time), which make an overall structure of the development team desirable.

It is the recent model, which best illustrates the needed requirements and the organisational structure of a core team working closely together with occasional support from supporting roles or extended teams (England and Finney 2002). The core team consists of three roles (where the programmer's skills will depend on whether the project needs HTML or other on-line programming skills or authoring expertise). The core team then uses resources from the extended team and the group of specialists. It is not quite evident, however, what makes a role part of the extended project team or a specialist. It

seems from the chapter in the book (England and Finney 2002, chapter 10), that the roles in the extended project team have large specific and technical tasks (like video production), and could perhaps be members of the organisation producing the multimedia application. (Employees in the same company as the core team members). Whereas specialists are only used for limited tasks, and are often external consultants.

England and Finney 2002 (Chapter 10)	

Online core team:
    one or more graphics artists
    one or more HTML or JavaScript authors
    producer / project manager
	Offline core team:
	    one or more graphics artists
	    one or more programmers/author
	    project manager

Extended project team:
    server-side programmers
    video personnel
        a video director /producer
        an assistant producer
        a production assistant
        a video editor
        a video journalist
        a video graphics artist
        actors / actresses
    sound personnel
        voiceover artistes
        sound editor
    general support
        a personal assistant
        secretarial support
	Specialist support:
	    business analysts
	    information analysts
	    technical analysts
	    an interface design specialist
	    scriptwriters
	    a training analyst
	    an instructional / interactive designer
	    subject matter expert

Table 4.10 - Identified roles in a multimedia development team 2002

Scenarios

John Carroll is probably the person most recognised for first describing the use of scenarios rigorously. A scenario is a simple, but efficient tool, which consists of a narrative sequence. "*Scenarios are stories - stories about people and their activities.*" (Carroll 2000, p. 46.) The scenario can be used very early in the development process, both in the analysis and design phases. This may lead to two dominating (but not excluding) ways of using scenarios.

The scenario on one side is a way of forcing the development team to begin considering design issues, such as interface/interaction design and aspects of the environment/context, which should influence the system. The scenario on the other hand also provides a mean for making design assumptions / explicit requirements, and considering the appropriateness of the discussed design. (Carroll 1995, Chin, Rosson and Carroll 1997, Dobsen and Riesbeck 1998, Preece, Rogers and Sharp 2002, Siochi, Hix and Hartson 1991.) Or as Bødker and Christensen 1994 illustrate the two perspectives:

"*Scenarios exist in the borderland between experience and expectation*" (Bødker and Christensen 1994, p.8)

When used for creating the conceptual design, the scenario acts as a first prototyping tool in the development process (Preece, Rogers and Sharp 2002). The scenario is often developed through workshops or similar events, where several stakeholders are present. The objective is to create a common ground, a common vision about the system being built. Though it may sometimes look as if the primary reason for use of scenarios is the idea of having users participate in the design process. In both respects (creating a common ground and involving users), the scenario has turned out to be an excellent communication tool (Preece, Rogers and Sharp 2002).

Using a narrative scenario is an approach to analyse an existing situation, and decide on specific requirements (Rosson and Carroll 1995). An example of such a scenario is given in Figure 4.5. The language in the example seems quite distant and without the emotions, daily actions and sense of character, which a real situation would have. (Even though the scenario used first person, as in "I select add reference" and "conference paper" from the submenu", it is not done as a story, more like a person thinking aloud or recalling what he/she did at that time.) It may be that this relative unnatural description is due to the focus on the user task, rather than on goals and needs. And when a scenario is used in such a detailed description of a task, as is seen in the bottom part of the example, I suppose any format would be uninteresting to read.

Table 10.1	Specification and Elaboration of Bibliography Scenarios

Initial specification of Lange and Moher reference-entry task:

I want to add Beth Lange's paper documenting the copy-edit strategy in OO reuse. I remember that she gave it at CHI'89, and I think it was co-authored with Tom Moher, so I enter that info, but I can't remember where that conference was held or who edited the proceedings. I'd like to give the reference a nickname, but I can't decide between "oo-reuse" and "copyEdit".

Elaborated specification of Lange and Moher reference-entry:

Using the menu from the default browsing screen, I select "Add reference" and then "Conference paper" from the submenu. This brings up a Conference paper form, with "nickname" as the first field, so I figure I should come up with a nickname first. I think about it for a bit, then decide that probably this will be my default reference for the copy-Edit strategy, so I enter "copy-Edit" as my nickname. I then type in the other information, the authors' names and initials, separated by commas, the title, and year just like when I type them in a reference list. I know it is a CHI'89 paper, but I can't remember the editor of the proceedings, or the actual dates of the conference. So I enter the other stuff, the location of the conference, and the publisher and publisher location, the proceedings, and the name and location of the publisher. When I've finished, I press the "OK" button, and the system tells me it has entered a conference paper reference; it also formats the information nicely, and puts question marks into the unfilled spaces. I make a mental note to come back later and try to fill in the missing stuff.

Figure 4.5 - Example of a narrative scenario[48]

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[48] Source: Table 10.1 from Rossson and Carroll 1995, p. 250

In the previous sections of this chapter, I showed that multimedia teaching cases focuses on transfer of the case story, by motivating students to use the system, by use of emotions, case stories, multiple pathways through the system etc. The scenarios, as presented above, do not seem to have room for this, they seem unnatural and without real sense of what the motivating effects are.

A new and innovative approach to scenarios is found in Cooper 1999 and Nielsen, L. 2002. Here the focus is on the characters being described in the scenario, personas (in Allan Cooper's terminology) and the rounded user (in Lene Nielsen's terminology). The starting point derived from this perspective is the goals of the persons, who have to use the system being developed (rather than on the tasks the person is performing at the computer). I have worked for (quite) some years, with scenarios using experiences from the movie industry, which is oriented towards including action of characters, in a present tense active language, and evolving emotions and everyday contextual information, to add to the scenario contextual placement. (I will investigate these issues in more details in the development dimension, 8.2.2)

Storyboards

Faulkner determines that: "*The initial design for the system can most conveniently be presented in the form of a storyboard*" (Faulkner 1998, p.103). Storyboarding is a method originating in the movie industry. A storyboard phase typically begins, when a decision to produce a movie is taken. It contains two elements: drawings of the appropriate appearance of the screen, and comments about everything from the set, the actor(s) mood, what should be said, foreground and background action etc. (Bordwell and Thompsen 1997, Hart 1999).

Storyboarding is a method, which is useful in multimedia because of its ability to visualise, what should take place in the system. Multimedia storyboards typically also contains information about timing requirements, hyperlinks, animations, text etc. (Landay 1996, Orngreen and Pries-Heje 1999). A storyboard can thus serve as a tool, which supports the design process in conjunction with scenarios (Preece, Rogers, Sharp 2002). And also as a way of documenting the decisions taken in that process, and then used when the production of scripts, media production and authoring (programming) begins (Backer 1994, Hofstetter 1997). Figure 4.6 shows an example from Hofstetter's book on multimedia literacy, and even though this book only gives an extremely short introduction to storyboards, Hofstetter is one of the few who shows an example of a form, which could be used for documentation (Hofstetter 1997).

```
Module: _____ Strand: _____
Filename: _____
Screen No. _____ of _____
Images: _____
        _____
Audio:  _____
        _____
Video:  _____
        _____
    N A V I G A T I O N
Next:   _____
Back:   _____
Menu:   _____
Help:   _____
Notes:  _____
_____
_____
_____
_____
_____
_____
_____
```

Figure 4.6 - Storyboards as design and documentation tool[49]

Dobsen and Riesbeck 1998 shows in their paper *Tools for incremental Development of Educational Software Interfaces* that storyboards can be used in an incremental way, slowly elaborating and emphasising details in the system: *"Storyboard: Authors concretely envision what the program will look like. They use paper or programs like PowerPoint or Director to make a linear sequence of screens, each screen showing one or two mouse clicks in the demonstration. Although the introduction to the scenario is usually complete, tests and re-mediation are usually extremely sketchy. First walkthrough: Authors animate their storyboard, this time doing a higher fidelity mock-up of the interface"* (Dobsen and Riesbeck 1998, p. 385).

The quote also shows that in their process only authors (multimedia experts) work with "envisioning the program". However, others in the team (for example instructional and content designers of the educational software) also have their envision and ideas. It generally seems that storyboards can become so technical and rather complex in large multimedia systems, when used for documenting the detailed design, that it would be difficult for others (than multimedia experts with programming skills) to work with them, (Orngreen 1998).

Prototyping

Prototyping is not only a tool in itself, but rather started out as a development approach being used as an alternative to for example the waterfall model (Sommerville 1992). But since it is often only applied in parts of (multimedia) development processes, it

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[49] Source: Figure 45-6 from Hofstetter 1997, p.379

is today often referred to as a tool. A tool used in either the analysis, design or authoring process. (Preece, Rogers, Sharp 2002).

Different prototyping proportions, or rather classifications, exist, and different techniques, different ways of working with the prototype exist. Combining the terminology from Hix and Hartson 1993 with Preece, Rogers and Sharp 2002, the following classifications can be defined:

- vertical vs. horizontal prototyping (Preece, Rogers and Sharp 2002, Hix and Hartson 1993)
- high vs. low fidelity (Preece, Rogers and Sharp 2002)
- executable vs. non-executable (Hix and Hartson 1993)
- revolutionary vs. evolutionary maturity (Hix and Hartson 1993)

A vertical prototyping method is concentrated on the effort of generating the details in one section of the programme, as when one sub-menu is developed content and media wise as well as the program functionality. Whereas a horizontal focuses on getting the functionality and structure of a wide range of sections generated, but with very little detail for each part.

If a prototype presents content and navigational elements in a very draft-like manner (for example using only headlines instead of text, or just nonsense text like "blah, blah, blah", dummy graphical elements and video etc.), then the prototype is said to have a low fidelity. At the opposite end of the scale, a high fidelity prototype uses elements, as they will be used in the final program (the edited video recordings etc.).

A prototype can be made either executable (as an HTML prototype) or non-executable (like paper-mock-ups or PhotoShop® graphic of how the interface will look and function).

Finally, the term revolutionary maturity refers to the type of prototypes, which are used to gain further knowledge about a problem or area in the system being developed, to generate specifications for the final system. This prototype will be thrown away, and the product will be built from scratch, based on the experiences and requirements deducted from the prototype. Whereas a prototype with an evolutionary maturity characteristic will evolve into the final system, i.e. the prototype is re-used in several iterative cycles, until the product ideally is satisfactory to the development team, clients and users.

Each of these classifications serve different objectives, depending on the way they are applied / worked with. It does not imply that a more polished, high fidelity prototype is in anyway "better". According to the literature there are certainly benefits in using a very low fidelity, non-executable prototype in user-evaluations, since it may motivate the final users of the system to contemplate what it is, they really need. Instead of "being afraid" to alter something, which looks like a final system. Susanne Bødker and Kaj Grønbæk for example identified the co-operative prototyping model, which were low fidelity prototypes (paper

mock-ups), created by the development team and users in co-operation. (Bødker and Grønbæk 1991.)

Just like these paper mock-up(s), tools like the scenario and storyboard can be seen as early paper mock-ups, and are ways of prototyping. However, when prototyping is introduced in a multimedia development process as a tool after using scenarios and/or storyboards (which in themselves are low fidelity prototypes, either of parts or of all the system) the prototypes are usually running versions. For example HTML prototypes (the multimedia teaching cases from Chapter 0 are developed in HTML) are running versions, which are maturing into the final system (not thrown away). So this prototype is an evolutionary and incrementally developed executable of the full system, but which often begin from a horizontal approach, getting the first structure in place, and which then shifts to a vertical approach, finishing an element at a time. (Sano 1996.)

Both software engineers and interaction designers warn about the evolutionary method, as it can result in spaghetti code, and fragile systems, which only the persons programming them, know how are structured. (Preece, Rogers, and Sharp 2002, Sommerville 1992.) Though 4th generation authoring tools and web-editors tend to be modularised and have a code which is rather easy to understand, making a prototype possible (Sano 1996).

It is primarily the diversity of the people involved in the development team, which makes prototyping attractive for multimedia development. This diversity can make it very difficult for people to really understand each others ideas, and even imagine how their own design suggestions to the final product will look and function, when implemented. (England and Finney 2002 describe the problem as the "*gap between written and visual understanding*" p. 248.)

It is rather expensive to produce media elements (sound and video etc.) for multimedia educational systems (Hagel et al 1996, Wilson and Sasse 2000). In a prototype the audio can be replaced by an inexpensive sequence, where someone from the development team records approximately what is going to be said. Then the group might discover that this text was not well suited for speaking, and can be changed accordingly, before using a lot of money on hiring a sound studio and actors.

4.3. CONCLUSION

The findings of the two previous sections are here combined, investigating implications for multimedia teaching cases development contemplating use. The objective is to show that the development of multimedia teaching cases engage in a number of activities that are quite different, and which requires different competencies than case writing traditionally does. On the other hand the opposite claim is also valid, namely that development of multimedia teaching cases engage in a number of activities that are quite different, and which require different competencies than multimedia development typically does.

Relating multimedia teaching case development with the case writing process in Figure 4.4, means that it would especially influence the three phases in the middle of the model: collecting, structuring/writing and enhancement.

With respect to the collection of material for the case, the developers have to first of all consider the size and scope of the case (volume wise), since multimedia systems have the potential of containing almost an endless amount of material. A larger amount of data can be structured in such a way that it is still reasonable easy to get an overview of the case content. The material can be used to provide in depth background information structured perhaps in a hierarchical way.

However, using extensive amount of material in a case is not problem-free. For example Erskine, Leenders and Maufette-Leenders 1998 asks if a very large digital case could actually be regarded as a teaching case. Paper-based cases are relatively small and limited descriptions that a student can prepare for a discussion in class (which is often no longer than two hours/sessions). Perhaps a large case can be used over a more extensive period, but then the teaching objectives would have to be designed for this as well, and the question of whether the teaching case then actually is a teaching case, becomes legitimate.

Another perspective is if other changes (than just volume) due to the choice of media platform in anyway changes they way the teaching case is applied in the classroom and when the students prepare the case individually and in groups. I.e., how are the elements of a teaching case (case story, case role, teaching note etc.) implemented into a multimedia environment? Table 4.3 and Table 4.4 provided some aspects, which have to be considered, when changing media, but little is known about the interaction between students and the case, about how the messages, the lessons learned in the case story can be transferred in multimedia teaching cases.

The different ways of researching a case, finding lessons learned by using personal interviews, public available information etc., as suggested by both Heath 1998 and Leenders and Erskine 1989, are still highly useful for data collection for multimedia teaching cases. But they have to be adapted to serve this new purpose of also providing for multimedia material. For example the interviewers have to be aware of the different opportunities to use multimedia material which exist in the company. The primary question will be, is the case story suitable for representation in a multimedia environment? Secondly, the contact persons in the company have to investigate, whether the company already has some material available, which can be re-used. Also, agreements early in the process on the possibility to record, draw or in other ways produce new material about the company are necessary.

As shown in 4.2.1, the traditional case writing process is a "one-mans-job". Though research assistants and students are used, they will typically write a first version alone and the final version is then written by the supervisor/researcher, and finally and editor may polish it. Quite oppositely multimedia development is (like almost all software projects) a group event.

The idea of using different kinds of scripting tools, scenarios, storyboards as well as manuscripts for sound etc., may not at first seem that different from writing a teaching case story, which could be compared to a kind of manuscript. However, due to the group character of the development process, also scenarios and storyboards have to be worked on in groups, and a more structured process is needed (besides the more obvious of having to contemplating the use of different media, and how they interact).

The supporting material may also have a different use than in traditional teaching cases. The use of video and sound recordings as analogue accessories that can be played in class may not seem as useful, as they in a multimedia case would be integrated into the case. However, I could imagine the use of other already existing tools, which could also be linked to the multimedia case and used directly during preparation, like statistical or financial programs etc.

Finally and most predominantly the time and cost perspective of the development process are bound to be different from traditional teaching cases. Teaching cases were in Leenders and Erskine 1989 said to be one of the more expensive ways of developing teaching material. Choosing to make multimedia teaching cases is not going to make this any cheaper. The cost of making video, sound etc. at good quality is quite high, and if the interface (functionally and aesthetically) should be motivating to use, a graphical artist and a HCI specialist of some sort would also have to be engaged. People, who know how the different media expressions will be perceived by the target groups. Two weeks were the (optimistic) optimum needed according to Leenders and Erskine 1989, when a highly experienced case writer writes a case. This would probably not be a feasible timeframe for multimedia products, but how much longer it need to be, depends on the size, type, design strategies, learning objectives etc.

All these issues will be dealt with in chapter 8 and 9, after presenting the method and research design, as well as the data material in the rest of the dissertation.

5. METHOD DIMENSION

The purpose of this chapter is to present the research design used in the Ph.D. project, and to consider the methodological issues embedded in this design. The methodological framework of the dissertation is a composite phenomenon, which have multiple reference points. Section 5.1 describes the overall method used, and discusses the appropriateness of the chosen method according to the field under investigation. The types of data collected, and sampling strategies are also presented in 5.1. The somewhat large section 5.2 investigates the analytical techniques and their methodological implications for both the development and use dimension. Finally, in section 5.3 a concluding chapter, which highlight the major techniques used in the research design of this Ph.D. project, by addressing the issue of validity of the research design.

This chapter deliberately takes on a rather abstract discussion of the research design in the beginning, and it is not until 5.2 that I will show examples of the analysis carried out, and in chapter 6 an overview of the data collected will be presented.

5.1. CHOICE OF METHOD AND SAMPLING STRATEGIES

The methods and techniques chosen during the three-year period has been a mixture depending on the research questions and findings in the area. There are many different methods that I chose from the beginning, as grounded theory and action research, others I became aware of during the project, as with cognitive ethnography applied in the use dimensions. I believe this reflects the winding and convoluted manner, in which researchers accept inspiration from different fields. Such methods can supplement each other, or they can even be integrated, if the underlying values and worldview allow this.

The purpose of my research is to investigate and increase understanding of the roles and tools in the development and use of multimedia teaching cases. The roles and tools constitute the unit of the analysis, and I have described in the previous chapters what lies within the boundaries of that part of the project. I showed that the primary focus is based on the HCI issues of the development process, and I introduced the roles and tools, as they have been described in literature.

The character of the research area and the novelty of the approach points to a qualitative study, as mentioned in the introduction (chapter 2). I chose to use an explorative research design, which required a richer form of data that could elucidate and inform the formulation of concepts vital for the development of multimedia teaching cases. The objective was also to use an approach, which would result in findings that are not purely descriptive, but which would result in a more practical normative perspective. A perspective, that would aloud supporting and restraining factors to be investigated, and enabling future development of multimedia teaching cases in business education.

In the following two sections I will present an argument for the use of especially grounded action research (5.1.1) and within that, cognitive ethnography (5.1.2). I will also investigate the chosen sampling strategies for each approach.

5.1.1. (PARTICIPATORY AND) GROUNDED ACTION RESEARCH

When studying the BUSINES-LINC project an action research approach was used. The most frequently quoted definition of Action Research[50], is a sentence from Rapoport, so why not honour tradition. "*Action research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework*" (Rapoport 1970, p. 499). When defining action research Susman and Evered refer to Rapoport, and add a third objective, namely "*to develop the self-help competencies of people facing problems.*" (Susman and Evered 1978, p. 588.)

I can not compare the my research process directly to action research or action science studies, which would require the more formal intervention process of freezing a situation, finding the problems/opportunities, designing and applying a solution, which then unfreezes the organisation (Argyris, Putman and Smith 1985). In such studies, the organisation is not constituted of several researchers with the same objective of developing concepts for the development of multimedia teaching cases, nor does the organisation dissolve once the field study ends, which was the situation in BUSINES-LINC.

Because the BUSINES-LINC organisation did not continue to operate after the end of the action research program, the aim was not to help people in an organisation with the problems, they may feel they have, or which have been observed. Rather the research program had a more exploratory nature. One could of course claim that the aim here is to help people in their own home organisations (the respective business schools at which we were all employed), but this was not the original intention with Susman's and Evered's statement.

The precise frame of reference of my research process was that of participatory and especially grounded action research. Such perspectives allows for action research to inform theory generation and to have actions based on theory, by using an interpretative perspective and a sequential sampling strategy to the action research cycles. As will be shown in the following, where I investigate the following issues:

- Theory Generation
- Actions Based on Theory
- Using an Interpretative, Explorative Perspective
- Sampling Strategies
- Action Research Cycles
- Client-System Infrastructure

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[50] I have found references to Rapoport in almost all papers I have read about action research, and Susman and Evered 1978 (p.587) calls it "*the most frequently quoted in contemporary literature on the subject*".

- Diagnosing
- Action planning
- Action taking
- Evaluating
- Specifying learning

Theory Generation

During the research project, a long term study due to its duration of two years, the aim was indeed to develop personal competencies within a local community, and to increase understanding of the field of multimedia teaching case development. According to Susman and Evered 1978, it was Kurt Levin who first introduced Action Research to denote a "*pioneering approach toward social research which combined generation of theory with changing the social system through the researcher acting on or in the social system.*" (Susman and Evered 1978, p. 586.) And it is in this spirit of theory generation that an action research program has been carried out.

However, as Baskerville and Pries-Heje 1999 point out, the formulation of theory is not described very well in the literature, and they suggest that grounded theory provide a framework for producing rigorous and reliably theory. The authors present a strong argument for this combination used for information systems development in workplace situations. Applying especially the coding techniques of grounded theory, when doing action research cycles, has proven beneficial in this research project within educational multimedia development as well.[51]

My purpose of finding and investigating key roles and tools can be compared to the main objective of formulating theory through data in grounded theory. Theory consists of a set of: "*concepts related through statements of relationship, which together constitute an integrated framework that can be used to explain or predict phenomena.*" (Strauss and Corbin 1998, p.15.) The framework is the set of resulting roles and tools, which explains the phenomena of multimedia teaching case development (and use). The dissertation is heavily rooted in an empirical data set, but is not in anyway non-theoretical. It relies on review of literature and considerations on how literature interplays with this relatively new area of multimedia teaching case development.

Grounded theory - as described by Strauss and Corbin 1998 - provides a very detailed framework for analysis procedures, with both formal and informal coding procedures, such as open, axial and selective coding. Examples of the coding procedures used in my research will be given later in this chapter and in 5.2.

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[51] See Baskerville and Pries-Heje 1999, p.8 for how they integrated grounded theory in action research for information systems development and p. 2 as well as the case study beginning at p. 9, for arguments on applying grounded action research to information systems development.

Actions Based on Theory

The five phases of action research, first identified in Susman and Evered 1978, are:

- Diagnosing,
- Action planning,
- Action taking,
- Evaluating and
- Specifying learning.

These can be viewed as a cyclic process, evolving within the client-system infrastructure. (More about the phases and relation of the actions within this study will be shown later in this section and in details in the following chapter).

As action research has been applied in different settings, different types of approaches have emerged (Kemmis and McTaggart 2000, Baskerville 1999)[52]. One of these is participatory action research and as Richard Baskerville states *"Formerly, responsibility for theorising rested primarily on the shoulders of the researcher. In participatory action research, this responsibility is shared with client participants"* (Baskerville 1999, p. 17). The major difference is therefore that it is value based. It is recognised that the researcher(s) and the clients contribute each with their own theories. Theories, which guide actions and later theory generation. The researchers have their academic knowledge and theories, whereas the clients have the situation-based knowledge and theories about the practice. (Kemmis and McTaggart 2000, Baskerville 1999.)

However, it also turned out that grounded theory offers a way of utilising the concept of using theory for planning action. Again an aspect that is often mentioned in action research, but no framework for carrying this out is provided (Susman and Evered 1978, Baskerville 1992, Kemmis and McTaggart 2000). *"Because some grounded theory techniques can dramatically improve the rigor and reliability of the theory in action research, it could really improve the generalizability of the findings of action research"* (Baskerville and Pries-Heje 1999, p. 19). This is my primary reason for using grounded action research.

Newer and adapted versions of grounded theory use a dialectic approach to theory. It is both inductive and deductive (Strauss and Corbin 1998)[53]. We (researchers) base the reading of data *"…along with our assumptions about the nature of life, the literature that we carry in our heads, and the discussions that we have with colleagues"* (Strauss and Corbin 1998, p. 137). I personally see the literature playing a larger role than just including the literature studies I

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[52] Besides Participatory action research as Kemmis and McTaggart 2000 and Baskerville 1999 investigates, the first paper also introduces Critical action research, Classroom action research, Action learning, Action science and Industrial action research to frame the classes of action research programmes (Kemmis and McTaggart 2000). Richard Baskerville does not define any of the "sub-classes" of action research, except participatory action research, but does strike on an important distinction. *"The term 'action research' is itself used, on the one hand, to refer both to a general class of methods in social enquiry, and on the other hand, to a specific sub-class of those methods as distinguished from 'action science', 'action learning', 'participatory action research', etc."* (Baskerville 1999, p. 6).

[53] Grounded theory is often critiqued or appraised as being purely inductive (see for example Charmaz 2000, Baskerville and Pries-Heje 1999, Miles and Huberman 1994). It was Glaser, who was the main promoter of this strict approach, and who believed in abandonment of predefined concept to allow for truly grounded theory (see discussion in Miles and Huberman 1994, p.208). However, in more recent work Strauss and Corbin argue that their view on grounded theory is more dialectic. Glaser and Strauss originally emphasised induction, due to the large amount of ungrounded research that was carried out, but they too emphasised the relationship between the researchers' interpretation of meaning and the data collected (at least according to Strauss and Corbin 1998, p. 294).

have in my head, and we have in BUSINES-LINC been actively looking for theories, which could support the planning of action, as was seen in chapter 4.

There is however one aspect of the Ph.D. study that does not comply with grounded theory. An action research program "… *will typically commence with a practical problem that will suggest predefined categories and concepts"* (Baskerville and Pries-Heje 1999, p.7). In grounded theory categories are derived from data. They can not be pre-defined (Strauss and Corbin 1998). This suggests that grounded theory cannot be completely integrated into action research, but can inform and improve the theory generation part.

Using an Interpretative, Explorative Perspective

An interpretative perspective is used throughout my analysis, using a hermeneutic and phenomenological worldview - as mentioned in the methodological overview of the dissertation 2.4.

I do not see this as incompatible with grounded theory[54]. This is however Miles and Huberman 1994 argument, when comparing the many different qualitative research methods. They mention an *irreconcilable couple* between the quest for *lawful relationships* in social anthropology (the category which grounded theory is put in) set against the "*search for "essences" that may not transcend individuals, and lend themselves to multiple compelling interpretations (phenomenology).*" (Miles and Huberman 1994, p.9) They may in fact be irreconcilable, if the meaning is that they can not be fully integrated. However, they can supplement each other.

The essences as Miles and Huberman 1994 mentioned are to me the happenings, acts and emotions, which stand out from the ordinary and catch my attention. Essences together with descriptions of lawful relationships (the regularities and patterns) enhance the analysis and the creation of concepts, because essences can be rich sources for questioning what is happening and why. Such interpretative aspects forced me to look further into my data, before "jumping" to extractions and conclusions.

Maaløe argues that it is not a necessity to have an explorative approach in qualitative project, but that it (to him) is a natural choice, when conducting qualitative projects that are grounded in empirical data, with a purpose of generating usable concepts, relying on existing literature. (Maaløe 1996.) Miles and Huberman say the following about explorative research approach: "*The ultimate power of field research lies in the researcher's emerging map of what is happening and why. So any method that will force more differentiation and integration of that map, while remaining flexible, is a good idea. Coding, working through iterative cycles of induction and deduction to power the analysis, can accomplish these goals*." (Miles and Huberman 1994, p.65.)

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[54] For a well-put argument on interpretative aspects in grounded theory see Charmaz 2000, on constructivist grounded theory. Also, back in 1978 Susman and Evered discussed a hermeneutic view to action research, though not from the more "modern" participatory action research perspective, which I use. The argument of Susman and Evered was that a hermeneutic interpretation strengthens the researcher's position, enabling him/her to see the system in another way that the "ordinary" system members would, and the researcher would thus be able to "*see possible solutions not seen by system members.*" (Susman and Evered 1978, p. 595).

Sampling Strategies

BUSINES-LINC was a two-year research study. The characteristic of the project, which had other researchers and educators as members, gave me the opportunity to not only observe the development of multimedia teaching cases, but also to actively participate, give suggestions to work-processes etc. In the BUSINES-LINC project everybody was aware of my role in the project, the dual roles of producing the cases and doing research about them at the same time. And, I was aware of their similar roles, some of research, some of education (using the cases as they were produced) - or rather we understood our roles, as they evolved.

Within the scope of the BUSINES-LINC project, I aimed at an intense (rich data) and combination sampling, Miles and Huberman 1994. This included both:

- Interviews with different stakeholders and the different partners in the project (though the objective was not to make a comparative study of the different countries development models per se, rather to see different approaches from different business schools).
- Triangulation between different types of data, ranging from observation notes taken at meetings and during my own development work, field notes written after meetings, to recorded interviews with the other members in the project, and then a wide range of work documents. The work documents were minutes, internal work in progress reports, official deliverables to the EU etc.

Grounded theory uses theory-driven sampling strategies, but the final research design was not created "up-front", prior to any empirical data collection. The sample tends to be intentionally picked out, and evolves during the fieldwork process, unlike quantitative data, which uses a more randomly pre-defined sampling strategy (Strauss and Corbin 1998). I like the expression *conceptually driven sequential sampling* for this type of sampling strategy (from Miles and Huberman 1994, p.27), which is similar to what occurred in my Ph.D. project. E.g. my original intention was to focus on the development process only, and not to investigate the use situations, but as my understanding of the area increased, I realised there was a need to investigate this use dimension in details as well.

Action Research Cycles

As shown in Figure 5.1 the client-system infrastructure represents the environment in which the phases of this grounded action research cycle project are carried out. This figure is inspired by the figure " *The cyclical process of action research*", from Susman and Evered 1978, p.588.[55] To this "classical layout" I have added the pre-defined 'problems/objective' of the BUSINES-LINC project programme and the 'literature' of theories and models, both of

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[55] The figure in Susman and Evered 1978 shows the five phases in action research, with the client-system infrastructure in the middle, informing all phases. Baskeville 1992 and 1999 uses a similar notation referring to Susman and Evered 1978, but places the client-system infrastructure as surrounding the action research cycles. A notation I have also adopted in my version of the figure.

which are characteristic for the way I have carried out this grounded action research programme.

Client-System Infrastructure

The official project program of BUSINES-LINC in many ways laid the foundation and constituted this temporary organisation. The program presents the participating organisation, funding structure, the deliverables (and deadlines), which we were expected to produce, plus managerial responsibilities. There was therefore a quite explicit agreement and specification about the objective and the "official" relationship between the different partners. The actual individuals participating in the project were determined by the individual organisation / department, and it was quite clear for all that a few of us had a personal research interest within this temporary organisation, whereas others had a more educational interest.

One could say that the organisational structure of the BUSINES-LINC project had two aspects. Some members were members of the overall project organisation, and participated closely in all BUSINES-LINC meetings, took part in the decisions and in the general administration of the project. We referred to this group as the "consortium". The other part of the organisational structure consisted of members, who worked for one of the local partners and on the development of this partner's three cases.
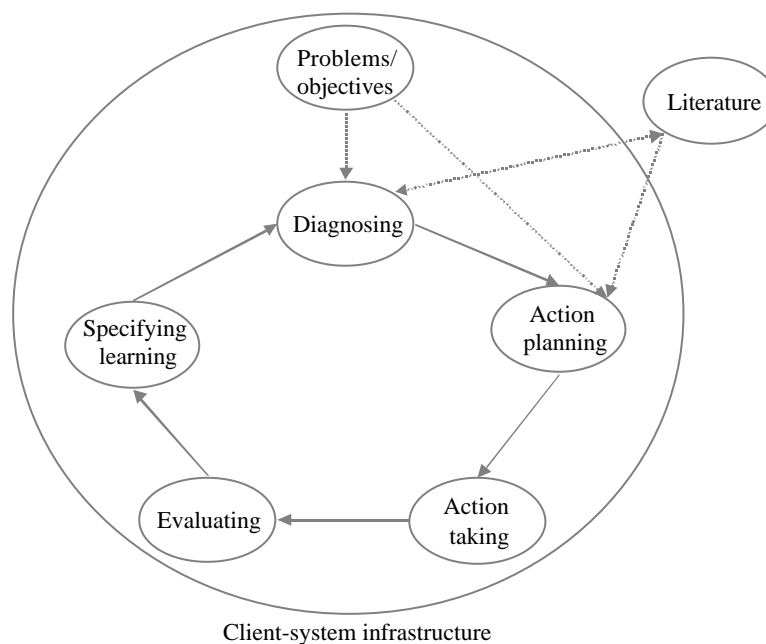
Figure 5.1 - The cyclical process of grounded action research

Diagnosing

In the diagnosing phase the primary problems that cause the organisation's request for change is found (Baskerville 1992). The primary problems of the organisation BUSINES-LINC were identified prior to my involvement, as the work of making the project application explicated many of the areas in which action was needed. However, it became quite clear, as the project commenced that this was on an overall basis, and so 'diagnosing' was also a vital element of the first action research cycle, and even more so for the next who followed.

For example the objective of the teaching cases was to disseminate innovative business solutions. But how is that defined, and what information has to be collected to cover a teaching case with the content: innovative business solutions? For the Ph.D. project, this pointed to a diagnostic process, which led me to look for ways of supporting the analysis phase of multimedia teaching case development; tools that would help the different roles in the development team understand, what type of content was needed.

Action Planning

The planned actions relied on theory within the given area (as discussed). This was especially true for our first cycle, when developing the first round of cases and laying the foundation of a mutual framework, based on the existing areas. We employed theories, and everyone in the project donated with their experiences with either multimedia development and information systems development in general or especially case teaching and writing. As the project evolved the experiences pointed to new areas in the literature or other viewpoints of that same area. So when new actions were planned and the next set of cases had to be developed, it was a combination of these experiences, the new literature, and the project programme objectives, which found its way into the new actions taken.

Action Taking

The actions in a participatory action research program are implemented in a co-operative manner (Kemmis and McTaggart 2000, Miles and Huberman 1994, Baskerville 1999). The degree of co-operation in BUSINES-LINC was high, perhaps due to the relatively small size of the project organisation. However, I also found that there was a high degree of independence or autonomy among the partners. I believe this is quite characteristic for researchers (which the vast majority was, even the people, who had a primary interest of education in this particular project). Such an independence lead at times to self-government and alteration of the decisions taken, and thus to a slightly different set of actions carried out at the different partners. However, whenever such deviancies became clear to us, we addressed them, looked for answers and discussed the results.

Evaluating

Evaluation focuses on the changes, which the actions resulted in. Due to the large number of different business schools attending (six partners from all over Europe), there were also rather large cultural differences, and sometimes also differences in how the various planned actions were perceived. Therefore the findings were evaluated, not so much to compare the results as to which partner "was best", but to uncover the differences, and understand the implications hereof.

Specifying Learning

"*While the activity of specifying learning is formally undertaken last, it is usually an ongoing process.* " writes Baskerville 1992 (p. 5), and points to three types of audiences for the learning outcome. First, within the BUSINES-LINC group, where we learned from our actions, and for example the new way we worked with a tool. Secondly, when explicitly identifying our lessons learned, this gave input to new action research cycles and further diagnosis for the research project. Finally, the learning provides important knowledge for the scientific community and practice[56] of multimedia teaching case development. It is this third type of audience that the result of this dissertation is addressed to.

5.1.2. COGNITIVE ETHNOGRAPHY

I have in the previous section lead an argument for the use of grounded action research, where a sequential sampling strategy lead to the inclusion of the use dimension. The following investigation deals with the method of cognitive ethnography applied in this dimension. This method is seen as an add-on to the approaches used when gathering and analysing content from the BUSINES-LINC project, but in a way, which requires separate treatment as it is an entirely different setting, which requires another set of techniques. I will in this section discuss the issues of:

- Including the Context
- Using Ethnography to Research the Context

Including the Context

As discussed in the introducing chapter, a few digital teaching cases were available when the BUSINES-LINC project commenced, but very little research on the area existed. The ECCH seemed (and still does) to lead in presenting reviews and opinions of people, who have experience with digital teaching cases.[57] For example already in late 1998, Gallagher and Stevensen reviewed four of the first attempts with teaching cases and one business simulation in some form of multimedia environment, some even within an

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[56] Only scientific communities not practice are mentioned in Baskerville 1992. But I would emphasise that the result of the Ph.D. is highly relevant for practice. That the roles and tools we used in the final stages of the BUSINES-LINC project, and the experiences (supporting and inhibiting factors) could help others, who develop such teaching cases.
[57] See the ECCH newsletter, also accessible on line on http://www.ecch.cranfield.ac.uk/ .

Internet setting (including hyperlink to web). In general they were quite positive to the approach, and their judgement was that "*At best they attempt … to bridge the gaps between cause and effect relationships; between theory and practice; and between fear and confidence. They achieve these ends by presenting materials, which allow the case user to construct, challenge and test this new found well of knowledge. At worst, they provide interactive data bases, which allow the user to access information more rapidly.*" (Gallagher and Stevensen 1998, p. 20)

Gallagher and Stevensen observations are clearly that of experienced case instructors and writers. However, their perspective on enabling the student to test this new-found knowledge, is one that I am not fully aligned with. The two authors are speaking in favour of those cases that in the end contain test questions, which include answer guides, suggestions to solutions and theoretical indications.

Testing the user at the end of a multimedia case session may be helpful in determining whether the user (the student) is able to recall the case story. However, according to the teaching paradigm of case-based teaching, it is the ability to work with the case story, to construct (new) relations, to reflect on the content and to create and evaluate decisions based on that content, which are important (as discussed in 4.1.2). It is therefore neither solely the teaching of the factual content from the case story, or solely the reflection and decision making process which is in focus; it is in the relationship between the two.[58] This can only by evaluated in the context of the whole teaching process.

Using Ethnography to Research the Context

When studying the use situation, I can compare the approach used directly to an ethnographic field study. Here participatory observation is in a form, where the influence of the researcher on everyday life is recognised, but sought minimised. However, quite often this research format acknowledges observation as the only valid data collection technique. (Van Maanen 1988.) Nevertheless, the extend to which I have to contemplate my own involvement and bias is similar to this research school, and many of the techniques used for data planning, collecting, analysis and interpretation are similar.

When assessment of information communication technologies and design of software systems are considered a lot of researchers point to the use of "semi" ethnographic research methods. That is, methods that are rooted in the epistemological stance of ethnography, but which deliberately combine the more traditional ethnographic collection techniques of observation and field notes with for example video analysis, semi-structured interviews and questionnaires (Ball and Ormerod 2000). Ball and Ormerod 2000 refers to this as *cognitive ethnography* (see also Blomberg et al. 1993 for a description of how ethnography is used to enhance design of software).

I used a so-called convenience sampling strategy (Miles and Huberman 1994). That is, I made use of the willingness of instructors from the Copenhagen Business School, to use

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[58] In Gallaghers and Stevensons defence, they did state that one of the cases "*successfully enlivens the learning process but stops short of testing the user, probably because at this point class interaction would be more appropriate to this case material.*" (Gallagher and Stevensen 1998, p. 21).

their case teaching classes as field study "objects". I aimed at a maximum variation between the different target groups (student groups ranging from bachelor to graduates and MBA classes, and also observing three different instructors). However, homogeneity or some sort of consistency within that group was also important to me, such as applying different cases developed in the BUSINES-LINC project to the same class. This enabled me to study whether certain aspects from a class had some degree of continuity, or whether it was related to one teaching case only.

The data collection techniques used were observation and video recordings of use situations (primarily class discussions, but also individual and group preparations in one of the classes), questionnaires and testimonies from instructors. The use of observation and video recordings were based on a perspective to meaning construction that says: When the students brought forward a specific subject from the case in the class or group discussions, this meant they were relating to and dealing with the subjects, which were present in the case. Since I did not evaluate the learning process of case-based teaching as such, the scope of this data was to see, if the multimedia teaching cases enhanced and triggered the discussions as they were designed to do (according to the teaching objectives in the teaching note and the instructors intentions).

5.2. ANALYSIS OF MULTI- AND HYPERMEDIA MATERIAL

The purpose of this section is to illustrate which techniques have been used to analyse the collected material. It is not only the object under investigation, which have a multimedia character, also the collected data consist of several media forms, and can be seen as interconnected into a hypermedia structure. Ricki Goldman-Segall expresses that the advantage of the use of several media types is that it invites the researcher to "*as many "points of viewing" on the data as possible to increase triangulation"* (Goldman-Segall 1994, p. 49).

Below follows a presentation of the analysis techniques used in the development and use dimension. Due to the rather different characteristic of the techniques used in the two dimensions, I deal with them in two separate sections. 5.2.1 illustrates the analysis of data from the development process, and 5.2.2 the analysis of data from the use situations.

5.2.1. ANALYSIS OF DATA FROM THE DEVELOPMENT PROCESS

When Baskerville and Pries-Heje used grounded action research, grounded theory activities were integrated "*primarily in two ways. First grounded theory notation (e.g. memos and diagrams) was used to represent the theory-data during the action research cycle. Second, grounded theory coding became the essence of the evaluating, learning and diagnosis phases of action research*" (Baskerville and Pries-Heje 1999, p.8). The same format was used in my research, by using the formal and informal coding procedures as described in Strauss and Corbin 1998.

In this section I will address the analysis of the development dimension from the following perspectives:

- The Coding Process in Grounded Theory (Overview)
- Choice of Software Platform
- Open and Axial Coding - with ATLAS.ti
- Selective Coding Using Analytical Storylines

The Coding Process in Grounded Theory (Overview)

The coding process consists of several parts, and should, according to Strauss and Corbin 1998, begin with microscopic examination of data. Here the properties and dimensions of each word and line are examined, thus the other name: "line-by-line" coding. A microscopic analysis gives the researcher sensitivity towards the different possible interpretation of data, that the actors (the researcher and the other participants) may have.

It is the definitions of formal coding procedures and guidelines for how to carry them out that grounded theory is most rewarded for. Open coding is the conceptualising process, where the data material is assigned different concepts according to defined properties of that concept, by the use of nodes and memos. As this process is carried out a pattern emerge and the different concepts will be formulated into categories. A category is an overall phenomenon observed in the data, and axial coding is the coding process, where sub-categories are found. The use of visual mini-frameworks and conceptual diagrams is part of the axial coding process of finding the relationship between the different concepts. Selective coding is the process of integrating the different categories, and choosing central categories for formulating a theory. One technique, which I have explicitly used, is the analytical storyline, which is the formulation of a complete story about a certain category or the relationship between several categories.

A set of less formal analytical techniques is also part of the framework. Two examples are:

- Using questioning, by asking questions to the data material. E.g. when a tool was investigated, the question of "what are the main characteristic of this tool?", often let to a number of supporting and restraining factors to be listed, which could then be further investigated.
- Using the flip-flop technique, by looking at the opposite of what is actually being investigated. E.g. when the consequences of confidential information from the case supplying company was investigated, then the opposition was to ask what would happen with the development process, if there was no confidential information to take into consideration.

Choice of Software Platform

I used a software package to support the analysis process, and due to the multimedia nature of the data material, I had a number of requirements to the software package. Besides multimedia support, it should primarily support the explorative and qualitative nature of my research study. I evaluated 7 of the most well-known packages for qualitative analysis: ATLAS.ti, Constellations, HyperRESEARCH, MacSHAPA, NUD*IST 5 (known as just N5), NUD*IST VIVO (known as just NVIVO) and Vprism. The evaluation was based on examples from my own data material.

The package should be able to handle not only text documents, but also graphic, sound and video, which all in principle were able to, except for N5. However, both N5 and NVIVO were able to analyse rich-text formatted text and not just unformatted text as the others. Vprism is almost entirely for video analysis, and I did not feel it was appropriate for analysis of for example text documents from the BUSINES-LINC meetings. As I began evaluating the different packages, I found that even though the latest versions of these well-known brands claimed that they could handle multimedia elements, the majority would in fact seldom allow for coding of video/sound. Instead they would only allow one code or memo to be assigned to one video or audio file. What I needed was to be able to divide a single file into sound/video segments, and assign different codes to each segment. Only three programs allowed this: ATLAS.ti, Constellations and HyperRESEARCH.

Constellations only supported one codex for each media type (QuickTime for movies, PICT for graphic, sound system 7 for sound, and txt for text-documents), and it runs on Mac only. (I preferred to run my analysis on a PC). HyperRESEARCH had a restricted support for explorative research. (HyperRESEARCH encourages a hierarchical structure of nodes, which does not fit well with an explorative nature in the beginning of the analysis). As a consequence I chose to work with ATLAS.ti, which had several codex available, and more importantly also had a hermeneutic explorative view on qualitative analysis.

Another criteria/facility that lead to the choice of ATLAS.ti was that it allows for these different views on the multimedia material to be explicated, by hyper-linking relevant segments of data with other segments of data. That is, rather than just assigning two related segments (called quotes in ATLAS.ti) with the same node (code in ATLAS.ti), a relationship between data could be showed. This facility supports the creation of a storyline later on in the coding process.

Open and Axial Coding - with ATLAS.ti

I used ATLAS.ti for both open and axial coding. Figure 5.2 shows how the different primary documents are coded. (Each interview, minute etc. is called a primary document in ATLAS.ti). Non-digital material, primarily hand written notes from meetings and field-notes taken directly after a meeting or during a workday in the project, was analysed by hand / not digitally. These hand written interpretations were entered as memos into the

Hermeneutic Unit (as the collective set of documents, codes, memos and diagrams is named in ATLAS.ti).[59] Figure 5.3 shows how an audio file is coded.

ATLAS.ti allows for in-vivo coding. Those are segments of data (called quotes in ATLAS.ti) from a primary document, that are so important that they themselves become code, with which the other quotes can be annotated (Strauss and Corbin 1998). I did not use this feature much, rather I found the need to use the explorative nature when generating codes. That is, when I found concepts (usually based on the analysis of several primary documents) that were so important that they should not just be mentioned in memos, I wanted them to be assigned their own new code, and from then on other segments of data could be assigned this code. As this coding process continued, I could organise the different concepts according to their relations. Where some programs only allow predefined codes, concepts and relations, ATLAS.ti allowed in-vivo procedures and the generation of codes (concepts) in an explorative nature.

The primary documents were thus first coded primarily according to my literature studies (in chapter 4, the Domain Dimension). As the research project evolved, and experiences from the action research cycles manifested themselves, the coding strategy shifted. From that point, categories were primarily generated from data, not theory. (Though as the action cycles were literature driven from the beginning, also these data were rooted in a theoretical perspective.)
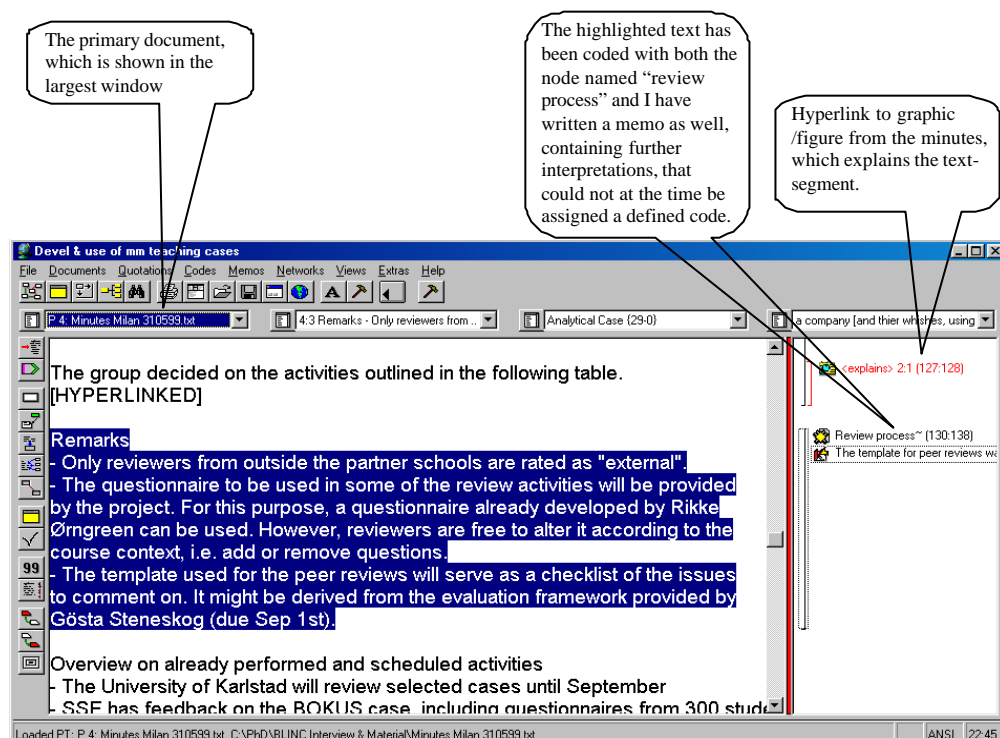
Figure 5.2 - Open coding of text in ATLAS.ti

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[59] This approach was chosen, since I did not have a scanner available at my office, which would otherwise have been the preferred solution.
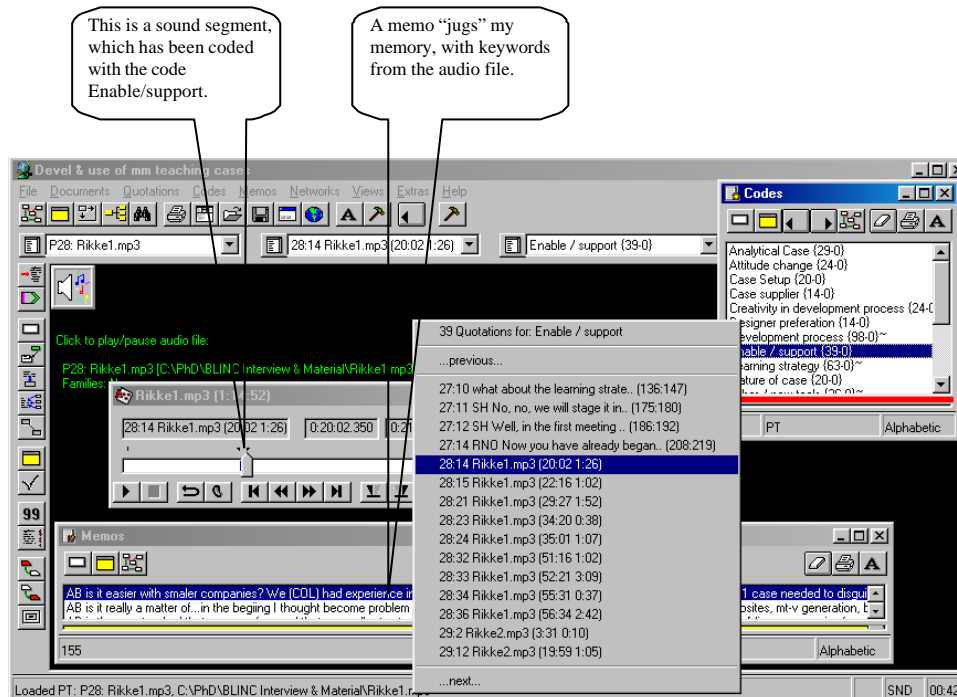
Figure 5.3 - Open coding of audio files in ATLAS.ti

An example of axial (and to some extend selective) coding is a network view (presented in Figure 5.4). This was a technique that I used frequently. The diagram shows an early (project wise) representation of all the codes in the network, and a selection of quotations. The selected quotations are those that are linked to the code named "case supplier", and the figure also shows, which other codes these quotations are linked to. I was not surprised to find that whenever we in the BUSINES-LINC project discussed the case supplier, it was especially in relation to the interfering or enabling factors. However, at this point in the analysis three other codes seem to be closely related as well. The network view showed that the case supplier had an influence on the development process (which the code named "development process" annotate). It also showed that our (the consortium's) attitude toward the case supplier's role had changed in the course of the project, (which the code with the tag "attitude change" stands for). Finally, it seemed at this stage that the code "nature of the case" either influenced the role of the case supplier or vice versa (see the code "nature of case").
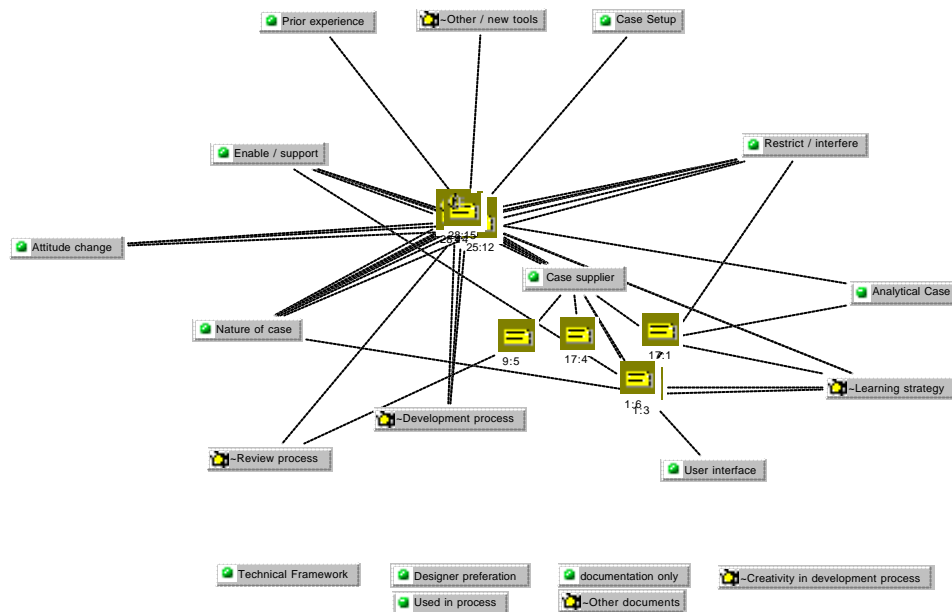
Figure 5.4 - Axial coding by use of network-views in ATLAS.ti

Selective Coding Using Analytical Storylines

Selective coding by writing analytical storylines was primarily done in an ordinary word editor, but on the basis of especially network-views as the one just described. These stories were inspired by ethnographic narratives (Van Maanen 1988), in a structure according to context and time (historical events), so I could still see the development of each tool or role taken from the different action research cycles. (Unlike ethnographies, these stories are not meant for publishing, though I did at times deliver them to my supervisor, as basis for our discussions. They are thus written in a non-formal language, and can be difficult to understand for people with no knowledge of the project and the collected data.). I used them primarily to make my interpretations explicit, as can be seen in Figure 5.5, rather than formulate distinct theory. The formulation into final theoretical findings was done in a more formal language, which has now evolved into this dissertation.
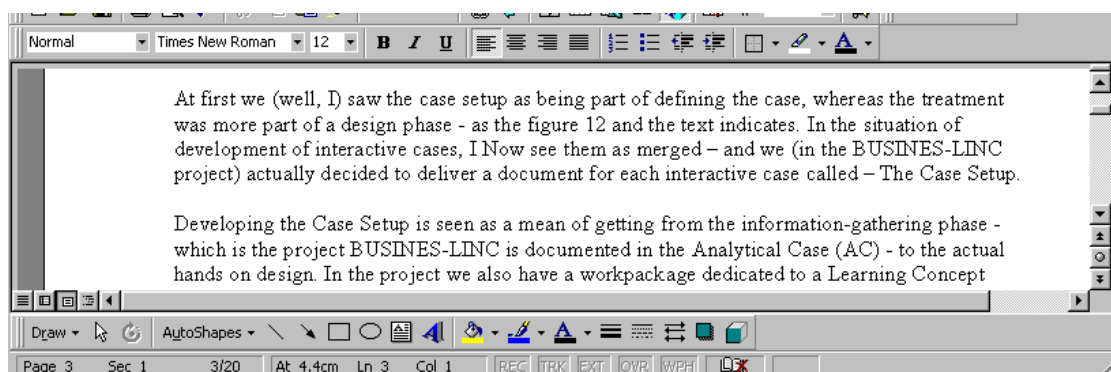
Figure 5.5 - Selective coding by use of analytical storylines

Evaluation of the use dimension was carried out in every action research cycle. Four types of data were collected:

- Written and recorded testimonies from instructors,
- Questionnaires,
- Field notes and
- Video recordings of use situations.

In principle, I was able to annotate directly the (written and recorded) testimonies from instructors in ATLAS.ti. But it turned out that I needed to investigate two aspects, before I was able to carry out my analysis of the observations and recordings made in class, and compare them to the findings in the questionnaire. Primarily, I lacked an effective tool for video-analysis, but also a clear understanding of how I could "register", if the message of the system (the case story and the lessons learned of the case) was transferred to the students. Thus in this section I will investigate:

- Critical Perspective on Video Analysis Techniques (Overview)
- Using the Interpretative Storyboard
- Applying Blooms Taxonomy
- Questionnaire

Critical Perspective on Video Analysis Techniques (Overview)

When I looked to the literature for suggestions of how to analyse video, I found that even the appraised methods did not take advantage of this rich medium, but were instead very textual. For example, two very frequently quoted authors are Suchman and Trigg 1991, which start their analysis with detailed transcriptions, which are purely descriptive and time consuming. These transcriptions are based on Jefferson's symbols, where pauses, movement etc. are annotated using coherent symbols, and speak is written down word by word[60]. Their analysis is then based on the transcriptions of the discussion and facial expressions. (Suchman and Trigg 1991.) I too see tempo and emotions as important issues in case based teaching, but they should not be based on the recorded tempo shifts and expressions, and not on detached abstractions.

Another aspect of the literature on video analysis is that it is often kept on a meta level. Articles contain profound discussions about for example ethical issues when conducting video analysis, which is highly relevant, but they rarely give any guidance in how to proceed with your own recordings, except advice on transcription notations (Alrø and Kristiansen 1997, Bødker 1996 and Suchman and Trigg 1991). Only Susanne Bødker, as one of the only authors also apply movement, in the form of logging the users focus on the interface, in her video analysis (Bødker 1996). However, again the descriptions are on a relatively abstract level, not including any guidance. As I have described, the last couple of years a number of software packages have been developed, which are able to run and code video

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[60] See Suchman and Trigg 1991, p.69

sequences, but considerations on what to look for, how to contemplate movements on screen etc. is not within the scope of such software.

Ricki Goldman-Segall points to yet another aspects, which she found was seldom considered, namely that video recordings are interpreted data from the moment they are shot (Goldman-Segall 1994). They are interpretations just like transcriptions are, (where a choice is made on what to transcribe and how). So my analysis or interpretation of the data material began already in the classroom, when selecting the different camera angles. It was therefore important to be aware of the type of data I was looking for, prior to the recordings. But even so, it is also important to remember while conducting the more formal analysis "back home", that the choice of camera angle was sometimes just made "from the top of my head", as the use situation was carried out, and was not the result of careful considerations.

Using the Interpretative Storyboard

Due to the focus on textual analysis, the time-consuming process and lack of practical guidance in existing video analysis methods, I began looking at other sources. As a result I developed the interpretative storyboard for video analysis, based on the data material from this research project and based on three existing research areas. First and foremost on the literature on video analysis (such as Alrø and Kristiansen 1997, Blomberg 1993, Bødker 1996, Goldman-Segall 1994, Suchman and Trigg 1991.) Secondly, on dance notations as inspiration on how to annotate movements and tempo, originating from especially the classic ballet (Benesh and Benesh 1977, LabanLab 2002, Watts 1998)[61]. Finally, on the way movie analysts' use analytical or interpretative sketches for film/movie analysis, which I found were very similar to the inverse use of storyboards (see for example Bordwell and Thompsen 1997, Hart 1999). This inspired the format of the approach, where I use cascades of frames, the coding of emotional factors, and the relation in time between the observed actions (tempo). The idea arose that if storyboards could be used for both the creation and evaluation of films, then perhaps the same could be done with multimedia systems. The technique turned out to be efficient and serve the purpose well.

This technique has been used for identifying discussions on the subjects from the case, the culture in the class, the type of language (non-verbal and verbal communication) spoken, as well as distinguishing the passages and character of actions (moods and tempo in the discussion).

The argumentation and discussion on how this approach emerged can be seen in the paper, "Learning happens -rethinking video analysis", written by Nielsen J., Orngreen, Siggaard and Christiansen 2002. In this paper my own approach and contribution to video analysis (the interpretative storyboard) is illustrated together with the three other authors' individual approaches. I will not go through the actual notation and technique behind the

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[61] Dancenotations are symbol systems for representing movement of the human body in space and time.

interpretative storyboard here. Instead, I have included a presentation of the visual analysis carried out in Figure 5.6, and in Table 5.1 an example of an on-going analysis is given. (I am not able to show the actual storyboard drawings, since the students would like to stay anonymous, but they do give an idea of the process carried out.)

Figure 5.6 - Drawing in and out of the frame in video analysis

The two drawings in Figure 5.6 show how I used both the concept of analysing what is seen directly in the frame, and what lies "beyond the frame". That is, concepts that are not

directly recorded, but understood from what is recorded and observed. The top frame shows how one of the members holds one paper up in the air. However, he does not do this to inform his fellow about a subject matter issue, but rather to make a joke. It is always he, who interrupts, which can also be seen from the on-going analysis in Table 5.1. Figure 5.6 also shows that he holds the paper up to a person not recorded by the camera - only his legs are seen. So it is not possible to directly see his reaction, but I can tell from his voice, and the reaction of the person holding the paper that this was not the "smartest" remark, and the conversation quickly shifts to something else. Also, movements are annotated, even though that may not actually be recorded. (It is also important to remember that these drawings are made by me (the researcher), who also recorded / observed the situation as it happened).

The frames that I selected for this kind of analysis would be drawn together to show the flow of use situation. The purpose was either to identify different levels of discussion according to Blooms taxonomy (See the following section) or to illustrate different ways of using the case (as printing material, while discussing it, as Figure 5.6 illustrates). Table 5.1 presents how I produced an on-going analysis of different perspectives, as kind of analytical storylines, which would evolve as the analysis evolved. In this example I pursue an identification of the verbal language and culture of the particular use situation.

The verbal language of the particular area is identified.
The researcher is familiar with the environment (who is the observer, recorder and analyst). From a vocational perspective, the case is used in a class about the strategic use of IT resources in companies. Unlike the rest of the class, this group is not DØKére[62], which might give them a different perspective on the preparation, as they are a bit older than the other undergraduate students, and have already finished a bachelor degree some years ago. They have now decided to study the DØK graduate/master part, and to this end they need some subjects from the bachelor part. They may also be a bit more motivated, since they pay for their education, unlike the others, who are financially supported by the government. Sometimes the group use a rather "boyish" language, and their stereotyped attitudes toward girls' (children that is) use of the Internet and technical toys, dominate the subject matter discussions at times. It is especially B who always has a "funny" remark, and who interrupts the more serious discussions, where M is a bit more silent, and Ra tries to control and keep them "on track". And thus it is often Ra, who takes the initiative to shift the subject of the conversation in the group from irrelevant matters to the case subjects, and it is B, who changes focus to the peculiarities. Even though they do not know each other very well, like regular DØK-students, they seem to communicate well, without misunderstanding each other. ….[cut]

Table 5.1 - An on-going analysis in video analysis

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[62] The class observed was from a certain line of education on CBS that belongs to the area of computer science and business economics. DØK is the abbreviation for that line.

Applying Bloom's Taxonomy

Because of their association with behaviourism, it may appear unusual to use Bloom and his colleagues' *Taxonomy of Educational Objectives in The Cognitive Domain* (Bloom et al 1956) in a context that claims to be dealing with a more constructivist approach to teaching[63]. Virginia S. Lee argues that Bloom's taxonomy using six levels is in fact useful in the active construction of knowledge (the six objectives are depicted in Figure 5.7). "[The taxonomy] *reflects not only the importance of acquiring information (i.e. Level 1: Knowledge) but also the intellectual processes of application, analysis, synthesis and evaluation by which we transform raw data into formalised knowledge structures. Utilising the taxonomy ……teachers can establish the ability to construct knowledge as a meaningful student learning outcome and embed its practice explicitly into the essential components of their courses.*" (Lee 1999, p. 4)

In other words, if it is possible to observe the students recalling subjects from the case (recognition being one of the attributes related to the first level, knowledge - Bloom 1956), such a behaviour can indicate that the first step in the construction of new knowledge is initiated. She (Lee) is thus seeing Bloom's six teaching objectives as a six-layered process, with the phases that the students have to go through, comparable to case-based teaching.

This argument may in fact be supported by Bloom himself. In their second handbook, Bloom together with Kratwohl and others argue that teaching at the higher levels may be more efficient by using discussion and problem-based teaching than lecturing (Kratwohl 1964). They are thus also saying that the problem-based teaching, which is part of a constructivist way of teaching, is not incompatible with the taxonomy. Also Erskine, Leenders and Maufette-Leenders 1998 address Bloom's taxonomy in their "teaching with cases" book, in which they claim it is possible to use cases at all levels, if the instructor so desires.

> 1. Knowledge
>
> 2. Comprehension
>
> 3. Application
>
> 4. Analysis
>
> 5. Synthesis
>
> 6. Evaluation
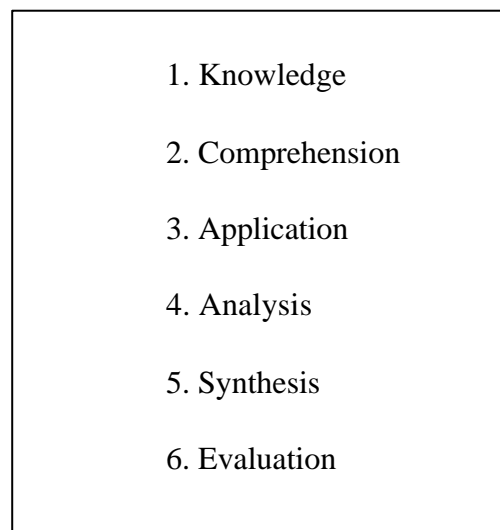
Figure 5.7 - The six levels in Blooms Taxonomy[64]

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[63] As the teaching case paradigm lies within - see section 4.1
[64] Derived from Bloom 1956, part II

In the report "Expert/Novices, differences in Case Analysis", Easton and Ormerod 2001 uses a very detailed framework that is based on Bloom's taxonomy - even though this is not directly mentioned in the report (perhaps due to the presumed paradigmatic collisions mentioned in the beginning of this section). This framework is divided into tables containing different forms of cognitive acts, for example "Cognitive Acts Involving Evaluation" containing attributes like: evaluate, exemplify and simulate; or "Cognitive Acts Involving Understanding" with attributes like: understanding case content while reading, while paraphrasing etc. (Easton and Ormerod 2001, p. 19-20). Participants were then placed in a laboratory environment, where they were observed and video recorded while preparing a teaching case, in a kind of thinking-aloud test. A quantitative analysis of counting these verbal protocols according to the different forms of cognitive acts identified was afterwards performed (Easton and Ormerod 2001).

Performing such quantitative analysis using Bloom's taxonomy would not provide any information on how and within which areas the multimedia cases support the student. Therefore, to perform an assessment of if and how the multimedia teaching case support the students is more vital than knowing, how many times did one student analyse content from the case. Focusing more qualitatively on how the students exemplify by use of case content, by relating to their own experience, or to other "cases", would confirm (or refute) the ability of the cases to motivate and engage the students. The analysis would show if the case trigger the memory of the student, to allow for application of material, for analysis etc. (The aspects, which in chapter 4 were found to be important for success of multimedia teaching cases).

Questionnaires

110 qualitative and quantitative questionnaires from the use situations have been collected. The purpose was to provide triangulation in to the analysis process. (On one side tendencies in the questionnaires could be refuted or found valid through video analysis, or a trend put forward by one student might be seen as supported or opposed by others in the answers to these questionnaires). The questionnaires also focus on technological issues, preparation time, preparation method and motivational factors, which cannot be observed from the class discussions.

The questions are shown in Table 5.2, where the Rockwool case is used as example. The questions varied very little from case to case to enable comparison. It was thus only the questions about the lessons learned, which had different content, but served the same objective, i.e. to ask if the students thought they got a clear perception of the processes depicted and understood the lessons learned).

The answers were first entered into a regular spreadsheet. Then the quantifiable questions were imported to SPSS (Statistical Package for the Social Sciences). That is, the questions in the two smaller tables in the top of the questionnaire and question 6 about

time used for preparing the case - see Table 5.2. In this statistical programme a frequency analysis was carried out to enable reflection on the response from the different target groups to the different cases.

	Fully agree	Agree	Rather agree	Rather disagree	Disagree	Fully disagree
I had a computer available to work on the case outside the university or I had enough possibility to work on the case in the school´s computer rooms.						
I had a satisfying amount of information available to work on the case on my own.						
The information provided in the case gave me a realistic insight into the subject (The process of Rockwool A/S company's entrance into the e-business world by use of digital technical manuals and software).						
I got a clear understanding of what the purpose of the site Rockwool.dk is?						
The text and graphics were understandable and well organised.						
The multimedia elements (mix actors speak and more objective text) were a good way of getting a deeper and more varied understanding of the Rockwool case						
The business plan was clear and usable.						
I had to search outside the case to write the business plan						

	Fully agree	Agree	Rather agree	Rather disagree	Disagree	Fully disagree
The Internet links were up to date and useful.						
The case has intensified my interest in the subject.						
The case was easy to use and navigate in.						
The case was well structured.						
The case had an overall professional appearance.						
It was fun to work with the case.						
I recommend you to use the case in future courses.						

1. Please, describe your overall reaction to the case and the case discussions today:
2. What did you like best?
3. What did you like least?
4. Do you believe you could use the lessons from the case or the discussions today in your future study or work situation? (if yes, which lessons, if no, why not?)
5. If you could change one thing to improve the case, what would you change?
6. How much time did you spend working on the LEGO case (total)?
7. With whom did you work with the Case, Individually, in a group, during class discussion?
8. How did you work with it (Did you solve the assignment, the questions provided by the instructor, did you take notes…)?
9. Do you have any other comments (also use the back of this page)?

Table 5.2- Questionnaire example from the Rockwool A/S case.

5.3. CONCLUSION - VALIDITY

This section concludes on the most characteristic decisions taken in the research design and reflects on the general validity of the research design. In my opinion there are aspects of this research project that makes it necessary to explicitly address the external and internal validity of the research findings. According to Miles and Huberman 1994, external validation deals with the transferability and generalisability of the study. Whereas internal validation deals with the questions: "*Do the findings of the study make sense? Are they credible to the people we study and to our readers?*" (Miles and Huberman 1994, p.278.) I would claim that my findings are valid, and in chapter 10 - in the Resulting Dimension and in 11 - the Future dimension, I will look closer into which restrictions there are to that claim, investigating areas of application and the future research areas, which the findings point to. However,

there are several features, which I will bring to attention at this point. Features that address both external and internal validity, these are:

- Doing Funded Research
- Fixed Numbers of Action Research Cycles
- Geographical and Cultural Distance of the Partners

Doing Funded Research

Cheek 2000 focuses in her paper on the researcher's freedom in funded research. She asks researchers to consider not only the ethical issues of the harm the research project or its findings can cause the people participating in a funded study[65]. Another issue is to contemplate what happens, if the delivered products do not live up to the fund-owner expectations. The BUSINES-LINC project was a funded project.[66] However, the Ph.D. dissertation is not under any obligations to the BUSINES-LINC project. Therefore, EU can not hold me accountable for any of the findings.

However, due to the close link between this EU funded project and my own Ph.D. research project, the concepts in my theories are similar to some of the findings within the BUSINES-LINC project. But the concepts, categories and their relationship are abstractions that I as a researcher have *constructed* from the "raw data".[67] The number of action research cycles performed also followed the funded project length, and could therefore not have been extended, even if the need had been present.

Fixed Numbers of Action Research Cycles

According to Baskerville and Pries-Heje 1999, the use of grounded action research to improve the generalisability of theory generation should imply that the action research cycles are continued, until the evaluation and specifying learning phases provide very little change in the planned actions and in the coded concepts (especially in the main categories). In my research, the number of cycles was externally given by the EU project programme, a situation, which is not ideal. There were three action research cycles in my research project, which compared to the scope of the study, has been quite acceptable for me.[68]

Another aspect of using action research cycles for theory generation is, that the researcher should be able to name the factors, which are kept constant during a cycle of implementing new actions. Otherwise, it is impossible to establish a relationship between the action taken and the effect it has. Or in other words, if all factors influencing the multimedia product or the development process is floating freely, then it is impossible to say that the changes found in the roles and tools were due to this or that action.

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[65] This is perhaps one of the more obvious issues of funded research, but not really an issue in BUSINES-LINC, where no form of personal sensitive information were dealt with. The students recorded in class did want to remain anonymous, and not appear with their "faces" in the dissertation, but this does not relate to the funding of the project. Also, the issue of keeping information from the case supplier confidential in multimedia case development is highly relevant, but not part of the doing funded research issue (see 8.1.2).
[66] And 2/3 of my Ph.D. salary stemmed from this project
[67] See Charmaz 2000 for description of constructivist methods in grounded theory.
[68] More details about the three cycles in the following chapter.

Geographical and Cultural Distance of the Partners

Though we made an effort of tracing the originating variables of the findings, the multimedia cases were developed in six different countries. It was therefore difficult to get a general view of which circumstances in the various environments had played a significant part. The geographical and cultural distance can also lead to the existence of different impressions and interpretations of what happened. As a consequence, the roles and tools in the development of multimedia teaching cases are well rooted in the Danish multimedia cases, which I have been deeply involved in (both developing and use wise).

This does not mean that the data material from the other countries has been neglected. A triangulation approach has been chosen to ensure different perspectives on the same experience (Miles and Huberman 1994). This is also the reason for choosing a more participatory approach, where all members' perception of what has happened, and which actions lead to what, are valued. As opposed to more traditional action research (or action science) methods, which have a clear researcher and subject domain distinction. Also, in this perspective of analysing experiences with multimedia teaching cases (use and development), it should be mentioned that it *does* matter, which material is coded first.[69] I have therefore provided visibility into the research design and interpretation processes, especially in this chapter, and the following gives an overview of the correlation of the collected data in time (chapter 6 - Process Dimension).

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[69] For example, if I chose to look at the results from the questionnaires of a class before examining the video recordings, my interpretations would be coloured from this and visa versa. Likewise, when the video recordings of one class are analysed prior to another recording of a different class, the second analysis will be influenced by the findings in the first analysis (Nielsen, J., Orngreen, Siggaard and Christiansen 2002).

PART 3

6. PROCESS DIMENSION

In this chapter I will present the BUSINES-LINC project and the technicalities of the product, the E-Case Series in more details, making the objectives of this project clearer to the reader. The primary purpose of this chapter is to provide an overview of the data that was collected during the Ph.D. project. I will do this by describing the grounded action research cycles in the project. This description should bring insight into the tasks that were carried out in the project, at the consortium level and at the partner levels. The description also attempts to identify the types of decisions taken, the experiences we brought about, and the emerging set of roles and tools used in the development process.

There are some issues of anonymity in the dissertation, especially in the use situations, where students explicitly asked that their names and/or "faces" were not revealed - as seen in Figure 5.6 in the previous chapter. However, the names of the participating institutions/partners and names of persons in BUSINES-LINC are shown throughout the dissertation.

The chapter begins with an overview of the E-case series and BUSINES-LINC (6.1), which is then followed by an investigation of the three grounded action research cycles (in 6.2). Hereafter an overview of the data material from the use dimension is given (in 6.3). The chapter ends with a brief conclusion or rather summary of the main characteristics of this chapter (in 6.4).

6.1. BUSINES-LINC AND THE E-CASE SERIES

BUSINES-LINC was supported by the European Commission, and the project team consisted of members from 6 European business schools: University of Cologne (Co-ordinator), Copenhagen Business School, Norwegian School of Economics and Business Administration (Bergen), Rotterdam School of Management, SDA - The Business School of Bocconi University (Milan) and Stockholm School of Economics. The project commenced in April 1998, which was seven months before I officially was employed as a Ph.D. student, but I was actively involved, and researched the BUSINES-LINC project from its start and to its end in Marts 2000.

The objective of BUSINES-LINC was to support and disseminate innovative business solutions, especially in the e-commerce area. The partners co-operated in the development of 18 multimedia business cases for educational purposes, though each partner was individually responsible for developing 3 cases. At least six of these should emphasise the concept of electronic commerce (e-commerce), according to the project programme, but in fact most of the developed cases have some sort of relation to e-commerce. The cases have been published and are being disseminated by the European Case Clearing House.

I was involved in all activities both on the international (the consortium) and national (at the Copenhagen Business School) level. This provided me with a network of developers and experienced (traditional) case teachers/instructors, as well as more inexperienced

assisting students, with different cultures and backgrounds. They were willing to participate in using the different tools, share their experiences on how the roles and tools influenced their development process, and further develop them in new action research cycles. Through qualitative interviews (often using an interview guide), meetings, reports, minutes etc. the project teamwork enabled me to identify roles and tools influencing the development of multimedia teaching cases.

I worked intensively in all phases of the development of the three Danish cases, and had five students working with me on especially the content gathering phases of the development. (Also external companies were used, for example for sound and video recordings). Two senior researchers from the Copenhagen Business School were involved. They especially took part in the general BUSINES-LINC meetings and decisions, as well as in the initiating and final meetings with the case supplier and conducted overall quality assurance measures.

Due to marketing reasons the collection of the cases has been named the *E-case series,* since they are Europian, Electronic and mainly E-commerce cases.[70] The cases represent real companies, and the real processes that they have been through. Unlike some types of traditional written cases (see section 4.1.1), these multimedia teaching cases contain quite a lot of information about what has already happened in the company with respect to the subject in focus, and could as such be seen as representing a case study. Though, they have been edited to enable students to co-operate and discuss with their colleagues and the instructor. The structure is intended to allow the students to evaluate the case company processes and past decisions; and create viable solutions to present problems/opportunities that the company is dealing with – in accordance with the case-based teaching paradigm. In other words, some solutions are presented, but there are almost always open issues. Using the Internet supplies the students with a possibility of looking at what has happened, since the case was developed and why. This could both be in the case supplying company, but also in the same industry or e-commerce area in general.

As the examples in chapter 1 showed, the teaching cases are implemented in HTML and run in either Netscape or Explorer (version 4 and above). They use plug-ins, like the RealPlayer® or Windows MediaPlayer® to support the sound and video elements. Due to limitations in bandwidth the cases are primarily distributed on CD-ROMs, but are also available in a network version. That is to say, the case can be placed on a windows-server, enabling access for students through PC laboratories or through employees workstations, but the case itself does not support any communication on-line between students. Therefore most people might prefer to get the CD-ROM version, as it enables them to go through the case on their own PC at home. (If the instructor wants to include direct synchronous communication between students on-line, this can be done through standardised communication or educational software, like WebCT or SiteScape - as mentioned earlier in 4.1.3, see footnote 42).

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[70] The name BUSINES-LINC is less catching and - as some students noted - the name contained two spelling mistakes in "business" and in "link".

The use situations were carried out primarily on the Copenhagen Business School, where instructors used the multimedia teaching cases in their courses (with no direct input from me, but of course my presence were observed by the students). Besides the three Danish cases from the e-case series, two others were used, the Norwegian Norsk Hydro, and the "traditional" written ALKA case. All five cases are shortly described in the table below (Table 6.1).

"Short" -name	Description	Characteristic of case structure	Media usage
ALKA	"The ALKA Teaching Case - BPR in the Insurance Sector" presents an insurance company, ALKA (www.alka.dk), which has completed a highly successful Business Process Re-engineering (BPR) in accordance with the radical change doctrines of early BPR literature. A change based on the substitution of a traditional sales force and paper based claims administration with streamlined processes conducted over telecommunications and IT.	Assessment of BPR project and results (not a role-playing case). Information presented in four groups according to the historical flow of events; support questions given.	Video & text quotations from interviews with two managers. The use of a narrator /speaker. Graphical animations and hyperlinks.
LEGO	"The LEGO Teaching Case - Direct Consumer Access" covers the aspects that need consideration when developing a website for selling, marketing and brand building on the Internet. The case focuses on two departments in the LEGO company: "New Ways to the Consumer" responsible for brand building and marketing on-line and "LEGO World Shop", which manages the Internet shop.	External consultant, which should assess the Internet decisions and provide strategies to new org. structure. Information provided in the consultant's office - folders etc. questions and assignment given (Can be used as role playing case)	Asks predefined questions to four managers. Video, sound and text answers. The use of a narrator /speaker. Graphical animations and hyperlinks.
Rockwool	"The Rockwool Teaching Case - E-Business & Customer Relations" considers the role of e-business, and in particular its value in Customer Relations Management in the Danish insulation company, Rockwool A/S. Rockwools site informs customers of building regulations that apply to the project at hand. The service is based on technical, digital manuals and software (mathematical calculations, CAD/CAM drawings etc.), that help determine the appropriate insulation solution.	New project member of the E-business project at Rockwool A/S. Assesses project and delivers Business Plan. Information divided into four areas: Rockwool, E-project, Customers and Business Plan template. (Can be used as role playing case)	Actors (sound and text) staging employees of Rockwool (a project member and sales consultant). Graphical illustrations and hyperlinks.

"Short"-name	Description	Characteristic of case structure	Media usage
Norsk Hydro	"The Norsk Hydro Teaching Case – Reengineering the Procurement Process" case stems from the area of business-to-business Electronic Commerce. It presents a subproject of a major reengineering and improvement effort at Norsk Hydro Exploration and Production, one of the leading oil production companies in Norway. In part of the re-engineering project, they developed and implemented an Internet-based purchasing system in order to reduce operating costs of Hydro's oil fields.	Assessment of the BPR project and the Internet purchasing system. Information provided with menu-structure and simulation of the system. (Not a role playing case)	Simulation of purchasing system and graphical animations with sound. (no video in this version)
Written ALKA	This case was written approximately 2 years before the ALKA multimedia case was developed, and as such looks at the same processes. Because of its paper-based nature this case does not include the same amount of information and personal perspectives (through video interview) as the multimedia case does. So, please note that this case has not been used for a comparative study with the same multimedia version (since comparison is not possible).	Assessment of BPR project and results. Case described in 3rd person, with linear structure and support questions.	Paper-based case with a few tables.

Table 6.1 - Overview of teaching cases used

6.2. ACTION RESEARCH CYCLES

Three action research cycles were carried out in the two years the project lasted. Even though the project programme of BUSINES-LINC did not have these phases clearly designated, this is how our work evolved around the development of the 18 cases, three for each partner. This section address these three cycles:

- three action research cycles
- first grounded action research cycle
- second grounded action research cycle
- third grounded research cycle

Three Action Research Cycles

Obtaining these 3 cycles throughout the project duration, it can be deduced that we used 8 months for each phase, though we may have used slightly more effort on the first and less on the last two. The reason for the first cycle being longer than the other two was that we found appropriate approaches to development during the first phase. We adapted tools to our process, earned the first experiences about these, and developed a mutual understanding of the project between the six partners. Figure 6.1 shows a graphical illustration of the three cycles.
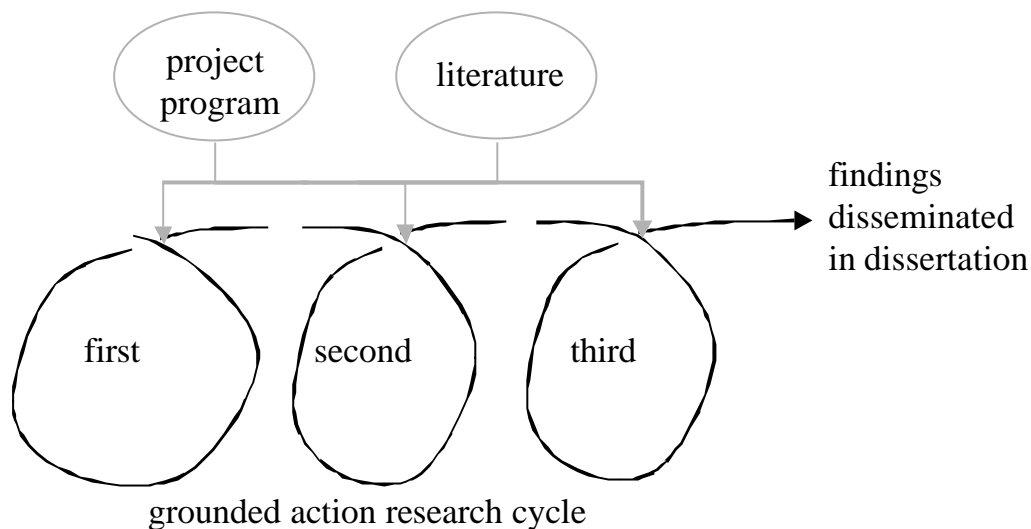
Figure 6.1 - Three grounded action research cycles

The cycles relations are determined not by time, but the case development, as each cycle represent one group of cases. The time-perspective of these cycles, is that the first group of cases was not fully completed before the next commenced. In the first group of cases, the first many months of the BUSINES-LINC project passed making the first prototypes. This included getting familiarised with our roles, and beginning to adapt the chosen tools to the multimedia teaching case process, which had decided upon. I.e. the cycles became over-lapping in time.

One way of representing this relationship is shown in Figure 6.2, where the different versions of each of the three cases at CBS are outlined. Typically, 2-3 versions of each case were made within the project duration. It was these different versions, which were applied in the use dimensions (as can be seen later in Table 6.2 - Overview of use-situations, in column 2). I have not provided a time-line on this figure, as it is not possible to pinpoint exactly, when we were working on this or that case, because we did not work on one case at a time.
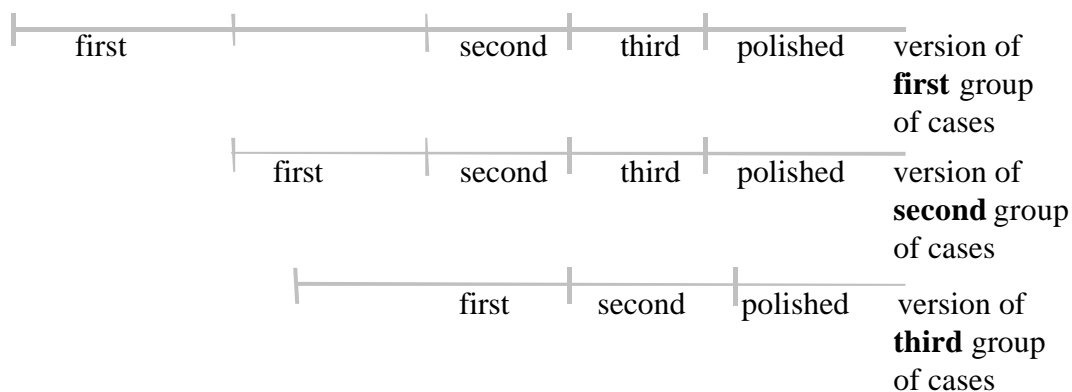
Figure 6.2 - Versions of cases developed

The following descriptions are described according to our experiences within each action research cycle. Because the BUSINES-LINC projects had pre-defined deliverables and deadlines, it also describes what happened in the approximately 8 months one cycle lasted, even though this sometimes means the overlapping nature of the cycles are reflected in the descriptions. The learnings from one cycle are presented in the next section, when describing the following action research cycle, this is done to relate it to the diagnosis process.

First Grounded Action Research Cycle

The official deliverables in the BUSINES-LINC project, which we handed in to the EU within the first grounded action research cycle (month 1-8), were:

- Technical reports about:
- the "Preliminary Business Innovation Consolidation Framework"

- the "Learning Concept".

- a pilot study for a Global Master in Electronic Commerce [71]

- The first prototype of the first group of case

The project began with general discussions and research on how to commence the development of multimedia teaching cases, and how we could ensure we would learn from each other during that process. At this point my contribution was in the area of multimedia development, and I had to "up-grade" my knowledge about teaching cases considerably. As our understanding of what we wanted to develop increased, we reached a mutual understanding of what the requirements to the first set of cases would be.

Current multimedia development methods and pedagogical models were reviewed. We investigated the existing digital teaching cases, and discussed what we could learn from these. Though we found that very little was said on how to develop such cases, we learned from experts' reviews and our own evaluation of them. This work was collected into the document named the "Learning Concept". This learning concept also contained our discussions on defining and developing possible teaching scenarios. We engaged in these discussions to find ways to use the 18 cases, and in particular to establish approaches suitable for the development of the first six cases. We also embarked on a more general discussion on how to disseminate, market and publish the multimedia cases, which lead to the choice of using a web-based platform, but distributed via CD-ROMs.

Each partner identified and contacted potential case suppliers. Some partners decided to elaborate on an existing written case as their first case, (which there was room for in the project programme). In Denmark we chose an existing case, the ALKA case, which was a

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[71] Within the BUSINES-LINC project a workpackage dealing with the initial work of a master programme was included. However, this was the only workpackage not related to the teaching cases at all (except from the fact that we intended the cases could be used in the Master-programme once it was up and running. Therefore I will not make any other references to this workpackage and the report / deliverable associated with it.

written case developed in the CEBUSNET project. The advantage of choosing such a case was that we could fairly quickly try the different roles and tools chosen, rather than using a lot of energy on sorting out obstacles, like establishing a network with contact persons at the case suppliers site. The disadvantage from my point of view (which I expressed at that time) was that adapting a story, which was originally meant for paper is not an easy task, and can entail creating other obstacles. (See for example Nielsen 1995 on the issue of "shovelling" analogue content into a digital frame, without considering the change in media platform).

We developed a set of requirements to the first set of cases, which we named "Didactical and Technical agreements". The primary agreement between the partners was only to have a few "restrictions" and no general framework to design the first six cases in accordance with. This should allow a free flow of creativity, and make it possible to test and evaluate the usability of different design approaches. The major technical agreements were to develop HTML cases implemented for Windows 95 or newer platforms, on a screen design, and with a resolution of 800*600 pixels. The major didactical agreements were that the first six cases should be designed with the following standard teaching scenario in mind: "…*The cases are used in a class environment. That is, the students will have to investigate the content of the case by themselves and/or in small groups. The teacher will then in class, discuss the students findings and further nourish the debate, maybe by use of some kind of teaching notes. The case should support different levels of education by letting the teacher be able to turn the discussion in different directions, depending on the course he is teaching and the experience of the students. …"*.[72] As can be seen from the quote, this was a very general or flexible teaching strategy.

A previous EU funded project named CEBUSNET (where the consortium consisted of the same six business schools and same senior researchers) formulated a so-called Business Innovation Consolidation Framework. This framework consisted of a tool to assist in the gathering of material for written cases. It was decided to use the same sort of tool within BUSINES-LINC. We then began a discussion of definitions, and development of modules for the framework, and clarification of which existing theories and models could be used.

To begin the actual design process, I introduced the concept of a treatment (a special form of scenario) to the consortium. However, we also needed some way of identifying the main lessons learned and target groups of the case, and so I suggested the concept of a case setup. The case setup contains a short description, which summarises the essence of the analytical phase of a case, and puts it in relation to the expected teaching environment(s) of the particular case. We decided that every partner should produce a case setup and a treatment for their first cases. (The cases setup, including treatments (or extended scenarios) will be discussed in details in 8.2.2)

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[72] The following text is taken directly from the "*D2: Prototypes of the first group of interactive cases (Accompanying Document)*", a document I wrote to accompany the prototypes. The management of this deliverable was handed by me at CBS.

We saw the first prototypes as an opportunity to employ flexible design requirements, which would allow the partners to explore different solutions. The idea being that later in the process, when we had to develop the next 12 cases, and update the six prototypes, we would decide, which overall design solutions to choose, so that a mutual "look and feel" were seen in the user interface of each case. At this point we did not know how to achieve this, but believed it could be done by using a general framework, which consisted of the ideas presented in one of the prototype cases or a hybrid framework, derived from all the prototypes.

With respect to the ALKA case at CBS, we gathered new material on what had happened, since the case was written, conducted video interviews with individual managers, and collected pictures and recordings of the physical environment. The video recordings were digitised and edited, and the interviews translated and dubbed. The navigational interface was determined by use of the case setup; the treatment/scenario and graphical material were developed using pictures, tables and diagrams, adding new text elements as well as redesigning existing text from the written ALKA case to the multimedia ALKA case.

The Second Grounded Action Research Cycle

The official (EU) deliverables in the BUSINES-LINC project within the second grounded action research cycle (month 9-16) were:

- Technical reports about:
- publication and marketing strategies for the multimedia teaching cases and disucssion on additional services opportunities

When the second action research cycle commenced, the Business Innovation Consolidation Framework for the BUSINES-LINC project consisted of several parts. One part was the template for producing an analytical case, which was used actively by all partners. All partners had agreed to use the template for analysis and collection of material to the second and third group of cases. (The other parts of the consolidation framework were a description of the concepts and models, which the template was based on, and a guide on how to collect data and analyse it.)

At CBS we gathered material to our second case, the LEGO case, and later in the research cycle also chose our third case supplier, the Rockwool insulation company. We worked with the analytical case headings, and later also with a general case story. In the LEGO case we conducted interviews, analysed web-sites, annual reports, found newspaper articles etc. However, unlike with the ALKA case, we did not video record the interviews from the beginning, as we had found that a lot of energy was wasted on finding a suitable clip afterwards, instead we "staged" the video clips, which we wanted to be available in the multimedia case. It was not only CBS, who made this experience, with directly recorded vs. staged interviews. Other partners did the same, and some had already learnt from our

experience in the first group of cases, since we were fairly quick to video record these interviews for the ALKA case.

The case setup and the treatment in this action research cycle had merged to one concept. That is, the treatment was now seen as part of the case setup. The first version of the analytical case and case setup were used at an internal peer review session with the Swedish partner. Generally, during this cycle we began to explicitly define quality assurance procedures for the multimedia teaching cases. We agreed in the consortium that every case had to be evaluated by at least one external and one internal source. At CBS we initiated a number of such initiatives, and an overview of the actual use situations is given later in this chapter. It is interesting that quality assurance was not mentioned at all in the initial project programme of the BUSINES-LINC project. But during our second review meeting with the EU, we had this issue added to an updated version of the project programme, as well as a deliverable containing a report of our quality assurance initiatives.

In the second group of cases, we at CBS also had a case supplier, who was very willing to participate in the process, but who also had a lot of restrictions. Some of the important issues were that confidentiality agreements had to be signed. It was difficult to get approval for performing video recordings, and the content had to be approved word by word. In the first group of cases, all partners had been surprised at the amount of time needed to get the case approved by the case provider. These were however things we could plan for, now that we were aware of it, but it was impossible to plan with the change in employees, which meant shifting messages and attitudes in the case stories and delays in our schedules.

As mentioned, we wanted a common look and feel in the cases, and at the very end of this research cycle we established what we named a "technical framework". A framework that consisted of a navigational menu interface (using frames and cascading stylesheets in an internet browser) and a colour scheme consisting of 12 colours. The ideas and requirements to the design of this technical framework were discussed during a workshop with an advisor from IconMedia, who then later designed the graphical interface and chose the colours for us.

The Third Grounded Research Cycle

The official (EU) deliverables in the BUSINES-LINC project within the third grounded action research cycle (month 17-24) were:

- Technical reports about:
  - the content of the second group and third group of cases - in the form of an analytical case document for each case.

  - an update of the Business Innovation Consolidation Framework

  - an update of the Learning Concept

  - an update of the publication, market and additional services considerations

- a framework of our quality assurance initiatives

- The first prototypes of the second and third group of case
- The updated and final versions of the first, second and third group of cases

As mentioned, the selection of the third case provider was Rockwool A/S (an insolation material producer). The use of the analytical case became less restrictive in the third cycle. We became aware that using it as a linked document, rather than a bureaucratic template, was more beneficial. However, we still had to deliver a written analytical case document to the EU, and so such a full version was still written at the end.

As with the LEGO group we also signed a confidentiality agreement with Rockwool A/S, but also with Vizion Factory. With the latter because in this situation we interviewed people both from the case supplier company, and also from one of their partners. Vizion Factory was a web-agency who had designed Rockwool DK Internet site and some of their software (as described in 1.3).

As the end of the BUSINES-LINC project was nearing, we decided to agree on a standard for development of teaching notes and marketing material. We had already developed teaching notes for the other two groups of cases, but found it beneficial with a minimal agreement on what they should consist of, including standard main headings. Also, we agreed to produce a small description of the case for marketing reasons, something which is not often considered in the teaching case literature, where the distribution of teaching cases gets only little attention.

6.3. USE SITUATIONS

During the three cycles, and as the first versions of the cases became usable, I applied the cases in different real use settings, which are described in Table 6.2. The other partners have also used their multimedia cases. Since I do not have direct access to the data material from the other business schools, I have contemplated the data, which I have collected (in Table 6.2), to a much larger extent. And then "only" evaluated these findings in relation to the other partners' experiences - as reported to me in meetings or in interviews.

Study[73]	Case used[74]	Methods/tools used	Description
Pilot study - graduates (pilot)	ALKA - 2.0	Observation (field notes) Video analysis of session Questionnaires Written statement from Instructor	28th of April 1999; course named "Designing and Managing Cyberventures". The case was discussed in class during 3 sessions (3*45 min.), same week as exams which meant 7-10 out of 34 students were present (7 at first, after first break 3 more appeared). The case was discussed in a cyclic manner, where the lecturer kept relating and explaining the PBR-theory and asking questions for a discussion about the case with the students.
3rd year bachelor students (SVIR)	Written ALKA	Observation (field notes) Video analysis of session & focus group Questionnaires Video Interview with Instructor	Autumn 1999; course called "Styring af Virksomhedens IT Ressourcer (SVIR)" [Management of the Companies IT Resources] The written ALKA case was used to gain knowledge about the difference in using and teaching with a traditional written case and a multimedia case. All students got the case, and a group of 4 students presented the case and lead the discussion. The focus group discussion was undertaken with this group.
	LEGO - 1.0	Observation (field notes) Video analysis of individual & group prep. and class session Questionnaires	All students got the case, and two groups (of 3-4 students) presented the case and lead the discussion. One of the two groups (with 3 members) participated in a close study, where the individual preparation of the case took place with the observer sitting behind the student (on the floor, not to interrupt the student's preparation, but still able to see the screen). The same observer was present as the group met to prepare their presentation together.
	Norsk Hydro	Text analysis Discussion with instructor	Three students got the case as a final assignment. They wrote a report, and an oral group exam was held. The report is 22 pages long and the students got the grade 10 [equals the B or B+] for their report and the oral examination (given by the lecturer and an external censor)
MBA students (MBA)	LEGO - 2.0	Observation (field notes) Video analysis of session Questionnaires Discussion with Instructor	26th of February 2000; course named "Management of Technology, Session 7 - The use of IT in creating the 21st century organisation". The case was discussed in class for nearly 2 hours, with a previous employee at LEGO and "participant" in the multimedia teaching case.
Graduates (BPR)	LEGO - 2.0 ALKA - 3.0 Rockwool - 1.0	Observation (field notes) Video analysis of session Questionnaires	Spring 2000, the course was a "BPR course" (Business Process Re-engineering) The cases were discussed in class for app. 1½ hour. This course was an opportunity to try out different multimedia cases with the same students.

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[73] The name in the parenthesis is the abbreviated name used for example in the questionnaire survey.
[74] The number occuring after the name of the case refers to the version of the case used in the class. I do not know if the Norwegian partner, who developed the Norsk Hydro case worked version.ing, but the case tried in this class was the same, and probaly similar to a "second version" according to the CBS versioning.

Study[73]	Case used[74]	Methods/tools used	Description
	Norsk Hydro	Written statement from Instructor	
Executive/ MBA (P-Portugal)	LEGO - 3.0	Questionnaires Written statement From Instructor	April 2000; course called "Inter-Cage - Advanced Course in Internet Business Management", from the DISLOGO-Distance Learning Program in Management in Portugal. The Multimedia case was used in a distance learning environment, where the case was presented (en-face), but students communicated together on-line in a learning space, and delivered a written assignment to the lecturer. (In this study I did not see the written assignments only the answers to the questionnaires.)

Table 6.2 - Overview of use-situations

6.4. CONCLUSION

The European Commission supported BUSINES-LINC, and the project team consisted of members from 6 European business schools. The project commenced in April 1998, seven months prior to my official employment as a Ph.D. student. I was actively involved, and researched the project from its start and to its end in Marts 2000. 18 multimedia cases was developed, and each partner was responsible for developing 3 cases. Most of the developed cases have some sort of relation to e-commerce.

Three action research cycles were carried out in the two years the project lasted. The cycles relations are determined not by time, but the case development, as each cycle represent one group of cases. Table 6.3 shows a brief summary of the main findings in the three cycles. In the use situations five cases were applied. Besides the three Danish cases from the e-case series, two others were used, the Norwegian partners case: Norsk Hydro, and the "traditional" written ALKA case. There were also five different classes trying the multimedia teaching cases. However since some classes used several teaching cases, ten different use situations were carried out. I used observed the use of the cases, with different target groups. These were graduates and under- graduates on one side and MBA students (executive education) on the other. (see Table 6.2).

Subject	First cycle	Second cycle	Third cycle
CBS case:	The ALKA case (based on a written case)	The LEGO case	The Rockwool case
Confidentiality agreements:		Confidentiality agreements were introduced	Confidentiality agreements with third party content providers (business associates)
Teaching strategies / teaching note:	Didactical and technical agreements (including definition of flexible teaching strategy)	Quality assurance procedures were initiated	It was decided to produce a standard for the development of teaching notes and marketing material
Analytical case	Business Innovation Consolidation Framework, consists of models and theories used for generating the analytical case were developed.	The analytical case was used for all cases in the "second" group of cases as a full written document.	The analytical case was adapted to a linked version, with pointers into content scripts
Case setup	Treatment and Case setup (for analysis of target group, teaching objectives, and overall content and interaction design)	The treatment became part of the case setup framework and not two separately tools.	The case setup became less important as the technical framework evolved.
Case supplier		The case suppliers role was very influential.	I identified a number of information risks associated with the case supplier
Technical framework		The technical framework was introduced to the development process, which enabled a even larger degree of prototyping process	
Scripts	Video recorded interviews	Staged interviews, outsourcing strategies in particular within media production were discussed	Content scripts

Table 6.3 - Relation of main findings in the action research cycles.

7. MODEL DIMENSION

Before being able to perform an investigation of the roles and tools of the development and use dimension and present it in a relatively structured manner, I will first provide an overview of the development model used in BUSINES-LINC.

The objective of this chapter is to create an understanding for the process as a whole, when investigating a role or a tool. In other words the objective is to see the greater perspective of the development process. The third of my research questions addresses the issue of how the roles and tools investigated are related. To further investigate this, it was necessary to model, what the phases of a development process look like, since the tools are related to each other through this process.

I will not at this point discuss the details of the model by addressing its relation to tools used. That is, I will refrain from discussion of whether a role primarily supports the first or the second phase, or if a tool is used in the third or the fourth phase, but I will present an argumentation for the process format.

The model was developed in three stages. In the first months of the BUSINES-LINC project, the first version was made - in the beginning of the first action research cycle (illustrated in 7.1). A couple of months later, in the transition from the first to the second research cycle, an update of this version was necessary (investigated in 7.2). Finally, I made a third version after analysing all the data material available, and after the project had ended (shown in 7.3).

7.1. FIRST VERSION

In the first months of the BUSINES-LINC project, we developed a process model with the same appearance as the Vee-model for software development as used in software engineering, Forsberg and Mooz 1997. Though a graphical layout of this model was chosen, we did not once discuss the relation to the Vee-model of software engineering. However, as I will show later in this section, features from this software engineering model are easily introduced in our model, and provide useful supplementary perspectives. Everyone from the consortium participated at the project kick-off meeting to establish the consortiums V-model, and later on to further develop / update it. However, the German partner did the actual sketch of the figures - as shown in Figure 7.1 and Figure 7.2.

Our first version of the model did at the time provide a way of showing that the use situation was important to us. Consequently, it illustrated that we focused on the transmission of business solutions within companies to individuals through multimedia case teaching, and these individuals furthered the transmission by disseminating the business solutions to other businesses. (Figure 7.1). The model shows feedback mechanism from different phases, but only within the development dimension, that is the phases:

- Select case,

- Define learning perspectives,
- Gather content and media,
- Analyse case,
- Define learning process,
- Design, construct and test application,
- Create necessary material and
- Test learning process.
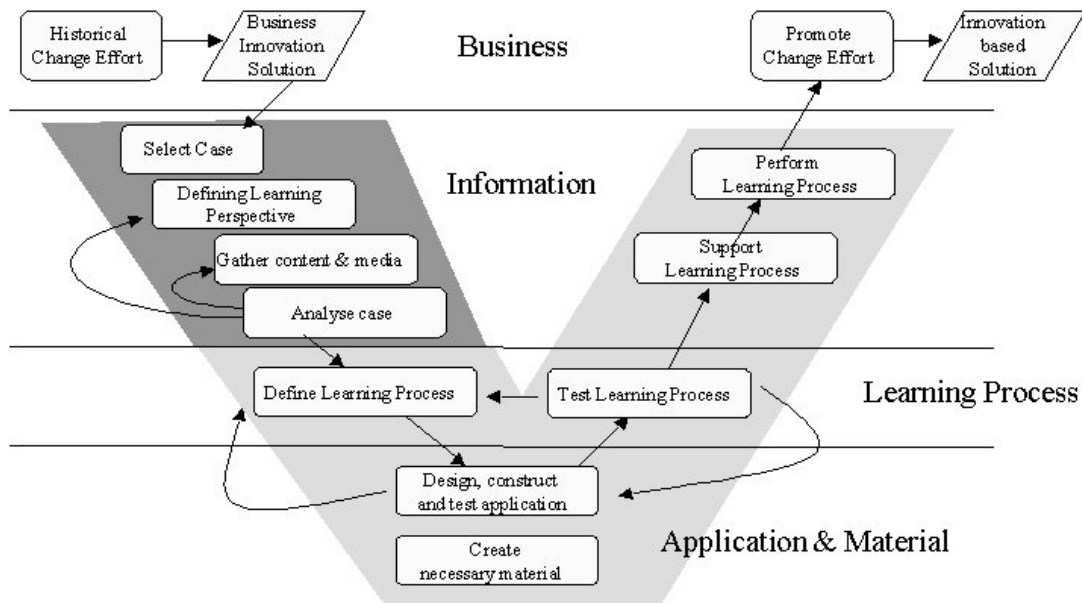
Figure 7.1 - The first version of the development model

Even though we discussed the difficulty of testing and tracing, which form of learning took place when the students used the cases, it continued to be the verb learning and not teaching that the majority of the people from the BUSINES-LINC consortium used. For example this model and the update (shown in Figure 7.2) were used in a document named the Learning Concept. But the major part of the learning concept document did not deal with learning per see, but rather teaching strategies and development tools for multimedia teaching case development.

7.2. SECOND VERSION

There were a couple of other persons in the consortium, who did not have knowledge within the field of multimedia, but who were interested in gaining such experience. After I had written a 20 pages input about tools to the document named the Learning Concept, we discussed these tools at a general meeting. During that period we had also gained knowledge about multimedia teaching case development from BUSINES-LINC. After the general consortium meeting, the German partner made an update to the first model (Figure 7.2).

The update came about 6 months after the first, and was thus developed at the end of the first research cycle and as activities in the second were being planned (see chapter 6). There are two noticeable changes. The concept of authoring was added to the model. This originates in the multimedia literature (see 4.2.2). Authoring was placed in the "second leg" of the V-model, but I do not know what motivated this move. The move meant development becomes part of the use-perspective, and I cannot today see any advantages to this. Secondly, what is taking place within the "learning process" has changed into a question mark, not indicating that learning is totally uncertain or unknown, but that it can happen in a multitude of ways, and is difficult to measure.
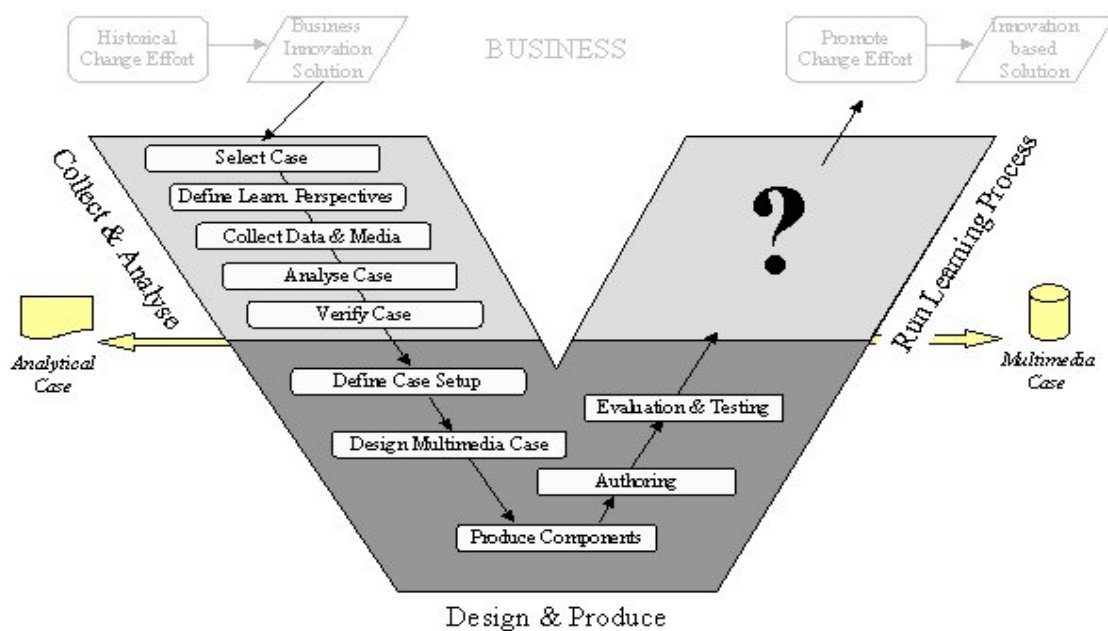
Figure 7.2 - The second version of the development model

The models do give rather a good picture of what happened during our multimedia teaching case development project. However it mixes development phases and tools - as did the processes described in Molin 2000 (in 4.2.2). When comparing the first and second version of the BUSINES-LINC project to the typical model of multimedia development in 8.2, this mix becomes clear. The major phases of a typical multimedia model are:

- Change analysis and needs,
- Analysis,
- Design,
- Production,
- Authoring (programming),
- Test and Implementation,
- Operations and

- Out-phasing.

These phases are comparable to a few phases in the BUSINES-LINC model, such as analyse case and authoring. However, the case setup is mentioned in the model (Figure 7.2) at the same level as the phases, but in reality the case setup is a tool, including for example a scenario/treatment work-process (as described in the previous chapter, and which will be investigated thoroughly in 8.2.2)

7.3. THIRD AND FINAL VERSION

On the basis of our experiences, now that the project was finalised, and based on my re-investigation of literature, I felt a third version was necessary. This need arose from the three critical findings of the existing versions, as well as a need for letting the phases of a written teaching case development and use scenario have larger influence.[75] The three critical points were:

- The mix of phases and tools,
- The previously mentioned shift to letting a development phase be part of the second leg (the authoring phase) as well as
- The strong focus on learning rather than teaching.

Thus the third version, which I have subsequently developed, is based on the phases of a case writing process, case teaching process and the development phases for multimedia systems. I find there are benefits in re-using the well-known and well-established phases from system development and teaching case theory.

Figure 7.3 shows this model, and it is seen that the "change analysis and needs" phase from multimedia development has been replaced with "leads and contact" from the written teaching case model. Multimedia teaching case development is not about changing organisations and the issue of need is contemplated in the "leads and contact phase". Leads and contact is the phase, where the investigation of the students needs for which type of cases were uncovered and analysis of the business industry to find appropriate case suppliers according to these needs were taking place.

The next five phases carry the names from multimedia development, namely:

- Analysis,
- Design,
- Production,
- Authoring and
- Test and Evaluation.

I have chosen these names because the activities resemble multimedia development more than case writing, but have added the word "case" for analysis and design phases, to

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[75] Within the project, other models than the two presented in the previous section were developed. These had the flow of information and the use of tools in the development process as their focus, rather than looking at phases. However, they still mixed the level of abstraction, and thus were not suitable for presenting the internal relationship of different roles and tools, which entails a clear separation of the three (phases, roles and tools). I will however in 10.1 also use a model, which have tools as starting point, but it is still a model, which is related to the V-model phases.

emphasise that both typical multimedia and teaching case tools are employed here. For example in case writing, a collecting phase exists, but the analysis is performed while structuring and writing the case (see Figure 4.4). This is quite different from the more clear separation of analysis and design in multimedia in Figure 7.3. Such a separation is needed, since the project team needs to know more about the background of the design, before actually carrying it out and also due to cost of re-production (as discussed later in the following chapter, 8.1.4).
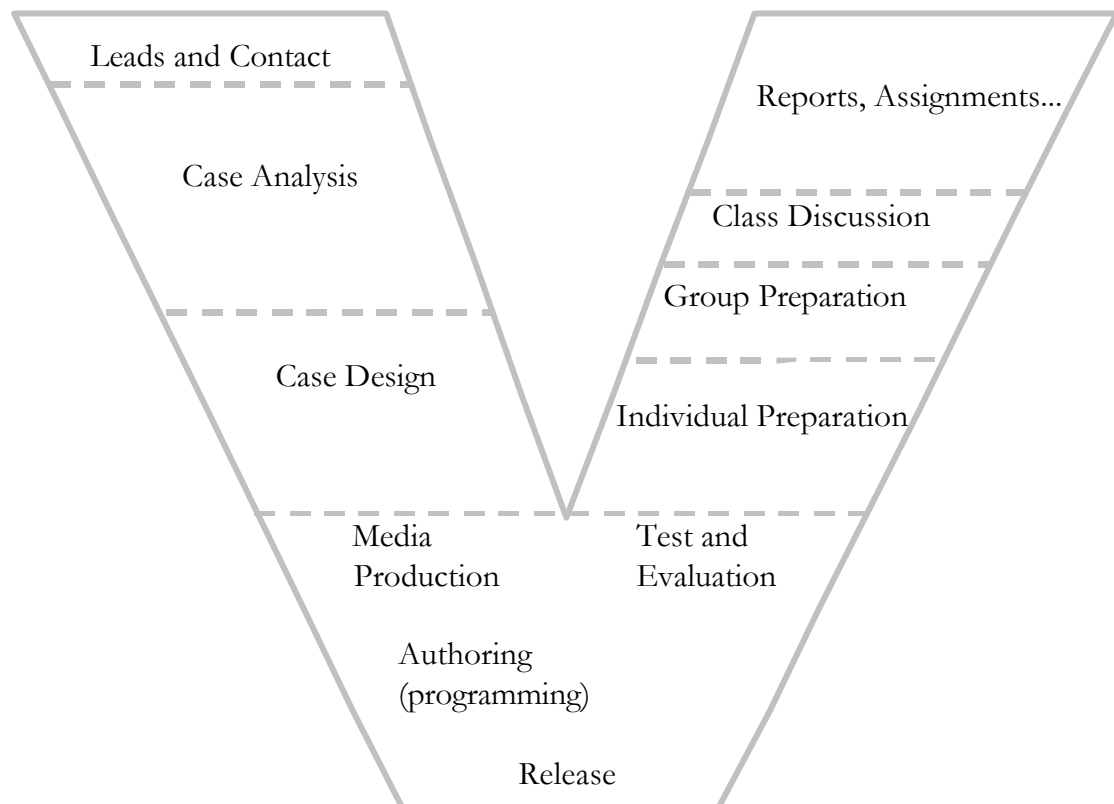
Figure 7.3 - The development-model

There seem to be no serious implementation issues to cover in multimedia teaching case development[76]. The technical requirements are limited. Using a browser and a remote server or CD-ROM during implementation means that there are only limited issues to deal with, such as copying the material to a server, to which the students have access. Such requirements to the installation are easier and more properly dealt with in the design phase, as a specification.

The test phase is extended compared to the general multimedia model in Table 4.8, so that the multimedia teaching case includes evaluation as well. I hereby propose evaluation

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[76] Please note, that I here use the word implementation in a system model sense, where it refers to the installation of software at the client sites, and not to the technical implementation of a design (e.g. programming), Thayer and Dorfman 1997.

of the multimedia cases in real use situations. Evaluation is carried out according to users' needs (usability etc.), on all levels of the interface, as opposed to only testing if the requirements are met- as I clarified in the research design of the method dimension, chapter 5.2.2. That is, the definition of evaluation compared to the term test has a more inquiry-based or explorative nature. This allowed me to investigate, how the multimedia teaching cases influenced different areas of the use dimension (motivation, discussion level etc.), but it did not involve predefined tasks for the users to carry out, as traditional tests do. Tests provide more direct feedback to for example a certain specification that is a requirement to the system being tested. (Barrett 2000, Neo and Neo 2001.)

In the bottom of the V-model the release phase is seen. As will be demonstrated in the following chapter, the release is a critical point in multimedia teaching case development, and getting approval of the case content by the case supplier is not a trivial matter. It can be said that releasing the case is part of testing and evaluating the case. But it has been added to this model to show, that approval and release by the case supplying company is indeed a process in itself, which requires much attention and time from the development team and the case supplier, especially in multimedia development. It also shows that formal tools, as the confidentiality and release agreements are needed in many situations. (As investigated in 8.1).

The second leg illustrates the use dimension (and that is why the test and evaluation phase is situated here). The use dimension originates primarily in the standard scenario shown in Figure 4.2. I have shown that other ways of using a case exist, so these phases should be seen as illustrative of the phases of use situations, which I have investigated, rather than as being an exhaustive list. The scenario has been elaborated in two ways. The individual preparation in this model also includes the phase of the use situation, where the instructor has to prepare the case, in order to lead a discussion. And secondly I have added the reports and assignments phase of a use situation, to illustrate a point of having a more "mandatory" way of pushing the preparation of multimedia teaching cases (a finding that I will discuss thoroughly in chapter 9).

The Vee-model, as it is presented in software engineering, is an attempt to integrate feedback mechanisms from test and integration phases to the requirements and programming phases of software development. It should as such be seen as an alternative to the more linear waterfall models. The objective is through the test and integration phases to compare with the requirements, design and program of the system, and to (hopefully) verify and validate the findings, or update the system accordingly. (Forsberg and Mooz 1997.) I have shown this relationship in Figure 7.4.
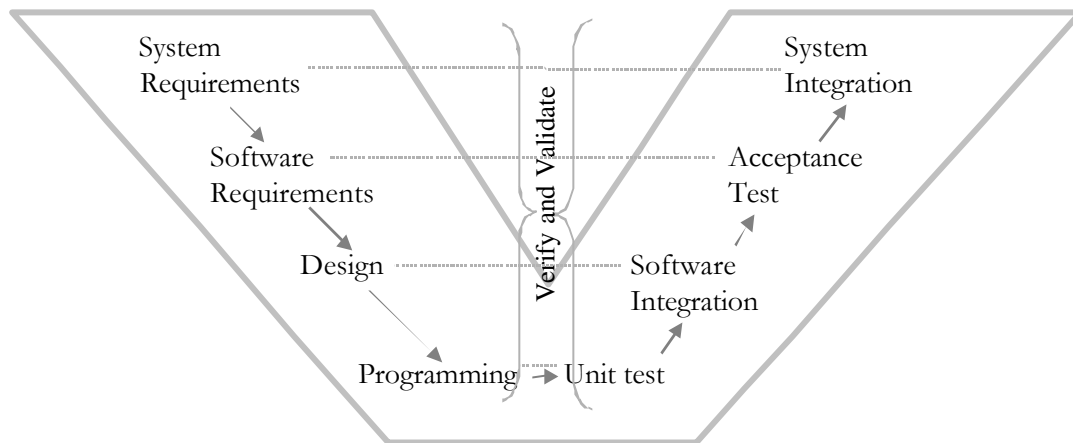
Figure 7.4 - Simplified V-model from software engineering[77]

The third version of the development model for multimedia teaching cases, that I have presented here, does have a linear appearance and in multimedia development there tends to be some linearity, Figure 7.5 (a). But also in this third model, like in the software engineering V-model, feedback mechanisms exist. The feedback worked in BUSINES-LINC both from a specific case development situation and a case series development perspective, but did not have direct reference from one phase in the use dimension to one phase in the development dimension - as in the Vee-models of software engineering (Figure 7.4). This is illustrated in Figure 7.5 (b), where the use dimension feeds back experiences to the development dimension.

For a specific case, the use dimension provided knowledge about how earlier versions of the case functions. This information served as input to a new prototyping sequence and new versions of the case. Such knowledge about the use situation was seen as part of the test and evaluation phase of a particular case, and did sometimes lead to getting new content and analysing it. However, such supplementing material was not seen as a new design phase iteration, rather supplementary information for a new programming and perhaps production phase in a prototyping manner. Consequently, an arrow at the bottom of the V-model illustrates this feedback loop. This loop was not an unusual feature of teaching case development, but could be observed in many other software development projects, were different versions of the same program is made.

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[77] The figure is derived from Forsberg and Mooz 1997, and their description of the model on p. 54-65
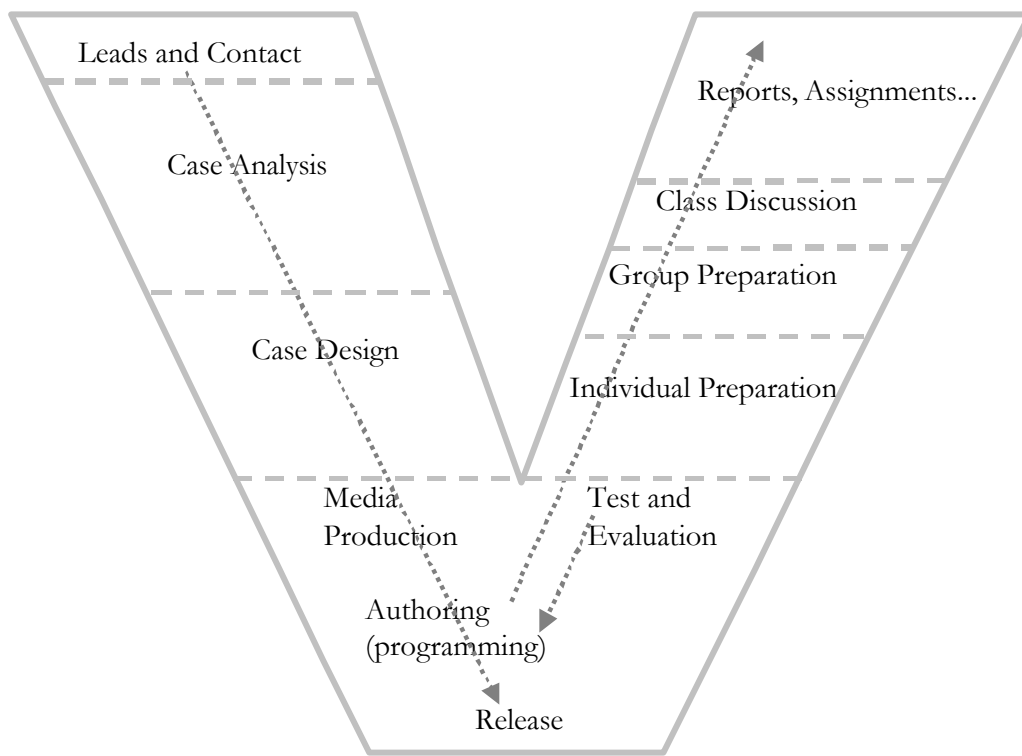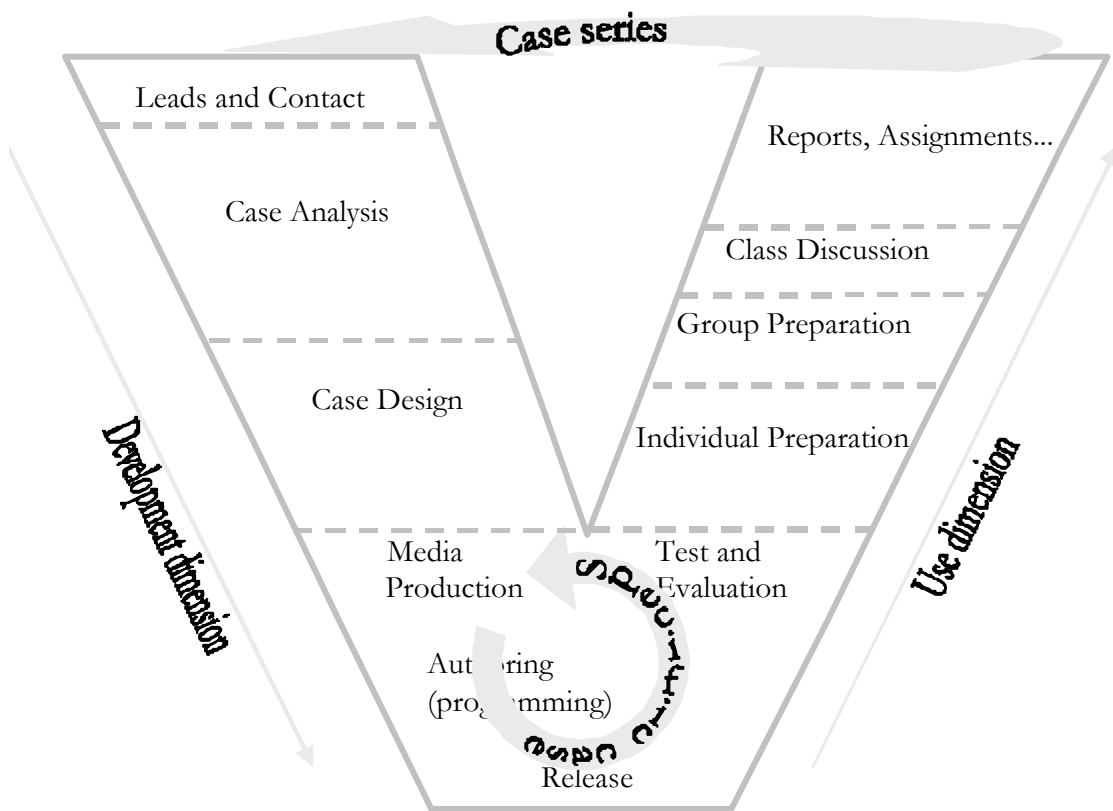
Figure 7.5 - Flow and feedback mechanism between phases

The feedback loop becomes interesting in a situation of a case series. When a centre, department or institution develop series of cases, which in some way are related: by subject, course or target group, and they would like some synergy or consistency between them, the feedback loop is widened, which will be investigated into more details in the following chapters.

In BUSINES-LINC, the experiences made from one case would thus not only influence future versions of that same case, but also how and what was analysed, designed etc. for the next set of cases. This is shown with an arrow at the top of the V-model illustrating the continuity and development cycles that such a teaching case series project would go through (Figure 7.5 (b)). It was necessary to provide tools, which supported this loop and the foremost tool for this was the technical framework, but also the case setup (including the treatment/scenario) played a part in this process (which will be discussed in the next chapter).

7.4. CONCLUSION

Multimedia teaching case development was not directly comparable to writing teaching cases or to development of multimedia systems, but emerged in the combination of the two. Within BUSINES-LINC a V-model (a model in the shape of a V) was produced, which evolved during the project life cycle. My final version of the model contemplated both the use and development dimensions. The development of multimedia teaching cases was represented in the "first leg" of the V, and the "second leg" of the V looked at the use of multimedia teaching cases. There was a feedback loop between the development and use dimensions, so that experiences found in the application of the teaching case influenced the design of the case and the way the tools are applied. Also, in this situation of a case series the feedback loop was widened, so that use of one case in a series influenced the development of other cases in the same series. Our experience showed that it was necessary to support this feedback loop specifically in the format of the tools applied, and by extending the test phase to an extensive test *and evaluation* phase.

8. DEVELOPMENT DIMENSION

This chapter investigates the roles and tools in the development dimension, which have been found to have vital impact on the development of multimedia teaching cases in the BUSINES-LINC project. Section 8.1 investigate the roles and section 8.2 the tools. I will not in this chapter conclude and relate the findings of the different tools to the use dimension until the resulting dimension (chapter 10), which comes after individual examination of the use dimension in chapter 9. Also, because this chapter contains a lot of information in each sub section (i.e. each section describing one tool), I have instead of having a final conclusion to the whole chapter introduced conclusions to each sub-heading.

As mentioned in 4, the literature in that chapter serves as a foundation for the dissertation. Subsequently, I have only seldom referred to that literature in this chapter, but instead I let the testimonies from the people in the BUSINES-LINC consortium speak their points of view, through quotes from interviews, excerpts from minutes and similar material. (Though there are a couple of situations, where further literature is used, in new areas or more detailed discussion as compared to the chapter 4 literature.)

8.1. ROLES IN THE DEVELOPMENT DIMENSION

Four overall categories of roles will be discussed here. First the role of the development team in section 8.1.1, including the significance of whether internal development competencies versus different outsourcing strategies are used. In 8.1.2 the very important and influential role of the case supplier is discussed from various perspectives in the development process. Section 8.1.3 discusses the role of students as developers in a co-operative development process. Finally in 8.1.4, the role of project management is investigated, focusing on the issues, which are significant to multimedia teaching case development.

8.1.1. THE DEVELOPMENT TEAM

In Table 4.10 I discussed the roles identified in a multimedia development team, as they are presented in England and Finney 2002. The list of roles focuses on the technical skills needed. For example the core team has an interface design specialist and information analyst as possible specialist supporting roles, but who will actually lead the design, lead the treatment and proposal process, which are vital elements of the design according to England and Finney 2002[78]. In our experience such design skills (and resources) are needed within a core team, when it comes to multimedia teaching cases. So even though roles in the core team, the extended team and the specialist team are quite similar to what we needed, the organisation or distribution of roles were somewhat different.

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[78] A proposal is a form of content specification and a treatment is a form of media specification, together forming a foundation for a contract with a client. See England and Finney 2002, chapter 4 for the proposal description and chapter 7 for the treatment.

The following section presents different strategies used within the BUSINES-LINC project, all of which influence the distribution of resources within the core team, extended team and supporting group of specialist. The collective experiences are assembled into a new list of roles. The three strategies used were:

- In-house Development
- Technical Outsourcing
- Media Outsourcing

In-house Development

The idea behind any of these lists in Table 4.10 and Table 4.9 are that one person can possess several roles, and in BUSINES-LINC this was also the situation. Especially since it was decided in the first months of the project, that the partners would use the project to gain in-house experience in every aspect of developing cases, meaning that the use of sub-contractors should be kept at a minimum. Four partners used this approach throughout the project, namely the Swedish, German, Norwegian and Dutch partners, who all chose to rely mainly on internal resources within the core team.

Neither of the core team members (or at least very few) had multimedia development experience. The team therefore typically existed of two to three persons from the information systems research field, with competencies within the subject matter area of the teaching cases, with practical experience and knowledge about teaching cases and the target group in general, and with (primarily theoretical) knowledge about information systems development. (Though some, in particular the younger members, had experience with some HTML programming as well.)[79]

The purpose of this in-house development strategy was that they would acquire the skills necessary during the process, and indeed, they were in the end very skill-full, also at some of the more complicated tasks. However, the end result was that many of the cases did not vary the media use according to content and interaction strategies very much.

Gösta Steneskog (senior researcher) and Magnus Bratt (student assistant), two members of the Swedish core team said the following about their process in an interview. "Gösta Steneskog: *now I think that multimedia design is a teamwork, and of course we focus a little the three of us, Magnus, Katharina and I, we are focusing a little on different parts of that process. Maybe I focus a little bit more on the content side. Magnus is a little bit more on the technical side. Katharina is very much on the design side. And Magnus is also very interested in the teaching and learning side and the learning process, so it is very difficult to say, we are doing that and that.* Magnus Bratt: *but we are doing pretty much most things together, but we have different perspectives.* Gösta Steneskog: *but sometimes we change perspective, but I think that is also an important thing in multimedia design, you need to have a team carrying a number of perspectives.* Magnus Bratt: *We are also all three of us quite new at this,*

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[79] During our process of two years team work we got to know each other' backgrounds, but I have also interviewed the different partners about their previous experience in multimedia and software development in general, except for the Dutch partner.

nobody have done it before, so the roles are not defined. Because we don't know which roles there should be, so we just. Gösta Steneskog: *If there should be any roles."*

This quote shows that even though the Swedish team was very group oriented and worked closely together sharing ideas and sometimes shifting perspectives, there were different roles in this core team or different responsibilities of these perspectives as they chose to name it.

The teaching case development process in general was characterised by small groups, which worked on the partner case, and then the larger group of the consortium. The consortium had meetings regularly (3-4 times a year), plus extended use of mails and ftp-services. The consortium meetings served as an administrative role to keep deadlines and milestones, as well as a discussion forum for multimedia teaching case development.

There was one problem with seeing the project as a training opportunity. These four partners did not have any prior experience with multimedia development as such, and completely underestimated the effort (energy) needed to develop multimedia teaching cases. As Stefan Schäfer one of the core team members from the German team said in an interview: "… *we underestimated the effort. Now, I have a really nice idea about what could happen. And when we talk about the infrastructure: then there should be an arrow flashing to the right, and then there should be the server room, and maybe the user could have a set of different components he could drag and drop on the screen and something happens. Really nice ideas, really nice from a learning aspects, but then the budget is too small, or the experiences or especially the competence on our side, when you say we don't want to outsource it, and then you have to compromise.*" The lesson here must be that at least one of the core team members should have substantial multimedia experience, and preferably with educational material.

Technical Outsourcing

The Italian partner used a total outsourcing strategy of all technical roles, which to a large extent was a decision that went against the general decision of the BUSINES-LINC consortium. They found that they already had some experience with multimedia educational material. And even though they still saw the project as a learning experience for their department, in conversations at our 2-3 day consortium meetings they would often state that the technical and professional look of the case were decisive for motivating the MBA students to use the case. As Paola Bielli, from the Italian partner, said in an interview with the German partner: "*From the very beginning we were very aware, and I would say worried about the technical side, and I would say that the MBA market, not just Italian, but international, is very demanding in terms of quality and technical requirements of case studies. For us the benchmark was not with paper based cases, but with entertainment tools and business games. So for us, from the very beginning we were aware that the development of the technical side of case studies was one of the key issues. Not because we were not able to develop it, but because in the project life, it was not cost-effective for our department to invest directly in internal competencies. Also in terms of investments, technical investments, it*

made no sense to have internal competencies in this field. So the idea from the very beginning was to outsource these competencies, and to develop the content and teaching approach internally."

Though this seemed to me to be an appropriate strategy, it was clearly also costly, but maybe in the long run more cost-effective. The disadvantage with this was that a fast prototyping process could not be used to the same extent. The prototyping technique used took advantage of the core teams knowledge within design, programming and the subject matter area within teaching cases, which meant executable prototypes could be developed in a co-operative fashion in a fast incremental manner, using low fidelity cases (see 4.2.3 about prototyping). Using a complete outsourcing strategy of all technical elements (every element in the authoring and media production phases) meant putting a (geographical) distance between the core team members, since some of them would be members of the business school, and others members from a multimedia company. Such a distance can be prohibiting for a fast prototyping approach[80].

Media Outsourcing

The strategy used by the Danish partner, CBS, was a mix between the two partners. We decided to develop the main part of the cases internally, where we also used (paid) student assistants. (Only the Norwegian and Dutch partner also did this, but to a much smaller extent.) We outsourced a lot of media product by using sub-contractors for of video and audio production (except digitalisation of video and some audio segments, which were done internally). The use of students as developers and the issue on sub-contractors will be dealt with in the coming sections, instead I will in the following describe in more details the organisational structure of the CBS development team.

The CBS core team consisted of the roles described for the on-line team (Table 4.10), but also multimedia design and information analyst, instructional design and a scriptwriting were essential abilities/roles, which were used throughout the project lifecycle. As in any smallscale project some individuals had several roles.[81]

The persons engaged at CBS were:

- One student assistant for the ALKA case, who helped collecting new content, and analysing content from the written case, and helped me design the multimedia case. Two assistants for the LEGO and also two for the Rockwool case, who worked on similar tasks, as well as scripts and content documents. The student assistants worked for a couple of hours a week, and only in the cycles representing "their" case.

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[80] The useof the word fast prototyping should not be compared to rapid prototyping, which is a method in its own, applying revolutionary strategies, rather than evolutionary that we used. (Gomaa 1997)

[81] These small project teams are comparable to the approach used in agile software development, which is often less concerned about methodology than methods for organising work and tools for development. In such projects it is very common that one person carry out the tasks of several roles. (See chapter 1 and appendix A in Cockburn 2001).

- One programmer (whom we hired late in the process, but had to lay off a few months later due to his inexperience and many errors when programming), which delayed the tasks he carried out significantly)[82].
- An accounting assistant from the department managed the financial side, using only 3-5 hours every 6 months.
- Of the two senior lecturers, whose roles I have already discussed in chapter 6, it was especially Peter Neergaard, who was engaged actively in the development of the cases by reviewing content and teaching notes, contributing to the BUSINES-LINC content collection and quality assurance framework, and participating actively at the meetings. Niels Bjørn-Andersen established contact to the case supplying companies and participated in the first meetings as well as some consortium meetings.
- I was the only full time team member.[83] I managed the multimedia development process at CBS, undertaking the development of the three cases and everyday project management. That is I wrote reports to the EU etc., performed content collection, contributed to the design, reviewed the students' analysis and design, developed scripts and a large part of the authoring/programming, video (recording and editing) for the ALKA case, and digitising for both the ALKA and the LEGO cases. I also tested and evaluated the cases. Finally, since the project could not afford to have graphical artists perform the design, I without the skills had to perform this role. (The result is obvious).

Conclusion

If it is ensured that the necessary skills are present then internal development may be a very cost-effective way of producing multimedia teaching cases. Otherwise, if high quality regarding the look and feel of the cases, and high relevance of media usage is wanted, then outsourcing of all elements (at least in the media production) is desirable. Unless there are plans to develop a series of cases over a longer period of time, which would make internal training or recruitment of qualified personnel a viable option. The content and design have to be developed by people knowing the teaching case area and the subject matter area extremely well (the contextual level). However, if the organisation wanting to develop these cases is a department or a research centre of a university or business school, these skills would normally already be present.

The core team should probably include around 3-4 persons, with one anchorperson, who knows multimedia development. Whether there are actual graphical skills within the core team, as England and Finney 2002 suggest seems less important. Such skills are needed at certain limited times throughout the project, perhaps only when reaching the

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[82] It is therefore difficult to give an estimate of the value such an extra resource would have under more "normal" circumstances, since we were in this case not able to use that much of his work.
[83] Well, almost full-time, as I also worked on my Ph.D., including getting data from the use dimension, which was not as such considered part of the actual BUSINES-LINC project, doing my coursework and publish papers.

media production phase, so a person with these skills could be included in an extended team. It also seems to be a bit exaggerated to operate with both an extended team and a specialist support in a relatively small project (for one case) and groups of smaller teams (for case series). Therefore, the list of roles for multimedia development could look as presented in Figure 8.1. The figure includes the roles of student assistants and the case supplier[84], which will be discussed below, where I will also discuss how we managed the extended team in the situations were it or part of it involved sub-contracting.
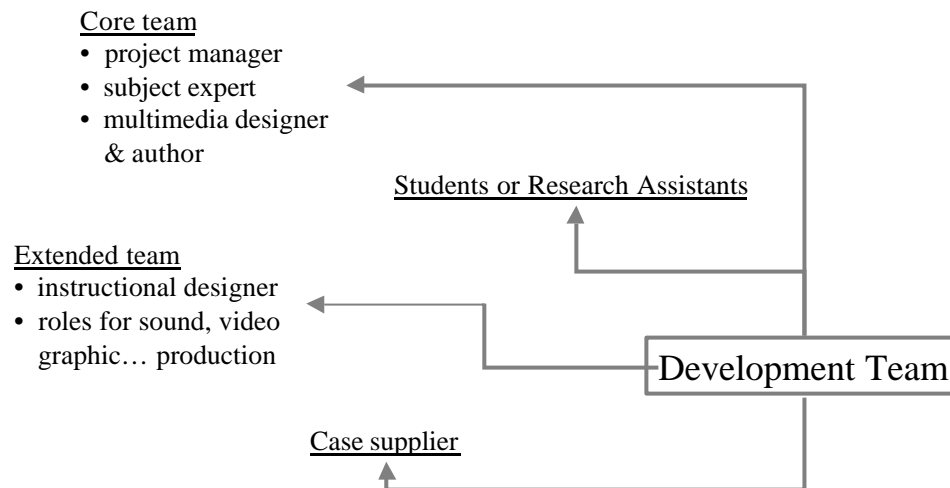
Figure 8.1 - Roles in multimedia teaching case development

In the following I will "zoom" in on and investigate in details some of these roles as they can play a dominant role in the development process. These roles are the case supplier, using students as developers as well as the characteristics in conjunction with project management.

8.1.2. THE CASE SUPPLIER

The first thing to contemplate in teaching case development was the selection of a suitable case supplier / case provider. Then it was important to get commitment to resources and the time-line for the case company participation in the project, and prior to actual collection and analysis if data could begin a confidentiality agreement had to be signed. During the development process we found that there were several information risks associated with the case supplier, when collecting and getting approval for the information collected in the company. The following section investigates these issues:

- Selection and Selling
- Commitment and Time-line

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[84] The company participating in the case, by *supplying* the case content.

- Confidentiality
- Information Risks and Approval

Selection and Selling

At the second meeting of the BUSINES-LINC consortium the following selling points were agreed upon, and even written into the minutes: "*Selling points. In order to get a "contract" with a case provider we need to have sales arguments. 1. International promotion of company name & products. 2. Making the company workplace attractive to students. 3. Improve the company's internal continuous education. 4. Promotion to customers. 5. Feed-back on business from the BUSINES-LINC project members….*" (minutes from 5th May 1998)

Notice that in these minutes we have put feedback quite late in the list, as we did not intend to "play" consultants. In fact Leenders and Erskine 1989 suggest seeing the organisation's name in print, recruiting top students, and personal benefits to the employees involved in the case development process are some of the factors that can motivate an organisation, but consulting (especially paid) should not be involved in the process. This is to avoid influence and bias on the information given at meetings. This means comments on, what the company did right or wrong in a given situation, should be avoided. Instead Leenders and Erskine 1989 touch upon another important point that I have not seen made explicitly by anyone else, namely that the company should primarily see the participation as a kind of charity. Supporting the development of educational material might heighten the quality of the teaching and could by many companies be seen as a worthy course. At the same time, the company receives public recognition, and become more visible in the "students' world".

Looking back at how in the three CBS cases we "sold" the concept to companies, we did not really use any of these arguments. Essentially, we did not have any problems getting the companies to participate, once the overall concept was explained. Though it is hardly a selling point, one of the managers from a case supplier said that taking the time to consciously recall and reflect on the process in front of "strangers", who were not familiar with what had happened, provided a way of making the process and its consequences clearer.

The companies also liked the idea of multimedia teaching material, and probably could easily see advantages to participating in this without our convincing remarks. But it was actually more difficult to explain in details what our objectives were in the beginning. As time passed we had a selection of cases, which we could use as demonstrations. Since these cases were often not released yet, it was however a problem how much of them we could actually show, but they still provided a much more precise picture of our plans, and did motivate the companies to participate.

Commitment and Time-line

The case supplier has vital influence on the teaching case, both on the design, but also on the process. Therefore, retaining a good relationship to the company is as vital, as it is with a client in a more traditional development project or in traditional written case. The initial contact phase in itself does not differ much from traditional cases either, though there is two important facets in the first meeting, which has to be clarified. Whether the events, which the case will depict, are suitable for presentation by use of multimedia material, and whether the company is willing to use the necessary resources (interview time, perhaps being video recorded etc).

To estimate the applicability of the case story to multimedia, we investigated both the narrative elements of the case, but also looked at which type of media, we would be able to collect and produce during the process. If the company already had some elements that we could use, like pictures or graphic, we would jointly have to consider copyright issues. If not, or if additional media elements were needed, they would have to allow us to produce this material (take pictures, record video etc.), which leads us to the second point.

In order for the company to participate, they would have to know and agree to the amount of resources, they were committing themselves to. Again, we found it rather difficult in the beginning to explain to the different managers, what they should expect to support us with, as it was difficult to predict, which kind of media representations and how much would be suitable for this particular case, that we hardly knew yet. As we got examples of multimedia cases that we could demonstrate, this provided a mean for understanding what could be necessary, but did not in any way give a fair estimate of what was required of this particular company. What we were able to say in the end was that we would probably have to make three visits to the case supplier to collect case content and production material. The rest could be taken care of by phone or e-mail.

Even though the amount of time spent with the case supplier does not differ dramatically from that used in a regular case (adding only one or in some cases perhaps two visits), the case provider should to expect to use more energy in the process. The time span is typically much longer, due to a gap between material collection and media production.

After using one or two meetings for interviews in the collection phase, the case supplier would typically have to participate in media production. (If for example video interviews or video of a work site, pictures of personnel etc. had to be made). Even though it may not be easy to get all involved at the company site to participate on the same day, when producing the media content, this is to be preferred due to economy of scale, especially when using professional camera and sound crew (which the Danish and Italian partner did).

Regarding video interviews all partners made the following experience: Taping the first interview of a person, with a typical duration of an hour or so and hoping to extract 5-10 short clips of approximately one minute with a fairly sharp message, is not an easy task. People, also those who seem to be rather concise in their statements, do not talk in short

precise sentences. Sentences seem to be interwoven, and even if your are lucky to find such short statements, they make a sudden movement, take a deep breath, or someone walks into the room at the same time. Of course there may be instances, where you know that only one meeting will be granted, and then this method of recording a long interview, which is later edited can be used – perhaps by only using the sound, and take still pictures to go with that. However, the majority of the partners found that staging the interviews were the solution, which gave the best result, and required the least amount of editing work. As a consequence all the partners I interviewed used this method.[85]

Confidentiality

Once a mutual commitment is established some companies would prefer to have a confidentiality agreement signed. With our first case, the ALKA case, this was not an issue, because the department had already worked with the company before, and had established a very good relationship. The LEGO Group being such a large and prominent company within the play material industry is often being approached by universities and research centres, which they do not all know beforehand. This makes confidentiality an important issue for them. Since development of a multimedia case was a new thing for both them and us, they had their lawyers sketch an agreement, which we used with slight modifications, both with the LEGO group, Rockwool A/S and Vizion Factory. Figure 8.2 show an anonymous version of that confidentiality agreement we used at CBS.

Information Risks and Approval

In addition to participation in the media production, the case supplier reviews and approves content and design strategies, and these issues prolong the time span, as well as increase the amount of resources, which the case company has to use compared to written cases. I have identified three aspects of, what I call the "information risk associated with the case supplier" all of which influence the development process. The first risk lies in the demand for changes and an approval of content. Secondly, the dependence on individuals in the case company, and thirdly the investigation of issues related to third party content and companies (daughter companies and partners etc.) is presented.

The first aspect is what England and Finney 2002 refer to numerous times as "the information risk" associated with the client's possible demands for changes to the product being developed. In multimedia development especially, this is a high-risk issue, as small changes to the design can have big consequences, and if changes come at a late point in the process, media re-production is very expensive (England and Finney 2002 and Garner 1997). Even though the case supplier is not a paying customer, they do have power to change the case within a certain range.

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[85] The procedure for staging an interview will be further discussed in 8.2.4 scripts for media production.

Confidentiality Agreement

I the undersigned, representing the xxxx Business School (hereafter known as the BS),

_____

Prof. xxxxxxxxx, Department and address

declare to xxx (Company Name, known as CN) that all written or oral facts, information, documents, drawings, sketches and other forms for material (hereafter known as MATERIAL), which BS has received or has been familiarised with after the meeting on the xxxxxxx regarding the development of a BUSINES-LINC case (see note 1) will be contemplated and treated as confidential, and that the BS will permanently file such given MATERIAL in a reassuring way, and under no circumstances hand over such MATERIAL to third party, neither in writing or orally, without prior agreement with CN

I the undersigned further declare that such MATERIAL only will be used in connection with the BUSINES-LINC case, and that BS will newer themselves use the MATERIAL commercially or let others use the MATERIAL commercially.

I the undersigned accept that CN shall approve all information in connection with the BUSINES-LINC case, before this can be used in either educational or commercial areas.

I the undersigned accept that CN can at any time bring the work relationship to an end, if the above is not observed.

I the undersigned accept that all physical MATERIAL shall be returned to CN if so requested.

Xxx place and date

_____
Signature

Note 1: The BUSINES-LINC project (BUSiness Innovation NEtworkS - Learning with INteractive Cases) has the objective to support innovative solutions in European companies, by developing interactive multimedia cases to be used in education.

Figure 8.2 - Confidentiality agreement - translated from Danish

As a consequence we introduced a time span between finishing the written scripts (as for example with the CSB sound manuscripts, which were recorded with professional actors) and the actual production of the media content, to allow for review and approval from the case provider.[86] We were surprised to find how much time some of the companies needed for review and approval process, and the amount of details to which they had corrections and suggestions. In one situation 3 months were needed to review text, speak etc. However, this was the extreme, approximately 1-2 month seemed to be the average.

For some case suppliers the amount of details they required in these reviews was a bit extreme. For example the German partner told me, how in one of their cases they had to provide a version of the content, where each line of text was written with a reference to the source of this information (from written material - like balance sheets etc. - or from which interview). But it does not seam to deviate that much from the LEGO group, who also went through the case word by word with a red marker. I found, that it made the process easier for the companies, if they got the prototype of the case on a CD-ROM, so that they could relate the content to the context of the design. But still every HTML page was printed, including a transcript of all video and sound elements, enabling the case supplier to mark on paper the places where they had suggestions or corrections.

Other case suppliers had a slightly more relaxed attitude, and only wanted to ensure that the case represented the "story" as it happened, but without revealing confidential information (which were typically sales numbers, exact revenue etc.). We found, it was particularly the smaller companies, who had this attitude, and who in general had an open culture, which allowed for information sharing, as the following dialog between André Bolz from the German partner and yours truly shows: "André Bolz: *is it easier with smaller companies? We [Germany] had the experience in CEBUSNET[87] that we needed half a year for approving some content, and in one case we needed to disguise the company. In BUSINES-LINC we switched to smaller Internet companies. It was really different, and there they really liked to give information.* Rikke Orngreen: "*also finding the people who knows the information is easier. Oh, I don't know that, but go and talk to Thomas, he is right over there.* André Bolz: *yes, and also finding people, who can approve the information is easier.*"

At CBS we found that the review and approval process typically had a span of 1-2 months. Though this was somewhat longer than we first anticipated, we also found that this process added to the value of the teaching case. The whole consortium later in the process recognised the case suppliers as quality reviewers, as can also be seen in one of the minutes: *"Feedback of the case supplier is considered a valuable input for the consortium and thus included as an additional QA activity in the framework*". (Minutes from 27th January 2000)

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[86] This time gap did not mean that the project was lying still in this period. The waiting time was used in the prototyping phase as explained latter.

[87] CEBUSNET was a preceding project to BUSINES-LINC, which developed written cases. As can be seen from the interview the consortium at CEBUSNET experienced that an approval could take as mush as half a year. However, getting a better startup agreement had in our (CBS) experience reduced this dramatically.

Just as a written agreement and confidentiality agreement was signed by us - the developers, it was equally important to have the approval, in the form of a release note, signed by the case supplier at the end of a single case's development process (as discussed in section 4.2.1). Figure 8.3 presents as an example the signed release note to the LEGO case, signed by the manager of the European Division of the LEGO Group.

The second point regarding information risk associated with the case supplier, is the dependence on the individuals participating from the company. With two of the three cases we (CBS) were so unfortunate that the two contact persons from each company (that is 4 persons in total) left the companies during the development. In one company, it was at the end of the period, and we managed to get everything settled prior to their departure. In the other, the situation was somewhat different. In half a day of meetings with one of our contact persons, the manager of the department, we got vital information to the case. Immediately after this he left the company, however, and his successor rejected many of the viewpoints and statements put forward, and we almost had to start from scratch again. Later the same thing happened to the new manager, this time during the approval process, and a third person took over (a top-level manager), who did not introduce new content, but deleted quite a lot of statements.

Stefan Schäefer gives a similar example: "… *what happened was that the chief of our contact persons left the department, the head of planning and controlling left. The new one came in and said, what are you doing here? This is not information I gave to you and I have a different view, and so we had fight with this. …. So what happened now, is that this guy also left. Unbelievable! Osur strong partner is in the IT department, and he said, I will do it for you, but now we don't have him, and what do we do. I know we find a solution, but it's hard. In the first round we thought we use this planning and controlling process, as to talk about knowledge management in the company, about communication processes between very soft factors. It could happen that this case will be just to introduce under-graduates, what is planning, how does planning function with IT control. It is a very big influence, yeah.*" This quote shows how a problem at the case supplying company leads to a different teaching case than first intended. At worst, a teaching case project could be discontinued all together.

One of the possibilities of minimising the influence, which a change in contact person can cause, is to introduce continuous approval of the content material. For example approval of the analytical case, containing descriptions and analysis of the collected material as well as links to the interviews (transcribed or digital) (see 8.2.1). However, it is very doubtful that the company would use the energy to go through a lot of different material or versions of the multimedia case. In fact, we did at CBS discuss whether we should show the case supplier content and/or design documents, but decided against it and instead presented and discussed the design ideas on a meeting, and got oral approval of these. Also, it may not have helped to have such an approval, since it is difficult to invalidate the opinions or statements from a new employee or contact person, even when someone else have approved it (someone who might not work there anymore).

Release Note to the Interactive Teaching Case:
"The LEGO Case - Direct Consumer Access"
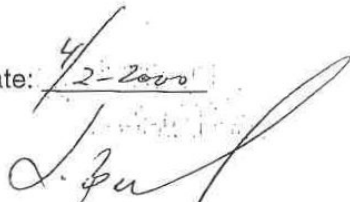
11 January, 2000 - Billund

This case was prepared by the department of Informatics, Copenhagen Business School as part of the BUSINES-LINC project[1] in a co-operation with the LEGO Company. The LEGO Company provided all the content information of the case and has reviewed the content of the case.

The case will be sold by an international publisher. It will be used in dissemination of successful business innovations and may be used both national and internationally in both educational environments as well as internally in organisations, who wishes to learn from the LEGO Company and it's successful management and implementation of an e-business solution.

On behalf of the LEGO Company, I hereby certify that we grant the BUSINES-LINC project the right to use the case as stated above and approve of the content of the case, which we believe portray a fair version of our process.

Date: 4/2-2000

Leo Bøgeholm Madsen, Senior VP

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[1] Under contract ESPRIT IV - No. 26.755: Project BUSINES-LINC - Business Innovation Networks – Learning with Interactive Cases.

Figure 8.3 - Release note

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It is vital to remember that the relationship to the case supplier can not at all be compared to the more typical client or customer relation described in the multimedia literature, as found in for example Bergman and Moore 1990, Donaldson and Cowderoy 1997, England and Finney 2002. The case supplier is not a paying customer, who has a need or a wish to develop a teaching case. It is we, the research departments and centres, who ask a favour of the companies, and this puts an indisputable limitation on the workload that we may give them. (I will return to this issue in 8.1.4.)

The third and final aspect of information risk (regarding the case supplier) is that of third party companies and content material. Third party material may originate from a public source (newspapers etc.) or from another company, who works together with the case supplier in the area, which the teaching case covers. Such as a partner / business associate, a supplier or customer in business to business relationships.

When a public source is used, the issue of copyright arises. We intended to use translated Danish newspaper articles to supplement the case story from another perspective than that of the company, and to give the teaching case a sense of reality. The newspaper editors liked the idea, but they did not own the copyright, it belonged to the authors, the journalists. We approached them all, but only two gave their immediate permission to use the article, the majority wanted between 3-400 ECU for a license to the teaching case. An amount we could not afford. We managed this situation by using summaries and clear references to the papers. It is extremely important however, that copyright issues are dealt with. If we had not tried to obtain these, but done the translation anyway, it would have been illegal.

If the company already has multimedia material, which can be used in the case, copyrights can also be an issue. E.g. a photographer may still have the copyright to a picture, even though it has been used in a commercial for a company and the picture is taken in front of this company's own factory. The copyright means the picture can not be used for anything but that commercial without the permission of the owner/the photographer. In the Rockwool teaching case, Rockwool gave us access to a database of digital pictures of their insulation products, factories etc. We noticed that this was not placed on Rockwools server, but on a photographer's site. We asked Rockwool if they were sure we could freely use them, and not until we got their second clearance, did we do so. However, it is not only the case supplier's media producing partners, who have to be respected, also work related partners or independent daughter companies have to be considered. As I have already mentioned, we interviewed Vizion Factory, who implemented Rockwools Internet site, and we also signed a confidentiality agreement with this company.

Conclusion

Even though I have mentioned positive issues of dealing with case suppliers, it may seem that the above analysis looks at all the pitfalls in the relationship. The case supplier

should however not be seen as a restraining role. It depends on the culture of the companies. Stefan Haaken from the Norwegian partner says that the "highest" risks they met, was not that high at all: "[on the first interview] *we already took a camera with us, we wanted to tape, and then they said, "well only for internal reasons, we are not prepared, I am not wearing a tie", but it was OK if we came back later and I said OK. That was one thing. Another thing was job changes, which just let to a postponement of things, and now my main contact point has got another job as well, but we decided to keep him as main contact.* Rikke Orngreen: *so you wouldn't say the case supplier put any barriers up?* Stefan Haaken: *No, We have very nice case suppliers.*" So it was far from every time that our wishes were denied, and even if they could not be fulfilled a hundred percent, usually an alternative solution was possible. Nevertheless, it is important to be aware of the risk issues before the relationship with the case supplier commences. You can then discuss agreements on what the company can do for you and deadlines, and problems may be avoided later.

Figure 8.4 illustrates the issues related to the role of the case supplier as investigated in this section.
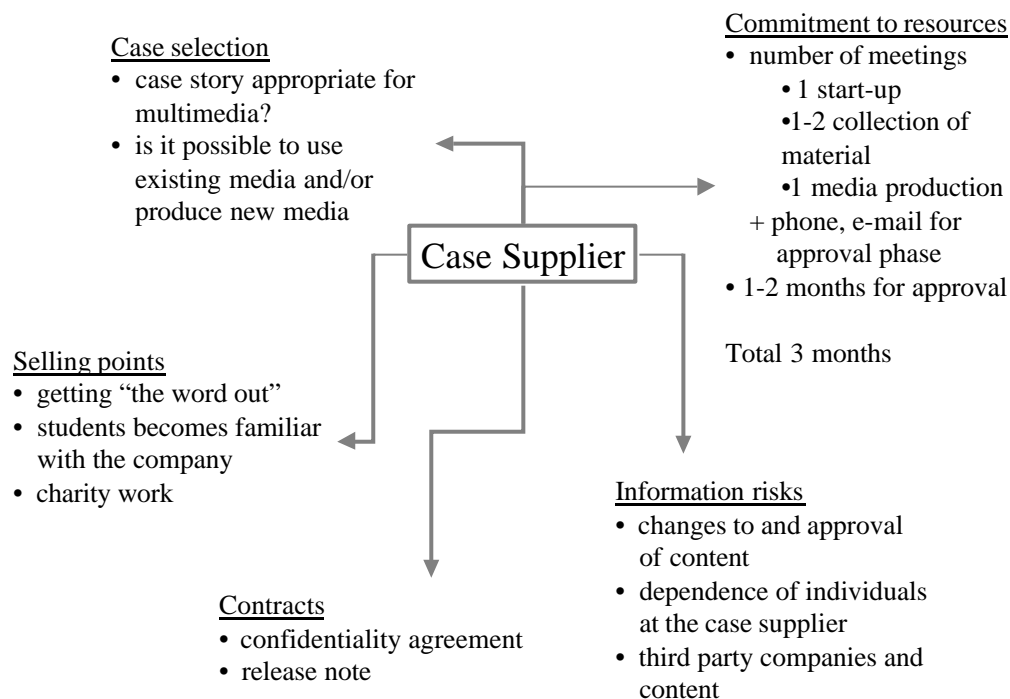
Figure 8.4 - Summary of issues related to the role of the case supplier

8.1.3. *STUDENTS AS DEVELOPERS*

In section 4.2 I mentioned that involvement of students in the development of written cases is quite normal. However, in Michiel Leenders and Jim Erskine book on case writing,

it is also mentioned that many of the professors complain that the students lack ability to write up the first draft of the case. That they as senior staff need to not only supervise, but do the majority of the work anyway (contact to the case supplier, and final write up of the case). The primary support the students could give was therefore in the content collection phase. (Leenders and Erskine 1989.)

In BUSINES-LINC we found that using students in multimedia teaching case development could be extended somewhat. Besides content collection, there were two major benefits of students as developers. They were able to see, if the design we were aiming at would be interesting / motivating for the target group. And a student represents low-cost assistance. However at CBS it turned out that getting qualified assistants could be a difficult task. The issues discussed in this section therefore becomes:

- Recruitment Strategies
- Assistants Knowing the Target Group
- Work Process

Recruitment Strategies

At CBS, we tried to attract students, who were ready to prepare their master thesis to ensure relatively qualified assistance. The majority of our students already had a halftime job (it seems 15-20 hours per week was the norm). The salary we could offer as a research department was quite insignificant compared to the salary, which our students were used to in the private sector. Therefore our experience at the department was that it was quite difficult to get students interested. As a consequence we posted the vacant positions pointing out that the data collected for the case could also be used as empirical material for a master thesis. It seemed to be what the students needed.

In a group dialog / interview I asked the research assistants, why they decided to become involved in the project (translated from Danish): "Maria B. Hansen: *Partly due to the master thesis and partly since it would be interesting to work with a company like LEGO.* Rikke Orngreen: *You had already been considering e-commerce, or..?* Maria B. Hansen*: Precisely, and one could see that there would be just that in this case.* Tine Foged: *Also, it looks good in the CV that one has participated in such a project. That it actually took so long, was a bit of a surprise. But it was a learning experience.* Flemming M. Larsen: *It is almost the same reasons for us. Collection of empirical data is never fun, and this looked like a short cut. And it is always easier to get something done, when there are someone who "bites one in the tale".* [Everybody smiles / small laugh] Rikke Orngreen: *Good argument.* Tim T. Christensen: *Yes, the last comment I agree to. It is also interesting, or I had expected, there would be more co-operation with Peter Neergaard and Niels Bjørn, than there actually was. It could have been interesting to be a real assistant, and I did not feel that happened.* [The others agree]". So there were a kind of mentor relationship that had been promised (though not explicitly), which the students did not "get".

The vacant position was officially announced by the two senior researchers, it was also them (or one of them), who talked to the students and made the agreements with them

about expected effort. However, once the practicalities concerning their employment and the relationship with the case supplier were established, the assistant students did not have any interaction with the senior researchers. The professors communicated with the students about their work primarily through me. (Also, Tine Foged and Maria B. Hansen were involved in the LEGO case, where the people involved in the case changed job, as described in the previous section. As this meant the project was delayed, so was their participation in the project. That might be the reason they found this longer than expected.)

Assistants Knowing the Target Group

Stefan Haaken prepared his master thesis while working with the BUSINES-LINC project at the Norwegian partner. When I asked him, what he thought about teaching strategies, and how he implemented them, the answer was: *"Well, actually I think a lot about it, and also I put myself in the situation of the students, who have the CD. And then I simulate in my head, myself working with what I am thinking of developing, and I ask myself, would that give you an insight and how big an insight, much better than paper, just a bit better, or is it just playing around? So I test myself quite strictly, because as a student I have made some, or a lot of experiences with learning material, which some was good and some was not so good, and for me it is really important that the students have the largest ever possible learning experience. So with everything I do, I ask myself, what are they going to do with it."*

So not only are the students a relatively low-cost aid for a multimedia development project, but they are also more sensitive to the needs of the target group. Hence, the majority will be able to analyse the material from a student's viewpoint. As discussed earlier, this form of participatory design, can not replace evaluation of the case in real use situations. In multimedia teaching case development this is due to two issues. First of all, the students obtain a lot of knowledge about the particular case they are developing. During an evaluation of the case, they will not be able to "see" the case as it was the first time they got aquatinted with the content, which would be the situation in a normal teaching case process (see chapter 4). Secondly and perhaps even more importantly, the case is supposed to support the case teaching discussion, which means having one student evaluate the individual use situation is not sufficient, the class discussion needs to be evaluated as well.

Work Process

Due to our focus on e-commerce in the multimedia teaching cases, the students used as research assistants were from CBS educational program on business economics and computer science. This had the fortunate "side-effect" that they possessed knowledge about system development in general, and were able to use this in the analysis and design phases.

The assisting students were participating in the initial meeting with the case supplier and the interviews performed after this.[88] The students wrote transcripts of the interviews and used the analytical case framework to carry out the first analysis (which will be thoroughly described in 8.2.1). We used this result to find areas on which we needed further information. The initial design strategy was developed in co-operation with me. When an idea concerning the case design (teaching objectives, overall structure of case, navigation etc.) was approved by the case supplier, the students prepared the first version of a case setup (see 8.2.2). From this point on, I continued to work with the case setup, the detailed design and content alone. Thus at CBS, the students did not actually participate in the prototyping phase – though they participated in the media production, when this happened early in the process at the case supplier in the form of recorded (staged) interviews.

Conclusion

The use of master students as assistants in the development project is an economical solution, which can provide qualified support - primarily in the case analysis, but also in the beginning of a case design phase, and for some media production activities. The students may combine it with the data collection process for their master thesis, however it is quite important that conditions of the work are communicated clearly, including amount and duration of work. These relationships are summarised in the Figure 8.5.

Work process
- support in the case analysis phase, and in early design and production activities.
- business economics and computer science students.

Students as Developers

Assistants comes from the target group
- can develop from a student perspective
- can not replace real use situations in evaluations

Recruitment strategies
- difficult to recruit
- master students are qualified and can use data in thesis

Figure 8.5 - Summary of issues related to the role of the students as developers

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[88] Except for the ALKA case, where no introductory meeting was held, and the first video recorded interview was done prior to hiring an assistant.

Project management of such a large project as BUSINES-LINC demanded energy and knowledge about managing multimedia systems and the case writing process. However, it is not within the scope of the dissertation to go into details with the general management issues, since our experience was that it did not deviate much from any other software project, and only three characteristics will be mentioned here. First the issue of project management strategies, which is dependent on the degree of outsourcing to sub-contractors. Then the issues of the relationship between the development team and clients, and finally the interdependency of the different tasks in multimedia teaching case development projects.In short:

- Sub-Contracting
- Dependencies of Tasks
- Organisational Confusion

Sub- Contracting

In section 8.1.1 I began a discussion on the issue of using sub-contractors. When an outsourcing strategy of all the technical issues associated with programming, media production and testing is chosen, at least one person with multimedia experience should present in the company. This person will then form what I would call a "communication bridge" between the company (here the research institution) wanting to develop the case and the sub-contractor(s). Such expertise is also necessary when creating the design of the case, probably together with an instructional designer, a subject matter expert and the sub-contractors graphical designer. (England and Finney 1996).

When using sub-contractors for media production it requires more focus on documentation and scripting than in-house media production do. Engaging for example a camera crew or a sound studio means that these sub-contractors are hired for a specific, limited task and for a short period of time. This implies that they will have very limited knowledge of the teaching case being developed, and they should therefore be given a very precise work and requirement description, enabling them to carry out the task. Scripting is very suitable for this, as it gives the contractor a precise list of the things needed and the file name, requirements (like resolution or frames pr. sec.) which each element should be saved in. The sound editor at Zinckernagel and co. told me, after seeing and working with the rather detailed script, that it was quite easy for him to perform his tasks. He told me that we saved some hours on editing and especially on re-recordings. I will present more about the script techniques used in BUSINES-LINC in 8.2.4.

When using a sub-contractor or third party consultant it is just as important to negotiate the legal rights to the produced material as when using existing material. For example an important issue could be whether the material can be used for new versions of the same or other cases, or whether a graphical interface can be used for a series of cases, or only for the one it was design for. As it may have become clear to the reader, copyright

can be a big issue in multimedia development projects, and it deals with a broad range of topics, whether it is a picture or the actual code used in the program. James Hemsley for example dedicated a role to the points of legal issues and copyright in connection with multimedia systems (Hemsley 1997).

Whether the media production is outsourced, or a full in-house development strategy is chosen, our experience is that both of these requires more than just a role with general multimedia skills. Software management skills are also necessary. Therefore this is a role which is part of the core team in Figure 8.1

Organisational Confusion

We found that in the BUSINES-LINC project the persons engaged in the project had several responsibilities, in the form of client, customer etc. In many software projects, the initiator and founder of a project will often be the management of a company (or the head of a department).[89] They will approach either an internal IT, web or multimedia department or engage an external company. Both situations will entail establishing a development team working with the project. The development team will operate with a notion of having a client, the persons or the organisation paying for the project. The target group of the project being developed, could be employees or customers of the client organisation. Examples of multimedia systems are commercial programs, like games or dictionaries, which the customers have to pay for, and marketing products, which should trigger the customer to buy the client's main products, or awareness programs or internal training programs for their own employees.

The relationship between the research institution, the students and teachers, as well as the case supplier in multimedia teaching case development was quite different. The persons, who initiated this project were the individual professors (but could also be a whole research centres), and which got the necessary funding through a research grant. The same persons were due to their expertise also belong to the development team, in the role of subject matter experts and/or instructional designers, plus sometimes also project managers (see Figure 8.1). Also, in teaching cases another type of client entered the scene, with the role of the case supplier - which was described in 8.1.2. Though the case supplier provides the case story and content as well as approves the case, the company is not a paying client, or the one initiating the case development. (Though it could be the situation, if the multimedia teaching case was initiated by the company as part of an internal training program.)

The target group was primarily students at teaching institutions. That is to say, the teaching cases was designed to motivate the students, but it was not the students, who themselves selected, which cases to use during their education. Therefore from a selling

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[89] I am here referring to the people in the organisation, who have the power and funds to initiate a software project. The idea for the project itself could arise many other places, the idea may come from an employee, a group of people at a department etc.

and also project management viewpoint, the instructors or teachers were also regarded as the customers to the teaching cases.

Figure 8.6 gives an overview of the relations between the involved parties / roles in a multimedia development project from the perspectives discussed here.
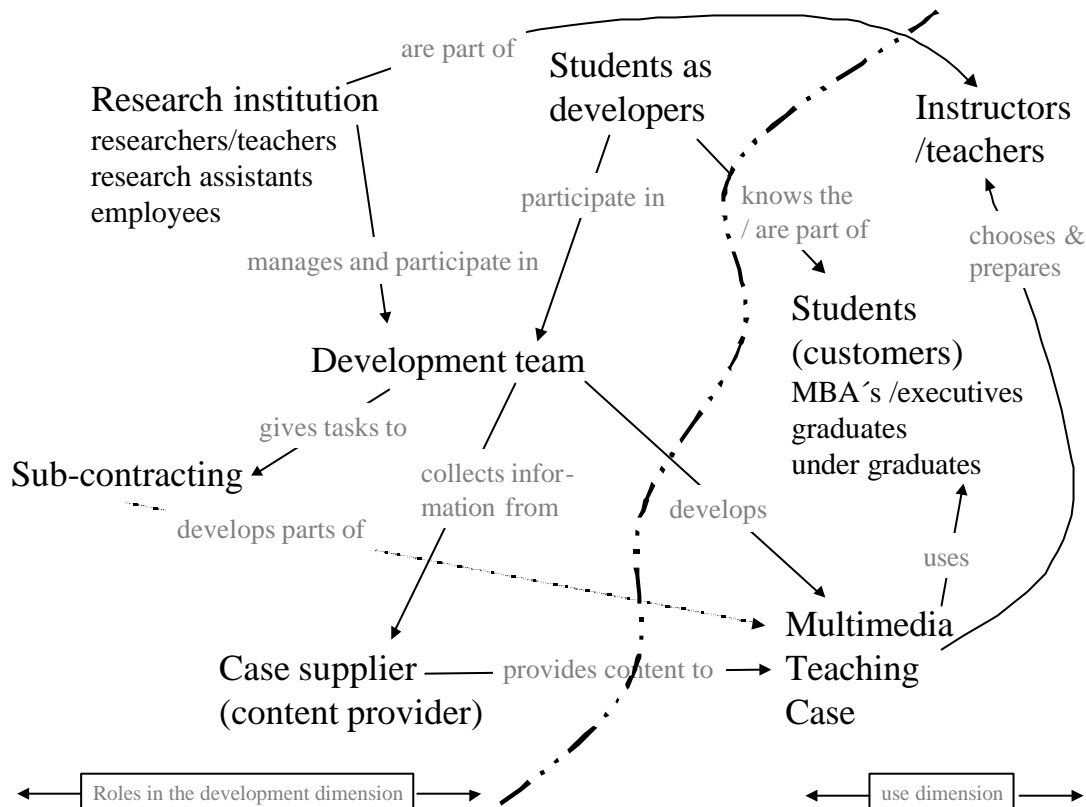
Figure 8.6 - Relations between the roles in the development dimension

Dependencies of Tasks

Some multimedia literature claims that project management of multimedia system development is quite demanding due to the inter-dependence of the tasks and phases in the project (see for example the description of Molin 2000 in 4.2.2). Though almost all software projects are complex, I have found that there were two interesting circumstances (in multimedia teaching case development), one lead to quite linear processes, the other to quite iterative processes in different areas of the development model.

First the cost of media production, which as already mentioned, made re-production extremely costly, particularly sound and video recordings, if changes should be required. Therefore it was vital that all content design, layout, navigation etc. were approved before media production begins. However, not all the different scripts have to be finished and approved before any media production can begin. For example it was possible for us to begin relatively early with the video recordings of the staged interviews of the employees. Whereas the sound studio recordings with the actors functioning as narrators in multimedia

cases, had to be done at the very end of the whole BUSINES-LINC project. We therefore recorded all three cases at the same time - or rather recorded with one actor per day, but each actor was used for all three cases.

Secondly, the content of the case and the lessons learned influence the design of the teaching strategy. But the chosen design of the case also influences which kind of data needs to be collected on a more detailed level. So even though there are linear elements in the process, where a second task can not begin before the first is well under way, this second task may very well feed-back to the first task.

For example in the ALKA case, when analysing the new interviews we had made, we found that compared to the data in the written case, it would be a good idea to present the teaching case in a menu, which had a cyclic element of time. This is seen in Figure 1.9. In the figure the narrator introduces the menus, which at the same time represent the continuous change or improvement programme that ALKA undergoes. The students are encouraged to follow this route, when investigating the case, including "looking" twice into the section "company information". Our choice to present the case this way made us realise that we needed information, which we had not yet asked about in the interviews. The information we lacked in the ALKA case, was the information, which should start the discussion about the future for ALKA. That is the type of information, which should not be investigated by the students until the second time they entered the "company information" menu. Through mail and telephone calls, we managed to collect this information as well.

Conclusion

The rather atypical organisation of a multimedia teaching case project puts an interesting dimension into the project management role, since the case participants had different perspectives to the organisational character of the project as compared to more traditional system development. For example even though a case supplier was not comparable to a paying client in traditional system development, they had a lot of influence on the project and the final design of the case. Also, due to future relationships and the reputation of the school developing the case, it became crucial to pay the outmost attention to the communication between the case supplier and the development team's core members.

Figure 8.7 summarises the main aspects discussed in this section.
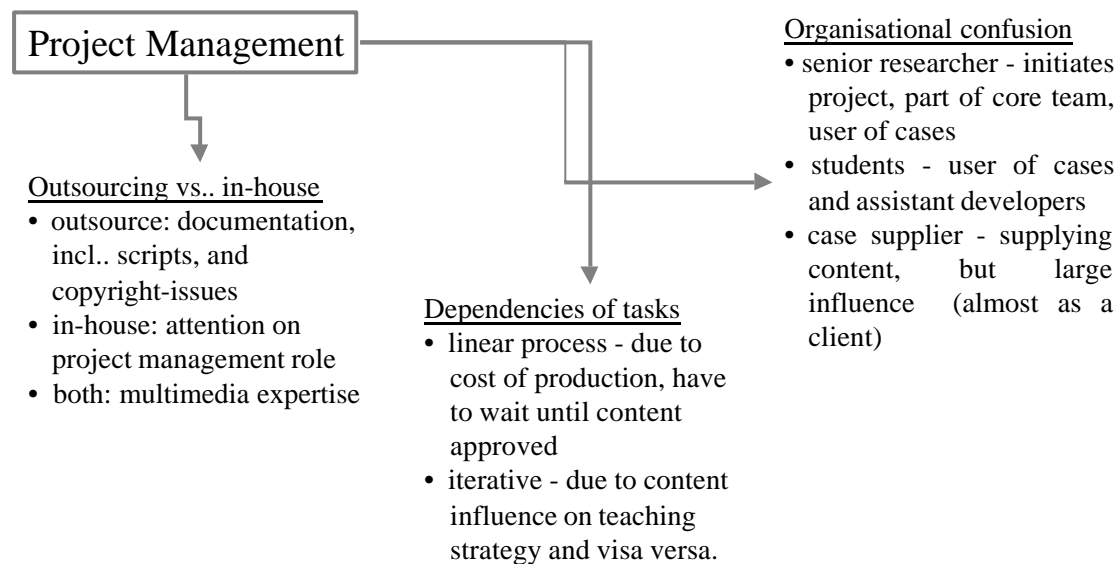
Figure 8.7 - Summary of issues related to the role of project management

8.2. TOOLS IN THE DEVELOPMENT DIMENSION

The tools, which will be analysed in this section, are all based in one of the phases of the development model Figure 7.3. However, the tools are often used in an overlapping manner, so that the result from one tool is used to initiate the subsequent phases. Also, these tools are often used in an iterative way. As with roles in the previous section, the tools investigated are the ones that we have used predominately in the BUSINES-LINC project, and the ones my analysis have shown to have a substantial influence on the development of multimedia teaching cases.

The tools will be described in a chronological order according to the development model described in 7 and in the action research cycles in 6.2. There are two key tools in the leads and contact phase, the confidentiality agreement and the release note, which I have already presented (8.1.2). I will therefore begin with the analytical case in 8.2.1, which the development team begun using in the case analysis phase. In 8.2.2 design related issues will be addressed through the tool named the case setup. Then the technical framework and prototyping tools are investigated in 8.2.3. These are tools, which are primarily part of an authoring and production phase, but can also contain design issues. Scripts for media production are discussed in 8.2.4 and the teaching note in 8.2.5.

8.2.1. ANALYTICAL CASE

The analytical case was part of a larger framework named the "Business Innovation Consolidation Framework", as mentioned in section 6.2. Though the content of this framework will be described, it is the analytical case, which is in focus in this section. The investigation of the analytical case uses this format:

- Objectives and Appearance
- Common Ground
- Working with or Writing the Analytical Case
- Peer-reviews, Documentation and Overview
- Structuring Content (Not Design)
- The Case Supplier and Iterations
- Roles Involved in the Creation of Content

Objectives and Appearance

The Business Innovation Consolidation Framework consists of three main parts:

- Concepts and models,
- The analytical case template, and
- A guide for selecting cases, collect and analyse content material.

The first part describes the concepts and models, and defines the different terms, which we used in the analysis of the case. For example one of the concepts used was the "target". The target represented the unit (the department, company etc.) transformed or changed due to the innovative business solution. We described a model, the target model, focusing on the elements of the innovation, using three models. The target model was in part based on Leavitt's: Organisations as Multivariate Systems (Leavitt 1965), but was extended with Scott Morton's: Management in the 90´s (Morton 1991) and Richar Beckhard's and Wendy Pritchards: Changing the Essence (Beckhard and Pritchard 1992). The section with concepts and models described all three models and then the combination model, which was named the "BUSINES-LINC target model".[90]

The second part of the framework was the template for the analytical case, based on the models and concepts that had been "translated" into the template. The template contained headings and small definitions of these headings with references into the concepts and models description. I can not show a complete example of an analytical case for one of the cases we developed, as it contains confidential information or at least information, which the case providing company later on wanted deleted from the case, prior to the final approval and signing of the release note.

To give an overview of the content and look of the template, I have included two small excerpts in Figure 8.8. The first row is from the result of working with the template when creating the actual analytical case for the Rockwool case. The second row shows excerpts for the matching descriptions from the concepts and models in the framework. For practical and confidentiality reasons I have chosen excerpts that are purely text based. Though the analytical case contained illustrations, pictures, tables, links to interview etc.

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[90] The business innovation consolidation framework was primarily developed in the beginning of the project and a so-called preliminary framework was delivered to the EU in November 1998. At the end of the project we made a few updates (but only a few) based on our experiences, and a new deliverable was made. I did not personally contribute to the development of the concepts and models, but participated in the seminars and discussions on, how the models and concepts affected the analyst guide and the template it self, and how they could assist when developing *multimedia* cases, as opposed to the similar framework developed for the previous CEBUSNET project for written cases.

Figure 8.9 illustrates all the headings, which are included in the template, and together the two figures should provide a fair picture of the general subjects, which are included in the case.

The third part of the framework is a guide on how to select a case, define the learning perspectives and collect and especially analyse material. This guide is only a couple of pages long, and it therefore only covers the aspects on an extremely general level.

Excerpts from **The Rockwool Analytical Case**	Excerpts from **Concepts and Models descriptions**
2.3.1 Enterprise in Focus Rockwool (Denmark) is part of the Rockwool Group. The Rockwool Group is a Danish concern, which owns companies comparable to Rockwool Denmark in Europe and North America. The Group employs more than 6.000 people and the annual turnover is in excess of 6 billions Danish Kroners. The companies in the Rockwool Group operate rather independently and only share the brand and technology…….	**2.2 Enterprise in Focus** In order to understand Change it is important to understand the Enterprise/enterprises being changed. More and more Change aims at Targets covering parts of more than one Enterprise. Usually, there is one Enterprise leading the Change. This one is called the Enterprise in Focus. *The Enterprise in Focus is the one containing the Idea and the Driving force…….*
Strategy & Mission: The mission of the Rockwool Group is to develop, produce and market products, systems and services for purposes for which stone wool is suitable. Furthermore, it is the mission of the Group to enter into any other activity where the Group has the necessary expertise…….	**2.2.1 Strategy & Mission:** All enterprises have their own mission, that is a set of objectives, rules, principles, leading their action over the years. Many enterprises also explicit their mission with precise statements useful both for understanding their strategic choices (e.g. gaining growing market share, becoming global, etc.) and ……

Figure 8.8 - Excerpt from the analytical case[91]

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[91] The heading numbers differs, since one is taken from the Rockwool analytical case, the other from the consolidation framework document.

```
3   TEMPLATE FOR ANALYTICAL CASE
    3.1  INTRODUCTION
         3.1.1  Role in BICF
         3.1.2  Recommendations for use
         3.1.3  Format of the Analytical Case
         3.1.4  Case Summary
         3.1.5  Learning Perspectives
         3.1.6  Background
                3.1.6.1  Enterprise in Focus
                3.1.6.2  Environment
                       3.1.6.2.1 Task Environment
                       3.1.6.2.2  Institutional Environment
                3.1.6.3  Target – initial state
         3.1.7  Change Process
                3.1.7.1  Change Overview
                3.1.7.2  Overall Characteristics
                       3.1.7.2.1 Main transformation approach
                       3.1.7.2.2  Degree of flexibility and learning
                3.1.7.3  Initiation
                3.1.7.4  Change Phase 1-n
         3.1.8  The Business Innovative Solution
                3.1.8.1  Environment and Target Key Variables – End state
                3.1.8.2  The innovative combination
         3.1.9  Improved Business Results
                3.1.9.1  Financial results
                3.1.9.2  Customer oriented results
                3.1.9.3  Process oriented results
                3.1.9.4  Personnel oriented results
                3.1.9.5  Innovation and Development
         3.1.10 Lessons Learned
```

Figure 8.9 - Subjects addressed in the analytical case

Common Ground

I have named this tool the analytical case and not the business innovation consolidation framework. Primarily because the name "business innovation consolidation framework" is specific to the type of business solutions dealt with in our teaching cases. It may therefore not be the same concepts, which another type of multimedia case wants to rely on. Whereas the work process and the experiences, we had collecting and analysing data, are generally more applicable, and I will frame these work processes and experiences around the analytical case. However, writing the complete framework was a good way of reaching a mutual understanding about the project.

The prevailing benefit of working with the analytical case was that it created a common language for the consortium and the partners. At a general BUSINES-LINC meeting on the 27/1-2000 Peter Neergaard called it a "common mindset" for people, which gave us a mutual set of definitions and models, within which the cases could be developed. But it was not the business innovation consolidation framework as a reading material that gave us that mindset. When at the same meeting I asked if the consolidation framework could be

used by others, Gösta Steneskog (Swedish partner) answered "*Yes, but they would need to go through the same process of getting same or mutual mindset*". And Paola Bielli (Italian partner) continued: "*You should as a team use a couple of days, months, or xx to digest the models that you use, whether this is a consolidation framework or Porters model or something different.*"

Working with or Writing the Analytical Case

The number of sub-headlines (i.e. the number of levels in the headlines) used in the analytical case template[92] had an intimidating effect on the student assistants working with me on the cases. This high degree of details made the template seem more bureaucratic and formalised than were intended. This may be because we as project leaders at CBS tried to use the analytical case in a rather stringent manner. The idea was that the template should provide the students with an overview of the data necessary and guide them in the analysis, since they were inexperienced in carrying out this form of research. This is similar to the intentions of the list of questions (Heath 1998) and the case plan (Leenders and Erskine 1989) as shown in Table 4.5 and Table 4.6.

By stringent I mean, we suggested they should write content into the template, instead of just short keywords. Encouraging them to write real sentences instead of keywords forced the students to consider and analyse the content, and not just copy directly from the interviewer as face value. In the beginning the students misinterpreted this and believed that every heading mentioned had to have content, which instead should depend on the situation in the case company. That was why the many headlines, at many levels, were both intimidating and de-motivating for the students, and in the end even for myself, since I had to review and work with the students on the rather large analytical case, which was the result of their work. (Typically 15-20 pages including figures and tables and with references to transcribed material consisting of a lot of pages.)

The same experience was made in the consortium, and made us underline the fact that the analytical case should be used more as a document with links into the "raw" data collected in the company. By this we tried to focus the energy on designing the case content, teaching strategy and interface, rather than on writing a support document.

There was a divergence between this decision of having a small "hyperlinked" analytical case, and the fact that we still had to deliver a full written and well-documented analytical case as a deliverable to the EU. As Flemming M. Larsen (one of the assistants of the Rockwool case) said that there was indeed a strange conflict: At the general meetings a signal about "this process being free play" was given several times, but on the other hand an analytical case and a technical framework were given, which stated "*you can do what you want, as long as it looks like this!*" (Translated from Danish).

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[92] The levels were more than can bee seen on the table, since some headings did not have numbers attached to them, but were either bold or italic sub-headings (Figure 8.9).

Peer-reviews, Documentation and Overview

The final analytical case document was used as an external and internal quality assurance document, especially in the first trial.[93] As an external quality assurance document, it was reviewed by one of the six partners (for example the Swedish partner would peer-review the Danish analytical cases and visa versa). But it turned out that it was difficult for the reviewing partner to get an idea of what the case was really about, and how the key issues of the business solution would be presented in the multimedia teaching case. Therefore and as time became a limited factor, the peer-reviews of the analytical case became more superficial and then again even less usable. At least in the co-operation between the Swedish partner and us in Denmark. But it continued to work as a very important internal quality assurance document within the CBS core development team.

Since the anchorperson working with the development of the case for the Norwegian partner was primarily staying at an office at the German partner's department, they had the opportunity to inform each other orally about the progress of the data collection phase. The Norwegian and German partners were also later able to provide valuable feedback to each other regarding the overall design ideas. The geographical closeness gave two extra dimensions to their peer-review process. At the one hand they knew more about each other's cases and therefore were better qualified to evaluate them; On the other hand the everyday meetings made it difficult for them to plan a formal review sequence, and so reviews were of a more sporadic character.

Besides being a content related analytical work-process within the BUSINES-LINC consortium, the analytical case work provided us with a way of presenting the case status for each other, as it gave an overview of work done according to the deadlines we had. As the project progressed we realised that it was possible to have a linked version, and still use it as an internal quality assurance tool as well.

At the end of the project, the analytical case was therefore first used more as a super structure with links to information (though not as extended as would be recommended now). This linked structure was later in the process written as a "complete" document, which then served both as quality assurance document and as a formal EU deliverable. In larger projects this kind of formalisation of actually writing the analytical case in the end of the case analysis phase may be necessary.

Structuring Content (Not Design)

When interviewed, the partners mentioned the analytical case as a tool, which supported them when structuring the information, which has been attained during the interviews, and provided them with an overview of the case content.[94] Quite early in the

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[93] For each case we wrote several versions of the analytical case. Typically, the assistants would write the first version, then I would review it, add content and give them feedback. As we collected more information the analytical case was expanded, and a new review process took place. At some point doing these iterative cycles Peter Neergaard, the senior researcher and main subject matter expert would also review the document. At the end of the analysis phase and well into the design phase, I would make a couple of additional versions, when developing the final document as a deliverable to the EU and as quality assurance document.

[94] This position was mentioned individually by the German, Swedish and Danish development teams.

process we were aware that the analytical case should be used as input and be developed to some extent in parallel with the design. This was already discussed at the first workshop in the business innovation consolidation framework on the 5/5-1998. In the minutes from this meeting was written that the analytical case: "*must be done concurrent with and in close co-operation with the design of the learning process and the development of the multi-media application.*" (Minutes from 5th of May 1998).

However, the primary drawback of this – as I and the assisting students from CBS saw it – was that the analytical case was now very visible in some of the 18 cases, and this was not our objective. The focus of the teaching case as it should be conveyed to the target group, should be on the business solutions, not on the models and concepts, which were used to collect and analyse of content.

The assistant, Flemming M. Larsen, states in a recorded group interview, that (translated from Danish): "*I believe one becomes a bit more comfortable, when the framework is given. You go out and ask* [the case supplier] *about these things* [in the analytical case template]*, and you get the information, then it is quite an obvious opportunity that you also take approximately the same pieces and put into a structure* [of the multimedia case]". Tim T. Christensen (another student assistant) also points out that this problem may be due to time and cost restrains, and though we all agreed to some extent, we also discussed if it might rather be lack of professional involvement. That multimedia professionals (multimedia designers and graphical artist etc.) are able to design and re-structure content, so it matches the needs of the user rather than resemble existing formats.

The above argument corresponds with André Bolz's position, as stated in an interview with the German partner, that the analytical case can work as a hand-over document. He sees the actual writing of a complete analytical case as making sense, when the data collection and development process are separated tasks (separated in the sense that different people carry out the two tasks).

If I take the Italian partner's cases as an example: The analytical case framework is not visible in their multimedia cases. It was Paola Bielli, who - at the previously mentioned general meeting on the 27/1-2000 - mentioned that the analytical case helped in the interaction with the company, so that one would keep the focus and not wander off too much, but that it was not a design tool. And this last point is important to keep in mind, so that cases, which bear a resemblance to the analytical case can be avoided, whether an in-house or outsourcing strategy is chosen.

The Case Supplier and Iterations

As I have already described quite extensively in section 8.1.2, the case supplying company has large influence on the content collection process. The case suppliers at CBS were quite traditional in their organisational structures, and were companies, who had existed for a long period of time in well-established industries. Therefore we experienced that the models and concepts of the framework could be applied, though we had to adapt

other concepts as well, in order to understand certain phenomenon. However, in other situations the analytical case was less applicable or suitable because of the companies history and culture.

One of the German members had a case supplier, who was a start up company (which e-commerce companies used in BUSINES-LINC tended to be). Here it was difficult to describe the traditional concepts from the analytical case template, simply because such structures were not existing within the company. Even though this was the situation the partners still felt the analytical case supported them as a working tool.

The analytical tool was used in an iterative manner. As Stefan Schäefer says: *"… it was more iterative. Maybe we had a big advantage that we developed the analytical framework. The cases are all based on the consolidation framework. In my opinion most important in this consolidation framework, is that you have within the consortium a common language, common definitions, and that you know what is important, when you go out to collect data. Not really, that all data is needed, but that you have in mind and absorbed, what are the relevant topics in general. So therefore I definitely applied the framework, in all the interviews. In two interviews I had a print out of the analytical case with me, just the headings. … And in the meanwhile I have it in my mind, you know what you have to ask and what you don't have to ask. It is not that I after each interview, I go and fill it in* [to the analytical case template]. *But at some period, when you have a lot of papers, articles and so on. You loose a little bit of ehm, ehm control and ehm* Rikke Orngreen: *oversight?* Stefan Shäefer: *Yes, and you know in the end that you have to deliver an analytical case. So I print in some links to what we have. So definitely also, like the case setup, the analytical case we deliver now* [the final version to the EU] *we have prepared in the end."*

Roles Involved in the Creation of Content

A subject matter expert in the area under investigation was certainly required for the analytical case work, but someone with multimedia experience were also beneficiary, to consider the possible media production settings and the multimedia narrative elements of the teaching case. Getting these different views on the analytical case was quite important.

I have already mentioned, how assisting students used the analytical case tool. Senior researchers also participated in the initial meetings with the case supplier, and thus got adequate information to perform internal quality review of the analytical cases, supplying comments based on their experience with teaching cases and knowledge from the area. So where the development of written teaching cases according to literature often only involves one person or two, if an assistant is used, and even then often one at a time (see 4.2.1), multimedia teaching case development required more attention even in the analysis phase.[95] It was a co-operative effort.

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[95] Then again, the case centres emerging at different locations all over the world do have more of a team-based development process even for written cases. Though the cases are still written by 1-2 persons, the whole team shares experiences. For example at the Hong Kong Business, Farhooman leads the centre for Asian Case Studies. At the ICIS 2000 (International Conference on Information Systems) in Brisbane, Australia, he introduced the centre's approach to case development (written cases). He talked about a material collection tool in the form of interview guides, where the work with this was discussed in teams, even though one person was writing the case (perhaps with journalistic or editorial assistance from another employee at the centre). I reckon such an approach were similar to that of the consortium and the core teams.

Conclusion

In summary, the issues shown in Figure 8.10 has been discussed.

Objectives and appearance
• supports collection and analyses of information
• Business Innovation Consolidation Framework
  • models and concepts
  • analytical case template
  • analysts guide

Common ground
• created a common language or mindset
• can not be read in a template, needs to work with the theories over a period of time.

Working with or writing the analytical case
• used as stringent template for EU deliverable
• worked better as a flexible template with hyperlink into raw material

The case supplier and Iterations
• some companies do not fit into the framework, analytical case need to be flexible
• iterative work process ensured quality and consistent case story

Analytical Case

Involved roles in the creation of content
• subject matter experts
• student assistants
• the case supplier
• at some points multimedia expertise

Structuring content (not design)
• used in case analysis phase, but also in case design phase.
• is unintentionally visible as structure in some final cases
• can be used to structure content, but is not a design tool

Peer-reviews, documentation and overview
• as external quality assurance tool difficult, requires extended knowledge of the case
• as internal quality assurance tool good
• in case series provides overview of status
• for outsourcing good documentation of process

Figure 8.10 - Summary of issues related to the tool analytical case

Quite often educational multimedia systems are based on existing knowledge (theories and models) from existing literature, or on research performed by people who will play a vital role in the development as subject matter experts. However, the teaching case story was "out there" in the company. It was collected using interviews and existing material. The content was analysed and lessons learned derived according to the target group(s).

Because the content had to be "developed" from scratch and not from an existing teaching book etc., the more creative process, which is otherwise related to the design phase, became visible in the case analysis phase. To "see the stories" in the company. Though it was not creativity as an idea thought in a split-second: "*Creative leaps might be taken by individuals, but design thrives in the different points of view found in teams*." (Kelley and Hartfield 1996, p. 158.) And the analytical case-work is a team process.

8.2.2. CASE SETUP

The purpose of this tool, named the case setup, is to support the process of choosing a teaching and interaction strategy, as well as to support the design of the case story. It does

this by letting the development team work with and describe future use of the teaching case at different levels: target group, teaching objectives and strategy, user interface, media usage, and general story line. The following perspectives of the case setup are investigated:

- Objectives and Appearance
- Treatment (Extended Scenario)
- Working with the Case Setup
- Storyboards and Sketches
- 1st Version of the Teaching Note
- Quality Assurance and Influence on Content
- Involved Roles - Choosing Between Alternatives

Objectives and Appearance

Where the analytical case was based on a tool from a previous project, with the same six partners, this tool was a new "creation" initiated by me. It is based on practice and literature within multimedia development as well as teaching case reviews (as discussed in chapter 4). The tool was created with special focus on the development of multimedia teaching cases. A template was developed, and though a final document was made especially for the first group of cases, it focused even more on the working process than did the analytical case.

The first column in Table 8.1 depicts the headings to the first version of the case setup for the LEGO case. Here it is seen that the template consisted of two items, the case setup and the treatment[96]. The case setup was used to extract the lessons learned, which we had begun identifying in the analytical case-work and then relating those to a relevant target group. From this the teaching objectives were identified. It is noticeable that I have used the term learning concept and learning objectives. This is due to the deliverable named the learning concept, which was a product of our long discussions on teaching cases. See section 6.2 for a reference to the learning concept in the first action research cycle and 7 for the consortium use of the term learning even though it was clearly teaching strategies, which were in focus. The content of the case setup headings also relates more to teaching than to learning. For example the "learning objectives" was among others used to identify questions and discussions, which can be derived from the case content.

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[96] A treatment is similar to a scenario, as mentioned earlier, and will be discussed in details in the next section.

2.1 Case Set-up
    2.1.1 Introduction
    2.1.2 Relation to the Analytical Case
    2.1.3 Relation to the Learning Concept
        2.1.3.1 Target Group
        2.1.3.2 Learning Objectives
2.2 Treatment
        Lego.com
        Lego world shop
        Getting started
        Background & the LEGO case
	1 Introduction
	2 LEGO – development of direct consumer
	   access (CBS)
	  2.1 Introduction to the Case Supplier
	  2.2 Relation to the Analytical Case
	  2.3 Relation to the Learning Concept
	      2.3.1 Target Group and Learning
	            Perspectives
	      2.3.2 Learning Objectives
	  2.4 Treatment
	      2.4.1 Media Use
	      2.4.2 Layout and Structure
	          2.4.2.1 Introduction
	          2.4.2.2 The Mission
	          2.4.2.3 Information Gathering
	      2.4.3 General Navigation

Table 8.1 - Subjects addressed in the case setup

As is seen in the second column of Table 8.1 the treatment is now part of the case setup. We felt that the setup of the case comprises both the formal structure (of lessons learned, clarification of the target group for the specific case, and the teaching objectives) and the design issues of the narrative elements or the case story, interface, navigation and media usage decisions of the treatment. The headings appearing below the treatment section are not part of the template as such, but will depend on the case at hand.

Treatment or Scenario

I pointed in section 4.2.3 to the use of scenarios within a design phase, as a way of working towards a description of the system being developed. I also pointed to some of the weaknesses as I saw them, especially when working with scenarios for multimedia yeaching case development. The first critical point was that the scenario did not consider narrative elements to the degree necessary for multimedia teaching cases. Also, scenarios seldom consider experiences or the historical context, but have their offspring in the task carried out at the computer. Therefore it becomes difficult to identify with the character of the user. He/she has become an artificial archetype in their actions.

So even though there is a well-established field within the application of scenarios, I have looked at the history of a similar tool in the movie industry, namely treatments, to encompass the critical points mentioned above. A treatment has two perspectives. One objective is as a tool for working on the plot, the characters and their actions. The other as marketing material, which should "sell" the idea of the movie to the producers. (Frensham 1996.)

In the latter form the treatment is typically a couple of pages (from 3 to 10 pages at an average) describing the story line or plot in a movie. It is this description, which is

forwarded to possible producers, and it thus makes up the first basis on which the producer / script reader decide, whether this is a film-project they would like to consider pouring their money into or not. (Atchity and Wong 1997, Filmmakers 2002, Frensham 1996.)

As a work tool the treatment is used to expose the weaknesses in the script being produced (whether for television or the "big screen"), but also to work with and incorporate essences of the main plot and the characters (Frensham 1996). "*The characters are hands down the most important element of any story and should generate the action, setting and point of view throughout the treatment*". (Filmmakers 2002, p. 1.) The treatment should also focus on the emotions as well as the actions of the characters (Atchity and Wong 1997). According to Raymond Frensham it should be a chronological description, which uses "*active verbs and descriptive nouns to capture the action, verve and pace of your script. Pace is important,*" (Frensham 1996, p. 177). The treatment thus focuses on the use of the language to capture our interest, and to get an idea or a sense of what the script is about. It is in this light that the treatment has been used for multimedia teaching cases, to get a *feeling of* the future system as it will work and function.

Each character is displayed in the treatment as an individual person. So even if they represent an archetype as in the scenario, it is a believable personality and not an unidentifiable "John Doe", which makes actions unnatural, and therefore makes it very difficult to extract any design principles and requirements to the future system. The character of an individual is the quality I wanted the treatment in multimedia teaching case development to have.

Another form of treatment is found in England and Finney (already in their second edition 1996, and in their new third edition 2002), where a treatment is a description of the multimedia system's media usage. The treatment is used for agreeing on the use of media with the client (though it does not deal with the interaction at any level concerning the user interface or navigational issues, rather it identifies media types and requirements). This element of treatment of the media types is not including in the movie version of a treatment, but was also contemplated in the multimedia teaching case treatment.

At the time when the case setup was first created, I wanted to distance the work from the more traditional scenario descriptions, as outlined in section 4.2.3. This is the reason I adapted the word treatment (encompassing the two forms of treatments, from script writing and media usage as mentioned above). The concepts of character, plot and media usage deal with the two critical issues from the scenario approach: the possibility of designing a case story or plot, including the character/culture of the case supplier; and designing this for the users.

It is a bit of a paradox that I looked to the movie industry to find a tool that opened for discussions on people, who should seem real. Both the users and the case supplier's employees are very real, the fiction characters, however, are not. But the movie industry

was able to give me the inspiration needed to add a new dimension to the scenario approach.

I began working with treatments in 1996 as a way of extending the use of more traditional scenario application, e.g. as seen in Carroll 1995 to multimedia applications. However, as mentioned in 4.2.3, other approaches to scenarios also appeared approximately at the same time. I observed companies using more active and extended scenarios, and just recently I was introduced to two approaches, which intrigued me a lot, Alan Coopers use of *personnas* and Lene Nielsens use of *rounded user* or *rounded character*. Both of which challenge the archetypal use of the concept "the user". (Cooper 1999 and Nielsen 2002.)

Cooper even suggests that the use of the word "the user" within the development process produce an "elastic" archetype of a user. A user, which in a scenario would use the system in unrealistic ways, to ensure that all facets of the system is being used, when rather the system should be designed to support the different objectives, which each individual have when using the system. (Cooper 1999.) Though this aspect of creating an "elastic" user, was not an explicit criticism that motivated me to work with the treatment as an extended scenario, I find the argument very interesting, but also difficult to avoid.

This is also seen when Cooper and his development team identifies a number of personas. When they work with these individuals, it is seen that each persona represent a target group of users / a certain type of users. However, I find that this individualism in the personas, when used in the scenarios, provide a perspective for the stakeholders, to "see" possible solutions, due to the individual character of the future systems use situation. It becomes the goals of people that motivate the design, rather than observing a constructed use situation based on the "pre-defined" objectives and beliefs of a system. A scenario according to Cooper thus becomes "*a concise description of a persona using a software based product to achieve a goal*, (Coopers 1999, p.179).

The multimedia teaching case treatment (or extended scenario) can be written at a very early stage, based on information derived from work in the case analysis phase. The description should be a user situation, and can be seen as kind of an advance walk-through of the future programme. One perspective of the treatment is to illustrate the content of the system, the narrative aspects, the interaction structure, as well as the graphical layout by means of drawings of the screen layout, as it is supposed to look and work in future versions.[97] The other perspective is to show the environment, in which the system is used. Table 8.2 shows the type of questions, which the treatment can support the development team in answering.

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[97] These drawings were later, when a design strategy had been chosen, often turned into simple standard storyboards (see later in this section).

Case story or plot	What is the main message in the case? Which kind of case story can be build around this message and the lessons learned?
Interaction with the user interface	How do we communicate with the user (which kind of language do we use)? How should the user and system interact? How do we want the user to navigate through the case? How should the visual interface be represented?
Content	How deep and broad an aspect should the case cover? Should some material be generated from existing material or should everything be produced from scratch (media production)? Which media is suitable for presentation of which information?
Requirements	Which kind of physical platform should be chosen? (browsers, stand-alone applications) Are there any special requirements to the platform? (plug-ins, etc.) Is there a need for any special equipment for the actual production of the parts or authoring process?

Table 8.2 - Example of questions a treatment can answer

The treatment used in BUSINES-LINC covered a use situation, including description of who the user is, his/hers objective for using the case, and how the user prepares for the class discussion. I have mentioned the concept of using the name of these individual characters (or personas in Coopers 1999 terminology) instead of the term users, which I have also done with success in other projects.[98] However, in BUSINES-LINC it was not at all easy to maintain or "keep alive" the different characters identified. I met a lot of reluctance in the consortium to such a "game play", which was not seen as serious development work. For example, I observed that some treatment descriptions at CBS start out with the personal character, but become more and more "a user" as the scenario works proceed. The treatment used as final version did not at all refer to an individual character with respect to the user. This is seen in for example how the text reads "the student" instead of Michael, Susan etc (see Table 8.3). However, it did very much contain the narrative aspect and actions, as well as the individual character and culture of the case supplier, which was the other reason for using the treatments.

…. The student is now in the role as an external consultant. He enters the LEGO headquarters through the glass doors – [he is looking out through the video camera as if everything is seen from the eyes of the consultant]. At first his eyes pan-around the reception of the LEGO headquarter which is decorated with LEGO bricks and toys …… ….. Clicking on the first door activates the opening of the door and the consultant enters the office of the manager of the electronic commerce department. Tau Steffensen is sitting behind his desk……

Table 8.3 - Excerpt from the LEGO case treatment

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[98] Adapting an individual charector description for use in scenario/treatments does not restrain me from using the concept of users and students, as I have done throughout the dissertation. It is merely seen as a work process within the case design phase, but does not restrict me from referring to "a user", when I am leading discussions about my research. As I for example will do iontesively in the use dimension in the next chapter, where the word users and students are used numerous times.

As an example of the high priority given to the narrative elements and thoughts about navigation, the two small excerpts from the treatment, headings of which were shown in the second column of Table 8.1 are shown in Table 8.3. Compared to the narrative scenario used by Rosson and Carroll 1995 (see Figure 4.5) the plot or story and the character of the company are more visible here. For example instead of writing that "the multimedia system will include three screens looking like offices. One of these offices illustrates the manager of electronic commerce office, including folders with information about….", an attempt to provide a situational feeling of what the users will experience when using the system was provided, by for example stating that the consultant enters the office.

Working with the Case Setup

I asked the partners, how they worked with the case setup, and it turned out there were different procedures depending on, where we were in the project. In general the teaching objectives were first discussed, then an iterative process of using the case setup with the treatment and storyboarding (se the next section) was used. Then a sequence of prototyping would take over for the detailed design, especially as our knowledge about the case series increased, and the project evolved.

Stefan Schäefer from Germany expressed the following: "… *you sit there, you brainstorm, you develop your ideas, then you add something to the paper, and then some development takes place, and then you redefine, you have another brainstorm. The latest version of this case setup was written after it was realised* [after the case was authored], *that is clear, but draft versions where prepared in conjunction … We have a flipchart in our office, and the result on this flipchart were used to prepare some structured version, at the end the case setup.*" This is quite similar to our approach at the CBS, though we were somewhat restricted, since we were not physically located in the same building (the assistants did not have an office available). Our case setup work-process was initiated in a scheduled meeting. This would happen after we had had one or two interviews with the case supplier. On these meetings we would take pieces of blank paper and say ok, how could we see the starting point of this case, for example the home page, and then work through the case from there, specially by use of sketches (simple storyboards).

The Swedish partner had a different experience with the first case, but would use a similar approach in the next two cases. Magnus Bratt said: "*I would say, for the Sandvik case, we did it* [the case setup work] *before or in conjunction with* [development through prototyping]. *Because Katharina had this idea - this was actually before I came into the project - but Katharina had this idea of a game, an adventure game metaphor. And I think we developed the case setup, before we realised the case structure in HTML.*"

The Norwegian partner stated that they too had made the first case setup prior to any programming of a prototype. Stefan Haaken says that: "*I did it strictly before*", but when asked about the next cases he said: "*OK, so it was very different, because the treatment was not that*

important anymore. Because I think I have more experience, so I don't need that kind of aid any more. I mean that there will be a treatment, and there will be a case setup, but.. Rikke Orngreen: *why?* Stefan Haaken *Well, why? I think it is a good checklist to make sure that you consider everything, but I feel I myself much more comfortable, even now, just how should the case look like.* "

The Norwegian experience is a common experience among the partners. It seemed less vital to discuss the case set-up in some areas than in others, as the project evolved, simply because we were getting more experience on our case series and what they were about, (and thus also on the characteristics of the target group). This change was especially due to the development of the technical framework, by which all cases in the series were implemented. The technical framework pointed to the use of colours, frames of the browser, and technical issues or requirements like the use of plug-ins, browser version etc. Issues that would normally be considered within the case setup. And so it seemed the use of HTML prototyping took over as the project evolved.[99]

The focus on the qualities of the treatment / scenario was still apparent in our work at CBS. We moved from large story-like descriptions in the ALKA case, where we also made a menu in PhotoShop and HTML, to a mix of showing user situations in smaller future use descriptions together with more separate descriptions of the system's navigation structure and interface design. This worked better at conveying the overall functional and aesthetic design, once the technical framework was given.

The case setup as a written document was used at general meetings. We would present the results to each other as inspiration on design issues, as quality assurance, and to initiate discussions on what we wanted the 18 cases to have in common. With such a large group of six partners, such discussions were easier to get going, when the smaller group worked on their own cases first, and then the larger group discussion was made on the basis of such "small reports" (typically 10-15 pages).

Storyboards and Sketches

As shown above sketching was an important tool for all the partners. It played the creative part of making us realise the content according to the teaching goals. At first we used hand-sketched screen illustrations with no navigational structure at CBS, later images and flow diagrams in the case setup was made in PhotoShop® or Dreamweaver®. Such sketches and images were comparable to simple storyboards. (Orngreen and Pries-Heje 1999.)

In Table 8.4 I have placed the use of these simple storyboards in the three Danish cases, into the storyboard framework formed in Orngreen and Pries-Heje 1999. There are four parameters in the framework, where each can be divided into their two extremes (high-low, small-large, little-much):

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[99] The features of the technical framework and prototyping tools will be discussed later (see 8.2.3).

"**Complexity** – *measured as the number of ways through the multimedia system and the degree of user control. These two concepts – no. of ways & user control - are often dependent on each other. For example: If the user has total control of, which directions he/she can "walk-through" the multimedia system, the number of ways through this system will be large. Such a high degree of complexity entails a need for a tool / a storyboard, which can direct attention towards the flow in the system. Precise annotation of which link goes to where and when is necessary. Whereas few ways through a multimedia system and less user control implies that a simple flow diagram may be enough to give a complete overview of the structure.*

Reuse – *measured as the amount of existing material (text, video etc.) used directly in the multimedia system or slightly adapted to fit the new medium. For example: If an education system is based on material subtracted solely from a video and textbook, then the requirements for a storyboard, which covers content design, learning perspectives etc. are lower than with a system, where all the learning material is designed from scratch.*

Reality Likeliness – *measured as the importance of a reality feeling – a feeling of being in or learning from a situation portrayed by the system. For example: In order to achieve a high degree of reality likeliness, the systems capability to interact with the user, to display feelings and moods becomes very important. Thus a storyboard, which supports design of the GUI (Graphical User Interface), detailed design of the human-computer interaction, as well as synchronization of the different media used, is highly relevant. While a multimedia system, which do not prioritize reality likeliness, still needs to consider the above issues, but on a less refined level.*

Size – *measured as the relative sum of different screens and different types of media used. This measure does not contemplate size in the form of bytes. For example: If a system consists of a menu system with lots of screens with text, sound and animations; designs tools, which can be used to form these different kinds of media and to structure the large number of elements are essential. Storyboards that can provide different perspectives or views, since the creation of text and animation are quite different, are then necessary. Whereas with only a few elements of the same character, a top-level design is adequate and each element can then be created according to that general outline.*" (Orngreen and Pries-Heje 1999, p 42) [100]

The first of the cases developed at CBS was the ALKA case, and it was also one of the seven case studies to ground the storyboard framework presented above. Since the case was based on a written case, the textual information was re-used (though quite a lot of new and re-purposing of content has happened, like turning text into speaker material). The system itself was relatively small, at least compared to large educational multimedia systems covering a complete course material instead of "just" material for one case. Though the case contained internet-links, the destination - the website - that the links point to is not part of the development effort. The number of possible roads through the system is designed to be a quite hierarchic menu-structure, where only few links transverse the menus making the overall complexity degree low. The degree of reality likeliness is also low. Even though the information in the case is displayed by use of text, sound, video

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[100] Even though this section was written by me, the four variables were deduced together with Jan Pries-Heje, I have thus treated this large section as a direct quote from the paper: Orngreen, Rikke and Pries-Heje, Jan "Designing the Design - Need-based Storyboard Adaptation for Multimedia Systems Design" In the *IRIS-proceedings of the 22nd IRIS conference* (Information systems Research seminar In Scandinavia), 7-10 August 1999, vol. 3, pp. 39-56, Finland, 1999.

interviews and animations, it is structured according to subjects in the business process re-engineering project. So even if this information does depict what happened, it does not do so in a reality-like environment, according to the definition above. The resulting placement of the ALKA case is in the 16th quadrant of the framework (Table 8.4).

The storyboards used for the ALKA case were extremely simple. It focused on making a frame for the overall narrative case story, and suggested standards for user interaction via the navigation and the interface design. At first we drew these suggestions in hand on paper, and then we tried them on screen to decide especially the colour scheme.

In Figure 8.11[101] the resulting digital storyboard standard for the ALKA case illustrates how quotes, choice of colour and navigational consequences should be designed throughout the ALKA prototype. The figure was made on the 5/11-1998. It was based on a similar previous design, which used reverse colours in the quotes-box. We continued to work on the design and a final standard was made on the 8[th.] This is not shown directly, but the storyboard was identical to the actual implementation used in the prototype shown in Figure 8.12, except that was here in its "correct" context (the menu-structure, text layout etc.). This part was finalised at the 24th of November.

		High Reality Likeliness		Low Reality Likeliness	
		Large	Small	Large	Small
High Complexity	Little Reuse	1	2	3	4
	Much Reuse	5	6	7	8
Low Complexity	Little Reuse	9	10	11	12 LEGO and Rockwool
	Much Reuse	13	14	15	16 ALKA

Table 8.4 - The three CBS cases plotted into the storyboard framework[102]

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[101] The storyboards and prototypes screen dumps are quite small, but it is not the text which is important here, rather the layout of the screen.
[102] This is similar to the figure found in Orngreen and Pries-Heje 1999 table 2. The difference between the two version is that in the paper-version the seven case studies are plotted into the table, here it is the three Danish BUSINES-LINC cases.

Figure 8.11 - An ALKA storyboard standard
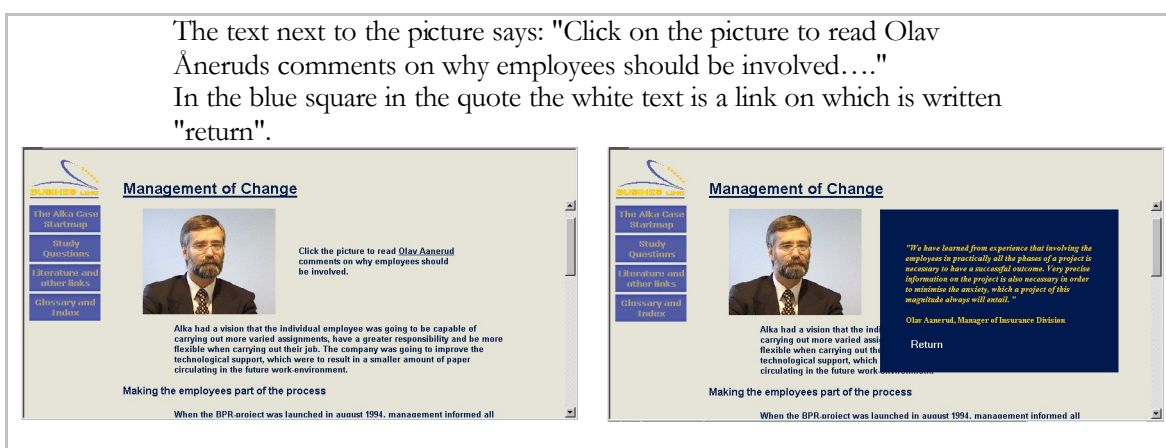
Figure 8.12 - The ALKA prototype implementation of the storyboard standard

The amount of re-use of material was much smaller in the following two cases (The LEGO and Rockwool case). However, the content was described during the analytical case work process – even if creating the case story in the case setup lead to further information gathering, this additional information was linked to the analytical case. Also, the reality likeliness was increased somewhat, though not at all to an extent where it has a high degree of reality likeliness as opposed to simulations. Almost the same type of storyboards was used. Perhaps they were even less sophisticated. The primary reason for this was the establishment of our technical framework, as one of the last conclusions in our article stated: "*you can choose an environment and/or a program that makes it very easy to make prototypes. And many prototypes can to some degree replace the need for storyboards.*" (Orngreen and Pries-Heje 1999, p.55.) The technical framework and the HTML provided such an environment.

It is noteworthy that the way storyboards were used at CBS in the BUSINES-LINC project may not be appropriate for all types of teaching cases. In our situations it was the four factors of the framework and the use of prototyping, which pointed to using sketches and simple flow charts, which later in the process lead to a storyboard standard for the whole teaching case. (Orngreen and Pries-Heje 1999.) To use a storyboard standard did not mean that only one page as the one presented in Figure 8.11 was made, but rather a set of standards, for different situations/angles of the case - for example one for menu structure,

one for video format etc.. Also, for each case a standard was made (i.e. one or set of standards for one case, not the same standard for all three cases).

1st Version of the Teaching Note

An unexpected or unintended, but welcome side effect of working with and documenting the case setup work, was that the case setup could be looked upon as the first version of the teaching note.

When we began working with the case setup, we contemplated the teaching strategies of the case in class. The partners had different perspectives to how detailed a teaching plan we should design the case for, i.e. how guided a teaching process did we want to suggest to the instructors using the case. (See the discussion on teaching notes in 4.2.1). The German partners (Stefan Schäefer and André Bolz) said: "Stefan Schäefer: *For me the case setup is a little bit the first version of the learning or teaching strategy.* Rikke Orngreen*: Yes, exactly, for me as well.* Stefan Schäefer: *It is really hard to write down, how this case could be used in a two hors lecture. What we can do, that is really clear, we can say, by analysing the case - the enterprise - we found core concepts, which are valuable to transfer. We can give advise; that we say, we have other concepts, which relate to this case, … It* [the case setup*] could give a first guide, what we, on a topic* [subject] *level want. You could say, you* [the teacher] *could introduce B2B* [business to business]*, communities, action nets. We could also give the first voice* [opinion about]*, how we could introduce it. The question is how deep in detail could we go? And that is, ehm I don't think you could standardise.* André Bolz: *Yes, Yes, we don't want to standardise it, we don't want to limit the teacher to one topic, to one discussion point.*"

So the case setup was used as input to the teaching note, as many of the aspects in a teaching note had been considered in the use of this tool. This was because planning the teaching strategy was part of the development process and should be considered in the design phase. However, the consortium agreed that too stringent teaching notes would restrict the instructor from adapting the case in (new) ways that might be more appropriate for his/hers course. Thus the approach adapted in the BUSINES-LINC project was a mix of the two forms described in 4.2.1. In this chapter I described that one strategy was to make very rigid teaching notes during the case development, since planning a teaching strategy was seen as part of the development. The other strategy was to have a minimal description or nothing at all, because the teaching note otherwise would restrict the instructors application of the case.

Quality Assurance and Influence on Content

The case set-up was intended used as a peer review tool between two partners, as was the analytical case. With the first set of cases the review process worked fine, but it was less useful in the second and third group of cases. Partly due to our use of the technical framework, and partly due to a change in attitude, or rather an increased awareness about the necessity of instead of using energy on peer-reviews, the cases at an early point should

be used in real use situations. Originally there was no room to perform early real-use situations for evaluation in the official project programme. The consortium had first agreed to have experts and peers review the case, but it turned out it was difficult to gain enough insight in the case with this method to give qualified feedback (as discussed earlier). The use of evaluations of the early versions provided valuable knowledge about areas, which had to be changed in some way or the other.

Naturally there was a limit to how many resources the case supplier could use in the development process. We found that instead of having the design decisions approved by letting the case supplier read the case setup, just explaining the design strategies, found in the case setup, to the employees involved in the project often provided valuable feedback. Feedback as quality assurance of the design conveyed that, which took place in the company, and feedback hinting at further information we could use in that design

The German partner describes how they shifted between the case setup and prototypes, and how that helped to ensure the communication between the case supplier and the development team. "André Bolz: *From my point of view, I think it is very hard and difficult to plan it* [the design of the case] *in advance … you should have a first perspective in mind of how this should be applied in the case, otherwise it makes no sense to collect it, but you shouldn't have a detailed position in the case in your mind where it should be.* Stefan Schäefer: *You can't structure it, but you have a structure. You have some separated module of information. You can think about how you can realise this module multimedia like. This is good because when you have a first module, you can use it to influence the other modules. … What happens was that I needed also the first modules realised to discuss this with our representative in Haniel* [the case supplier]. *So to verify information, to get new information and to bring new prospect in the case, because then he also saw what we wanted to transfer and said "ohh, I have an idea", or "is that the information that you have".* "

Involved Roles – a Team Process of Choosing Between Alternatives

According to literature, one of the disadvantages of going directly to a prototyping phase, as soon as an analysis phase is carried out, is that it is too easy to jump to design solutions rather than contemplating alternatives first. (See for example the interview with Verplank in Peece et al 1994, p. 467-468). The work with the treatment in the case setup emphasises a creative process of producing alternative case stories and user interfaces, even though the final version of the case setup only presents one alternative (namely the one chosen).

For the assisting students the case setup felt less bureaucratic and restraining than the analytical case, and they said it was motivating tool to work with. By having students involved in the design process is comparable to a participatory design project, as discussed earlier (chapter 4 and 5 as well as in 8.1.3).

A case setup was as such an excellent way to reach a common understanding, or as Robert Bergman and Thomas Moore say: *"The most valuable asset you can supply your team with, is a shared vision of the application."* Bergman and Moore 1990, p. 121 Researchers like John

Carroll, Susanne Bødker and Ellen Christensen focus on the use of scenarios primarily to involve the users' perspectives (Carroll 1995, Bødker and Cristensen 1994). This is a vital aspect, as I have also argued; but getting other stakeholders involved in the educational systems is vital too. This includes especially the roles of subject matter and multimedia experts, as well as instructional designers. All who have knowledge of the design of the case, according to the teaching paradigm (the instructional designer), the field it conveys i.e. e-commerce (subject matter expert), and the media used in the interaction (multimedia experts).

Conclusion

The result of working with the case setup tool was a written document, just as it is with many other design tools, like requirement specifications or CASE-tools/flow diagrams etc. However, the case setup as a final written document was not as an important aspect as getting a mutual perspective on the case as a team process. A process of identifying teaching strategies, messages or lessons learned, and using extended scenarios/treatments and sketches/storyboards as basis for discussing alternative design solutions. Figure 8.13 summarises the issues investigated:

The BUSINES-LINC treatment
• written in a early stage
• advance walk-through of future programme.
• illustrate content of the system, narrative aspects, the interaction structure and graphical layout.

Scenario & treatment (theory)
• scenarios did not consider historical context of user and narrative element of the system, (new developments uses characters)
• treatment in movie-script
  • tool for working on plot, characters and actions.
  • chronological description, uses "active verbs and pace" to get a sense for the future system
• multimedia treatment is description of the systems media usage.

Working with the case setup
• extensive use early in project prior to prototyping
• then iterative process between treatment and simple storyboards in case setup and prototyping

Storyboard framework
• 4 variables: complexity, reuse, reality likeliness and size
• prototyping enhances use of simple storyboards

Case Setup

Quality assurance and influence on content
• not useful for external quality assurance
• instead early evaluation in use situations
• useful for quality assurance with case supplier

Structuring content (not design)
• in case analysis phase, but also in case design phase.
• is unintentionally visible as structure in some cases
• to structure content, but is not a design tool

1st version of teaching note
• case setup incl. teaching strategies therefore used
• as input to teaching note

Involved roles – choosing between alternatives
• team process
• users (student assistants)
• instructional designer
• subject matter expert
• multimedia experts

Storyboards and sketches
• few simple storyboards
• showing standards to interaction, navigation and interface design.
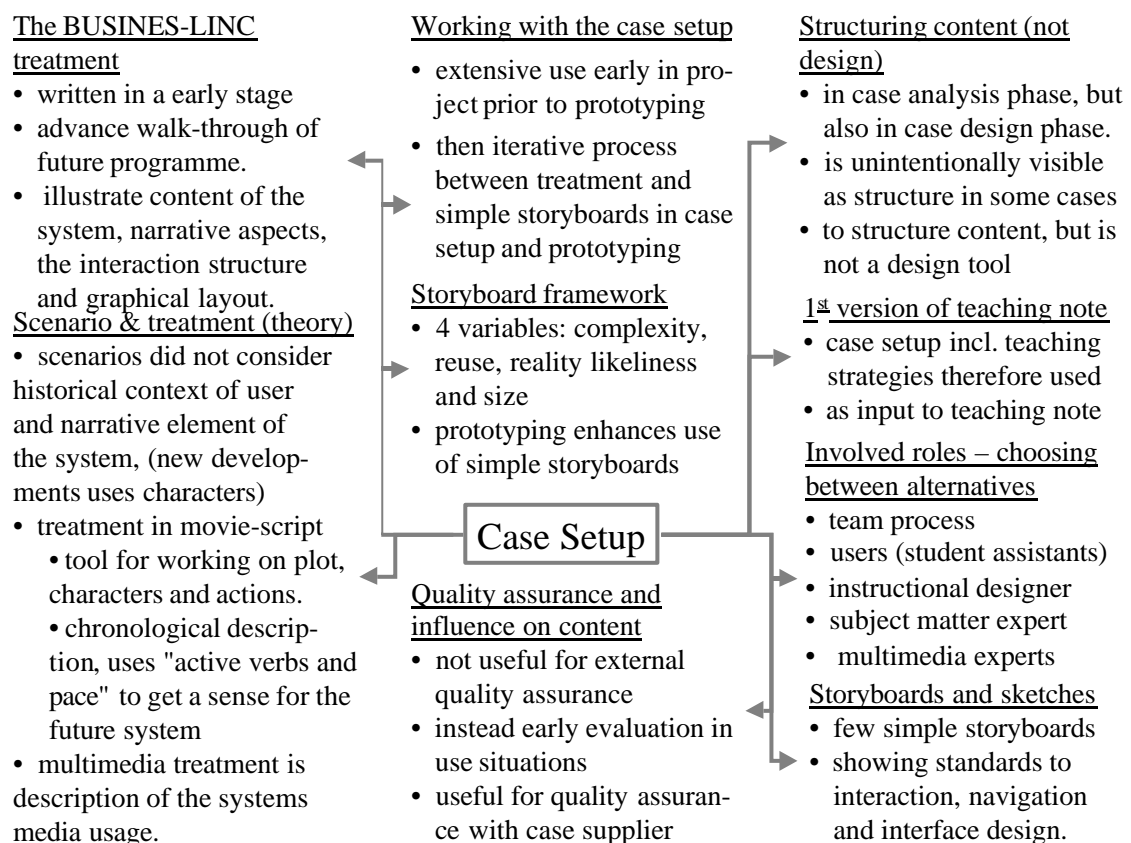
Figure 8.13 - Summary of issues related to the tool case setup

8.2.3. TECHNICAL FRAMEWORK (INCLUDING PROTOTYPING)

This section discusses both the prototyping and technical framework tools. However, the prototyping tool did not deviate much from other system development approaches, rather it was application of a technical framework during and together with the prototyping process, which was characteristic for multimedia teaching cases. Because these two tools are interwoven in may aspects they are here described in the same section. This section investigates the following issues:

- Prototyping Environment
- Objectives and Appearance of the Technical Framework
- Establishing the Technical Framework
- Prototyping with the Technical Framework
- (Not) a Stereotyped Template

Prototyping Environment

As expressed in the case setup discussion, if the environment allows it, prototyping might be the way to proceed with the detailed design (Orngreen and Pries-Heje 1999). Two aspects allowed for a prototyping environment, the HTML platform and the technical framework.

The decision to develop in an HTML platform was determined by the BUSINES-LINC consortium after the project commenced. (In other words, the platform choice was not yet determined in the project programme). The main reasons for making such a decision were the advantages for the users, the students and the instructors. Such advantages as ease of use, ease of distribution and connection to further material through the Internet.[103] Yet another advantage, which we had not immediately thought about, was the ease of updating. HTML is quite suitable for easy up-date of smaller systems, both content and structure-wise and therefore also create a basis for a good prototyping environment.

The second aspect, which facilitated a prototyping environment, was the choice to produce a technical framework, which included overall graphical user interface considerations as well as some software and hardware requirements. The intention with the framework was to provide a common look and feel, especially for marketing reasons. Later on further objectives were identified: "*It was agreed that the Technical Framework has been developed in order to facilitate: Recognition of the case / branding, Easiness to use and Simple development. Generally speaking, it should support the developer to achieve a "good case design".*" (Minutes from 31st of May 1999.)

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[103] Regarding ease of use and distribution, it was estimated that: everyone in our overall target group - information systems education at the business school level - was familiar with a browser environment. Also, that access to the case could be given easily through an Intranet or by handing out CD-ROMs.

Objectives and Appearance of the Technical Framework

The technical framework consists of a navigational graphical interface implemented in HTML, choice of colours, as well as a series of technical requirements - all shown in Table 8.5.
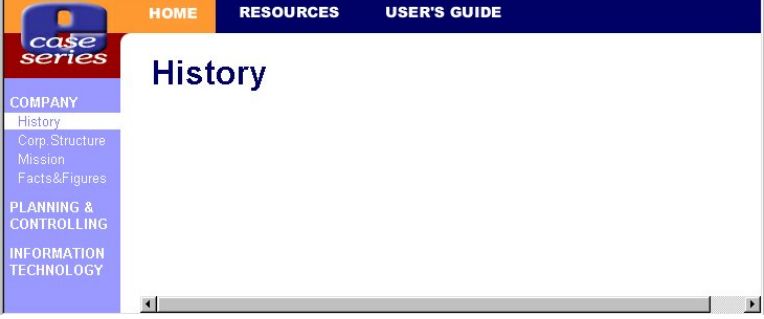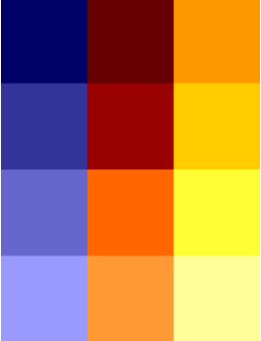

Navigational interface, including top and left frame, the framework also used cascading stylesheets. (From version 3)

The palette with the 12 colours we could use within the case (excluding video- and photo material, which could use true colours)

Technical Requirements (excerpts of the main features, excluding detailed discussions - *extracted and re-structured from the minutes on the 6/3-1999*):

- Common structure. The following parts should be present in every multimedia case:
    - BUSINES-LINC Start Page. The starting page will have the BUSINES-LINC logo, Case/Company-Logo/Titel, Start-Button to get to the first case start page (case-home) or case-introduction
    - Case Start Page (Home). The Case Home Page is the page where the user usually starts to work on the case study. It often includes a menu from which the learner can jump to the different parts of the case study. The format of the Case Home Page could differ depending on the individual case. It should contain the top-navigation-bar and a link to the case-introduction.
    - Case Introduction. The format/structure of the case introduction could be chosen individually
    - Top-Navigation Bar. The top-navigation-bar should be present on every case page at the top of the screen (except special pages like start pages, introductions or pages containing animations, presentations etc. running in a separate windows). The top-navigation bar includes the new e-case series logo.
- Stylesheets / Graphical guidelines In order to have a common look and feel the consultant from Icon Medialab, Ryan, will produce stylesheets and graphical guidelines
- Delivery medium. CD-ROM … Nevertheless, by using HTML, we are able to migrate the cases easily to the Internet/Intranet.
- Size of Screen. The size will still be 800x600.
- Hardware/Software requirements for the cases. Hardware: Pentium 133, CD-ROM Player 8x, VGA-Card with 256 colours / 800x600 resolution. Software: Windows 95/98/NT4.0, Netscape/Explorer 4.0 or higher (HTML 3.2)

Table 8.5 - Overview of the technical framework

The colours and style of the framework are quite neutral, and may to some seem a bit monotonous or uninspiring. However, as one of the assisting students, Flemming M. Larsen said: "*If something has to fit everything, then it has to be something rather dusty… and then perhaps these colours aren't so bad, if you have to take any company and press their look and feel into this framework*". The reason for restricting the number of colours was to ensure that the cases reassembled each other even when quite different design strategies was chosen.

Establishing the Technical Framework

Taking the best design and technical implementation strategies from the different solutions presented in the first six cases generated the technical framework. (Later also those first six cases were transformed according to the framework). We engaged professional assistance in the form of an experienced designer from Icon Medialab. He attended a two-day meeting with those people in the consortium, who primarily worked with the multimedia development of the teaching cases (design and authoring in particular). At this meeting we discussed and explained our objectives with each case, and from these mutual considerations we derived a more specific set of requirements. After the meeting the external consultant from Icon Medialab developed the navigational graphical interface, as well as chose the colours we could work with.

We had a few versions of this graphical interface, but the corrections were minor, and not due to experiences with its inefficiency or the like, but rather corrections of minor faults, which had "lurked" themselves into the code. Also, the headings of the menu shown in the screen picture of the navigational interface were not part of the first versions. Only a first level suggestion was given, with the standardised heading "subject1", "subject 2" etc. In version 3 more meaningful names were applied, something which actually caused two of our assisting students some trouble, because they at first saw the headings as mandatory (see later this section).

Prototyping with the Technical Framework

As described in chapter 4, there are different approaches to prototyping. In BUSINES-LINC we re-used each prototype, which in the end would be the final version of the system. Typically we would develop evolutionary prototypes, which was executable prototypes of the full system. Though we often began from a horizontal approach, getting the first structure in place, we would then shift to a vertical approach, finishing an element at a time, which is quite typical for web-development (see Sano 1996 and 4.2.3). This prototyping approach was supported by the technical framework

At CBS, developing the detailed design and authoring by use of prototyping was often done, while scripts for graphical, sound and animations were conducted. Synchronisation between these parts (for example synchronising sound and a graphical animation), which are often part of a storyboarding / sketching process (Hofstetter 1997, Landay 1996) was also incorporated into the prototyping process.

According to literature, the main disadvantage to the evolutionary prototyping method is the risk of ending up with a spaghetti code, because constant updating on a previous version can create complex structures and unclear code, which a programmer will find difficult to find the way around in. Another characteristic of evolutionary prototyping is that it often leads to less documentation of design decisions. (Preece, Rogers, and Sharp 2002, Sommerville 1992.) An unstructured and unclear programming structure and lack of documentation make updating difficult (Orngreen and Pries-Heje 1999, Preece, Rogers and Sharp 2002).

The programming was done in flat HTML files. Even though we did use both dynamic HTML, cascading stylesheets, frames etc., the word flat refers to the fact that we used a limited number of nested programmes, e.g. when a database input is called during a page.[104] Such flat pages were easy to update and maintain both during and after the prototyping process, since the code for the functionality of the given page was found directly on this page, and not in hidden subroutines in other locations in the system. Another clear advantage of web-editors was that they could easily generate the flow-diagrams necessary to give and overview of the system being built - as illustrated in Figure 8.14, using the Rockwool case as an example.

We also found that using the prototyping strategy with HTML, we could easily copy facilities or features that we liked, and re-use them in other places in the same case or in other cases (Sano 1996).
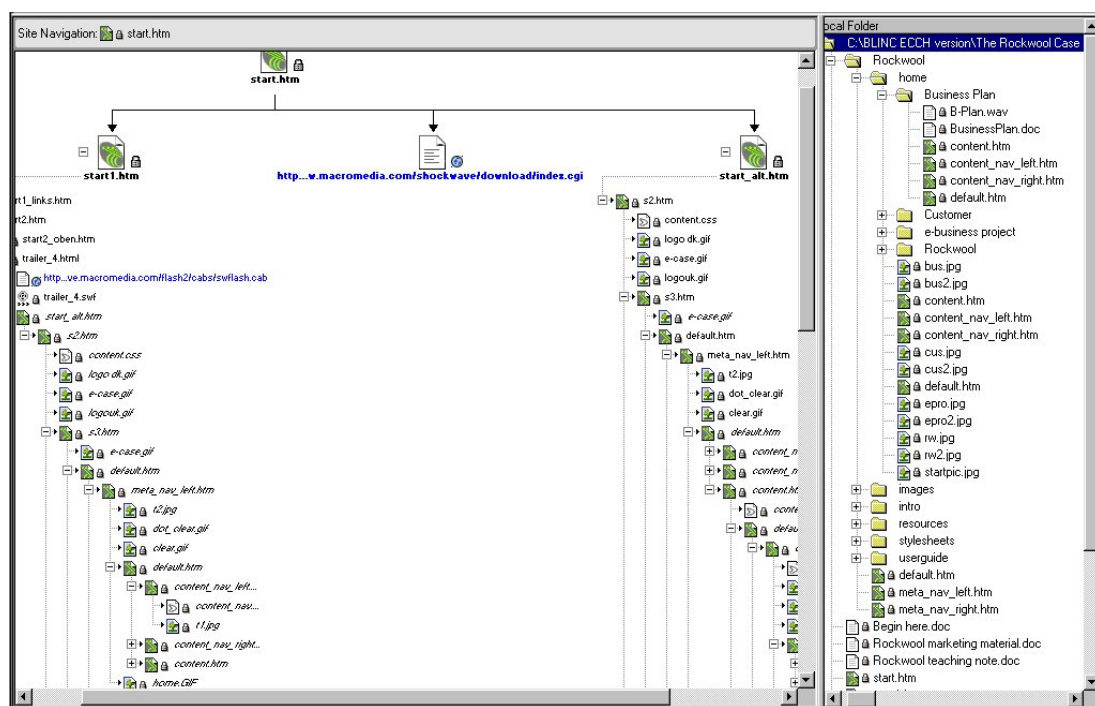
Figure 8.14 - (Rockwool) flow-diagram when prototyping in Dreamweaver®

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[104] When nested programmes were used it was for simple calls, like opening a word file, a video file etc. Also, at CBS we chose to design the use of video as embedded into the HTML pages, instead of having the video being played using the originating plugin screen, like the RealPlayer® or WindowsMedia® player, which pops up, when choosing an audio or video segment.

(Not) a Stereotyped Template

Though all six partners were quite content with the technical framework, and it served our original purpose. There are two aspects regarding the extent to which it could be applied, and under which circumstances.

The names of the headings in the navigational interface (see the technical framework in Table 8.5) were not supposed to be fixed or mandatory in anyway, but were merely examples. However, the assistant students did not like these types of templates.[105] In a discussion about the framework they pointed to the fact that the templates looked like an old case, which had been cleared of the content. The coding of the remaining menu-structure was made in a standardised software like "Adobe - Golife", where the auto-generated code was made inefficient, and made it difficult to alter. In a discussion two of them said: "Flemming M. Larsen: *Yes, it would be better if they made a guideline. Because this about structuring HTML and how the form should be presented that can't be generalised. …* Tine Foged: *Yes, then it is again far too specific. The thing here is that the majority of the consortium seems to go too far into details.*" I also used quite some time to figure out how the menu-worked, and so did the Swedish partner.

After establishing the framework it was decided on a meeting that: "*Partners deviating from the Technical Framework must be able to give good reasons that these criteria still hold for their case. They should inform other partners about all major deviations and argue for their necessity. All kinds of deviation from the Technical Framework are carried out on the risk of the partner and have to be undone on majority decision of the consortium.*" (Minutes from the 31st of May 1999.) When the second group of cases was about to be implemented using the framework, the Swedish partner for example encountered problems when applying the standard interface (that is shown in Table 8.5) and they then decided to deviate from it. They took away the right frame and added new colours to the background. We discussed this at a consortium meeting for quite some time, but we were not that strict about the consequences. The very formal statement about undoing changes to the framework was not even thought of or suggested to be applied, because the Swedish case still "looked" and "functioned" as a BUSINES-LINC or E-case series case.

This example illustrates our intentions of not wanting to be bureaucratic though we did have a few strict requirements (e.g. using an HTML platform, little use of plug-ins, and the general set-up of the interface). In a case series there should be room for the different case stories to be implemented in a manner, which suited the case, not the framework, and which took the different teaching strategies and interaction forms into account.

Some partners had hoped that the technical framework somehow would make the adaptation and decisions on use of different types of media in certain settings easier. But all of us realised in the end that designing content was a far reaching process, which could not

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[105] It was only the two students from the Rockwool case, who worked for us long enough to get acquainted with the technical framework (since they started later than the three working with the other two cases). Those two students had quite a lot of multimedia and web authoring experience, from their student jobs and choices of subjects in their educational course. Though they did not perform any programming as such, I gave them the framework in order to get an idea about what we were designing for.

be described in a technical framework. Media usage was context dependable. It depended on the target group, the use situation and the case story. This was why the case setup was needed throughout a case series production and not just for the initial cases, even when a prototyping approach and techinical framwork were used.

In other words the technical framework could not supply an assembly plant type of work-process. By assembly plant, I suggest the belief that the same frame could be used for any case; and content could be "poured" into that case, with no consideration of context, interaction design and teaching strategy. In an interview Stefan Schäefer states: "*you can use the technical framework, you can use the structures, if there are some navigation in a JavaScript you can re-use it, but it's a major task that we have now to do with the Haniel case, to polish the case. That, when we have the information, and we have the structure, to make it attractive* André Bolz: *yes* Stefan Schäefer *To find eye catchers. I can't say that it is less resource consuming, even though we have experienced it so much, that we have in a box a draft version… I would say, what is good, is when we agreed on a design for the frame, it was very good, because then you have structured ground*". So the framework supported the case series common "look and feel"; but did not speed the development process or enhance creative use of media for communication or interaction with the students.

Conclusion

A technical framework was a tool, which provided us some continuity within the case series, it also made us think about technical requirements to the cases. However, we found that it should not be applied in too strict a manner, but rather used as guidelines, ensuring the cases were designed with the interaction form and case story format of the interface that fit the specific case best. Summary of the issues presented in this section is shown in Figure 8.15

(Not) a stereotyped template
- not supply assembly work process, adapt content design and polish cases
- guidelines, not stringent requirements
- cases designed according to interaction and case story form, not framework.

Establishing the technical framework
- developed with an external consultant
- only few versions or corrections, but discussion of interpretation

Prototyping with the technical framework
- evolutionary executable prototypes of the full system.
- began horizontal approach, got structure in place, then shifted to a vertical approach, finishing an element at a time
- flat HTML files ensured ease of re-use, update and maintain

Objectives and appearance
- HTML platform for ease of use and distribution, plus further material via the Internet
- HTML environment suitable for prototyping.
- technical framework provided a common look and feel
- framework consisted of navigational graphical interface, choice of colours, and technical requirements

Technical Framework and Prototyping

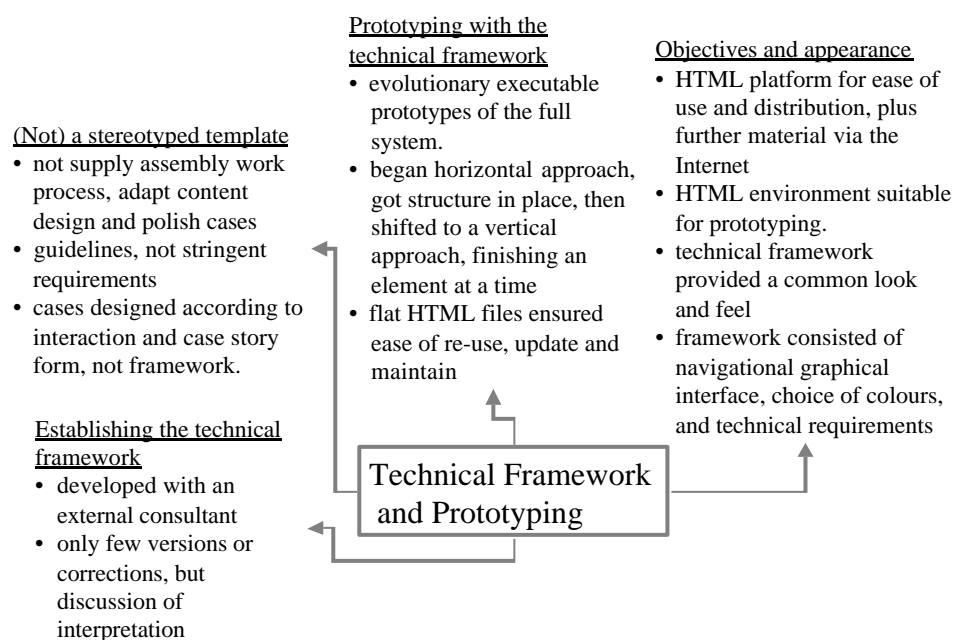**Figure 8.15 - Summary of issues related to the tool technical framework**

Scripts refer to a full list of all the media elements in the final system (Hofstetter 1997, Staylor 1999). Scripts can thus be seen as a tool pointing from a design phase and prototyping sequence to supporting a media production sequence. Traditional scripts (e.g. video manuscripts and sound-scripts) were mainly used by those partners, who used an outsourcing strategy for media production. This was done in a way that is not that different from traditional multimedia development. I will therefore not use much energy on going through every characteristic. I will shortly describe the traditional scripts used, and then show how staged interviews with the case supplier were used. Finally, I look at how the analytical case was used together with content scripts. This discussion thus investigates the objectives and appearance of scripts for:

- Traditional Scripts
- Staged Interviews
- Content Scripts

Traditional Scripts - Objectives and Appearance

There are different kinds of traditional scripts. The sound-script for example is normally only text-based, showing the text, which have to be read aloud. Whereas a graphical scripts is a list of the objects, that have to be drawn often including dummy elements. In a prototyping dummy graphic or dummy sound elements are often used.[106] Dummy elements enable the design suggestions to be implemented as basis for a discussion of the design and approval from the case supplier prior to the actual media production process.

Scripting is not a "cut and paste" phase from the prototype. First of all it has to provide detailed descriptions. Descriptions are needed to ensure that the figures, video etc. are drawn, or video recorded with the same objective in mind, conveying the message they are intended to. The description should also contain information about the media quality wanted. Our experience told us that media quality does matter, as I will address further in the next chapter. According to Wilson and Sasse 2000 there are many multimedia authors, who claim that students are able to "live" with poor media quality, if the content is high quality content. But these statements are based on soft evaluation, and their quantitative studies of media quality indicated, there might be a problem with using low quality media. (Wilson and Sasse 2000.) This is another reason for choosing an HTML platform distributed on CD-ROMs, which provide a relatively high bandwidth. It enables a higher quality of for example video (frame rate and size) to enable amble performance, which would not be possible over lower bandwidth, which many students may have at home using a telephone connection to the universities server.

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[106] In 4.2.3 in the description of prototyping, the concept of dummy elements, like dummy graphical elements, were defined.

Furthermore, a list of scripts for a third party assistant, would need unique and precise reference to the prototype, so that a filename can be given, and its place for insertion in the multimedia teaching case can easily be re-found and re-placed with the dummy version.

Table 8.6 depicts the type of sound manuscript that we used at CBS for all three cases. The editor in the sound studio mentioned that the detailed level of our script, using precise phrasing to the actor and references to the editor, saved us money (see 8.1.4).

The example in Table 8.6 is from the Rockwool case. The sound represents employees at Rockwool, but was recorded by actors. It was therefore important that these actors were told, which kind of mood their speak should be recorded with. Also, since these actors did not know anything about the specific case, they sometimes had questions during the recordings to passages of the text. Therefore in our experience, it was best to have someone from the core team attend the recordings.

Unlike the analytical case and the case setup, the number of roles involved were quite limited. It took quite a lot of time and energy to produce the script, but since all decisions regarding design was taken and approved at this point in the development process, it was done by a person with multimedia experience and knowledge about the case, in the core team.

FOLDER NAME: CUSTOMER	
File name:	**Speaker 1:**
Customer.wav	I have arranged a visit with a P-Consultant, with whom you can walk through the parts of a construction process that are relevant for you. But maybe you should first get acquainted with how a general sale and delivery situation looks like at Rockwool.
File name:	**Speaker 2:**
Overview.Wav	My job is to drive out to the architects and engineers, either at architect companies or larger construction sites. I advise them on various issues, but do not perform any direct sales, for this I have three sales consultants affiliated to the same area as I.
Meetings.wav	On one day I have 2-3 planned meetings and then the rest is canvas, so all in all I have 5-6 meetings in a day. In the smaller companies it is not always necessary to have an appointment, however in the larger ones I often do not get any further than to the reception, but you get a hang of it after a while. Sometimes you can also hear if they are too busy, then I call back later. In general I would say that I meet with 80% architects and 20% engineers.

Table 8.6 - Speaker manuscript - excerpt from the Rockwool case

Staged Interviews - Objectives and Appearance

I have mentioned earlier that instead of recording long interviews with the employees or managers at the case supplier, and then use hours on editing them, many partners found that using staged interviews were an "easier" process. Stefan Haaken, the Norwegian partner, said: "*We will stage it in a way, because that makes it easier, otherwise you have 100 minutes of material, and then you have to pick out. No, I will send in the questions in advance and ask them to give a 30 seconds answer, to keep it short and then make breaks after the questions, so that you will be able to cut it easier.* Rikke Orngreen: *Would you use a kind of script before or* Stefan Haaken: *Yes, there will be a script because that will make it easier to edit.*"

Staging interviews turned out to be not only time-efficient, but also the results were a lot better. The messages of the people being interviewed came out more clearly and well reasoned. When recording interviews directly, we found that people being interviewed talked in half sentences (as we all do), or perhaps the most important statement was in the beginning and in the end of an answer, or they coughed in the middle of a sentence. This made an editing process difficult.

Let me illustrate how we at CBS worked with scripts for staged interviews, with the LEGO case. Table 8.7 shows the resulting script, but prior to this a great deal of analysis and design work had to be done. After conducting two interviews (one where the sound was recorded) with the employee in question (in this example Birthe Ryborg Clausen, the manager of the department "New Ways to The Consumer" from the LEGO case), we analysed the content of these interviews. While relating the analysis to the other material we had, we found key aspects in her interview. We thought about how we wanted to convey the most important messages, and found that four video clips with Birthe Ryborg Clausen would be able to convey these, and at the same time give the students a feeling of her personality and her role in the case story depicted. Quotes extracted from the first recorded interview supplemented the video clips in the case.

Prior to the video recordings (which were done by a professional company - using a photographer and a soundman) the manager would receive the script, of which Table 8.7 shows the first part. The table shows a collection of keywords that should guide and support her in talking about "idea generation" at the LEGO.com website. So even though we wanted to get pre-prepared answers, we did not want to put "words into her mouth", that would seem unnatural to her. If the manuscript were prepared word by word, it would also further stress the individual being recorded, who was already put in an unusual situation. These were not actors that are used to the warmth of the spots, and the artificial situation of talking to a camera (especially when you know quite a lot of people might see it later on.)

2. Interview with **Birthe Ryborg Clausen**	[The four parts are supposed to have a duration of **approximately 1 min**.]
2.1 Idea Generation	• Fan sites unofficial → Need for official presence • Viggo.com (mid 1996) • NWC (New Ways to the Consumer) established in fall 1996 • The drivers of the project was Sales & Marketing Europe, because of the management involvement • The development of LEGO.com emerged / was created over a period of 3-4 months
…….	……

Table 8.7- Script example for staged interviews (from the LEGO case)

Staged scripts and the actual media production of staged interviews often took place prior to the details of the design was settled (but not necessarily). It depended on the culture of the company, and which type of collaboration (time-wise) they preferred. But in order to get the largest amount of benefit from the video recordings, some overall design strategy in form of overall case setup work was always present.

Content Scripts - Objectives and Appearance

One of our experiences when writing the analytical case template was that the tool as a written document should serve more as a link to the raw and analysed material than as a written document. Such a shift in perspective also moved the focus from writing the analytical case to working with analysing the case, using the analytical case template as a support tool.

The Swedish partner was the first to specifically use the word script in this connection, as we discussed in an interview. "Magnus Bratt: *but didn't we relatively early in the BOKUS process decide OK, we don't want to write a completely different analytical case, and that it should be a kind of script. And you* [Gösta Steneskog] *talked about the analytical case as pointers in to a scripts, so that you could read the analysis.* Gösta Steneskog: *Yes, we came to that, because at the end, we took the same analytical case as we wrote in the beginning and just added pointers into the scripts. Because the script is one of the main tools in the development of multimedia cases. So the script contains of a number of small pieces. What I did was walk through all these pieces and add a pointer.* Rikke Orngreen: *a kind of link?* Gösta Steneskog: *Yes, a kind of link and instead of having the material in two places we just had the analytical case linked.* Rikke Orngreen: *So did you see that as helping you to structure the information?* Gösta Steneskog: *No, what we say is that we tried to avoid having the same information in many places, because we understood that the information we collect we put it into the multimedia case, and we don't want to put it in the analytical case too. As a matter of a fact, we have the information in the case, then what we call the raw material - interviews, unedited video clips etc., and what we have in the case we do have in the scripts. We deduct the case from the scripts.* Magnus Bratt: *And the script is a word file, with all the text.*"

Script was thus a name covering the material, to which the "hyperlinked" analytical case points. The term content script appeared suitable, as it was not a tool for design or for structuring information, as the quote above also shows. (This kind of support was provided by the analytical case). Instead it contained information, which was used in the case as content, but which had to be produced first in order to appear in the case. Text had to be edited etc. In some situations these content scripts served as input to other traditional or staged scripts later in the process, as it contained "raw" material of information, which was used for example in a staged interview. It is noteworthy that it did not just contain "raw" data in the form of transcribed interviews, balance sheets, organisational diagrams etc. It could also contain notes or observations from the core team members, as they reflected on the case and its use, i.e. ideas for teaching strategies etc.

At CBS we did not apply the hyperlinked analytical case to the extent we wanted, but we did use pointers to the same kind of content scripts as the Swedish partner did, and we also had these in a Word-document, just like they had. The scripts were not in an individual document though, but at the end of the analytical case as appendixes. To get an idea of how content scripts work Table 8.8 illustrates how the connection between the content script and the analytical case was used in the LEGO case.

Analytical case	Content Script
2.4.2 Initiation …. There are around 10.000 unofficial LEGO fan sites on the web, **(track: I.2.L).** The IT department (especially one person named Viggo) felt a need for a more official presence. An Intranet solution called Viggo.net was created and later this was further developed and renamed into LEGO.com. Soon after the management of the LEGO Group anchored a project – early 1997 – in the Sales & Marketing Europe department, with the purpose to further investigate LEGO´s new possibilities. The department New Ways to the Consumer is still today placed at Sales & Marketing Europe. ……. See (tracks: C.11.S, C.12.S, C.13.S, C.14.S, C.15.S, C.16.S, C.17.S, C.18.S, C.19.S, C.20.S, C.21.S, C.22.S, C.23.S, C.24.S, C.25.S, C.26, C.28a.S, C.29.S, C.36.S, C.42.S, C.43.S, C.45.S, C.46.S, C.47.S, C.48.S, C.53.S, C.56.S, C.57.S, C.59.S, C.62a.S, C.65.S, C.68.S, C.70.S)	Translated Keywords from: Recorded interview with Birthe Ryborg Clausen, manager of the department New Ways to the Consumer and Torben Stubkjaer, Business Planer, from the same department. (the number points to the track on the recorded minidisk - for easy "recovery") **(track: I.2.L).** The original idea arose from the huge net of unofficial LEGO fan sites on the Internet (Between 5.000 and 10.000). Need for an official presence. Idea started in the IT department, a guy called Viggo, he build a small web site, unofficially called Viggo.com Started in mid 1996.

Table 8.8 - Content scripts in the LEGO case

At this point we would write the analysis into the template, with a few links to the content scripts inside the text as reference only. These links are seen as tracks in the table. Then in the end of a section, we gave a list of links/tracks, which would provide further

readings. The first column shows content from the analytical case, and second column the content script from one of the links/tracks. The links were named tracks, because the interviews were recorded on a minidisk, which during the recordings were edited with tracks, to divide the different questions or subject change. Then the student assistants wrote summaries of each track, which were included in to the analytical case as appendixes.

Conclusion

There were three forms of scripts used in the BUSINES-LINC project. The "traditional" script for professional media production, scripts for staged interviews and content scripts. The staged interview and content scripts deviated somewhat from what is usually the situation with scripting, in the way that they were applied early in the development process. Figure 8.16 summarises the issues discussed in this section.
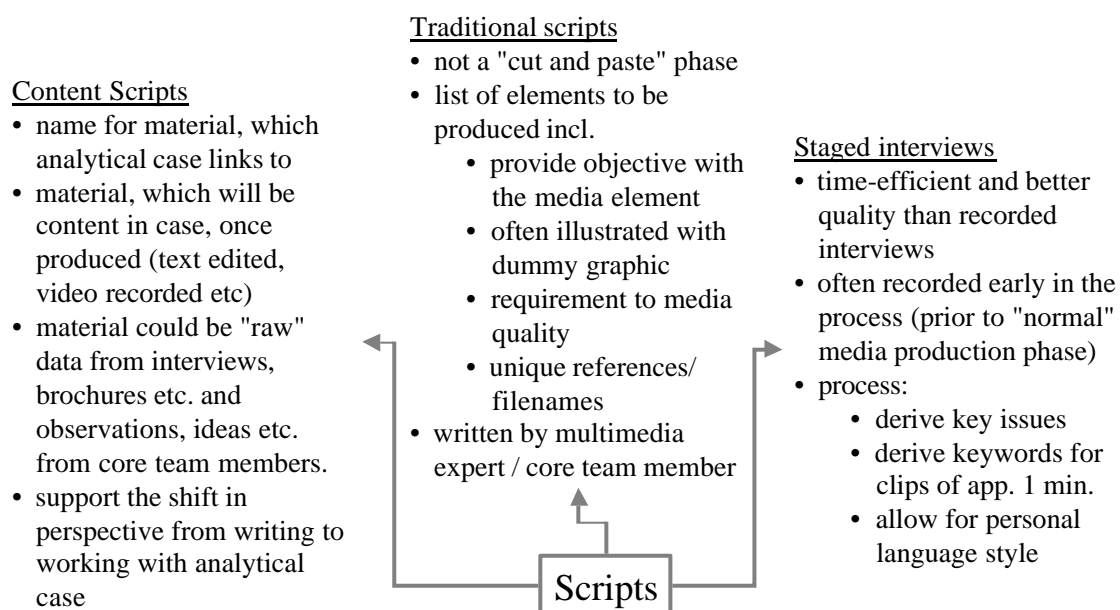
Content Scripts
- name for material, which analytical case links to
- material, which will be content in case, once produced (text edited, video recorded etc)
- material could be "raw" data from interviews, brochures etc. and observations, ideas etc. from core team members.
- support the shift in perspective from writing to working with analytical case

Traditional scripts
- not a "cut and paste" phase
- list of elements to be produced incl.
    - provide objective with the media element
    - often illustrated with dummy graphic
    - requirement to media quality
    - unique references/ filenames
- written by multimedia expert / core team member

Staged interviews
- time-efficient and better quality than recorded interviews
- often recorded early in the process (prior to "normal" media production phase)
- process:
    - derive key issues
    - derive keywords for clips of app. 1 min.
    - allow for personal language style

Scripts

Figure 8.16 - Summary of issues related to the tool scripts

8.2.5. TEACHING NOTE

This section will take a very brief look at our (BUSINES-LINC) teaching note format, and investigate how we saw the teaching note as a tool in the development process. However, the teaching note is primarily a support tool for the instructor in the use dimension, which means its use will be further investigated in the next chapter. This section looks at:

- Objectives and Appearance
- Work Process

Objectives and Appearance

The teaching note was developed on the basis of the case setup as investigated in 8.2.2, in the subject "1st version of the teaching note". As the BUSINES-LINC project neared its end, we took the subject of teaching notes up in a consortium meeting. We agreed to have some form of consistency also among the teaching notes. This was to ensure certain aspects were available in the case, so that instructors using a case from the case series would know what to expect. We also wanted to bring information about the other cases, and show how they could be used to supplement each other. As a consequence we named a set of headings, which should be in all teaching notes.

The teaching note headings of the Rockwool case are shown in Table 8.9, and the two last headings "relation to the other e-case series cases" and "BUSINES-LINC" have the same content for all cases. It is the first level headings, which were suggested or agreed upon on the BUSINES-LINC meeting. Underneath this table is a short excerpt from the heading "3.1 guidelines for discussion", to show the relative general level, to which the teaching note applies (Table 8.10).

1	MANAGEMENT SUMMARY	4
2	LEARNING OBJECTIVES	5
2.1	PLAYING THE ROLE OF THE NEW EMPLOYEE	5
2.2	TEMPLATE FOR THE BUSINESS PLAN	6
3	LEARNING SCENARIOS	9
3.1	GUIDELINES FOR DISCUSSION	10
4	TECHNICAL REQUIREMENTS	12
5	RELATION TO OTHER E-CASE SERIES CASES	13
6	BUSINES-LINC	14

Table 8.9 - Teaching note headings of the Rockwool case

3.1. Guidelines for Discussion
This section describes briefly some of the discussion topics available in the case.

Rockwool A/S has been criticised of being a "a sleeping giant", a conservative company, unwilling to re-invest capital in innovations. It has been a large step for Rockwool A/S from considering the Internet to actually having invested resources in **e-business** and to now considering a full running **e-commerce** solution.

First of all it was necessary to convince management of the potential of the Internet. Now there is the problem caused by **distribution policies**, which could be discussed at a detailed level using this case. These problems include some of the **organisational** problems/opportunities in the entire internal organisation as well as some of the problems/opportunities concerning changing the **customer relationship**.
…………..

Table 8.10 - Excerpt from the Rockwool case teaching note

Work Process

Leenders and Erskine 1989 point out that many teaching case writers prefer to write a teaching note early, or a type of commentary, which helps to further develop the actual case, because it forces the writer to think about its use. This was also our experience, as the subjects contemplated in the case writers teaching note, were similar to the concepts in the teaching note about lessons learned in the case, teaching strategies etc.

But even though the case setup served as input to the teaching note, the case had developed somewhat since then. Sometimes changes were due to new ideas when prototyping. At other times it was due to the approval process, which would change for example a large portions of the content for a specific part, meaning that the teaching objectives were moderately or even quite heavily changed. (See for example 8.1.2 for the case supplier's influence on the case).

The teaching notes were written at a rather general level, to avoid that the case was restricted to a certain perspective. They also contained information, which would be possible to discuss, even if these subjects were not part of the primary teaching objective. For example even though the majority of the people using the LEGO case would use it to discuss e-commerce, their development strategies etc., the ethical considerations of branding/marketing products for children on the internet were equally interesting. These two subjects were mentioned in the teaching note, but in a way that it did not exclude other subjects.

Another motive for not including very detailed information in the case was that it sends the message to the instructor to use/prepare the case him/herself. Some instructors did however not agree to this approach, as I will return to briefly in the next chapter.

It was primarily the subject matter expert from the core team with knowledge of the application area, and the instructional designer with knowledge about use of teaching cases, who will write the teaching note.

Conclusion

The teaching strategy was part of the development process, and supports the development process, as it encourages rethinking the thoughts, which were introduced in the case setup, but which may have changed in the process of prototyping, media production, experiences in use situations and in the approval process. Figure 8.17 summarises the points mentioned in this section.
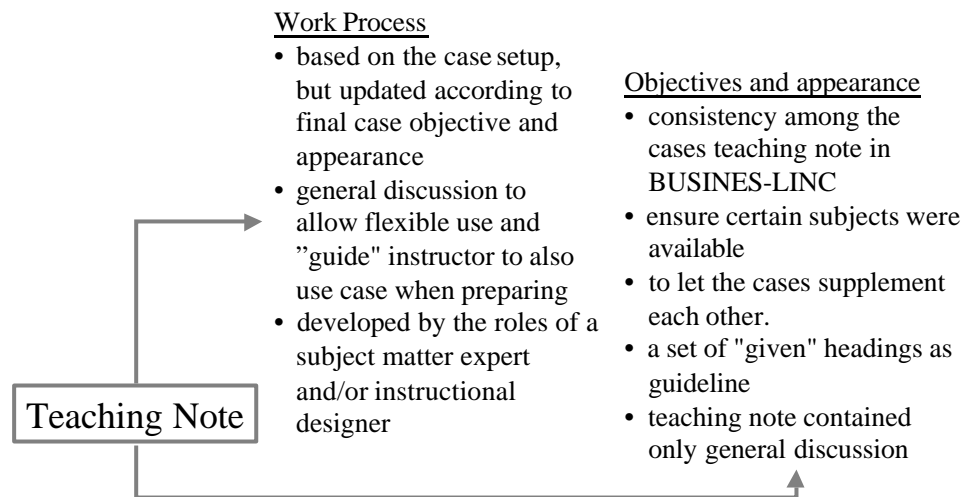
```
                    Work Process
                    • based on the case setup,
                      but updated according to      Objectives and appearance
                      final case objective and      • consistency among the
                      appearance                       cases teaching note in
                    • general discussion to           BUSINES-LINC
                      allow flexible use and        • ensure certain subjects were
                      "guide" instructor to also      available
                      use case when preparing       • to let the cases supplement
                    • developed by the roles of a     each other.
                      subject matter expert         • a set of "given" headings as
  ┌──────────────┐    and/or instructional            guideline
  │Teaching Note │    designer                      • teaching note contained
  └──────────────┘                                    only general discussion
```

Figure 8.17 - Summary of issues related to the tool teaching note

9. USE DIMENSION

There were two different objectives for the investigation of the use situations. One was an investigation as a quality assurance process of the cases in a test and evaluation phase (see Figure 7.3). Different versions of each case were used to improve the forthcoming versions, as in many system development projects. The character of this process did not differentiate much from known procedures, for which reason this will not be the primary focus of the discussion in this chapter.

The second reason for the investigation of the use situations was that the data analysis and the interpretation gave a more detailed understanding about what to contemplate when developing multimedia teaching cases on a more general level. The available data, i.e. observations, video recordings, questionnaires, interview and written statements, can be divided into different perspectives. I have looked at different target groups using the same case, and the same group using different cases. The size of the group under investigation also varied from the individual performance in class discussions and reports, over group preparation, presentations and reports to overall class performance during discussions. The cases were used in different ways in a classical teaching scenario (as shown in Figure 4.2), but also in an assignment and written examination report.

The findings in the use dimension are those characteristics, which influence the use of multimedia teaching cases. The analysis were guided by the literature reviews as discussed in chapter 4, the discussion level in class according to Blooms taxonomy (see 5.2.2) and a number of assumptions about how I expected the cases would be used and support the use process. The assumptions are presented in 9.1. In section 9.2, I present the analysis using the questionnaires as starting point, but relating the answers to each question to the interpretations based on the video analysis and observations. The overall interpretation of the data material can be grouped into a set of roles and tools of the use dimension as investigated in 9.3, where I also began a discussion on the consequence these roles and tools could have for the development dimension. Finally, in 9.4 I conclude on the chapter, by summarising the most important discussions.

9.1. EARLY ASSUMPTIONS

This section discusses the series of assumptions and objectives, for how the multimedia cases were expected to function and support the use situations. The multimedia teaching cases were intended to work with a rather large range of people. The target group can be divided into two main groups:

- MBA's and executive students. The assumption was that this first group would construct knowledge especially based on their work experiences, wanting to relate the case story to their own company situations, and from their knowledge of the business area in general.

- Undergraduates and graduates. The other group does not have the sane amount of work experience they can apply to the case story. Therefore it would probably be more likely for them to have applied theory and models, which they had been taught during their student years. This was the behaviour expected from student groups as they were foreseen both by literature (see chapter 4) and the senior researchers within the BUSINES-LINC project.

The case itself attempted to support the difference in the two target groups in the case content, by use of external links, literature references and the case story. Though - as mentioned earlier in 4.1.2 - it was believed in case-based teaching that the process of constructing new relations to the case would mainly appear in the social interaction; i.e. in the discussion of the case story with others. In general it was expected that the instructor in the under-graduate and graduate classes would probably be the driving force of the discussion, and he/she would thus assume a more influential role than in a MBA or executive class.

The size of the multimedia teaching cases was larger than traditional written cases. They contain more information and it was expected that the students would use at least 2 hours in preparing the case individually. I also expected that it was probably more difficult to skim such a multimedia case than to "speed-read" through a paper-based case. It could therefore be difficult for a student, who tried to use a minimum of time for preparation, to actually gain any knowledge of the lessons learned in the case. And consequently this student would not be able to participate very well in the class discussion.

The main purpose of the observations and video analysis of the class discussions was to contemplate whether the multimedia teaching cases enabled the users to focus on the same issues, which were mentioned as important in the teaching objectives of the case. Therefore, when considering the case effectiveness or success, the teaching objectives described in the teaching notes are seen as a vital tool. It was assumed that the students were able to mention and discuss the issues, which the teaching notes mentioned as important. The expectation was that the students knew the important subjects from the case, and they could apply, analyse and for a few perhaps even synthesise and evaluate the decisions put forward in the case. (Here I use the terms know, comprehend, apply, analyse, synthesise and evaluate as defined by Bloom et al. 1956, and as discussed in section 5.2.2)

If the students were not able to bring forward and discuss the teaching objectives from the teaching note, this could point to a poorly designed case, which led the students to misinterpret the case. Such problems could occur due to inadequately designed content representation, but also the teaching strategies might have been chosen differently, and so a holistic view was necessary

Other variables could also influence especially two were expected to be found. First of all, the students' failure to work with the teaching objectives from the teaching notes could have been due to trouble with the technology, which had constrain their preparation

possibilities (like limited access to equipment or problems with downloading plug-ins required to fully experience the case). Secondly, the instructor could have chosen to pull the use of the case into another direction than the case was originally developed for. This would mean that other issues than those described in the teaching notes were intentionally discussed.

In summary the following overall expectations was investigated:[107]

- Differences and similarities in the way two target groups discussed the case (using theory, models, practice, own experiences, and other cases).
- Time used for preparation (I expected that at least 2 hours was necessary for active participation in discussion).
- Analysis of the level of the discussion based on the teaching objectives from the teaching note (I expected that they knew the subject, could apply and analyse it, and a few perhaps even reached synthesis and evaluation levels)
- If the students were not able to reach these levels, the expectation was that it was either due to poor design of the case, trouble with technology and/or the instructor had intentionally focused on other subjects than the teaching note.

9.2. ANALYSIS STRUCTURED ACCORDING TO QUESTIONNAIRE

Underneath follows a walk-through of the answers to the questionnaire, where I analyse each statement according to the frequency of the six categories, which the students could choose from (fully agreeing to the statement or agreeing, rather agreeing, rather disagreeing, disagreeing or fully disagreeing). Each question will at the same time be related to the findings in the video analysis and observations made in class. There will be a very brief presentation of the intermediate interpretations of this analysis, which leads to a larger investigation of the roles and tools in the use dimension, based even more on the video analysis and observations data.

- Sample and Response Rate
- Analytical Comments to Each question
- Three Characteristics of the Use Dimension

Sample and Response Rate

The only suitable type of statistical analysis of the result of these questions is frequency analysis.[108] The exception is the question regarding how much preparation time a student has used, where descriptive statistic has been used to calculate a mean value and the standard deviation. It should be mentioned that the answers are based on a small number of respondents, and could not be regarded as a large typical sample (see the sampling strategy in 5.1.2). However, since the data are supplemented with observations and video analysis, they do give a comprehensive picture of what happened in these use situations.

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[107] The issues are presented in the same order as in the above text, and are not a sign of priority of importance in any kind.
[108] The answers do not have a progressive numerical value, that allow for other forms of descriptive statistic.

The figure and table below shows the distribution between the 6 classes that I followed (Table 9.1 and Figure 9.1).

(see **Table 6.2**)	Short reference[109]	Frequency[110]	Percent	Valid Percent	Cumulative Percent
ALKA used in BPR course	ALKA - BPR	17	18,9	18,9	18,9
LEGO used in BPR course	LEGO - BPR	18	20,0	20,0	38,9
LEGO used in MBA class	LEGO - MBA	16	17,8	17,8	56,7
LEGO used in Portugal MBA class	LEGO - P	10	11,1	11,1	67,8
Norsk Hydro used in BPR course	NH - BPR	12	13,3	13,3	81,1
Rockwool used in BPR course	RW - BPR	17	18,9	18,9	100,0
	Total	90	100,0	100,0	

Table 9.1 - Frequencies for case type
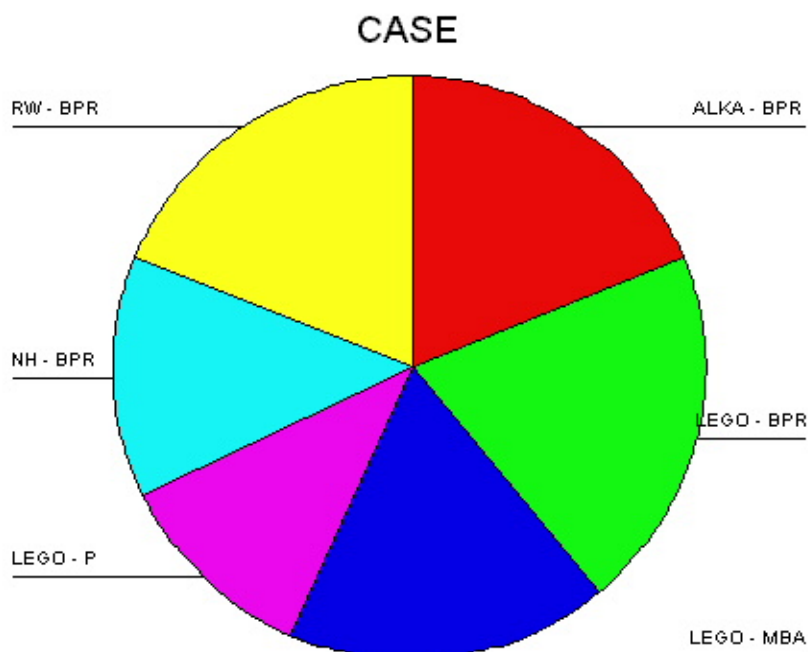
Figure 9.1 - Frequencies for case type

In the comments below I have used the valid percentage (that is excluding the percentage of missing answers / blanks), except when the number of missing answers were relatively large. In such a situation the circumstances are analysed and discussed. (Missing answers are not the same as missing respondent, but is merely a student, who handed in the questionnaire, but left one or several of the questions unanswered/blank).

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[109] The short reference is also found in Table 6.2 - Overview of use-situations in an abbreviation in parenthesis.
[110] The frequency is the number of answers, which were received from each group.

The response rate was at the same time very low and very high. This paradox is explained by the fact that only about half of the students chose to fill out the form, but also almost the same amount of people had prepared the case. This meant that I probably got the maximum possible answers anyhow, but it also raised some interesting questions to why the student did not prepare the case, which I will come back to later.

It is also noteworthy that by far the majority had chosen the word "agree", which have a positive connotation rather than the more negative valued word "disagree". Though I have not asked about this, I would say that students would really have to disagree with the statement asked, before actually "daring" to put a mark here, even if it is in the "rather disagree" box. Therefore I have thought about this when making the interpretations, contemplating that this survey may have encouraged a certain way of answering.

Analytical Comments to Each Question

I had a computer available to work on the case outside the university or I had enough possibility to work on the case in the school's computer rooms.	
	All cases Valid Percent
fully agree	85,4
agree	9,0
rather agree	1,1
rather disagree	1,1
disagree	0,0
fully disagree	3,4
Total	100,0

Table 9.2 - Result of questionnaire survey, 1

By far the majority of all students had access to the technical equipment needed. 85,4 % fully agrees and 95,5 % accumulating fully agree, agree and rather agree. We chose in the final stage of the BUSINES-LINC project to produce marketing material, which contained the technical requirements, so potential buyers of the licenses would be made aware of these prior to the "investment". However, looking at the possibility of the students to get access to technical equipment to prepare the case, 4,5% either fully disagree or rather disagree. In the situations were one class was given several questionnaires, as the BPR class did, there is a high probability that the same person answered that he/she had not access to the necessary equipment for several questionnaires, however this was also the situation with those, who did have access to equipment. Thus the total average percentage are comparative to the "real" result. (Table 9.2)

I had a satisfying amount of information available to work on the case on my own.		
	All cases Valid Percent	All cases Cumulative Percent
fully agree	19,5	19,5
agree	50,6	70,1
rather agree	25,3	95,4
rather disagree	4,6	100,0
disagree	0,0	100,0
fully disagree	0,0	100,0
Total	100,0	100,0

Table 9.3 - Result of questionnaire survey, 2

Even though 70,1% of the cumulative total fully agreed or agreed to having enough information prior to the case work only app. 25% rather agreed. This was also shown in the qualitative answers and through my observations, which showed that the students indicated they would have liked to know more about the case and the objectives with using it prior to their individual preparation. (Table 9.3)

The information provided in the case gave me a realistic insight into the subject (The process of Rockwool A/S company's entrance into the e-business world by use of digital technical manuals and software)[111].				
	All cases Valid Percent	All cases Cumulative Percent	All LEGO cases Cumulative Percent	LEGO - MBA Cumulative Percent
Fully agree	9,3	9,3	15,9	18,8
Agree	53,5	62,8	72,7	75,0
Rather agree	26,7	89,5	95,5	87,5
Rather disagree	8,1	97,7	97,7	93,8
Disagree	2,3	100,0	100,0	100,0
Fully disagree	0	100,0	100,0	100,0
Total	100,0	100,0	100,0	100,0

Table 9.4 - Result of questionnaire survey, 3

The students were asked if they thought the main messages of the case were conveyed in a realistic manner (see above in Table 9.4 and footnote 111). The statement did not refer to the teaching objectives per see, but rather how it was conveyed. App. 90% had a positive answer to this (fully agreed, agreed, rather agreed), and from this the vast majority agreed to the question, namely 53,5%. So one of the supposed advantages of case teaching, a sense of "real world" issues (problems and opportunities) was from the students point of view very much present in the multimedia cases.

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[111] This statement varied according to the case. For the LEGO case it said: "The LEGO company's entrance into a new business area, in the e-business world." For the ALKA case it said: "The BPR process in the ALKA Company."

This result was very positive, but there was especially one sub-result among the different sessions, which was interesting when compared to the analysis of the qualitative data. When comparing all sessions made with the LEGO case with the overall results, they are slightly more positive, app. 96%. One class, however, did not experience that the case gave this same degree of realistic insight into the subject. This was the MBA class, which judged the case to be under the total average, namely app. 88 %. This is too small a data set to judge from with such a small deviation[112], but comparing with the class discussion, where the student showed high experience from practice and a feel for the business community in general, a likely answer is found. MBA students were well connected to the business work life, and perhaps a higher level of realistic insight had to be used before an illustration of "real-life" was found realistic. A couple of students said to me during the break that they were pleased to try out a multimedia case, and the processes it depicted – though they were at bit surprised (negatively) over the amount of time necessary to prepare it. So perhaps the MBA group does not need the high level of realism to appreciate the interaction form / the media used, since they are already familiar with the business environment.

Teaching objectives	
	Cumulative Percent of fully agree agree rather agree
All LEGO cases	86,4-90,5
LEGO - MBA	68,8-80,0
LEGO - P	90,0-100,0
LEGO -BPR	88,9-94,4
ALKA - BPR	93,8
RW - BPR	100,0
NH -BPR	100,0

Table 9.5 - Result of questionnaire survey, 4

For each case questionnaire there are case specific questions, which points to the teaching objectives of the case. Questions like: "I got a clear understanding of what were the important elements for the success of the BPR project at ALKA?" For the ALKA, Rockwool and Norsk Hydro case only one general question was asked, whereas in the LEGO case four questions were asked (see below). Since the questions are individual from case to case, the answers are not directly comparable, but an overall indication of whether or not the students themselves judge the teaching objectives to be communicated can be compared. Also, I had three different classes using the LEGO case, which provide a reasonable foundation for comparing, how the students in these different classes perceived the same case.

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[112] As mentioned in 5.2.2 110 questionnaires have been collected, but only 90 of these were exactly similar, like the one shown in Table 5.2. The others were longitudinal questionnaires I used, when following the two groups, in the SVIR class. The analysis shown in this section is based primarily on these 90 questionnaires, but is then compared to the other questionnaires and the general observations and recordings for further interpretations.

In the latter example (the LEGO case in three different classes) the students found that they got a clear understanding of the four primary subjects (the purpose of the two sites LEGO.com and the LEGO world shop, and the emergence of the two departments, the LEGO world shop and New Ways to the Consumer). In numbers, no one fully disagreed, and cumulated between 86-91% fully agreed, agreed and rather agreed. The Portuguese group, which had to write an assignment based on the case, had a higher percent than average, who believed the teaching objectives had been conveyed, and the MBA class less, whereas the master-level class, (the BPR class) had a distribution very close to the average. Investigating the three other cases, which the BPR class used, a similar result is seen (as with the LEGO case in the BPR class), even better for Rockwool and Norsk Hydro, with 100 %. (Table 9.5)

So when contemplating that the Portuguese MBA group class may have got a better impression of the teaching objectives due to the longitudinal aspect of their work, the MBA level is significant lower than the BPR class. This could be a small indication that there is a difference in how the two groups view of the cases.

The text and graphics were understandable and well organised					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	fully agree	9	10,0	10,6	10,6
	agree	29	32,2	34,1	44,7
	rather agree	16	17,8	18,8	63,5
	rather disagree	19	21,1	22,4	85,9
	disagree	12	13,3	14,1	100,0
	fully disagree	0	0	100,0	100,0
	Total	85	94,4	100,0	
Missing		5	5,6		
Total		90	100,0		

Table 9.6 - Result of questionnaire survey, 5

The multimedia elements were a good way of getting a deeper and more varied understanding of the case					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	fully agree	10	11,1	12,5	12,5
	agree	25	27,8	31,3	43,8
	rather agree	19	21,1	23,8	67,5
	rather disagree	15	16,7	18,8	86,3
	disagree	8	8,9	10,0	96,3
	fully disagree	3	3,3	3,8	100,0
	Total	80	88,9	100,0	
Missing		10	11,1		
Total		90	100,0		

Table 9.7 - Result of questionnaire survey, 6

These are the two questions with one of the largest distribution among the six answers though no one answered that they fully disagreed to the first question (Table 9.6), and only 3 percent to the second (Table 9.7). Almost 6% did not answer the first question, and 11% the second. The largest group of answers is seen in agreeing (with 32 normal percent), and rather disagreeing 21% to the first statement about text and graphics. 28% agreed and 21% rather agreed to the second about the multimedia elements. Looking at the individual cases they give a similar look.

Comparing the students' notes to the qualitative answers indicates two important issues: Foremost, many students were not able to ignore the dummy-elements of the sound segments. That is, even though the versions used in these use situations were content wise quite finished, the sound in the cases had not yet been recorded in a professional sound-studio with the actors. Rather it was people from the development team, who had recorded their own voices. And this might be why the Norsk Hydro case was evaluated slightly better by the students in the second statement analysed here, since this case did not contain any sound. The second reason is that different persons have different tastes. The questionnaire asked the students to mention an item or feature from the case that they preferred as well as one, which they liked the least. They were also asked if there were any elements, which they would like to see changed in the case (see Table 5.2). From these answers it became clear that some would like to change some graphical layout or similar, which others described as the best thing about the case.

Case introduction and case story/plot - I had to search outside the case to write the business plan		RW - BPR Valid Percent	ALKA -BPR Valid Percent	LEGO - BPR Valid Percent	All LEGO cases Valid Percent
Valid	fully agree	0,0	0,0	5,6	9,5
	agree	18,2	10,0	0,0	4,8
	rather agree	45,5	40,0	27,8	16,7
	rather disagree	9,1	30,0	22,2	23,8
	disagree	9,1	20,0	33,3	28,6
	fully disagree	18,2	100,0	11,1	16,7
	Total	100,0	100,0	100,0	100,0

Table 9.8 - Result of questionnaire survey, 7

As mentioned there were a different number of case specific questions to each case. Here I asked about the students how they found the introduction, guides and/or driving questions were presented and related to the teaching case content (Table 9.8)[113]. A large number of them had a positive valued answer, and there were a lot of qualitative remarks on the questionnaire that showed the same tendency. Also, in the ALKA pilot study (see Table 6.2), a person said at the end of the session that he had used the written ALKA case in a course at the Norwegian School of Economics and Business Administration. (The case

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[113] The Rockwool case had two questions in this group, and the others three.

which CBS made in the CEBUSNET project.) He preferred the interactive one, and he also wrote this on his questionnaire answer. Later on he even sent a written message attached to the CD-ROM with the case to Gunnar Christensen, who had been the lecturer in this course he had taken, encouraging him to use such interactive cases in the future. He did not know, Gunnar Christensen, was a member of the BUSINES-LINC consortium from the Norwegian partner).

Judging from the results of the other questions, the rather positive feedback was not surprising. As I mentioned it may be that the students would have to disagree substantially, before "daring" to actually express this, or they really did find the cases generally positive. There was one question that they "rejected" rather surprisingly. The three CBS cases each had one question, which was comparable (in this group), namely the question shown in Table 9.8. The students should answer if they agreed to the statement that they had to search outside the case to write the business plan (Rockwool case) / solve the assignment (LEGO case) / answer the driving questions (ALKA case). Our (the BUSINES-LINC consortium) intention was that the students should contemplate other resources, especially using the Internet links to search for industry related material as well as compare the case to course literature, when preparing the case.

When observing the classes, it became clear that only very few of the active participating students in the discussions had done this, as the questionnaire answer so clearly indicates. On an average the cumulative percentage for fully disagree, disagree and rather disagree was above 50% for the ALKA case, and 66% for the LEGO case in the BPR classes. When looking at all the LEGO cases 70% was in this category, and as many as 17% fully disagreed. The Rockwool case however, had a significantly lower result with only 36% (though a noticeable 18% fully disagreed). (Table 9.8)

The data material from the groups and individuals, which either made a presentation in class or wrote a report about the case, shows that these students did in fact use material, which was not directly found in the teaching case itself.[114] It is part of an instructor's "responsibility" to instruct and give clear signals to what is expected from the students in class. This was not done very often. Since a multimedia teaching case requires more energy for preparation, it was perhaps difficult for the students to motivate themselves to search outside the case for additional information, without encouragement from the instructor, when they were only supposed to use the case for a traditional class discussion.

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[114] This material was: the video analyses of the group from the SVIR course, who individually and then together prepared their presentation for the class. The observation of a presentation from two other groups preparing the LEGO and written ALKA case. And the class in Portugal, which had to deliver a written paper / synopsis about the LEGO case.

Internet links were up to date and useful.				
		All Cases Frequency	All Cases Percent	All Cases Valid Percent
Valid	fully agree	5	5,6	8,1
	agree	22	24,4	35,5
	rather agree	24	26,7	38,7
	rather disagree	6	6,7	9,7
	disagree	5	5,6	8,1
	Total	62	68,9	100,0
Missing		28	31,1	
Total		90	100,0	

Table 9.9 - Result of questionnaire survey, 8

The issue of the Internet link quality may not have interested the students that much, since 31% of the total number of received questionnaires (from all sessions) chose not to answer. Out of those who did answer (valid percent) only 8% fully agreed, but app. 36% agreed and 39% rather agreed and none fully disagreed. (Table 9.9)

The high number of lacking answers is not surprising due to the discussion above, where it was established that a large percentage did not find it necessary to search outside the case. Those who disagrees (18% rather disagree and disagree) may do so, because the links did not lead directly to a certain subject, rather to the "homepage" of that subject. This was a decision made in the consortium (and part of our technical framework, though not seen on Table 8.5, as we did not view this to be very important aspect of the framework. The reason was to avoid "dead" links, which had been removed or updated/relocated to a new URL. It can be annoying to be "transferred" to another location at a more top level, than was expected, and then "dig" into the web-site to find the subject.

The case has intensified my interest in the subject.		
		All cases Valid Percent
Valid	fully agree	14,3
	agree	32,1
	rather agree	39,3
	rather disagree	9,5
	disagree	4,8
	Total	100,0

Table 9.10 - Result of questionnaire survey, 9

If the multimedia teaching cases were able to motivate the students so much that they felt an intensified interest in the subject presented in the case, this would indeed be a success. It turned out that quite many, more than I would have anticipated, fully agreed

(14%), agreed (32%) or rather agreed (39%) to this. But I could see that neither of the under-graduates (in the BPR master-course, which used four different cases) fully agreed to this statement, but also not fully disagreed. Those who fully agreed were the two executive classes, namely the MBA classes with app. 50% each of the 14% from the valid percent. (Table 9.10)

Students on an executive training programme are part-time paying students. They are perhaps from the very beginning more motivated and interested in the subjects/courses they undertake, than full time non-paying students (as under-graduate students in Denmark are). That is, when adults with full time jobs also choose to undertake a training program, which costs a large amount of money (though their companies most often pay this) their motivational level is bound to be high. Higher than for more traditional (& younger) full time students (whose education in Denmark are paid by the government, not the parents or grants etc., independent of high grades).

The case was easy to use and navigate in		All cases Percent	All cases Valid percent	LEGO - MBA Valid Percent	LEGO - P Valid Percent
Valid	fully agree	10,0	10,6	25,0	0,0
	agree	34,4	36,5	31,3	55,6
	rather agree	23,3	24,7	25,0	33,3
	rather disagree	13,3	14,1	12,5	11,1
	disagree	12,2	12,9	6,3	100,0
	fully disagree	1,1	1,2	100,0	100,0
	Total	94,4	100,0	100,0	100,0
Missing		5,6			
Total		100,0			

Table 9.11 - Result of questionnaire survey, 10

The case was well structured		All cases Percent	All cases Valid percent	LEGO - MBA Valid Percent	LEGO - P Valid Percent
Valid	fully agree	5,6	6,0	43,8	33,3
	agree	31,1	33,3	25,0	55,6
	rather agree	30,0	32,1	25,0	11,1
	rather disagree	17,8	19,0	0,0	100,0
	disagree	7,8	8,3	0,0	100,0
	fully disagree	1,1	1,2	6,3	100,0
	Total	93,3	100,0	100,0	100,0
Missing		6,7			
Total		100,0			

Table 9.12 - Result of questionnaire survey, 11

The case had an overall professional appearance.					
		All cases Percent	All cases Valid percent	LEGO - MBA Valid Percent	LEGO - P Valid Percent
Valid	fully agree	11,1	11,8	31,3	30,0
	Agree	32,2	34,1	31,3	50,0
	rather agree	31,1	32,9	25,0	20,0
	rather disagree	11,1	11,8	6,3	100,0
	Disagree	3,3	3,5	0,0	100,0
	fully disagree	5,6	5,9	6,3	100,0
	Total	94,4	100,0	100,0	100,0
Missing		5,6			
Total		100,0			

Table 9.13 - Result of questionnaire survey, 12

The answers to the first statement about the ease of navigation has a quite dispersed result through the first five categories (from fully agree to disagree), when looking at the results from all the case sessions in total (Table 9.11). The second question about case structure was more concentrated on agree, rather agree and rather disagree choices (Table 9.12). Whereas the third about the professional appearance had even more weight on agree and rather agree (33 and 34%) and 12% each for fully agree and rather disagree (Table 9.13).

The same pattern is not so obvious in the individual cases. The scattering is due to a target group preference rather than case preference, with large differences, i.e. that one target group prefer the same elements of all cases, rather than the two target groups preferring the same elements of one specific case. The students in the executive training programme judge the cases to be easier to use, well structured and with a more professional appearance than do the under-graduates - as can be seen from the MBA answers in the tables (Table 9.11, Table 9.12 and Table 9.13).

One reason could be that the under-graduate target group was more experienced with the professional look of other existing multimedia material, whether for education or entertainment. This would make their standards and criteria's higher. This interpretation is consistent with the reasons the Italian partner had for choosing to use an external / third party developer for their cases, i.e. ensuring a high quality of the user interface (8.1.1).

It was fun to work with the case.	
	All cases Valid Percent
fully agree	11,8
agree	31,8
rather agree	42,4
rather disagree	8,2
disagree	4,7
fully disagree	1,2
Total	100,0

Table 9.14 - Result of questionnaire survey, 13

There is a high percentage agreeing to this statement, almost 12% fully agreeing and 32% agreeing, 42% rather agreeing, Table 9.14. It has to be taken into consideration that the large amount of students fully agreeing to the "fun experience", may be influenced by the novelty of the approach.

14% are disagreeing at various levels, which is a quite large percentage, Table 9.14. Considering that a certain amount of the positive answers may be due to the novelty of the approach, then after the students have been confronted with many multimedia cases, they may find that that the cases are no longer so "fun to work with". This is a perspective, which should lead to the professional development of a functional and aesthetic interface, which is motivating to use. However, this does not necessarily point to an outsourcing strategy. In the BUSINES-LINC project experience, a motivating case can also be achieved in-house, as long as the resources (roles) are available through an extended team. (That is, whether a department is "fortunate" to have a student assistant or similar who are a good graphical artist or the department buy a consultant to produce it, is not the issue here. The focus is on which roles are present, not by whom).

I recommend you to use the case in future courses.			
		All cases Percent	All cases Valid Percent
Valid	fully agree	14,4	15,5
	agree	36,7	39,3
	rather agree	30,0	32,1
	rather disagree	8,9	9,5
	disagree	3,3	3,6
	fully disagree	0,0	0,0
	Total	93,3	100,0
Missing		6,7	
Total		100,0	

Table 9.15 - Result of questionnaire survey, 14

As with the previous statements, there was here a clear indication towards using this form of teaching cases in the future, yet there was also a fairly high number of 9% rather disagreeing and 3% disagreeing to this. No one fully disagreed, but almost 7% did not answer, though this could be because they did not know, or did not care, it could also be a sign of disagreeing as well. (Table 9.15.)

I noticed at the sessions, that some students missed lacked the ability to browse fast through a multimedia teaching case, the same way they could skim through a written teaching case, find the area, which the discussion is focusing on, looking for facts, numbers etc., and still be able to follow the discussion in the classroom. So though I would say, the answers showed that by far the majority appreciated and found the case interesting, I was personally a bit surprised to find once again, that it was the executives, who appreciated the cases the most. The MBA group is normally much more busy and pressed for time than the bachelor and under-graduate group, and a multimedia teaching case needs a lot of preparation time. However, as the next table will show, the MBA group may not have considered the preparation time to be a problem.

Preparation time									
	Minutes	All cases Frequency	All cases Percent	All cases Valid Percent	N	Min	Max	Mean	Std. Dev.
Valid	20	2	2,2	3,3					
	30	9	10,0	14,8	**All cases: Descriptive Statistics**				
	35	1	1,1	1,6	61	20	1200	169,67	227,25
	45	7	7,8	11,5					
	60	13	14,4	21,3	**All BPR cases: Descriptive Statistics**				
	90	4	4,4	6,6	40	20	300	94,50	75,74
	120	7	7,8	11,5					
	150	1	1,1	1,6	**LEGO - BPR: Descriptive Statistics**				
	180	4	4,4	6,6	10	60	300	192,00	77,72
	240	2	2,2	3,3					
	270	2	2,2	3,3	**LEGO - MBA: Descriptive Statistics**				
	300	1	1,1	1,6	12	30	120	67,50	35,90
	480	1	1,1	1,6					
	600	4	4,4	6,6	**LEGO - P: Descriptive Statistics**				
	720	2	2,2	3,3	9	240	1200	640,00	254,56
	1200	1	1,1	1,6					
	Total	61	67,8	100,0					
Missing	System	29	32,2		N = number in calculation				
Total		90	100,0		Std.Dev. = standard deviation				

Table 9.16 - Result of questionnaire survey, 15
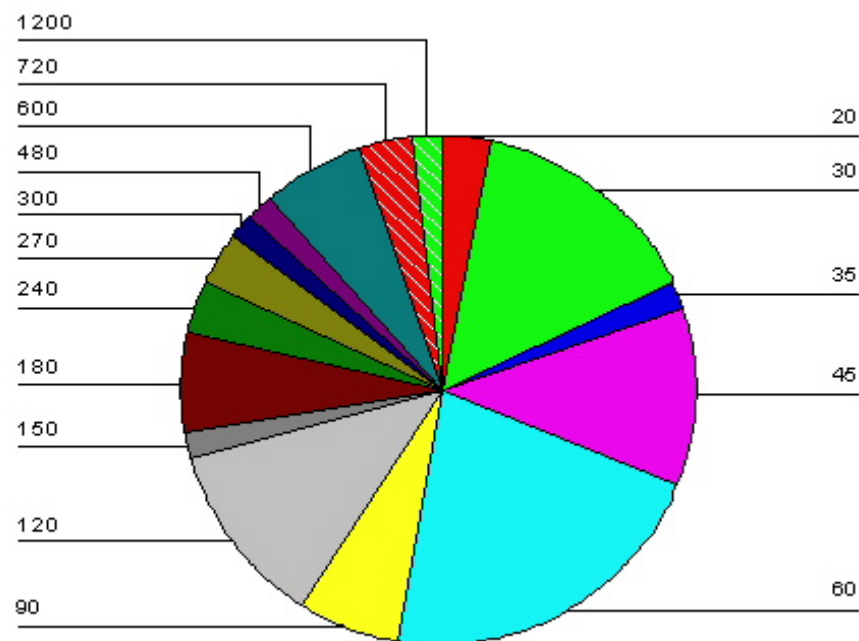
Figure 9.2 - Distribution of preparation time, excluding the missing answers

Table 9.17 shows that the mean value of minutes used for preparation was 170 minutes, or 2 hours and 50 min., which is well above the average 2 hours that was expected (9.1). However, it is the Portuguese group, which had to prepare a small written report that pulls the average into this high level. This can also be seen from the very large distribution from 20 to 1200 minutes, for the total of all cases. For the preparation of the case, the Portuguese MBA group used 640 minutes (the mean value), though these also cover large deviations from 240 to 1200 min. (making a standard deviation on 254 min.) Since all of them prepared a report, it could be that some answered including the time it took to write the report/synopsis, while others excluded this, thus explaining the large difference. Anyhow, this group used the case in an extensive manner.

Getting the case so much "under ones skin" probably causes them to better understand and appreciate the structure of the case than those who only skimmed the case in 30 minutes. This may therefore be the reason they are so much more positive about the case content, structure, interaction form, and the way it uses external links etc. For example looking at the longitudinal questionnaires from the SVIR[115] course, they too used a lot of time on preparing the case, and also appreciated the case content and structure (though they complained about the missing sound elements, which had not been prepared yet, as mentioned earlier).

The BPR class used app. 95 min. for preparation, but a lot more for the LEGO case (192 min., and with a min. of 60 min. - which was 20 min. for the other cases). This is not

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[115] SVIR being one of the under-graduates class, see abrrevations on Table 6.2 - Overview of use-situations.

the situation with the MBA group, which had a mean value of 68 min and a narrow spread (36 min. standard deviation). The preparation time deviance is thus neither case nor target group related. (Table 9.17)

Two reasons might explain the difference. The LEGO case had a brand value, and the students expressed an eagerness to work with the LEGO case, which they did not have with the other cases. (This is based on the students' reaction prior to the preparation, not afterwards, were it seemed it was more the case experience as a whole, which influenced their opinion, not the brand.) But primarily the reason may be found in the instructor's "pep-talk". After having witnessed rather poorly prepared students for the first three cases, he told them to "shape up" prior to the fourth case, the LEGO case. Unfortunately, it did not make any difference to the number of people actually preparing the case, but these numbers seem to indicate that the conscientious students, who had also prepared the other cases, used even more time on the LEGO case.[116]

29 respondent did not answer the question, that is 32% (Table 9.17). However, again judging from the activity during the presentation (see footnote 116) it is unlikely that it was the students with a high preparation time, which did not answer the question. If the special use situations of the LEGO case in the Portuguese class and in the BPR course are deducted from the calculation of preparation time, it will be significantly lower than the 120 min. estimated as a minimum.

Preparation type		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	individually	43	47,8	75,4	75,4
	group	11	12,2	19,3	94,7
	individually + group	3	3,3	5,3	100,0
	Total	57	63,3	100,0	
Missing		33	36,7		
Total		90	100,0		

Table 9.17 - Result of questionnaire survey, 16

By far the majority of the students (75%) had prepared the case on an individually basis only (again a large percentage did not answer this question, and though I do not know, it is likely that they too followed this preparation approach), Table 9.17. Even though the literature within case teaching encourages working in groups prior to the class discussion (see 4.1.1), this is not done very often - at least not in Denmark. The students have to be explicitly invited or even told to do so by their lecturer, before such initiatives are taken. The students in these use situation were not encouraged to work in groups, so having 25% working in groups may actually seem satisfactory, Table 9.17.

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[116] I can not know if it is the exact same students, which have prepared for each case. Though there was a tendency from my video analysis, that I could see the same students looking into notes or print-outs from the case, and it was always the same couple of students (4-5 people), who took the first initiatives to begin a discussion on a subject.

However, judging from the way many wrote "only group" and followed by a "2 persons", it may be that they prepared the case sitting two persons in front of the computer, seeing the case for the first time. The reference to small groups does not refer to this kind of preparation, but rather the preparation for the class discussion by reflecting on the case content in smaller groups prior to the class discussion (4.1.1). For example the groups that I followed and observed, clearly got a rather profound discussion going during their group preparations. Each student brought out their perspectives, which gave the other new perspectives to the case, that they could discuss.

Three Characteristics of the Use Dimension

There were in particular some findings in the data material from the use dimension that I found was characteristic for the use of multimedia teaching cases. These findings can be grouped into three characteristics of the use situations. The three characteristics are:

Different target groups, different needs. → The different groups of students reached different levels in their discussion (according to Blooms taxonomy). Under-graduates and graduates reached a somewhat lower level as opposed to MBA and executive training programs. They also seemed to be motivated by different elements in the case.

Push for preparation, enhances discussion. → The students, which had been given a more specific assignment, like preparing a report or group presentation in class, used longer time for preparation and had a much higher level of discussion in those groups or reports, than was reached in the class discussions.

Embedded teaching strategies, supports and motivates. → There were elements of the teaching cases, which were able to motivate and guide the students to use the case in a way, which corresponded with the teaching objectives of the case. This was for example seen, when students used the business plan in the Rockwool case, which when applied "enforced" the students to think about the subjects in a way that they were contemplated.

These characteristics highly influenced the development of the cases and the resulting set of roles and tools from the use dimension, which I will discuss in details in the following section.

9.3.   ROLES AND TOOLS

This section investigates the roles and tools from the use dimension. I use a sequence, which fit the investigation process, rather than dividing the roles and tools into two different sections. In 9.3.1 the students' role is investigated and then the tool of guided preparation in 9.3.2. The embedded teaching strategies, of using embedded teaching roles for motivation and embedded teaching tools for support of student case analysis, will be investigated in 9.3.3. The Instructor's role is discussed in 9.3.4, which is closely related to the teaching note tool, which will close the investigation of the use dimension roles and tools, in 9.3.5.

The two groups of students, which were defined in 9.1, were also described a bit more detailed in the CBS teaching notes, encouraging a discussion of the case, based on practice for one group and theory for the other, as can be seen in Table 9.18.

Two different target groups can be identified. The first is undergraduate and graduate students (full time students) and the second is students on MBA, executive and in-house courses. The two groups have different needs, which the case accommodates.

MBA and students on executive or in-house courses: These students want knowledge, which they can apply to their own company. Therefore it would be relevant for them to consider how to use the solution and lessons learned from the Teaching Case in their own company. Two questions are especially relevant: How do the conditions differ in the student's sector compared to the rest of the insulation industry? Particular attention must be given to differences in environment, customers and competitors. What are the criteria, barriers and benefits, when implementing such an e-commerce/e-business solution in their company?

Under graduate and graduate students: These students often have little or no actual work experience. It would thus be very relevant to reflect upon the solution chosen by Rockwool A/S from the perspective of the theories central to their course. They could consider questions such as: Are there some of the decisions in the case that contradict theories used in their course, keeping in mind the environment in which Rockwool A/S operates? What would have been the consequences if Rockwool A/S had used one of the models from the course in all its phases, from start to finish? Given the conditions and variables that Rockwool A/S has now, what does the theory say they should do next and why?

Table 9.18 - Target group description from the Rockwool teaching note

I will in the following investigate these two issues:

- Discussion level in class
- Motivational drivers

Discussion Level in Class

The initial assumption was to expect differences between the two groups. It was assumed that the MBA students would compare the case to their own work situation, and in general, use their practical experience a lot, and that the master classes would involve theories to a higher degree. This was not the situation. Even though the MBA classes relied heavily on their work-knowledge, they did this with the case story in mind, applying their experiences to evaluate what the case company had done. They did not think about what their company could do in the same situation, only if asked explicitly to do so by the instructor. The master class did not quite do the expected either, i.e. they did not at all use the theories from their course, unless told so by the lecturer.

When performing the video analysis on the basis of Blooms taxonomy using the interpretative storyboard (5.2.2), it turned out that the MBA group had quite a high level of analysis, synthesis and evaluations, when looking at the case company (more than the

master class). At some points the discussion was a bit "dead"/silent, and it was necessary for the lecturer to "kick-start" the discussions on a different subject, by asking into the subject matter. The discussions at the master class level (the BPR class) had the same silent periods, and it even at times looked like the instructor was telling the case story, rather than the students discussing it. One of the reasons could be that only about half of the present students had actually prepared the case.

The under-graduate students were not able to discuss at the same high level as the MBA/executives. They often recalled content from the case, but needed the instructor's guidance to analyse it, and only seldom did they initiate such an analysis themselves. However, this was not at all the situation in the small groups of students from the SVIR class (See footnote 115), which had to prepare a presentation and lead a discussion in class about the case. They had a group discussion at a very high level, analysing content and synthesising on the decisions made. The same group of students also made a report, in the Norsk Hydro case, which they were orally examined in. This report showed a similar high level, where material from outside the case was also considered.

Using material from outside the case boundary, either by following hyperlinks given in the case or by searching material from other resources (analogue or digital), was something I had expected would support the different needs the two target groups had. Not using external resources had implications. The students were not well prepared for the case discussions and were not able to contemplate other information than that in the case

The multimedia cases are not suited for browsing / skim reading, as I also expected. This was also obvious for the group, who had to present the LEGO case in class. Here one of the students tried to prepare himself by browsing through the material without actually reading, listening etc. to each subject/page, merely browsing around quickly, clicking here and there, while writing a note or two on his paper. This gave him a significantly poorer idea about what had happened in LEGO and why, which became obvious in the group's preparation and discussion. He had to refer to the case (actually looking for information in the multimedia case) more often, and had to have things explained by the other two. Even though the poor support of browsing was expected, I had not contemplated the disadvantageous result that it led to. Since the case needs longer preparation time, many students chose the "easy way out", and did not prepare it at all. (Possible solutions to this problem will be investigated in 9.3.2).

In general it was the subjects in the teaching notes, which were discussed (9.3.4 elaborates somewhat on this issue). It was interesting to see on the videotapes, how much substance there was for a discussion among the students in the preparations for the group presentation, without an instructor to guide them. When comparing these group discussions with the actual presentation, and the discussion they facilitated afterwards, my interpretation is that they achieved a much higher level discussion in their preparation than from the activities in class.

Motivational Drivers

The two different groups of students investigated responded to different aspects of the interaction form and user interface. The MBA group judged the processes shown in the teaching cases to give a less realistic picture of what had happened, the BPR master class did not. Contrary, the MBA felt the user interface (the multimedia elements, the structure of the case text and graphical elements etc.) were better than did the master-course class. It was also the MBA group, who in general appreciated the cases the most and recommended future use of it.

The multimedia teaching cases are used for a short period of time, compared to other educational systems, which are often used more extensively. From the questionnaires and the three students I recorded, when using the case, I found that these cases were easy to use navigational wise. It did happen a couple of times that the students obviously expected other information under a menu point than that which were found, but they very quickly gained an idea about the structure of the case as well. 60 min. represented the mean preparation time for the MBA, and 95 min. for the BPR. The students, who had written or oral presentations of the case to perform had a preparation time from 6 hours to a couple of days, but the case itself was only used for some hours. This implies that a requirement for a multimedia teaching case is that it has to possible to use it without prior training. Otherwise the risk is that the students get de-motivated. Consequently, ease of use is of outmost importance.

9.3.2. GUIDED PREPARATION

This section discuss the issue of using assignments as a mean for guiding the students preparation effort and thus also increase preparation time, with the purpose of reaching higher levels of discussion (in the prepared assignments and in the class room discussions).

The class discussion has been mentioned in the literature as the primary focus point or "climax" of a teaching case event. "*For most case teachers the plenary discussion is at the heart of the case method*", (Heath 1998, p.16). The multimedia teaching case should therefore support this part of the teaching scenario, which I discuss approaches to here. However, when I investigated the use dimension it was factors not relating to the case design, which primary influenced the case discussion. Especially the lack of preparation meant that the instructors felt obliged to conduct "one-man-shows", rather than a discussion. The lecturer had to present some issues of the case and/or draw parallels to theory and other companies, before the students were able to discuss the case at hand.

A multimedia teaching case like the ones we developed in BUSINES-LINC requires more effort from the students and instructor to prepare, compared to a written case. We had anticipated that approximately two hours of preparation would be the minimum, however the students used much less (when they were not supposed to do something like a presentation). As a consequence the case should have more time allocated, than a regular

double session. The lecturer could add to the discussion by letting the students prepare presentations, synopsis or reports/discussions that they would be graded by or which were mandatory to hand in. For example one of the consortium's internal instructors, Professor Niels Bjoern-Andersen, told me during a session, that at INSEAD (a French Business School, which has campuses in Fontainebleau and also in Singapore) the students were constantly rated according to their class discussions. These ratings were then made public to the whole class. I am not trying to promote special ways of using the teaching case for grading, but want to point to the tools, which could enhance the use of the multimedia cases, and which then in turn have to be considered during the development these.

Everyone (teacher and students) could benefit from some kind of "mandatory" preparation, where tools like reports, assignments, etc. are given (not necessarily graded). First of all a typical tendency, when motivation is lacking is that it is the same two to four persons', who are taking the initiative to and participate in the discussion. Even though this may also be the situation in other types of teaching (like lecturing), it is more obvious and critical in a teaching situation based on discussions. Secondly, the case preparation time is longer not only for the students, but also for the instructor. If the instructor could prolong the use or use situation slightly by introducing written synopsis, reports or similar, he would both get a clearer picture of the students' abilities in the course, and his/her preparation time might seem more adequately spent.

9.3.3. EMBEDDED TEACHING STRATEGY

In this section I investigate the concept of using embedded teaching strategies consciously to motivate the students when working with the case and to support their analysis of the case. I look at these issues:

- Defining the Concept of Embedded Teaching Strategies
- Embedded Teaching Roles and Tools

Defining the Concept of Embedded Teaching Strategies

Choosing to use a teaching case strategy implies applying a set of pedagogical rules or unwritten policies, which govern this teaching strategy, just as if any other method (discussing theory, lecturing, etc) was chosen. I have already discussed different strategies within teaching cases suggested for example by Maufette-Leenders, Erskine and Leenders 1997, i.e. using the three dimensions of the case difficulty cube (see Table 4.2). I have found that one difference between a traditional teaching case and a multimedia version is that in the latter the teaching strategy can be chosen to be even more embedded into the structure of the case.

One characteristic of the embedded teaching strategy is the degree of control, which the students have of their own evolving "story" of what has happened in the case supplying company. As I have mentioned, it is possible to design the web-based multimedia teaching cases with different structures directing how to proceed through the case (contrary to linear

structures, known from written cases). An example is the hypermedia structures found in an information pool design, where the students have to make sense of the structure of the information themselves.[117] Another approach is using a very hierarchical menu-structure, where the information is sorted according to type, department, or the like. Using hyperlinks between such menus is a design often seen in the E-case Series. A third possibility of structuring information is according to a game-playing strategy, where the case could be a simulation of a company.[118]

By using such structures multimedia teaching cases can include more of the teaching strategy embedded into the case than traditional cases do, since the structures include something about the objectives of the case teaching strategy. For example even an information pool has an embedded teaching strategy, as it denotes how we as developers want the students to assess the information. Typically an objective in such a scenario would be teach the students to extract relevant information and let them "create" the case story entirely by themselves.

As mentioned previously, this dissertation is not an exercise in learning, and I will not engage in a discussion on what is best. It depends on the type of lessons to be learned. However, it was clear to us that there were a variety of possibilities to choose from, much more than would be the situation with a written case. So the possibility of embedding a teaching strategy with a specific intention or teaching scenario in mind was part of the development process. (This is also true for a written case, just so much more so here, where the flexibility is larger).

To have a teaching strategy, which was embedded did not imply, that it was a very narrow case. In general, the cases from our e-case series contained far more material than a written case, which also made it possible to apply them to a wider area. When the "embedment" was seen as an issue influencing the development (using different design strategies, i.e. case information pool vs. case role-playing vs. case simulations), the largest impact was observed at the individual level. How the student interacted with the case, navigated through it, and especially how it motivated the student to use the case (which for us was a vital criteria). The design strategies to be considered can be seen as embedded teaching roles and tools.

Embedded Teaching Roles and Tools

From the three examples in chapter 0, the Rockwool case contained a business plan template within the context of the case story. It was a guide on (tool for) how to proceed with the analysis, but it was at the same time incorporated as part of the role, the student could play in this teaching case, as an employee in the e-business project in Rockwool. The

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[117] I have for example previously mentioned the "case material" cases developed at the CBS Learning Lab, such cases would belong to such an information seeking teaching strategy, Microtonic 1996/8, Copenhagen Airport 1997. (See footnote 15).
[118] I have also mentioned examples of case simulations, as found in Parker and Swatman 1999, Joyce 1999 and Klassen, Stone an d Vogel 1999. (See footnote 16)

idea was to make a business plan that evaluated the current decisions and which should result in a plan for Rockwool´s next step in the e-commerce area.

In the LEGO case, the tool "driving questions" was used. The questions pointed forward and backward in the case horizon - i.e., questions which should "force" the students to analyse LEGO´s current decisions and questions, and which should make the students come up with new solutions. As with the Rockwool case, these questions were part of a role-playing situation, and they were thus placed in an assignment binder belonging to a consultant (the role being played by the student).

The ALKA case had driving questions, which were placed outside the case story context. These questions were similar to a written teaching case, which looks backwards in details on the decisions and their consequences illustrated in the case. The case story did not employ a specific role for the student to play, but did recommend the student to navigate through a certain route.

Even though there were roles, which encouraged a certain view of the content in the case, or a suggested route as in the ALKA case, all cases allowed for individual exploration, and they were not roles, which enforced the students to make decisions or act within the individual case situation. The roles served primarily as a motivational factor.

The embedded tools (business plan and driving questions in the CBS cases) were however tools, which was used both at the individual level, but also at group and/or class level. For example the lecturer using the Rockwool case used the business plan template in the discussion. He handed out the template in the beginning of the session, and used a couple of "time-outs" during the discussion, where he told the students to talk in small groups (as they were sitting, not physically moving around in the room) about some of the headings in the business plan. At some point in the discussion, the students acted more as passive listeners, and perhaps for this reason the instructor also chose to include another tool, but not from the case itself. Instead he used a well-known theoretical model to identify Rockwool, their customers and core competencies. Some of the students were able to recall the model and even apply it to the case and begin a discussion. So in this discussion, models and theories worked as support tools in the analysis of the case.

I only attended this Rockwool case class session (in which I also video-recorded and collected questionnaires). Here the discussion was about other possible strategies Rockwool could have used, and what they could do to obtain e-commerce in full scale, rather than talking about the things they had already done. This was seldom the situation with the ALKA case, where the discussions looked more backwards, and hardly touched the aspects of future strategies, despite the continuity suggested in the introduction sequence. And as a middle position were the LEGO discussions, which seemed to do both in equal measures.

So tools (driving questions, templates etc.) and roles (consultants, employees etc or non-personified cases) implemented in the design of the teaching case, can be utilised so

that different foci are achieved depending on the objectives of the case. Though these roles and tools may function as guides for teaching strategies, they did not seem to affect in any way the students' ability to discuss the case according to Blooms taxonomy. Also, they did not refer to the roles and tools, unless the instructor explicitly drew their attention to these.

To include theory into the multimedia case itself would be possible, but in the BUSINES-LINC project we have chosen not to do so. Primarily because it would mean deviating from the paradigm of case teaching. That attention from the real life situations would move towards a "how theory fits or does not fit the real world problems", and in its extreme to the use of small real life examples or vignettes to explain theory. This may be a great teaching and learning experience, but it is not the objective of case teaching in business education (4.1). It would also mean narrowing the applicability of the case, both with respect to fields of application, but also to different levels of students (different target groups, which I will discuss in the next section). But of course the teaching of theory and models are vital parts of an educational system, and so the teaching notes may very well focus on how to apply the case to specific areas of interest.

9.3.4. INSTRUCTORS ROLES

I found that the lecturer's influence with case based teaching was significant on the topics beings discussed and the "mood" of the discussion. The personal character of the teacher, his experiences etc. can bring a very poorly written or designed teaching case "home" so to speak, or pour a rather interesting and high quality teaching case into the drain.

For example the group of undergraduate students had been given the task to present aspects of the LEGO and the written ALKA case, and to lead a class discussion with their fellow students, but they were inexperienced in the case method. Both groups' preparations and presentations of the case showed that the teaching case enabled them to carry out high level discussions, they were however so inexperienced at leading a discussion that neither of them were capable of this. There were few of the attending students in this course (the SVIR course), who had prepared the case in advance. However this was also the circumstance in the other classes, where the lecturer still managed with the same set of cases to establish a discussion (quite a passive discussion, but still a lot more active than the small groups of students were able to lead).

When discussing assumptions and expected results, I mentioned that one reason for not observing the teaching notes subject in class, could be that the instructor chose to pull the use of the case into another direction, than the case was originally developed for (9.1). This to some degree happened in the BPR course with the LEGO and Rockwool case, and in the SVIR course with the LEGO case. In both instances the cases were used for BPR related areas, which the cases were not intended for. The class discussion as led by the instructor (in the BPR course) or presented by the students (in the SVIR course), did not focus on classical BPR phenomena, rather on organisational change. But in the Rockwool

case no organisational change had occurred, making this a difficult case to use in this area. However, the instructors and students must have realised this, and all chose an approach were the interesting elements in LEGO and Rockwool were discussed, and then briefly looked at the influence on organisational change stemming from both historical events and future choices. Though afterwards one of the instructors did "complain" to me that he had expected it be more suitable for BPR (though this subject was not even mentioned in the teaching note). There is also another aspect, which should be considered.

Just as the instructor can be qualified in conducting case discussions, so may the students over time become skilled at how to solve a teaching case problem and participate in a case discussion. [119]Some of the students become "experts" in the case-based teaching approach. They know the paradigm, what the case-based approach of teaching looks like and/or they have been subjected to this way of teaching many times before. For example the instructor giving an all case-based course, may provide the students with written guidelines, like the ones based on "learning with cases" by Maufette-Leenders, Erskine and Leenders 1997, as for example Heiberg 2002a and 2002b. However, this is seldom the situation[120], rather they have learned the "tricks of the trade" by being confronted with many different teaching cases and using them many times. By using the term "tricks of the trade", I suggest that there are two ways of utilising this knowledge.

A student knows how to use cases, so that maximum benefit and learning are achieved (which is a positive approach). Knowing how to "fake" a case discussion (which may not have the same positive influence) is another. I.e. knowing when to speak, how to turn a comment just mentioned around to another comment, which also makes sense in the context etc., without actually having prepared the case, but still looking like an active student in the eyes of the instructor. Though the instructor may detect such a conduct over time, it means the instructor would have to adapt the class discussion during the session, as he becomes aware of the "loose talk" of these students. This is not an easy task and may result in a lower level of discussion than would otherwise be the situation. Other students have no experience (probably whole classes of the "younger" students). They can only rely on their everyday knowledge and imagine the possible ways to use and learn from a teaching case. Diversity in the student qualifications regarding the teaching approach used, should be considered by the instructor, and could also be discussed when developing the teaching note.

If the instructor follows a detailed teaching note from step a to z, on how to use the case, adapting a "pre-defined" teaching strategy, there will be no adjustment (of the teaching strategy) to the individual student present in the classroom discussion. I.e. there

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[119] The following argument about anonymity stems from the paper "Will Bambi cross the Ice?" an unpublished paper that I wrote in connection with a PhD. course with Roger Koppl in business economics (Orngreen 2000 xxindsæt i ref). Here I applied some of the theories discussed to my area, and found through these studies, especially the concept of anonymity productive to work with. Though this was a new area of application, the concept is a fundamental issue in social science, and Koppl saw the concept of anonymity could play a role here, (Mail from Roger Koppl on Thu, 15 Jun 2000).

[120] I have not formally asked all students in the investigated classes this question, but I talked to 12 students about how they were introduced to case teaching (7 from the investigated groups ans 5 student assistants). Neither of these had had any "formal" introduction, but had gained experience from practice only. This was also how I as student learnt to use the approach.

will be no considerations of their individual vocational qualifications, and/or his/hers abilities in the case teaching method.

According to my observations there was a high probability for the instructor to determine his/hers teaching objectives and format from the teaching notes of the multimedia case. This meant that they were acting under tight system constraints in accordance with the case-based teaching approach. In keeping with the concept of anonymity, the ideas, plans and suggestions developed to a group with a high level of anonymity are more dependable than those who have a low degree of anonymity. (Koppl 1998.) But as I have just discussed maybe the students have a low degree of anonymity, because the multimedia cases (at least those that we developed, but also others both written and digital cases, I have reviewed) aimed at target groups which have a large differentiated heterogeneous character.

Machlup states that "*The role of the past in the process of adjusting the present to the anticipated future is essential in al theory of human conduct.*" (Machlup 1946, p. 150.) And so like any other type of teaching the expectations have to be adapted to the situation. The lecturer has to "translate" the case so that it takes the individual setting of his/hers students (which can not be foreseen in the teaching notes) into account.

In a multimedia teaching case with a embedded teaching strategy the instructors may have been acting under tighter system constraints, than was the situation with written cases. There was a risk that vital information, which the teacher knew about the class level of knowledge and way of working, could have been overlooked. This could be the reason for the quite similar teaching approach used (individual preparation followed by class discussion) in the majority of classes that I recorded, and the relatively passive discussion as a consequence of this.

9.3.5. TEACHING NOTE

The teaching notes of the E-case series of the BUSINES-LINC project focused on describing the target group and teaching objectives of the case and then continued to present the case structure and content. Finally, discussion subjects were mentioned, but only with a small paragraph on each subject.

The feedback from the instructors in some of the sessions I observed/recorded, sometimes made comments on the teaching notes, I have also recently received comments (though only a few) from instructors, who have used the case at other business schools. The main comment was that the instructors did not feel the teaching notes provided much guidance, and that they themselves had to plan, which path the discussion should follow. The teaching note as a tool supporting the discussion was also criticised because it did not contain information on what the case supplier had done in the area after the case story ends. That is additional information, which only the teacher could be informed about. The consortium's argument was not to have such additional information, and to have flexible

teaching notes. We had chosen and planned both of these critical issues consciously and intentionally (see 4.1.2 and 8.2.5). As a consequence, it required more attention from the instructors to get a discussion running, and quite many were not pleased with this.

These critical remarks can be compared to the finding I made about the instructors adapting a very similar teaching approach in all classes, though the classes had different vocational level and experience with the case-based teaching method. This finding go against the notion of the constructivistic paradigm, to which many authors argue the teaching case approach belongs (see chapter 4.1). According to the constructicvist paradigm it would be improper to act under such tight system constrains by following an inflexible teaching strategy (as provided in detailed teaching notes and applying a standard teaching scenario). The type of (rather inflexible) teaching strategy, which some of the instructors claim they would like to have, by criticising the flexible approach. It seems there might be a fundamental paradigmatic problem in treating an individual student as a highly anonymous other, and at the same time believing that the individual construction of knowledge is fostered in an active communication with peers (which is not predictable or based on tight system constraints). However, taking such a detailed learning discussion further than this, is not within the scope of this dissertation.

9.4.   CONCLUSION

Figure 9.3 summarises the roles and tools in the use dimension.

Guided preparation (tool)
- multimedia teaching cases need longer preparation time than written cases.
- assignments like writing a synopsis, report, oral presentations etc.
- should increase preparation time and number of students having prepared.
- create environment for more active and high level discussion in class.

Students' role
- different target groups have different needs
  - to the interaction form, interface etc. within the case
  - to the class discussion level, case assignment etc. in the context of using the case

The instructor's role
- experience of the instructor influence the success of the case
- instructor influence the focus of class discussions
- case use should be adapted to students vocational skills and knowledge

Roles & Tools use dimension

Embedded teaching strategies
- using design structures (i.e. information pool, role-playing, case simulations)
- design structures are also implemented case teaching strategies

Teaching note (tool)
- most common support tool for instructor.
- when designed to encourage flexibility, it created some criticism from the instructors.

Embedded teaching tools
- within a case (e.g. LEGO assignment or business plan in Rockwool)
- outside the case story (e.g. driving questions in the ALKA case)
- supports the analysis of case content.

Embedded teaching roles
- like consultant in LEGO or non-personified cases as the ALKA case
- serves motivational factors for the individual using the case.

Figure 9.3 - Summary of the roles and tools in the use dimension

In this chapter I have presented my assumptions to the case use and investigated a number of issues regarding case use, by using the questionnaire as starting point and then addressing the findings here, with supplemental information or other issues from the video analysis and observations.

The analysis resulted in three characteristic of the use situation, which were:

- Different target groups, different needs.
- Push for preparation, enhances discussion.
- Embedded teaching strategies, supports and motivates.

These characteristics were grounded in findings about the level of the discussion of the two target groups including different motivational factors, as well as analysis of how an embedded teaching strategy can support and motivate the use of multimedia teaching cases. Another quite outstanding finding was the extremely small effort of preparation time and number of students having prepared the case.

The analysis could be interpreted into a number of roles and tools, which are seen influencing the development process. E.g. by using different design structures (i.e. case information pool vs. case role-playing vs. case simulations), multimedia teaching cases can include more of the teaching strategy embedded into the case than traditional cases do. This is because the structures say something about the objectives of the case teaching strategy.

PART 4

10. RESULTING DIMENSION

In the two previous chapters I discussed both the development and use dimension investigating a number of roles and tools, which were used in the BUSINES-LINC project, and which were found to be characteristic for the development of multimedia teaching cases. The supporting and restraining factors as well as the relationship internally, i.e. within each dimension were discussed. Though I have mentioned the phases that the roles and tools were affiliated with, I have left the third research question somewhat unexplored. I shall in this resulting dimension investigate the inter-relationship or cross relations between the roles and tools; I will discuss the influence of the use dimension on the development process, and look at how the roles and tools are related to the V-model.

The aim of this chapter is therefore to create an overall resulting picture of the development process and provide a summarised answer to the three research questions in 2.3. This conclusion will provide reflections on the relationship between roles and tools throughout the development process in 10.1, and summarise primary findings from chapter 8 and 9 in a schematic view in 10.2.

10.1. ROLES AND TOOLS RELATIONS

In this section two different views are used. At first I relate the roles and tools to the V-model, then I investigate the relations based on a view using the development tools as starting point.

Relating Roles and Tools to the V-model

The investigated roles and tools are shown in Figure 10.2. It depicts relations to the V-model, as presented in section 7. The roles and tools have arrows to the phases, which they are *primarily* connected to.[121] There are dots at the end of some lists (e.g. in the extended team), where the most important roles are mentioned, but other roles may also be used, depending on the type of case.

Many roles and tools from the use dimension were contemplated in al-most all phases, but it would be too complex to also show on this model, how these use roles and tools need to be contemplated in the development dimension. Also, project management and the case supplier have been given an arrow to show involvement in all the development phases. But it is not possible to see from the figure if they were also involved in every tool that I have investigated in the development process. Therefore to better understand how and where the tools supported the development, and which role was involved for which tool, I have made a model, which uses the development tools investigated as starting point. Such a model also provides a less complex relationship model by focusing at one area at a time.

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[121] The different line-styles do not carry any value, they are used to enable tracking of which line leads to which phase.
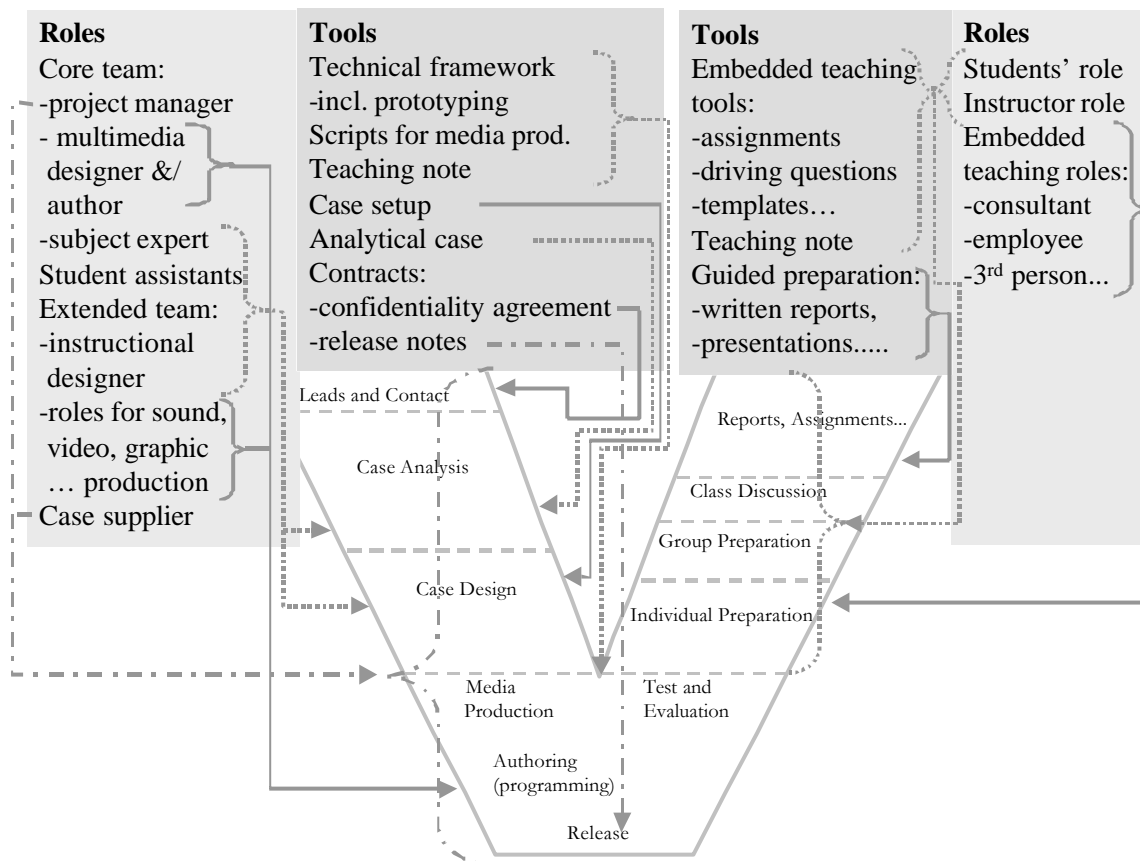
Figure 10.1 - Relating roles and tools to the development model

Relating to the Development Tools

The first tool model illustrates the development tools internal relations and their relation to the "first leg" of the V-model, the development dimensions phases. The model is seen in Figure 10.2. The thick and fully outlined arrows show the general direction of the workflow (though iterations did occur). The dotted arrows represent information output from one tool as input to another. The icon showing a folder in front of the name of the tool on the diagram illustrates a document-type tool (like templates provided as formatted text in the case setup and analytical case). The other icon is a circle with a cross through, illustrating a program-type tool, which can be executed (like HTML programming and style sheets in the technical framework for BUSINES-LINC).

Development Tools:
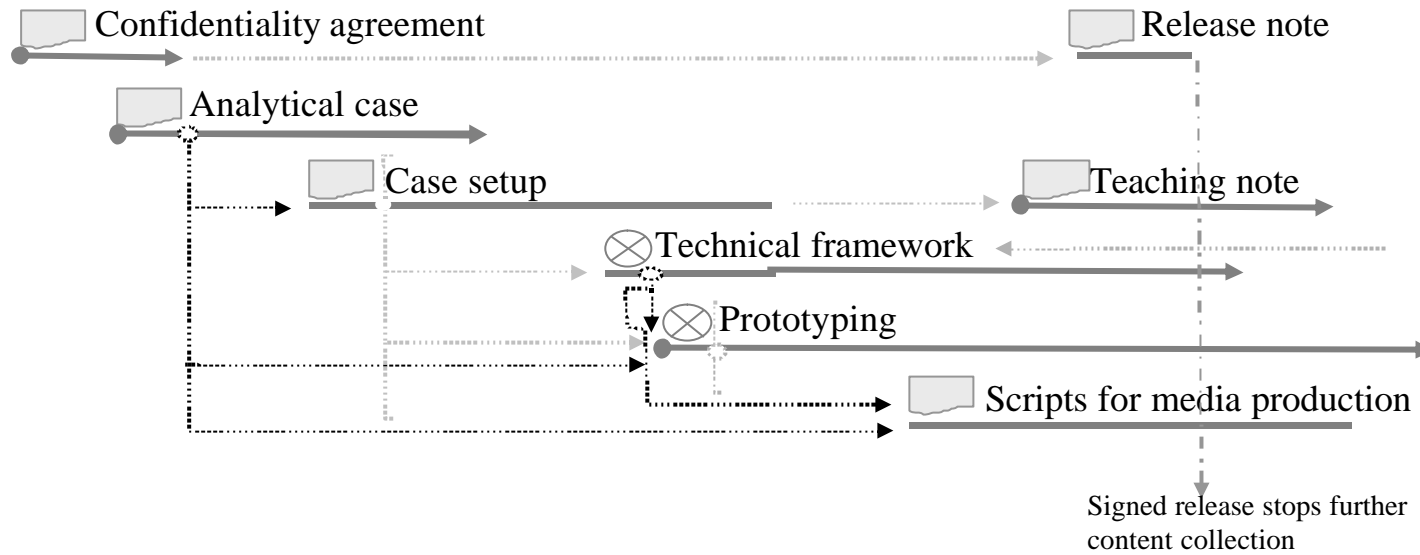
Figure 10.2 - Development tools, internal relations

The technical framework has an extended line indicating that because a case series was developed, this tool was given much more attention and evolved as the case series was made. In the situation of a single case the technical framework would not take such an eminent position. The teaching note is placed on the same "line" as the case setup, showing that the case setup tool served as input to the first version of the teaching note. The figure also illustrates that at some point in the development process, prior to the final media production, the case content needed to be approved and "signed off" by the case supplier. This entails that further content changes could not be done (for this version of the case), since the case supplier has to know (and trust) what they are releasing is also what will appear in the case.

Changing the focus from internal relations of the development tools to cross relations to the development roles has the format as presented in, Figure 10.3. The figure illustrates, which roles participated in the development or provided input to which tools. It shows (among other things) that even though both project management and the case supplying role were involved in all the development dimensions phases – as was seen in Figure 10.1 – it was only the project management role, which was involved in all tools. The case supplier was typically involved in supplying information for the analytical case, (oral) approval of the design in the case setup. Also they participated in media production, when this happened at the company site (staged interviews, footage of surroundings etc.), and the case supplier approved final content, including signing the release note.

In general it is seen that the two tools for case analysis and design involves a large set of roles, especially as this figure "only" depicts the most essential roles. E.g. in the detailed discussions in chapter 8, I described that in our experience a multimedia designer should also be involved in the analytical case process, and that the subject expert on the other hand also should participate in the case setup process. This is however not shown on the figure, as it would make it rather complex. The large number of roles participating in these two tools (analytical case and case setup), was the reason for the tools focus on supporting communication between the involved parties.

A similar relationship diagram is shown in Figure 10.4. As the previous one, it also takes a development tool perspective, but this time it is the roles and tools from the use dimension, which is related to these development tools. The diagram shows that it was especially the teaching note, which provided a way of describing the use of roles and tools to the instructor. It also shows another important issue, namely that the embedded teaching strategies (both roles and tools) of a multimedia teaching case as well as the student's role were considered much sooner, and also to a larger extend. In the following section I will elaborate somewhat on this issue.

Development Roles

Core team: 👤　　Student assistants 👤　　　Extended team: 👤　　Case supplier 👤
-project manager ─
-multimedia　　　　　　　　　　　　　　　　-instructional designer
 designer &/ author　　　　　　　　　　　　-roles for sound, video
-subject expert　　　　　　　　　　　　　　 graphic… production

Development Tools:

▢ Confidentiality agreement　　　　　　　　　　　　　▢ Release note

　　　▢ Analytical case

　　　　　▢ Case setup ▾

　　　　　　　　⊗ Technical framework

　　　　　　　⊗ Prototyping

　　　　　　　　　　　▢ Scripts for media production
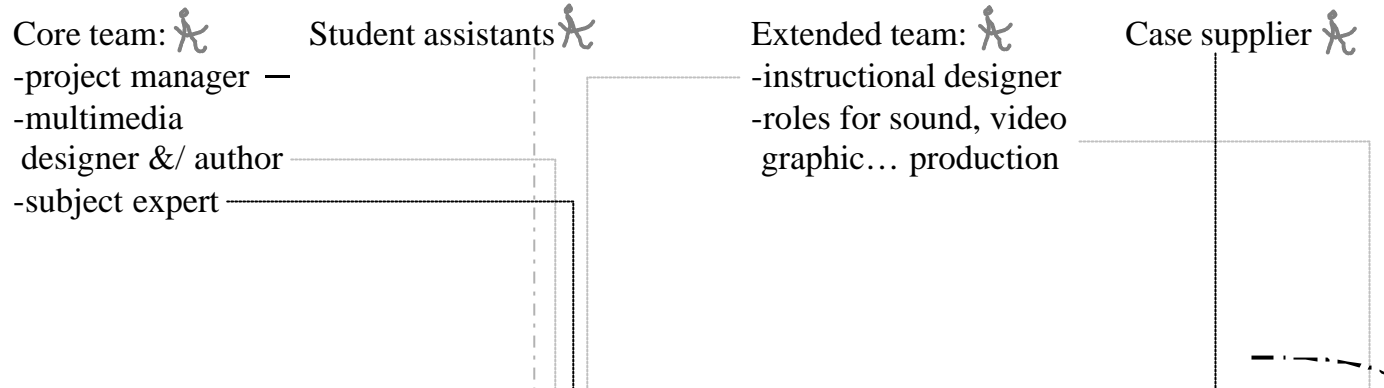
───── participate in　●➝ work flow　⊗ program tool　▢ document tool　👤 role(s)
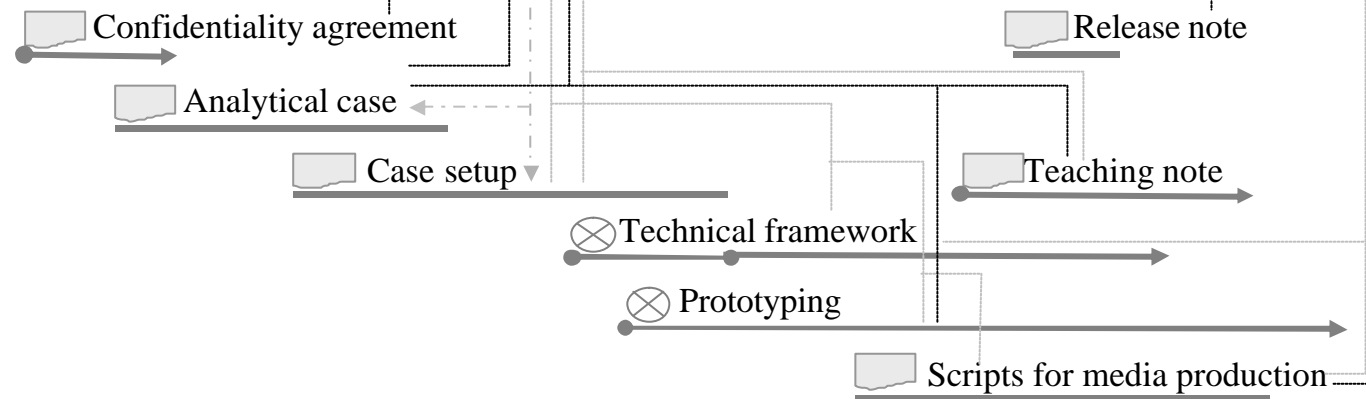
Figure 10.3 - Relation between roles and tools in the development dimension

Use Roles and Tools

Students' role   Embedded teaching   Teaching note   Guided Preparation   Instructor's role
roles and tools

Development Tools:

Confidentiality agreement   Release note

Analytical case

Case setup

Technical framework

Prototyping

Scripts for media production

participate in   — work flow   ⊗ program tool   document tool   role(s)
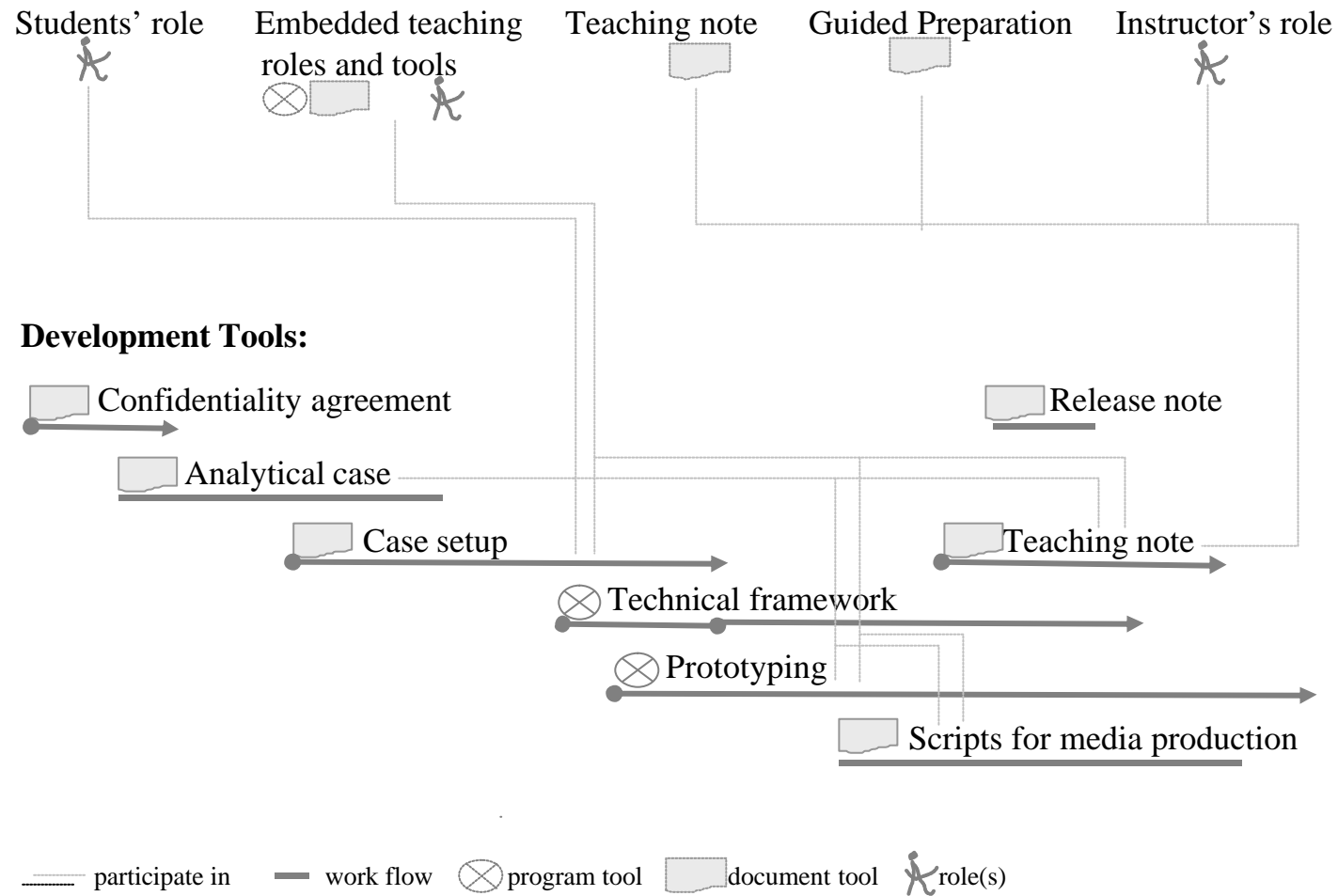
Figure 10.4 - Development tools and the use dimension's roles and tools.

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These three models (Figure 10.2, Figure 10.3 and Figure 10.4) show relations between the roles and tools within the two dimensions. They do not show the relationship between the use dimension and development dimension in a case series development situation, as I illustrated and explained in Figure 7.5. After having examined the use dimension in chapter 9 it should be evident that the feedback cycle shown for case series in this figure, was not the same as re-use of material (though that happened as well). Rather the knowledge about use of multimedia teaching cases within the domain of the case series was increased for each single case development cycle. This meant that we could improve our development process. Findings also had a backward loop, so that cases, which had been developed, were changed due to new findings. This situation took place in particular with the ALKA case. To get a full overview of the development process it is necessary to combine the different models (the V-model and the model using the development tools as starting perspective).

10.2. MAIN CHARACTERISTICS - RESULTING SET OF ROLES AND TOOLS

In this second and final section of this concluding chapter, I present a summary of the roles and tools in the development and use dimension, as well as a discussion on their internal and cross relations. This summary will take a schematic form. First the roles in the development dimension are summarised (in 10.2.1), including a concluding discussion based on the findings regarding the development tools, i.e. which role participates in the development of which tool is discussed in more details than in chapter 8.1. Hereafter the roles and tools in the use dimension are recapitulated (in 10.2.2). Finally, key points from the tools in the development dimension are extracted, including an assessment of the influence of the use dimension on the development tools (in 10.2.3).

This rather schematic overview of each role and tool make use of the following format:

- Name of Role/Tool
- Objective
- Functions
- Supporting and Restraining Factors

10.2.1. MAIN CHARACTERISTICS OF DEVELOPMENT

After having investigated the development tools and the use roles and tools in details, I am able to give a more precise description of each development role, the objective and functions including the supporting and restraining factors. I was not yet able to do so in section 8.1, where the tasks and tools, in which the development roles participated were not yet investigated. The row in the table named *functions* in this section focus on the tasks carried out according to the development process or tools in the development dimension. It is noticeable that several roles can often be assigned to the same person. So that a core team could often consist of 2 persons - perhaps assisted by students.

Project Manager - Core Team

Objective
- To keep communication between the different roles flowing and to co-ordinate the tasks and use of tools in the development process.
- In a large teaching case development project as BUSINES-LINC, there were two co-ordinating bodies, the partner level and the consortium.

Functions
- Project management was a resource that was necessary throughout the project life cycle.
- It was a management role to take contact to the case supplier and continuing communication with them on all official issues. To discuss deadlines and milestones within the project, and to overlook the economy and quality assurance processes in the project.

Supporting and restraining factors
- The nature of a multimedia development required a more linear development approach. As the cost of re-production of media like professional video and sound recordings was very high, content design for media production needed to be final and approved prior to this.
- The organisational structure of the development team was special for multimedia teaching cases, in particular due to two issues:
  - First, the organisation of the client/customer relations. In the core team, a (senior) researcher was often the initiator and financial owner of the project, as well as member of team as subject matter expert and/or instructional designer). The case supplier, could be viewed as a non-paying client, which supplied information to the case and which should also approve and release the case. The target group was students, but it was the instructor, who chose, which cases that the students should use in the class. There were thus two perspectives on the customer, the students and their instructors. So it was quite vital, that not only the need of the students were contemplated, but also those of the instructors, for example by the use of teaching notes (as shown on Figure 10.4and investigated in chapter 9).
  - Secondly, due to the outsourcing strategies used. In BUSINES-LINC there were different solutions to the degree of outsourcing chosen. Some partners outsourced all technical details (production of media, authoring etc.), others only parts (like sound and video production), and yet a third model was to develop everything internally. Internal development was an economically cheap alternative, but only when the necessary resources were allocated from the beginning. This was not quite the situation in the BUSINES-LINC project, where many partners saw the project as a training possibility. The result of this was that many cases had a poor use of media for communication and interaction, and/or an unprofessional looking interface. Because, as investigated in the use dimension, a realistic

Project Manager - Core Team
understanding of the case story process and the interface design were important aspects of the case from the students' perspective (chapter 9), there should be a professional design - whether developed through an outsourcing or in-house team.

Subject Expert - Core Team
Objective - To provide a theoretical and practical knowledge about the case content and teaching area of the teaching case being developed.
Functions - Participated in many phases: the leads and contact phase, the case analysis and design phases as well as the evolutionary prototyping process and teaching note development. - Primary tasks were to collect and analyse content from the case supplier, and later in the process to ensure that the case content was depicted in a realistic manner, including evaluation of the content necessary for the transfer of the lessons was included in the case. - A well designed case according to the use dimension findings meant that content, interaction and the interface design had to be correlated into the case story, matching the needs of the students. Therefore the instructional and multimedia designer also needed to co-operate with the subject expert on content in the case setup and even more so in the prototyping sequence, when the detailed design were implemented.
Supporting and restraining factors - Finding an appropriate case supplier was a task for the subject expert because he/she would know, which organisation was doing something interesting within the relevant area. Also this person would have an extended network which could be put into play, when finding an interested case supplier. - It was especially the case analysis that the subject expert took responsibility for, within the analytical case work. However, we found many subject experts did not have enough experience with multimedia applications to imagine the use of the media, and thus recognise the opportunities to get and use information, which was suitable for this digital platform. Close co-operation between the subject expert and the multimedia designer/author were thus necessary already in the case analysis phase. - We choose to develop the teaching note, using content structures and lessons learned from the case supplier, rather than describing detailed teaching approaches within all the phases of the standard teaching scenario. As a consequence the instructors did not see the teaching note tool to be as guiding as they would have wanted. (Probably the teaching notes should have been more guided by instructional design, including subject matter issues of the case and not visa versa.).

Multimedia Designer &/ Author - Core Team
Objective - The multimedia design objective was primarily to design the teaching case so that an appropriate use of media was chosen, and a consistent functional and aesthetic design achieved (and evaluated). - Where the multimedia designer is focusing on the design of the system, a multimedia author is focusing on programming (and scripting).
Functions - Tasks performed by a multimedia designer and an author role were often very interrelated. Because a prototyping approach using the technical framework as basis for the detailed design was used, it was not possible to distinguish between the two. Consequently these two areas were in the BUSINES-LINC project regarded as one role, and also quite often performed by the same person (though at CBS multimedia design was sometimes also undertaken by student assistants, who did not perform any authoring at all).
Supporting and restraining factors - The technical framework and the nature of teaching case development project as a case series project rather than a single case had vital influence on the multimedia designer/author work. It supported the designer once a technical framework was in place, but also restricted the creative process within each case design. - As with the subject matter experts, many who undertook the multimedia design roles were not experienced within multimedia development. They had to be trained in this before being able to use the traditional tools within the area. When the core team members at the consortium level, in the beginning of the project, worked with the scenarios and sketching using simple storyboards analysis they seemed uncomfortable with these techniques. There was a tendency to them choosing the first overall design solution, which came along, rather than to try out alternatives. As the team became more experienced, the process of telling stories and using sketches to illuminate the design became more visible in their use of these techniques. However, it was still seldom that different alternatives were being explored.

Student Assistants
Objective - Students represented fairly cheap labour, and many were also quite qualified, as they were senior students familiar with the case teaching method, and close to the needs of the target group.

Functions

- Students participated in the case analysis phase, where they primarily collected data, transcribed interviews and organised the material according to the analytical case template.
- CBS used students with a computer science and business economics background, who were also able to support the multimedia designer in the case design process.

Supporting and restraining factors

- The students being part of the target group for the case had a good sense of what the case needed to inspire them as users. As they gained knowledge about the specific case, they were less able to fully judge the needs of the target group and evaluate the case. This happened because their knowledge of the case inevitably was larger than what was presented in the case.
- The students' inexperience with case development meant they could not apply the tools (analytical case and case setup) in a flexible manner. I.e. the tools should be adapted to the situation at hand, the culture of the case supplier and the case story that was being investigated, and the students were not always able to do this.
- Usually only one person would be concentrating on the multimedia design role (on partner level) when in-house development strategies for the case design phase was used. Student assistants provided a way of getting "more heads" to contemplate the design and alternative solutions.
- We (at CBS) believed qualified students would be senior students, who had sufficient training in analysing companies and writing reports about them. Such students are difficult to recruit, as many already have a well-paid job in their spare time. At CBS we chose to use only students, which were ready to or in the middle of preparing their master thesis. We found that advertising for master students, who were contemplating to write their thesis within the field of our teaching cases, and offering them to use the case supplier as a case study for their thesis, gave us that "competitive edge", which we needed. The four assisting students, whom we hired at CBS through this method, all mentioned that it was the provision of data material for their thesis, which motivated them to participate. Though qualified, it was sometimes frustrating to have assistants, who were not only busy with their master studies and the case development, but who also had between 10-20 hours work a week, which made it a difficult task to co-ordinate the calendar.

Instructional Designer - Extended Team

Objective

- To further develop the messages of the case as they have been found and analysed by the subject expert and student assistants, and concentrate his/her effort on how they should be presented in the multimedia teaching case.

Instructional Designer - Extended Team
Functions - Even though the area of application was education, instructional design was not seen as a core team role, but rather as a part of the extended team (see Figure 10.3). Instead it was especially the abilities a subject matter expert had that were necessary throughout the project process, since the teaching case paradigm prioritised the realistic illustration of events, which had actually happened. This did not mean the instructional design was not important. It was just not a role that was needed throughout the whole development process - There were especially two tools, where the instructional design had large tasks to carry out. First when the overall design of the case was developed, using the case setup. Then in development of the teaching note.
Supporting and restraining factors - As just mentioned a traditionally written teaching case was characterised by the way it depicted the "real" world. Therefore it was the content rather than the teaching strategies, which the case development had focused on. (See 4.1.) However, as found in 9.3.3 the multimedia teaching case did hold the possibility of interacting with the user in a way that made the teaching strategy even more embedded into the case. This could be used to for example guide the students' use and way of reflecting on the case material. I.e. even when the embedded feature was not considered explicitly, it was still present in the case. It was therefore more efficient from a teaching perspective to contemplate the use of the case, considering the possibilities, which the media offered. This provided a use of media that corresponded to the message that the teaching case should transfer. More details on the influence of the embedded teaching strategy and on how to design for this embedment, in the following section.

Roles for Sound, Video, Graphic etc. Production - Extended Team
Objective - To produce the different media elements for the case in its final and approved format (not dummy graphic, video etc).
Functions - New media production was often performed late in the process (when the content was approved), whereas the collection and analysis of existing media happened early (e.g. video or photographs which the case supplying company had, and which could be used in the case). - The functions which the roles for media production undertook were both production of new media, but also adaptation of already produced elements, like digitising analogue video or similar.

Roles for Sound, Video, Graphic etc. Production - Extended Team
Supporting and restraining factors
- The production of media elements was in the investigation seen as a separate role from those of the multimedia designer and author to emphasise the necessity for professionally developed material (as discussed). The separation was not meant to illustrate a preference towards using sub-contracted companies.
- If third party assistance or sub-contractors were used for media production, scripting became an important tool for communicating the issues that needed to be produced. This was because such roles were engaged for a very short period and often in a situation with scarce resources, where there was no time to fully describe the teaching case being developed. Scripts provided a means for communicating what needed to be produced, the objective and references to the system. As in any multimedia development project, an additional issue when using subcontractors was copyright agreements.

Case Supplier
Objective
- Though there are cases, which are based only on desktop research (see chapter 4.2), the cases investigated in this dissertation were all based on relations and information provided by the case company it self. Active involvement from the case supplier provided a detailed and complex setting for the case, and thus also a realistic picture of what had happened
Functions
- The case supplier participated in several activities throughout the process (see Figure 10.3), and they had a very active role in two phases: First, when data was collected within the company. Here they were handing out existing material and gave interviews. Secondly, when the teaching case was about to be released, an approval process began, resulting in a signed release from the case supplier.
Supporting and restraining factors
- To assure the company that it did not have to worry about letting employees participate in interviews, without screening every statement they made, confidentiality agreements were signed. Often two visits to the case company were needed, before enough data had been collected to proceed with design strategies. In the design phase additional information was given through mail and/or phone. However, there were typically one (or two) more visits to the case supplier, performing the production of new media and getting the approval of the case, though the latter was often done by snail mail or fax.
- There are three types of information risks associated with the case supplier, which a

Case Supplier
development team should be made aware of. 1. The demand for changes to the case being developed was sometimes quite strong. In a very few instances, it was so strong that the lessons learned from the case or the design of the case story were no longer possible to maintain and had to be changed. 2. Often the contact to the case company happened through one or two individuals. When one of these got another assignment or changed job, others took over. These might be people who had other ideas about the content delivered so far; resulting in changes to the case story. 3. Sometimes the case involved a company, which the case supplying company worked with (a daughter company, a business partner or client). When it was beneficial to obtain information from such third party content suppliers, an additional confidentiality agreement was used. However, in order to avoid too many changes and influence from this third party company in the release phase, we at CBS decided to let the agreement state that all approval was done through the main case supplying company. - At the BUSINES-LINC project we learned, that an approval phase was much more time consuming than that we had expected it to be. This was due to the somewhat enlarged volume of content material in a multimedia case (as opposed to a written case), which needed to be reviewed, adapted and then finally approved (released). But it was also due to the media, which required the case supplier to evaluate their own statements, narrators, animations etc. and not just a written text. Thirdly, the more unfinished format/draft that such a multimedia case had, as compared to written teaching cases that are often approved in an almost final format, influenced the duration of the approval process.

10.2.2. MAIN CHARACTERISTICS OF THE USE ROLES AND TOOLS

In chapter 9, the use dimension was investigated and the findings were summarised in three characteristics of the usage of multimedia teaching cases. The investigation of these three characteristics led to a set of roles and tools, which were recapitulated in a separate conclusion. Since the use dimension was the last dimension investigated, the roles and tools in this schematic layout (using the same as in the previous section) do not contain that many new perspectives. As in the previous section, the row named *functions* describes influence on the process, but here it is the influence on the use process, which is described. The following sections will describe when these use roles and tools should be investigated in the development process (as already illustrated in Figure 10.4).

Students' Role
Objective - When differentiating between the needs of the students according their vocational abilities and their experience with the teaching case method, a higher level of discussion (according to Bloom) was reached.
Functions - The result of a design differentiation was evident throughout the use process on a motivational or inspirational level in the individual use situations, and on the level of discussion in the group and class discussion. - At CBS we operated with two broadly defined target groups, defined by the level of their education and the weight attached to theory vs. practice within their line of education. The MBA group, who are part time students, with some years of work experience, and full time jobs. The graduate group, with full time education, young (future) academics, with little or no experience from practice.
Supporting and restraining factors - The level of the class discussion (evaluated on the basis of Blooms taxonomy - as described in 5.2.2) was higher among the MBA group than among the graduate students. This seemed to originate in their knowledge from the work practise, which enabled them to relate their own experience to solving a problem presented in a case (but often only when the teacher encouraged them to do so). When looking at the group discussion of the graduate groups, the groups was able to discuss on a very high level using examples from books and the internet rather than their work experience. But the same groups did not perform very well in class. The video analysis indicated that the case did support the type of discussion it was intended to, but probably their lack of preparation and the instructor's way of leading a multimedia based teaching case discussion influenced the level of the discussion (as investigated in 9.3.4). - The students, who had prepared the case, were very positive about the case in every aspect, but there were two smaller differences in the motivational drivers. It seemed that the MBA group found the interaction form, the driving questions and assignments as a consultant etc. an interesting entry to the cases; more interesting than the graduates did. However, they did not find the case supplier's process as realistically illustrated as the graduate class did. The findings in general showed that different groups of students value different settings and are motivated by different designs, but that really few felt the case did not support their work-process. - When investigating the use situations it became evident that in the discussion some students were able to draw on an experience, which was not part of the course theory or the case. They were experienced teaching case students, who were able to "figure out" what they needed to say and act to a given question - without having prepared the case very well.

Embedded Teaching Strategies

Objective
- To explicitly design the structure and communication strategies of the case according to the teaching objectives. (This perspective is based on my finding that teaching strategies were embedded into the multimedia teaching case, probably more than in the written cases I studied.)

Functions
- There were two types of embedded teaching strategies used, which provided different perspectives to the content material of the case:
    - The embedded teaching role within the case, e.g. the CBS case that let the students "play" the role of a consultant or employee, or the CBS non-personified case (3rd person language use). This guided the student through the content in certain ways or left it very open (like browsing, searching through content pages). It also provided a motivational factor for using the case.
    - The embedded teaching tool, e.g. the CBS use of assignments, driving questions and a business plan template. These tools provided the student with a way of analysing the content of the case and reflect on the lessons learned.

Supporting and restraining factors
- At CBS the teaching cases supported different forms of usage and interaction by use of narratives, menu structures and different entry points to the material. These strategies was designed according to the lessons learned, and was meant to "guide" the use of the case. Though it should be noted that the content could be viewed in almost any sequence (only restricted by menu systems), i.e. the "guides" were intended to be supporting, not restricting. This way of structuring the teaching case according to a specific teaching strategy encouraged the students to bring forward the subjects, which in the teaching note was mentioned as the lessons learned of the case. It also influenced students' opinion about the case in a positive direction, according to the questionnaires and talks with students.
- However, it did not seem to change the students' ability to discuss the case in class in a significant way. That is, the design did enable the students to discuss the subjects identified as vital, but certain case structures or case stories did not seem to provide higher levels of discussions than others did.

Teaching Note - Tool
Objective
- To support the instructor in planning his teaching using the multimedia teaching case, both content and process wise.
Functions
- The teaching note has been the most common and well-known tool for instructors, but there have also been many different formats of teaching note. The BUSINES-LINC teaching notes were chosen to contain little elaborated guidelines about specific discussions and use processes. That is, the teaching case briefly described the structure and teaching strategy of the case and pinpointed interesting discussions and/or questions for discussion. It also contained comparison to the other cases in the e-case series.
Supporting and restraining factors
- Senior researchers in the BUSINES-LINC consortium felt that too rigid teaching notes sometimes lead to less adaptation and preparation of the case with respect to the target group at hand, i.e. the role of the students (as mentioned earlier in this chapter).
- However, instructors complained about the resulting "thin" teaching notes, which seen from their perspective resulted in requiring far too much energy for preparing the case. They also criticised that the teaching note because of its general topical level sometimes promised too much. E.g. it was claim that customer relationship management could be discussed in the Rockwool case, but one instructor remarked that not all views of this issue were covered by the case, only a few.

Guided Preparation - Tool
Objective
- There was one factor during my evaluations of the use dimension, which increased the number of students preparing the case and the amount of time each individual spent on preparation dramatically. This was whenever the case was used in a more extended use scenario, including an assignment, class presentation, written report or similar.
Functions
- This was a tool which was not implemented within the case it-self, but a method which we had described in the teaching note (and which according to my findings should get even more attention). The teaching note could describe different forms of extended teaching scenarios and reasons for adapting such an "extra phase" in the use process.
Supporting and restraining factors
- During the class discussions I observed that approximately half of the students had

Guided Preparation - Tool
not prepared the case. The answers to the questionnaire revealed, that those who had prepared had not spent sufficient time on the individual case preparation, according to my estimates. It could be that I had over-estimated this, but since the discussion went exceptional slow at times, with few active people, I found this an indication of insufficient preparation. - It was a bit surprising that the vast majority of the students seemed to find the cases very interesting, but did not "bother" to prepare adequately. Two professors told me that they too found it quite time consuming to prepare the case for a class discussions of two hours. Multimedia teaching cases demanded more preparation time than written cases, and if the students did not feel they would get the same amount of credit for doing so, they did not feel it worth the effort (to begin with). - Tools that extended the teaching situation not only increased the number of well-prepared students and thus preparation time, but also enhanced the discussion level in the groups/class I observed.

Instructor's Role
Objective - During the development process the team had to be aware of the instructor's major influence on both the case teaching discussion and the students' use of the case in general.
Functions - Even though the cases were not designed with particularly the instructor in mind, the instructor's role in the use dimension was very influential, and was carefully contemplated when developing the teaching note.

Supporting and restraining factors
- I found three factors influencing the "success" of the case, which did not directly relate to the case design, but rather were related to the role of the instructor. These should therefore be contemplated in the teaching note:
  - The instructor's experience with the case-based teaching method or his/hers general pedagogical abilities had influence on the class discussion level.
  - The instructor sometimes (intentionally or unintentionally) turned the discussion to subjects, which were not directly related to the case or at least to the case teaching objectives.
  - The case was not always adapted to the group of student using the case (see above description of the role of the students), which also might had lead to low levels of discussions.

In section 8.2, the tools in the development dimension were investigated, and in the following the same tools will be summarised, including new references to the use dimension. I have already discussed, which roles participate in which tool in 10.2.1, and I will therefore not dwell more on that issue here.

Confidentiality Agreement and Release Note
Objective
- Both tools provided a signed agreement that secured a smoother co-operation between the case supplier and the development team.
Functions
- The confidentiality agreement (shown in Figure 8.2) was signed by either the senior researcher in charge of the development project or sometimes all members of the development team, who would have access to the information, depending on the case supplier's wish.   - The release note (shown in Figure 8.3) was signed by employees at the case supplier, who had been "in charge" of the process of giving information to the case. Typically there was one or two managers of the departments involved in the approval, though an information department or a lawyer sometimes also reviewed the case, if the company was very large (like the LEGO company).
Supporting and restraining factors

- There were especially two supporting and restraining factors, both relating to the approval of the case content:
  - When a third party content provider was involved in the case analysis phase, a confidentiality agreement was made. We found that in order to have a more efficient approval process, this agreement should allow the primary case supplier to be in charge of approving content.
  - The signed release note sends a signal that students can rely on the involvement of the case supplier in the case. But on the other hand the approval process prior to getting this release, can lead to interesting facts being deleted or subjects changed.

Analytical Case
Objective
- The analytical case was a work document based on a template (see Figure 8.9 - Subjects addressed in the analytical case), which supported the collection and analysis of content to the multimedia teaching case.
Functions

Analytical Case
- The analytical case template was a document of headings, which was part of a larger framework, containing also containing a description of the theories and models, which the template was based on. - The analytical case template was thought to work as a document of headings, which would be filled in with content as the analysis of material from the case supplier proceeded. However, as we became experienced within multimedia teaching case development, we found it served better as a structure with keywords of content, which were linked to content scripts (see later). - Specially the use role considering the students' level of education was influenced by and influenced the analytical case. (I.e. a certain target group of students had certain needs or requirements to a case, and a certain kind of case content would be suitable for a certain group of students.)

Supporting and restraining factors
- The analytical case gave the development team (both at the consortium and at individual partner level) a common language or common ground, when discussing the content of cases. When working on establishing the template we agreed to what were the primary subjects we were interested in covering, and which terminology we could use to explain these phenomena.
- When used as a written document, which is filled out according to the headlines with the data collected, it had different and conflicting consequences.
   - It offered a way of performing quality assurance at the partner level, where it also gave control of project progress (for budgeting and planning reasons). However, we did not find it very useful as a review document at the consortium when peer reviewed by partners, as it was difficult to really understand the premises of the case, without having a profound understanding of the case supplier, the emerging ideas and clear impression of the case at hand.
   - But the analytical case as a document became bureaucratic to work with. The assistants found that it was almost a requirement to find content about every heading, even though the case story did not seem to develop in that particular direction. It also seemed there was a risk of missing or reducing attention towards interesting aspects of the case supplier's business process (or what ever subject the development team was investigating), if that aspect was not covered by the analytical case template, because the assistants were so caught up in adapting the content to the template. Secondly, this adaptation lead in some instances to a design structure (the navigational structure, interface and case story), which looked like the analytical case template. That is, the resulting document was sometimes presented to the students almost as it was, without further creative, speculative and interpretative ideas about how different teaching strategies, interfaces etc. would be able to transmit the content, so that the intended lessons learned came out clear

Analytical Case

to the students using the case.
- The restraining factors meant that we became increasingly aware of the call for a different way of using the analytical case tool. Quite early in the project, we made the statement at a general meeting, that the analytical case template would contain less text under each heading, than the written analytical case template would do, and that there instead would be links to the material collected in the company. This way of working with the analytical case as a tool and not as a document, turned out to be more efficient, and such inter-linked results (between template, resources and analysis) could still provide us with the ability to review the work of the assisting students. Because of the BUSINES-LINC project constrains (where certain deliveries and products to the EU had been agreed upon at start-up), we still had to make the written document as well. Therefore, the shift was sort of internal and meant that it was less bureaucratic to work with, and more sensitive to events in the case story, which were not described outside the template frame, but it was still difficult (though not impossible) to shake its influence on the content design.

Case Setup

Objective
- The case setup was a design tool, which should support the development team in choosing a teaching strategy, case story, user interface and navigational structure for the multimedia teaching case. One of the goals of the case setup work was that the narrative elements of case story had to be designed, so that the students got a feeling of ownership of the problems or opportunities presented. This is one of the important aspects of case-teaching according to literature (see 4.1)

Functions
- The case setup also contained a template, and the second column of Table 8.1 illustrates the subjects that the case setup working process focused on. As with the analytical case the case setup consisted of headings to a document, but the case setup was much more a communication tool than a written report.
- There were three "sub-tools" or areas, which were included in the case setup.
    - Analysis of the target group, their needs and the teaching objectives of the case according to the lessons learned in the case content. It was particular in this section the students' role was investigated
    - Treatments (or extended scenarios) to carry out the design of the overall case story, interaction form and navigation etc. In the treatment the form of embedded teaching strategy to use was contemplated, i.e. if certain roles could provide a certain way of using the case, or if a tool could support the analysis of the content

Case Setup
in the case from a specific perspective.   - Use of simple storyboards to support the treatment work and begin the more detailed design decisions. - The analytical case and the case setup tool work informed each other. The analytical case formed the basis for the design of the case. But also, as the work with the case setup began, it sometimes led to a request for information about a new area, or for further information to an already existing area.

Supporting and restraining factors

- Treatments (extended scenarios) focused on the end use (or future use) of the final product. I chose at the start of the BUSINES-LINC project to adapt the word treatment rather than scenario, since treatments – a concept from the movie industry – enhanced narrative elements as well as the emotions and actions of the people it described. (Whether the description was about people in the case, for example employees from the case supplying company or people using the case, like the students). Such narrative and emotional elements were an important part of the case story (see 8.2.2) and the user interface design, i.e. knowing which emotive acts and motivational factors the students are looking for (see 8.2.2 and 9.3.1). The concept of working with characters (or personas) in the treatment was however very difficult to maintain for longer periods of time, because some found it a rather unconventional or a "too creative" approach to educational design. This reaction was probably quite natural, because many from the core teams were inexperienced with case development.

- We developed a series of cases within the same area and to the same target group, and we also used a prototyping and a technical framework approach (see later). As our knowledge about the target group and the type of cases, we were developing increased, so did the guidelines on how to implement the cases, making the first part (the analysis) of the case setup less vital for the latter cases. Even though the specific teaching objective for a case varied, aspects about the target group had been discussed sufficiently. The use of the treatment also became less important for some partners, when developing the second and third group of cases. This was because of these partners decision to have the same kind of information pool teaching strategy embedded into the design of the cases, whereas others chose different forms of embedded teaching strategies for their (different) cases.

- As a communicative tool the case setup worked quite well, and for example all the student assistants in CBS thought the tool was more flexible to work with than the analytical case. It allowed the development team to discuss alternative ways of designing the case prior to settling for one strategy, which was one of the primary objectives.

- Storyboards are a tool often used within multimedia development in the design phase (as described in 4.2.3). Together with Pries-Heje I have developed a framework

Case Setup
indicating which type of storyboards to use in multimedia development. It is based on four variables: reality likeliness, size, complexity and reuse. Since all three CBS cases had little reality likeliness, were small in size and low complexity, a very simple type of storyboards could be used. These three variables indicate the use of very simple storyboards with overview flowcharts as sufficient. Only the reuse factor varied, being high for the ALKA case and low for the other two (LEGO and Rockwool) (see Table 8.4). Not reusing means that a lot of the material has to be designed from start, but since we used a prototyping strategy and emphasised the use of scripts for media production, storyboards could still be kept at a simple level, even when the re-use factor was low. When we in the core team had agreed on a mutual design using the sketches, it was described in the treatment, and a "standard" storyboard for the different formats of media representation and navigation was drawn directly in Dreamweaver®. (As investigated in 8.2.2). - The case setup turned out to be an excellent source for teaching note development, due to its focus on the target group, users, teaching objectives and teaching strategies. From the case setup it was thus possible to derive main issues, which should be present in the teaching note as well. As we became aware of this, we regarded the case setup almost as a first version of the teaching note. - Even though the case supplier orally approved the case setup, it turned out to be inefficient as a quality assurance document. When the case setup work was finished, a document could be written on the basis of the template. The teaching objectives and strategies were described, and the solution chosen in the treatment work was illustrated. Thus the document could show that work had been done in the areas necessary, and function as documentation of the design decisions. However, to have the document evaluated by people from outside the specific case development team (which we tried through partner level peer reviews), did not provide any value.

Technical Framework (Including Prototyping)
Objective - The purpose of the technical framework was to improve ease of navigation and allow for a consistent and professional look across the different teaching cases in a case series. The framework was quite useful for the BUSINES-LINC project, since we were developing a case series and used a prototyping technique.
Functions - The technical framework consisted (in the BUSINES-LINC) of a set of HTML-files presenting the user interface, navigational structure and font-colour scheme for the multimedia teaching cases. It also consisted of a set of requirements and guidelines to

Technical Framework (Including Prototyping)
hardware, plug-ins (shown in Table 8.5.)   - The main character of the prototyping technique was evolutionary, where the prototype was extended through loops and became the final version (see 4.2.3 and 8.2.3). When performing the prototyping it was initiated on the basis of the framework, but also very much on the basis of the case setup, considering how to programme the detailed design about the case story, content, embedded teaching strategies, interaction styles with the students etc.
Supporting and restraining factors   - Using the technical framework and deciding to programme in HTML provided a good prototyping environment. The framework gave us a structure, which could be used when the authoring process began, as well as a set of requirements everybody agreed to. The HTML approach meant easy update of code without at the same time generating spaghetti code (see 4.2.3 and 8.2.3). There was, however, some divergence on how strict to apply this framework among the partners. At the end we found the technical framework had a few overall, strict requirements, but that it otherwise was a flexible frame, that allowed individual interaction formats and user interface designs.   - The assistants from the Rockwool case, which had the possibility to work with authoring and the technical framework did not appreciate the quality of this framework. They found the HTML programming so poorly structured, that it would have been easier to just get the pictures and functionality in the form of storyboards, and re-program it on the basis of that. As with the analytical case they also thought it quite bureaucratic or rather restricting on the creativity of the individual case.

Scripts - for Media Production
Objective   - The traditional and staged interview scripts were communication tools that provided a way of describing the media to be produced to sub-contractors, actors and the employees at the case supplier.   - The content scripts served as filing cabinet for information to be used by the core development team.
Functions   - Traditional script was a precise list with a description of each element (each picture, sound sequence, animation etc.). It was especially used, when sub-contractors for media production were involved.   - In multimedia teaching cases, scripts were useful in two other areas as well: - For staged interviews, we used more "imprecise" scripts of keywords, which we gave to the employees at the case supplier, who participated in the media

production (video interviews). The keywords were generated on the basis of interviews with that same employee. The employee could thus prepare smaller brief statements of app. 1 min. duration based on a group of keywords.

- The content also served an organisational purpose, as scripts of information about the case. It contained everything from raw material, observations, or perhaps even edited digital material about the case being developed. The analytical case would then link to these scripts instead of having only the content available in an analysed format.

Supporting and restraining factors

- The traditional scripts described purpose and reference to location of each element in the system (8.2.4). This enabled production without the sub-contractor knowing every detail about the system being developed. My experience was that a precise script required a large effort to produce, but it saved quite a lot of resources. It was for example much cheaper and less time consuming to have a good sound manuscript for the actors to work with, and the sound editor to edit the sound after, than having to hire a sound studio and the actors for a second day as well. (See example in Table 8.6).

- Until the staged interview approach was used, there were two ways of obtaining recordings with employees from the case supplier.
  - To use hours on editing, trying to obtain a reasonable clip from a recorded interview. It was difficult to find the passages, without disruptions (coughing, moving too much, someone interrupting, phone ringing etc.) The result tended to be of a technical poor quality due to all the editing.
  - After conducting an interview, a precise traditional script approach was used, which the employee read aloud. The result often looked unnatural, since the employees were not actors. (see example in Table 8.7)

- A staged interview meant that the employee did not have to learn everything by heart, but still was able to formulate a precise and short statement. The staged script provided a means to receive higher technical quality and more natural statements.

- The scripts for traditional media production and for staged interviews had to be designed according to the decisions on the overall design strategy. I.e. we had drawings of "virtual" employees in the Rockwool case. We had to make sure the actor presenting these individuals did not read the scripts in a too formal tone of voice, but rather talked in an everyday language to the user, as if they were colleagues working on the same project.

- Content scripts are scripts used already in the analysis phase and are not lists for immediate use in the media production. (See example in Table 8.8) The content scripts would later on serve as input into the prototype directly as text, illustrations etc. or to other scripts, if media had to be produced about this content. The idea of content scripts surfaced as a direct result of our negative experiences with the analytical case as

Scripts - for Media Production
a written document rather than a linked template. The primary motivation for taking up this concept was to avoid, that content became to structured according to the analytical case tool, and thus avoiding the case being a replica of the analytical case.

Teaching Note

Objective

- The teaching note served as a guide for the instructor, facilitating his/hers preparation and also provided (the instructor) information about the teaching objectives and strategies. It furthermore served as a supporting development tool, as it explicated these objectives and strategies for the development team.

Functions

- Though the teaching note was developed late in the process (see Figure 10.2) teaching objectives and strategies for the specific case were contemplated early in the case setup process (the 1st. version of the teaching note).
- The teaching note had a very important function as a link between the development dimension and the use dimension, describing how the development team believed the case should be used. This can be seen from Figure 10.4, where all the roles and tools in the use dimension were linked to the teaching note.

Supporting and restraining factors

- In the situation of a case series, it was desirable to work on a shell or template of the teaching note. As with the technical framework it meant that a certain mutual standard was developed, and some of the same issues were covered in a more efficient way. In the BUSINES-LINC project, a section in the teaching note about the case series was included, describing how the cases were related in terms of subject and teaching objective. This was done, because we found it likely that if one case in a series was suitable for the subjects a specific instructor was teaching, then the others probably were as well.
- When the teaching note was written, it became easier to evaluate, whether the teaching objectives and teaching strategies described in the case setup were consistent with the case, after the detailed design had been prototyped. This became very evident, as the teaching note was revisited, when the case was applied in a use situation once or twice. The teaching note strategies and objectives can be compared with the use situation, giving feedback to alterations within the specific case, the case series and/or to the teaching note.

11. FUTURE DIMENSION

This chapter suggests new or further research areas, which the findings of this research points to (in 11.1). Then I present my considerations about the applicability of the roles and tools in different settings (11.2), i.e. I will look at the research results and how they apply to multimedia teaching case development within business education, and also briefly contemplate other areas than business education. I do not intend to lead long debates at this point (as I have already concluded on my research in the previous chapter). Rather the objective is to point to issues, which are relevant to contemplate, when using the results of this dissertation.

11.1. INFLUENCE ON RESEARCH

This dissertation presents research, which is empirical based / is deeply rooted in data. To enable the visibility of these data, I have deliberately separated the analytical, domain and method dimensions chapters, which are based on literature, from the more data oriented chapters, namely the development, use and resulting dimensions. At this point, after having presented the three last chapters based on data, I will present a bulleted list of research areas, which these data and the research results have uncovered.

- I have established a model for teaching case development, by integrating multimedia development and written teaching case development, but this model could be investigated further. I have shown how many system development phases reassemble the multimedia development phases, but that the tools and roles vary. For example it is interesting to note that the activities in the phases of case analysis, case design and media production, from the multimedia case development model are comparative to the four basic activities in interaction design, as identified by Preece, Rogers and Sharp 2002. These four activities being: (1) Identifying needs and establishing requirements. (2) Developing alternative designs. (3) Building interactive versions of the designs. (4) Evaluating designs. (Preece, Rogers and Sharp, see p. 168-170.) To further exploit the development model for multimedia teaching cases by investigating other phases or ways to integrate use and development holds interesting aspects.
- The use of scenarios has gained widespread use (Carroll 2000). The ways in which to expand its applicability by inducing elements from the movie scriptwriting field has been most interesting for me to research. But further research is needed, for example to investigate and expand the scenarios to other areas of application (than just business teaching cases), where narrative and characters play a significant role, as in the game industry, educational simulations or other forms of case-based teaching.
- During my research I worked with a framework, which supports the choice of type of storyboards depending on four variables of the system being

developed. However, there are many other variables, which are interesting to further investigate, when working with storyboards. In particular are issues dealing with the structure or organisation of the development project at hand. I.e. depending on the projects character the storyboard may be applied in different ways. I have earlier found that the storyboards level of details about interaction style, graphical elements etc. needs to be greater, when many different people are involved, to enhance communication about decisions between the development team. Another issue is the use of storyboards for documentation and cost estimation of the system being built. Another perspective relates to storyboards used in multimedia teaching case development. Further research about how to enhance the relation between the decisions about interaction style, case story etc. taken early in the case design phase and the visibility of these decisions later in the final system, could be interesting.

- The investigated roles and tools, and the internal as well as cross relations between these are the primary findings of the dissertation. However, this was novel research within the area, and many new elements were introduced. Therefore, it is certainly possible to research each one (each role and each tool) into details. This is now possible as the dissertation contain relatively valid assumptions about the whole process, which the researcher can then operate with as a contextual reference point, when investigating the details. It is also possible to contemplate other/new roles and tools.

- I have chosen not to investigate the students' long-term learning results in my research, but rather considered what the students talked about, and what I could observe from the actual ongoing teaching situations. However, interesting research could be carried out in the field of learning with (multimedia) teaching cases. E.g. contemplating what are the short and long-term learnings and what difference would it make, if the students are introduced to the case-based teaching method (which I found was seldom the situation), and if prior to each case, a short introduction to the case and the instructors purpose with the case use are given.

- Another aspect of the use situation is that the digitalisation has meant an expansion in the type of cases available. For example, I identified in the introduction three types of digital cases: (1) Multimedia teaching cases as those developed in the BUSINES-LINC project. (2) Case materials, which are large, only slightly edited, volumes of data from the company, transcripts of interviews etc. (see footnote 15 for references). (3) Case simulations, e.g. three web-simulations were published in a conference in the teaching case track (see footnote 16 for references). Research in a more detailed topography or at least validation of the one I provide, would support the development of tools, so that they are applied in a manner that best fits the type of case being developed. I.e. the different type of cases could mean that

different types of roles and tools should be applied. For example, though case simulations holds interesting aspects of teaching, the cases are not real, as they are based on students changing company decisions/variables and investigating the results. This means the simulations lie in the outskirts of case-based teaching and thus other forms of tools may be necessary – e.g. database management, simulation engineers etc.

11.2. PRACTICAL APPLICABILITY

The main objective with my research is that the result should have a practical applicable nature (in business education). In this section I will present findings, which are relevant for the application of the roles and tools investigated particularly the development dimension. These brief discussions are:

- Time Span and Product Life-Cycle
- (Other) Areas of Application
- Three Alternative Organisational Structures

Time Span and Product Life-cycle

The partners of the BUSINES-LINC project were all confident that in the future they would design better cases and in general be able to develop the cases faster. From the interviews I found that the partners' perception of what caused this improvement was due to a more efficient development process (with improved tools) compared to when we began the project. But it was also very much due to an increased awareness of how multimedia teaching cases can be designed and used.

If I had to develop a new multimedia case today (not using the technical framework developed for the e-case series, but an entirely new multimedia teaching case unrelated to the BUSINES-LINC project), I would expect it to take 3-5 months. The time span would depend on the level of quality assurance procedures, reports written, and whether the case would be a single case or part of a series. If it is a series, the time span would most likely be longer for the first case and shorter for the rest. However, one of the most critical factors, which can become a bottleneck situation, restraining the finalisation of the case, may turn out to be the approval and release of content from the case supplier. Therefore I would not expect a multimedia teaching case, which uses a relatively well-known and/or large case supplier to take less than 3 months.

The overall experiences found in BUSINES-LINC were in many ways affected by its relation to the EU. This meant that it was a project with partners from different countries, with different ways of working. We had a project programme, we had to adhere to. We had a a consortium level, which managed deadlines and product milestones. We also operated with a partner level, which was responsible for the development of three cases each. Such a constellation influenced the number of reports and quality assurance procedures present in the project, and thus also the duration of the development project.

But I do not see this as a special feature of this particular project. Within multimedia teaching case development it is not an atypical situation. I believe a common approach to multimedia teaching case development within business schools and universities, also in the future will be a situation, where a researcher/teacher has been granted funds to develop a case or case series (see for example Leenders and Erskine1989, Hagel 1996 and Hagel 1998). In such projects, where financing is by governmental or private funds some sort of report on the results of the investigation/development often have to accompany the financial statements. (I will discuss other possible development solutions in the final section of the dissertation).

According to the interviews with faculty in Leenders and Erskine 1989, written cases have a large turnover (the number of new cases a lecturer introduces in the class/course each year) and thus a short life-cycle. Different percentages are mentioned, ranging from 5-25% case turnover in a class. One person mentions that some cases will last for many years, even decades, but that approximately half of the cases will only be used for a couple of years. However, updating is seen as the way to extend case's "life" (Leenders and Erskine 1989.)

As discussed several times in the dissertation, multimedia teaching cases holds large potential for updates. Updating an existing case could even be done on an "everyday" basis (without new information being entered literally every day), if the cases are used in an online environment. Also new processes or situations are very likely to be interesting as new case versions. I.e. if the centres and departments developing the cases are interested in a long-term co-operation with the case supplier, there could be two ways of continuing the casework. Either as updates to the same case, or as new cases about the same company re-using a lot of material.

Updating or even producing new cases with the same case supplier (even if a lot of material is re-used) can be quite expensive when taking place in a multimedia environment (as opposed to a written case). If this has to be done within the same grant amount, careful financial planning about this has to be carried out, so that the project time and allocated resources are extended to the updating period. However, such long-term planning may not be possible, and another approach could be to allow the money from case-licenses sold to be used for updates, new versions or even for other cases in a case series.

(Other) Areas of Application

In the introductory chapter of the dissertation, I wrote that other areas of education using case-teaching often have: "*quite different approaches to content and teaching objectives. This means that investigated roles and tools are not likely to be similar to or directly applicable in these other areas, and so a clear distinction is necessary*" (section 2.1, business education). As the Ph.D. project evolved, and I got more acquainted with the case-method as it was used, I could see that there were differences in teaching approach and style used (see 4.1.2). But I also found that many teaching case developers used experiences found in one area and applied them in another. They did this with no seemly difficulties, for example as Herried 1997/8 does in natural sciences and Shulman 1992 in teacher education, when referring to use scenarios from law and medical schools.

It thus may seem that the pedagogic in and development process of a teaching case, though applied differently in different areas, is not very different. Though this is a statement that most certainly requires more research, the organisational structure, as it was used in the BUSINES-LINC project with a core team and an extended team, would most probably function in many other settings than business economics. The same adaptability is likely with the general ideas and formats of the tools in the development dimension, but the perspective within these tools would have to change. For example in teaching education: Here the theories and models about business innovations, which the analytical case is based on, would certainly change according to this new subject area. Also, the case setup structure, when designing case, should be adapted to contemplate the inclusion of commentaries as they are used in teacher education (briefly mentioned in 4.1.2, and investigated in Kagen 1993, Shulman 1996).

It is perhaps noteworthy to emphasise that these changes may also be necessary in a business education background, when other areas than those investigated with BUSINES-LINC are used. Certainly alterations have to take place within the analytical case, but also the continuous investigation of the use dimension is vital, even though some of my findings in the use situation carry a more generally applicable result for business education. (As for example the suggestions to use extended use scenarios to encourage more people to prepare and use longer preparation time).

Three Alternative Organisational Structures

The dissertation has investigated different outsourcing strategies, which were used by the partners. These strategies are adaptable for both business schools and companies wanting to develop multimedia-teaching cases for in-house training. I will here address three alternative structures not investigated in the dissertation: commercialisation, student projects, and educational laboratories.

By commercialisation I imply cases developed by multimedia agencies to be sold to business schools, universities and companies, just as the e-case series from BUSINES-

LINC are currently being sold through the European Case Clearing House. However, I do not believe this is currently a feasible or profitable solution. The business schools, universities or companies now developing cases for internal use, do not do so for profit, but to benefit the students and/or the employees in their education.

A lot of resources are needed, when developing multimedia teaching cases, and it would therefore be expensive to develop them within a (normal) business profit maximisation paradigm. At research departments or institutes, development of empirical based educational material is part of the researcher's research and teaching functions, and a published case (whether through sales or at conferences) is today often regarded as a research publication, which makes the production even more worth while for these people. It would probably not be possible for private multimedia agencies to get the aid of these subject matter experts and instructional designers at a cost that would enable a production at a sellable price.

Another more economically realistic solution would be to use resources, which are "close" to the researchers, who want to develop multimedia cases. Over the last years, I have discussed with several colleagues, the possibility of having students undertake projects, which transverse departments or faculties. For example: By dividing a class of graduate students in economics into smaller groups (2-4), the groups could each work on a case, contacting smaller case suppliers and performing collection and analysis of data. As their work takes form, a group from a class, who works with HCI issues, for example students in information science would then undertake the design phase. Then perhaps a third group working with programming could join the design group and so forth.

This may be a solution which is mainly suited for larger universities, where there are several types of faculties/departments (business, arts, informatics etc.), or larger urbanised areas with for example business schools, technical universities and design schools fairly close to each other. Such an initiative demands a lot of co-operation between and supervision by the instructors, but I still think the idea is fascinating and viable, and it gives both students and faculty a unique chance of cross disciplinary co-operation. The students' work would serve as basis for writing reports about their process, or the result it-self could be evaluated. (But the idea is not comparable to the extended use scenario, with reports, presentations etc., which one of the results in my research pointed to. This is a development process suggestion, which does not relate to case-teaching).

The third organisational structure suggested here is use of interactive educational laboratories, or learning centres. These are often present at business schools and universities to assist faculty in providing flexible (often on-line) educational material. Several times throughout the dissertation I have mentioned the Learning Lab at CBS, because they promote case-based teaching, and have produced what they call case material. Such centres often have the technical expertise and the instructional design perspective of higher education, which are necessary when developing cases. Therefore they could be an

affordable and qualified substitute for private outsourcing strategies, if the department or centre do not wish to perform a total in-house development project.

The strategy of using laboratories for such development tasks could be combined with a decision to increase case production by encouraging (also financially) researchers, who use case studies in their research, to transform and design the findings into a multimedia teaching case. The researcher would then co-operate with the learning lab or a case centre in the production of the case. Such a strategy promotes what the management of universities and business schools asks for: i.e. empirical research-based education.

And so with these contemplations on the applicability of my results and future research potentials, I conclude my work. For now that is, as I may very well take on some of these identified research areas. Though: *It is difficult to make predictions, particularly about the future.*[122]

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[122] The quote is often claimed to be first said by Storm P. a famous humorist and poet from Denmark, however this is not the situation. The quote appears to be even older than him and from a yet anonymous source, according to Lundskov 2002.

SUMMARY (DANISH) / DANSK SAMMENFATNING

Denne sammenfatning giver et indblik i afhandlingens indhold og struktur, samt præsenterer de primære resultater af min forskning:

- Forskningsområde, -spørgsmål og -metode
- Referenceramme - domæne viden
- Primære resultater

Forskningsområde, -spørgsmål og -metode

Afhandlingen undersøger udvikling og brug af multimedie teaching cases[123], som de anvendes i erhvervsøkonomisk uddannelser. Teaching cases illustrerer virksomheder og de problemer og muligheder, som de har på det givne tidspunkt (Barnes, Christensen and Hansen 1994, Maufette-Leenders, Erskine and Leenders 1997, Heath 1998, Manninen 1997). Det vigtigste element i casen er, at det er baseret på virkelige begivenheder, og ofte følger case beskrivelsen en beslutningstager situation (Mauffette-Leenders, Erskine, and Leenders 1997, Hazard 2000). De studerende forbereder sig (ved at bruge casen), og det bliver dernæst diskuteret i klassen. Målet med klassediskussionen er at analysere virksomhedens situation, og at nå frem til troværdige fremtidsstrategier for virksomheden (Leenders and Erskine 1989, Heath 1998, Orngreen and Bielli 2001). Teaching cases er blevet brugt på erhvervsøkonomiske uddannelser siden 1910, hvor the Harvard Business School introducerede dem, og har siden været anerkendt og brugt over hele verden (Leenders and Erskine 1989). Traditionelt set har teaching cases været skrevne beskrivelser, men denne afhandling omhandler multimedie cases.

Multimedie teaching cases er et ret nyt fænomen, og derfor er eksisterende forskning på området ret begrænset, både hvad angår brug og udvikling. Selvom jeg undersøger både et anvendelses og et udviklings perspektiv, så er brug af cases dog undersøgt med det formål at informere udvikling. I særdeleshed er resultatet af afhandlingen et sæt af roller og værktøjer, der influerer udviklingsprocessen, hvilket også kan ses af mine tre forskningsspørgsmål:

4. Hvilke roller og værktøjer karakteriserer udvikling og brug af multimedie teaching cases i erhvervsøkonomisk uddannelse?

5. Hvordan er disse roller og værktøjer anvendt i multimedie udviklingsprocessen, og hvordan understøtter eller begrænser de denne?

6. Hvordan er udviklingsroller og –værktøjer relateret til brugsroller og –værktøjer, og hvordan relateres de til en udviklingsmodel for multimedie teaching cases?

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[123] Teaching cases (på dansk: undervisningscases) er et begreb, der også i Danmark ofte omtales på engelsk. Jeg vil af og til i denne sammenfatning anvende engelske begreber, men vil første gang oftest oversætte dem. De engelske begreber benyttes, dels fordi det ofte drejer sig om ord, der kun lader sig dårligt (eller kluntet) oversætte til dansk, dels fordi det giver en bedre indgangsvinkel til læsning af og referencer til afhandlingen.

Afhandlingen sigter imod et praktisk /anvendeligt resultat, men har også det formål at informere forskningsfeltet om udvikling af multimedie teaching cases. Jeg har i mit forskningsprojekt benyttet empirisk data fra et EU projekt, kaldet BUSINES-LINC (<u>Bus</u>iness <u>I</u>nnovation <u>Net</u>works – <u>L</u>earning with <u>I</u>nteractive <u>C</u>ases). I dette projekt er 18 multimedie teaching cases udviklet i seks forskellige lande. De seks medvirkende i dette projekt var: University of Cologne (Koordinator), Copenhagen Business School [Dansk: Handelshøjskolen i København], Norwegian School of Economics and Business Administration (Bergen), Rotterdam School of Management, SDA - The Business School of Bocconi University (Milano) og Stockholm School of Economics. Hver partner var ansvarlig for at udvikle tre af de 18 cases.

Ph.d. projektet anvendte en kvalitativ, eksplorativ tilgang til forskningsfeltet. I forbindelse med BUSINES-LINC projektet brugte jeg grounded theory[124] og participatory research[125] i et aktionsforskningsprojekt (Baskerville 1999, Kemmis and McTaggart 2000, Pries-Heje and Baskerville 1999 og Susman and Evered 1978). Grounded theory gav mig et detaljeret analytisk rammeværk, med både formelle og uformelle kodningsprocedurer, såsom åben, aksial og selektiv kodning (Strauss and Corbin 1998). Som medlem af dette projekt og forsker ved Copenhagen Business School (CBS) medvirkede jeg i både BUSINES-LINC konsortium og i udviklingen af de tre danske cases. Efterhånden som min viden om feltet blev større, indså jeg, at det også var nødvendigt at undersøge brugsdimensionen og dens indflydelse på udvikling. Dette blev gjort primært ved brug af kognitive etnografiske metoder og teknikker (Ball and Ormerod 2000 og Nielsen, J., Orngreen, Siggard and Christiansen 2002).

Jeg fandt, at det var interaktion med grænsefladen, der forbandt brugs- og udviklingsdimensionerne, fordi indhold, fortællinger/narrativer og navigation påvirker grænseflade designet, og dermed interaktionsformerne. Afhandlingen er sat i en systemudviklings ramme, men anvender et Human-Computer Interaction (HCI)[126] perspektiv (Hewett et al. 1996, Orngreen 2001, Preece, Rogers and Sharp 2002 og Rogers 2001).

Referenceramme - domæne viden

En "komplet" teaching case består af både den egentlige casebeskrivelse og af en teaching note. Teaching noten er til støtte for underviseren, der bruger casen i klassen. Casebeskrivelsen er typisk 8-16 sider og kan indeholde:

- Introduktion,
- Case rollen og/eller plot,
- Generel virksomhedsinformation,
- Casefortælling eller problemområde,
- Løsningsforslag,

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[124] Teori, der er begrundet (i data).
[125] (Direkte) deltagende.forskning.
[126] Menneske-computer interaktion.

- Bilag og
- Guidende spørgsmål

Teaching cases kan også være del af en større case-serie, hvilket var tilfældet med BUSINES-LINC casene. En case-serie er en gruppe af cases, som har det samme perspektiv, dvs. de samme undervisningsmål, eller som beskæftiger sig med det samme problem. Det kunne også være forskellige perspektiver og mål, men hvor den samme casevirksomhed er brugt. (Casevirksomheden er den virksomhed, som casen omhandler.)

Casebaseret undervisning er ifølge litteraturen forankret i en konstruktivistisk og aktiv undervisningstilgang (Gallagher and Stevensen 1998, Dewey 1994, Duffy and Cunningham 1996, Williams 1992). Tankegangen er, at videnskonstruktion er baseret på den individuelle persons analyse af casens indhold sammenholdt med personens tidligere erfaringer. Den egentlige udnyttelse af casens potentiale, sker i interaktion med kollegaer i klassediskussionen (Hazard 1999 and 2000, Conway 2001a og 2001b). Det at relatere til virkelige begivenheder og diskutere casefortællingen med andre studerende, menes at simulere den nødvendige kontekst, således at den enkelte student kan kreere sit eget ræsonnement og egen selvforståelse af case situationen (Schulman 1996). Den præsenterede arbejdsgang følger med casen fra virksomheden til klasseværelset.

Der er i litteraturen divergerende holdninger til casefortællingens betydning, og nogle forskere er engageret i detaljerede diskussioner om værdien af den narrative form i teaching cases (Bearman 1997, Herreid 1997/8 og Schulman, L. 1992). I multimedie teaching cases bliver den narrative beretning en vigtig del, idet den kan tilføre historiske begivenheder og et plot, der motiverer personerne, der skal bruge casen (Herreid 1997/98).

Afhandlingen bruger denne definition: Multimedie teaching case er en præsentation af information om en virksomhed (afdeling eller industri) og dens muligheder og problemer. Informationen er præsenteret, så den understøtter videregivelse af et budskab: case fortællingen og lessons learned[127], således at den studerende formår at diskutere dette budskab med kollegaer. Budskabet er videregivet ved at integrere forskellige typer af tidsafhængige og -uafhængige medier, såsom lyd, video og animationer sammen med tekst, grafik og billeder, og ved ikke-lineær navigering, interaktion og kommunikation. Denne definition er dog kun lavet for at sætte teaching cases ind i en multimedie kontekst, og skal ikke tages for bogstaveligt.

Faserne i et udviklingsprojekt for en skreven teaching case er som følger (Leenders and Erskine 1989 og Heath 1998):

- Søgning og kontakt,
- Indsamling,
- Strukturering/skrivning,
- Forbedring og
- Frigivelse af case.

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[127] Erhvervede erfaringer.

Organiseringen af roller i af et multimedie udviklingsprojekt er noget mere komplekst end i et papirbaseret case projekt (hvor kun én eller to personer normalt deltager). Multimedie udvikling involverer en række roller: fageksperter, multimedie designere og authors, editor etc. (England and Finney 2002). Faserne i en multimedieudviklingsmodel er ikke signifikant anderledes end for andre typer af systemudviklingsmodeller, men de anvendte værktøjer er. Disse værktøjer stammer ofte fra filmmanuskript og -produktions verdenen. Modellen, der er brugt til at illustrere dette, har følgende lineære format (Carroll 2000, England and Finney 2002, Hofstetter 1997, Landay 1996, Molin 2000, Orngreen and Pries-Heje 1999 og Preece, Rogers and Sharp 2002):

- Forandring og behovsanalyse. Et eksempel på et værktøj er scenarier.
- Analyse (af design muligheder). Eksempler på værktøjer er forskellige typer af storyboards og grafiske layouts/sketches.
- Design. Eksempler på værktøjer er storyboards, scripts og simple data flow diagrammer.
- Produktion af text, lyd, video etc. Et eksempel på et værktøj er detaljerede scripts (som speaker- and filmmanuskripts).
- Authoring eller programmering. Eksempelvis ved brug af authoring-værktøjer såsom Director®, Toolbook®, HTML platform etc.
- Test. Eksempelvis intern test af systemet og ekstern test i forhold til kravspecifikation til systemet.
- De tre sidste faser er Implementation, Operation og Udfasning af programmet, som ikke er vigtig for multimedie teaching cases.

Primære resultater

De primære resultater i afhandlingen består af fire hoved resultater:

- V-modellen,
- Roller og værktøjer i brugsdimensionen,
- Roller i udviklingsdimensionen, og endeligt
- Værktøjer i udviklingsdimensionen.

Da afhandlingen fokuserer på udvikling, reflekterer resultatet af brugsdimensionen emner, der påvirker udviklingen. Vægtningen er således også lagt i beskrivelsen af roller og værktøjer i udviklingsdimensionen, der her er beskrevet i hver deres afsnit.

V-model

Multimedie teaching case udvikling er hverken sammenlignelig med det at skrive teaching cases eller med udvikling af multimedie systemer, men opstod i kombinationen imellem de to. I BUSINES-LINC blev en V-model (en model med udformning som bogstavet V) opstillet, og den udviklede sig i projektets forløb. Min endelige version af modellen har følgende layout: Modellen omfatter både et brugs- og et udviklingsperspektiv.

Udvikling af multimedie teaching cases er repræsenteret i det "første ben" af V'et. Her ligger følgende faser:

- Søgning og kontakt,
- Case Analyse,
- Case Design,
- Media Produktion,
- Authoring (programmering) og
- Frigivelse af case.

I det "andet ben" af V'et ses anvendelse af multimedie teaching cases fra et udviklingsperspektiv, hvor der Testes og Evalueres forskellige niveauer af brugssituationen:

- Individuel forberedelse,
- Gruppe forberedelse,
- Klassediskussion og
- Reporter, opgaver mv.

Der er et feedback loop mellem brug og udvikling, således at erfaringer fundet i anvendelsen af teaching casen influerede designet af casen og den måde, hvorpå værktøjerne bliver anvendt. Ligeledes, i udviklingen af en case-serie, bliver feedback loopet udvidet, således at en case i en serie påvirker designet og udviklingen af de efterfølgende cases i serien.

Roller og værktøjer i brugs dimensionen

Mine analyser viser, at det følgende sæt af roller og værktøjer har stor indflydelse på udvikling af multimedie teaching cases:

Studenternes rolle → Det er nødvendigt at tage hensyn til den heterogene karakter, som målgrupperne ofte har, når casene udvikles, herunder forskellige faglige kvalifikationer og varierende erfaring med case baseret undervisning. Formålet med BUSINES-LINC casene var at støtte de studerende til at nå et højt niveau i diskussionen (hvad end det var en gruppe eller klassediskussion eller for eksempel i opgaveskrivning). Niveauet i diskussion blev vurderet på basis af Blooms taxonomy (Bloom et al. 1956 and Kratwohl et al 1964).

Indlejrede undervisningsstrategier →Indlejrede undervisningsstrategier ses i form af forskellige design strukturer (f. eks. case information pool vs. case rollespil vs. case simulationer). Sådanne case strukturer kan afspejle undervisningsmål ved hjælp af indlejrede roller og værktøjer. For eksempel indlejrede undervisningsroller, som når personen der bruger casen, får tildelt en position som konsulent eller medarbejder. En sådan rolle medfører at man ser på materialet i casen med et bestem perspektiv (et ledelsesperspektiv eller finansielt perspektiv mv.), hvilket ofte er et af målene med casen. Indlejrede undervisningsværktøjer er enten placeret som en del af case fortællingen eller som supplerende materiale til denne. F. eks. Som i nogle af BUSINES-LINC casene, hvor en del af case historien, er at rollen som konsulenten skal skrive en forretningsplan til casevirksomheden, eller som i andre cases, hvor spørgsmål gives til personen, der bruger

casen, for at pege på vigtige områder i casen. Værktøjerne formåede i BUSINES-LINC at støtte de studerende i at analysere de emner af case indholdet, som i teaching noten var nævnt som vigtige punkter, men var ikke i stand til at højne niveauet i diskussion.

Guidet forberedelse (værktøj) → Multimedie teaching cases tager længere tid at forberede end skrevne cases generelt gør. Kun få i mine brugssituationer havde forberedt casen (ca. halvdelen af de studerende) og når multimedie casene blev anvendt i et traditionelt undervisningsforløb, var det endog med minimal indsats (lav forberedelsestid). Ved at udvide det traditionelle forløb med opgaver, som at skrive synopsis, reporter, lave mundtlige præsentationer, osv., blev de studerende guidet til at anvende en mere effektiv forberedelses form, og det øgede forberedelsestiden signifikant. Det styrkede også aktiviteten og niveauet i klassediskussionen.

Underviserens rolle → Underviserens erfaring med case baseret undervisning influerede casens succes, især når casen blev anvendt direkte som beskrevet i teaching noten med kun lidt overvejelse om casens karakter i forhold til de studerende. På den anden side er det også underviseren, som kontrollerer klassens fokus i diskussionen. Dette kunne forklare de til tider få diskussioner af emner, som ellers var nævnt i teaching noten som vigtige (men som måske ikke passede med de mål, som underviseren havde med denne specifikke time/kursus).

Teaching Note (tool) → Teaching noten og underviserens rolle er tæt forbundne. I BUSINES-LINC valgte vi at bruge forholdsvis fleksible teaching notes, som indeholdt forslag til diskussions emner, men som ikke havde en "prædefineret" agenda og lange beskrivelser af, hvordan klassediskussionen skulle foregå. Vi blev af nogle undervisere kritiseret for at have anvendt så "tynde" teaching notes.

Roller i udviklingsdimensionen

Projektgruppen bestod af et core team[128], studenter medhjælpere og et extended team[129]. Dog var den mest interessante og karakteristiske rolle i udviklingsdimensionen casevirksomheden, målt i forhold til indflydelse på casens design og på udviklingsprocessen. En person i projektgruppen kan have flere roller. I BUSINES-LINC var 2 til 4 core team medlemmer standarden, hvor studenter medhjælpere og antallet af extended team medlemmer varierede i forhold til den outsourcing strategi, der blev valgt i de enkelte tilfælde.

Projektleder - core team →Dette er en ressource, som er nødvendig igennem hele projektets livscyklus. I BUSINES-LINC var det en ledelsesrolle at kommunikerer med casevirksomheden i alle officielle anliggender, at have overblik over økonomien, at diskutere deadlines og milestene i projektet på partner niveau og på konsortium niveau, samt at igangsætte kvalitetssikringsprocedurer, især når en outsourcing strategi var brugt.

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[128] Kerne holdet (den permanente del)
[129] Udvidet hold

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Fagekspert - core team ➔ fageksperten bidrager med teoretisk og praktisk viden om case indholdet og undervisningsområdet. Eksperten medvirker især til case analysen, under anvendelse af "analytisk template" (se senere). Dog, fandt vi i BUSINES-LINC ud af at mange af eksperterne ikke havde nok erfaring med multimedie applikationer til at kunne forestille sig brug af medierne. Derfor blev multimedie designere også involveret mere i indsamling og analyse af materiale.

Multimedie designer &/ author - core team ➔ Hvor multimedie designeren fokuser på design af casen, fokuser authoren på programmering. Det tekniske rammeværk (se senere) og om projektet er en case-serie influerer multimedie designerens og authorens arbejde. I BUSINES-LINC understøttede rammeværket udførelsen af det detaljerede design, men begrænsede den kreative proces i hver enkel case.

Studenter medhjælper ➔ Studenter medhjælperne repræsenterer forholdsvis billig arbejdskraft, og er grundet deres tilhørelses forhold til målgruppen, i stand til at forstå mange af dennes behov. Medhjælperne i BUSINES-LINC deltog i case analysen og design faserne. De indhentede primært data, transskriberede interviews og organiserede materialet i forhold til den analytiske case template. Dog var de ikke altid i stand til at anvende værktøjerne (analytisk case og case setup) så fleksibelt som ønskeligt, fordi de var uerfarne med case udvikling.

Pædagogisk designer - extended team ➔ Den pædagogiske designer arbejder med budskaberne i casen. I BUSINES-LINC lå opgaven her primært indenfor det overordnede design, ved brug af case setup (se senere) og i forbindelse med udarbejdelse af teaching noten, f.eks. i forbindelse med formulering af casens lessons learned.

Roller til lyd, video, grafik etc. produktion - extended team ➔ Opgaven med at producere forskellige medie elementer til casen i deres endelige (og godkendte) form, sker oftest til slut i processen. Scripts bliver her et vigtigt kommunikationsværktøj, når der bruges underleverandører til medie produktion.

Casevirksomheden ➔ Case virksomheden deltager i flere aktiviteter igennem hele processen, og har en særlig aktiv rolle i to faser. Først, når data bliver indsamlet i virksomheden, og dernæst, når de skal godkende casens indhold og fremtoning. Jeg har identificeret tre typer af informationsrisiko i forbindelse med case virksomheden. For det første er kravet om ændringer til/af cases ofte temmelig stort i den afsluttende godkendelses- og frigivelsesfase. For det andet hænder det ofte, at kontaktpersoner (i case virksomheden) får andre opgaver eller nyt job midt i processen, hvilket betyder, at nye personer med nye ideer og krav tager over. For det tredje kan der komme et nyt perspektiv angående godkendelse og fortrolighed af informationer i forbindelse med, at materiale fra en tredje part (f.eks. et datter selskab eller en forretningsforbindelse) bliver inddraget. I BUSINES-LINC blev konsekvensen heraf bl.a., at vi lærte, at en godkendelsesfase tog meget længere tid, end hvad vi havde forventet (typisk 3 måneder).

Værktøjer i udviklingsdimensionen

Fortrolighedserklæring og Frigivelsesnote (Release note) → Begge disse værktøjer tilvejebringer en underskrevet aftale, der skal sikre et godt samarbejde mellem casevirksomheden og projektgruppen. Den underskrevne release note sender også et signal til de studerende om, at de kan stole på, at case virksomheden er involveret i forløbet, men på den anden side kan en sådan godkendelse også forårsage, at interessante detaljer bliver slettet eller redigeret i casen, før den kan frigives.

Analytisk case → Dette er et arbejdsdokument baseret på en skabelon. Værktøjet gav i BUSINES-LINC projektgruppen (både på konsortium og partner niveau) et fælles sprog, en fælles forståelse for indholdsområdet af casene. Skabelonen var planlagt til at fungere som et dokument med overskrifter, som skulle fyldes ud med indhold, efterhånden som.data blev indsamlet. Men den analytiske case som et dokument blev på denne måde et bureaukratisk og infleksibelt arbejdsredskab. Vi fandt ud af, at det fungerede bedre som en struktur af indholdsstikord, som var linket til indholdsscripts (se senere).

Case Setup → Case setup'et er et design værktøj. Et af målene med case setup'et er at designe de narrative elementer af teaching casen, case fortællingen og interaktionsstrategier, på en måde, der giver studenterne en følelse af ejerskab over de problemer/muligheder, som bliver præsenteret. Først bliver målgruppens behov og undervisningsmålene analyseret. Dernæst anvendes treatments (udvidede scenarier) til at designe den overordnede case fortælling, interaktionsform, navigering mv. Treatments fokuserer på det færdige systems (fremtidige) brug, inspireret af manuskript skrivning til film (se f.eks. Atchity and Wong 1997 and Frensham 1996). Brug af simple storyboards understøtter arbejdet med treatmenten, og åbner for mere detaljerede design beslutninger. I BUSINES-LINC blev det også tydeligt, at case setup'et også kunne fungere som den første version af teaching noten.

Teknisk rammeværk (inkluderer prototyping) → Formålet med det tekniske rammeværk er at gøre det lettere at navigere og opnå et mere konsistent og professionelt udseende på tværs af en case-serie. Rammeværket var meget brugbart i BUSINES-LINC, fordi vi udviklede en case-serie, og fordi vi anvendte en evolutionær prototyping metode (se Hix and Hartson 1993 and Preece, Rogers and Sharp 2002, og Sano 1996 for prototyper i fht. web-applikationer). Dog fandt vi, ligesom med analytisk case, at hvis rammeværket bliver anvendt for bureaukratisk, begrænser det designet af den enkelte case.

Scripts - for media produktion → Tre typer af scripts blev anvendt i BUSINES-LINC. De traditionelle scripts virker som kommunikationsværktøj, som kan beskrive de medie elementer, som underleverandører (og evt. skuespillere) skal producere. Et staged interview[130] script blev brugt, når medarbejdere fra case virksomheden skulle optages. Disse staged scripts var et middel til at opnå højere teknisk kvalitet og mere naturlige udtalelser i

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[130] Et iscenesat interview.

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interview klippene. Indholdsscripts fungerede som arkivskabe med information for core teamet, når de arbejdede med den analytisk case som et linket dokument.

Teaching noten → Teaching noten er en guide for underviseren, og den skal støtte ham/hende i at forberede casen. I de undervisningssituationer jeg fulgte, var det nogle underviseres mening, at vores relativ fleksible teaching noter fejlede på dette område (som allerede nævnt). Men teaching noten fungerer også som et værktøj i udviklingen, da det eksplicerer undervisningsmål og brugsstrategier. Det virker som en bro mellem udviklings og brugsdimensionen.

REFERENCES

Alrø, H. and Kristiansen, M. (1997): "Mediet er ikke budskabet - video i observation af interpersonel kommunikation" (Eng: The media is not the message - video in observation of interpersonal communication) in Alrø, H. and Dirckinck-Holmfeld, L. (editors.): *Videoobservation,* Aalborg Universitetsforlag, Aalborg, Denmark.

Argyris, C. (1980): "Some Limitations of the Case Method: Experiences in a Management Development Program", in *Academy of Management review,* 1980, Vol. 5, no. 2, pp. 291-298.

Argyris, C.; Putman, R. and Smith, D. (1985): *Action Science – Concepts, Methods, and skills for research and intervention.,* The Jossey-Bass Social and Behavioral Science Series, Jossey-Bass Inc.

Atchity, K. and Wong, C. (1997): *Writing treatments that sell,* 1ˢᵗ edition, Henry Holt, USA.

Avison, D.E. and Wood-Harper, A.T. (1990): *Mutiview - An Exploration in Information Systems Development,* Information systems series, Blackwell Scientific Publications, Oxford, United Kingdom

Backer, D. (1994): "Multimedia Presentation and Authoring", in Buford, J.K: *Multimedia Systems,* Addison Wesley, Publishing Company, ACM Press, SIGGRAPH series, New York, New York, USA, pp. 285-303

Baker, E. (2000): "Case-Based Learning Theory: Implications for Software Design", in *Journal of Technology and Teacher Education,* 2000, 8(2), pp.85-95

Ball, L.J. and Ormerod, T.C. (2000). "Putting ethnography to work: The case for a cognitive ethnography of design" in the *International Journal of Human-Computer Studies,* 53 (1), 147-168.

Barnes, L; Christensen, R. and Hansen, A. (1994): *Teaching and the Case Method - text, cases, and readings,* third edition, Harvard Business School Press, Boston, Massachusetts, USA

Barrett, H. (2000): "Create Your Own Electronic Portfolio - Using Off-the-Shelf Software to Showcase Your Own or Student Work", *Learning & Leading with Technology,* Volume 27, 7, 2000, available through http://www.iste.org/L&L/archive/vol27/no7/features/barrett/multdev.html.

Baskerville, R. (1992): *Distinguishing Action Research From Participative Case Studies,* DASY working papers, no 4/92, from Institute of Computer and Systems Sciences, Copenhagen Business School, Denmark, pp. 1-19,

Baskerville, R. (1999): "Investigating Information Systems with Action Research", in *Communications of AIS (Association for Information Systems),* vol. 2, article 19, p. 2-31

Baskerville, R. and Pries-Heje, J. (1999): "Grounded action research: a method for understanding IT in practice", *Accounting Management and Information Technologies,* Vol. 9, 1999, pp.1-23

Bearman, M. (1997): "Narratives and Cases: Implications for Computer-based Education", in the *ASCILITE 97 conference proceedings*, Australian Society for Computers in Learning in Tertiary Education, available in the 9th Online issue of the ASCILITE proceedings at http://www.curtin.edu.au/conference/ASCILITE97/papers-index.html, December 7th-10 th 1997, Perth, Western Australia, Australia, 6 pages

Beckhard, R. and Pritchard, W. (1992): *Changing the Essence - The Art of Creating and Leading Fundamental Change in Organizations,* Jossey-Bass Management series, a Wiley company, USA

Benesh, R. and Benesh, J. (1977): *Reading Dance – The Birth of Choreology*, Condor Book, Souvenir Press (E&A) Ltd.

Bergman, R. and Moore, T. (1990): *Managing interactive Video/Mulitmedia Projects*, Educational Technology Publications.

Bielli, P. and Basaglia S. (2000): "Multimedia case studies: development and use in management education", in *Proceedings of the 8th ECIS conference*, European Conference on Information Systems, in Vienna, Austria, 3-5 July 2000.

Blomberg, J., Giacomi, J, Mosher, A. and Swenton-Wall, P (1993): "Ethnographic Field Methods and Their Relation to Design," in Schuler, D. and Namioka, A. (editor): *Participatory Design: Principles and Practices*,. Lawrence Erlbaum Associates, New Jersey, USA, pp. 123-155

Bloom; B. S. (editor) et al (1956): *Taxonomy of Educational Objectives – The Classification of Educaitonal Goals.* Hanbook I, Cognitive Domain, Longman, New York, USA

Boehm, B. W. (1988): *A Spiral model of software development and enhancement*, IEEE Computer, volume 21 (5), page 61-72

Bordwell D. and Thompsen K. (1997): *Film Art, an Introduction,* McGraw-Hill, 5. edition,

Broll, W. and Prinz, W (1999): "Using 3D to Support Awareness in Virtual Teams on the Web", from the *WebNet 1999 conference proceedings* (WebNet World Conference on the WWW and Internet), Honolulu, Hawaii, October 24-30, 1999, pp. 137-142

Bruner, R. (1999): "Note to the Student: How to Study and Discuss Cases", originally published in *Case Studies in Corporate Finance* 3e, McGraw-Hill/Irwin, 1999, here found on Bruners own homepage on: http://faculty.darden.edu/brunerb/resources_studentnote.htm, pp 1-5.

Budde, R., Kautz, K., Kuhlenkamp, K., and Zullighoven, H (1992): "*What is Prototyping?"* Information Technology & People, volume 6: 2-3, pp. 89-95.

Burgoyne, J. and Mumford, A. (2001): *Learning from the case method*, a report to the European Case Clearing House, Department of Management Learning, Lancaster University Management School, UK, 2001, 99 pages

Bødker, S. and Christiansen, E. (1994): *Scenarios as springboards in design of CSCW*, a working paper from the University of Aarhus, the Department of Computer Science publications, PB-488, December 1994, pp. 1-16

Bødker, S. and Grønbæk, K. (1991): "Design in Action - from prototyping by demonstration to co-operative prototyping", in Greenbaum, J. and Kyng, M. (editors): *Design at work - cooperative design of computer systems*, Lawrence Erlbaum associates publishers, New Jersey, USA., pp. 197-218

Bødker. S. (1996): "Applying Activity Theory to Video Analysis: How to make sense of Video Data in Human Computer", in Nardi, B (editor): *Context and Consciousness*: Activity Theory and Human Computer Interaction, MIT press, Harvard Massachusetts, USA., pp. 147-175

Carroll, J. (editor) (1995): *Scenario based design – envisioning work and technology in system development*, John Wiley & Sons, Inc., New York, New York, USA:

Carroll, J. (editor) (2000): *Making Use – scenario-based design of human-computer interactions,* The MIT Press, Massachusetts, USA

CBS - Pedagogical Service Unit (1998a):*En særegen HHK-pædagogik, Oplæg til diskussion, 23/03/98* (in English: *A distinct CBS pedagogic – a discussion paper 23/03/98*), white paper in Danish from the pedagogical service unit at the Copenhagen Business School p. 1-13.

CBS - Pedagogical Service Unit (1998b): *Principper for en HHK_pædagogik - Vedtaget af Det erhvervsøkonomiske Fakultetsråd den 24. juni 1998* (in English: Principles for a CBS-pedagogic –accepted by the Faculty of Economics on the 24th of June 1998), available online at http://www.ll.cbs.dk, directly as pdf. file on http://www.ll.cbs.dk/pdf_filer/HHK_Principper.PDF, p.1-3

Charmaz, K. 2000: "Grounded Theory Objectivist and Constructivist Methods", in Denzin, Norman and Lincoln, Yvonna (editors), *Handbook of Qualitative Research*, second edition, Sage publications, Thousand Oaks, California.

Cheek, J. 2000: "An Untold Story - Doing Funded Qualitative Research", in Denzin, Norman and Lincoln, Yvonna (editors), *Handbook of Qualitative Research*, second edition, Sage publications, Thousand Oaks, California.

Chen, C. and Forsyth, M. (1999) "Spatial-Semantic Virtual Worlds: The structural Duality and Beyond", from the *WebNet 1999 conference proceedings* (WebNet World Conference on the WWW and Internet), Honolulu, Hawaii, October 24-30, 1999, pp. 207-212

Chin, G., Rosson, M.. and Carrol, J.M. (1997): *Participatory Analysis, Shared Development of Requirements from Scenarios*, in proceedings from CHI 97 Human Factors in Computing Systems, p. 162-169

Chua, T. (1991): "Issues in Hypermedia Research", in *Multimedia technology and applications*,, Waterworth, J. (editor), Ellis Horwood limited, Cornwall, Great Britain, chapter 2, pp. 33-59

Cockburn, A. (2001): *Crystal "Clear": A human-powered software development methodology for small teams*, Draft on-line version of book year to be published, available http://members.aol.com/humansandt/crystal/clear/ or through Cockburn homepage at: http://members.aol.com/acockburn/. Humans and Technology copyright 1998-2001, Chapter 1 and app. A, which is referred to in this dissertation were last edited in December 2001.

COLIS (2002): *COLIS Case Searching by Internet*, The European Case Clearing House database, with relatively advanced search possibilities, available through http://www.ecch.cranfield.ac.uk/.

Conallen, J. (2000): *Building Web Applications with UML*, Addison-Wesley Longman, Inc., reading, Massachusetts, USA

Conway, P (2001a): "Using cases and activity learning with undergraduate economics classes", in *ECCHO, The Newsletter of the European Case Clearing House*, the European Case Clearing House, Cranfield University, Bedford, UK, Spring 2001, pp. 18-19

Conway, P (2001b): "The use of Case Studies as vehicles for activity learning", in *ECCHO, The Newsletter of the European Case Clearing House*, the European Case Clearing House, Cranfield University, Bedford, UK, Autumn/Fall 2001, pp. 18-20

Cooper, A. (1999):The inmates are running the asylum – why high-tech products drive us crazy and how to restore the sanity, SAMS, a division of Macmillan Computer Publishing, Indianapolis, Indiana, USA

Copenhagen Airport (1997): *Case material about the Copenhagen Airport A/S*, extended multimedia case material developed by the Learning Lab at the Copenhagen Business School, and distributed by this lab as well, see http://www.ll.cbs.dk

Dewey, J. (1994) "Teaching in Education", first appeared in *Democracy and Education* from ©1916 Macmillan publishing, 1944 John Devey, here in by Barnes, L.; Christensen, C.R. and Hansen, A. (editors): *Teaching and the Case Method*, 3. Edition, Harvard Business School Press, Boston, Massachusetts, pp. 9-14.

Dirckinck-Holmfeld, L.; Nielsen, Janni and Danielsen, O. (2000): "Dialogue design -with mutual learning as a guiding principle" in the *6th bianial Participatory Design Conference (PDC),* New York, USA, November 28th to December 1st, 2000, pp.1-6

Dobsen, W.D. and Riesbeck, C.K. (1998): *Tools for incremental Development of Educational Software Interfaces*, in proceedings from CHI 98 Human Factors in Computing Systems, p. 384-391

Donaldsen, J. and Cowderoy, A. (1997): "Towards Multimedia system quality", in Van Veenendaal, E. and McMullan, J. (editors): *Achieving Software Product Quality*, UTN-Publishers, pp 189-205.

Duffy, T.M and Cunningham, D.J. (1996): "Constructivism: Implications for the Design and Delivery of Instruction", chapter 7 in *Handbook of Research for Educational Communications and Technology*, by Jonassen, D.H. (editor), Macmillan Library Reference, NY, USA, pp. 170-198

Easton, G: and Ormerod, T.C. (2001): *Expert/Novices differences in Case Analysis,* a report to the European Case Clearing House by G. Easton from Department of Marketing & T.C. Ormerod Department of Psychology, Lancaster University, UK, February 2001, 81 pages.

ECCHO (2001): "Incorporating the use of the Internet to enhance case learning" in feature article *ECCHO*, Journal from the European Case Clearing House, issue 27, Autumn/Fall 2001, pp. 6-7

England, E. and Finney, A. (1996): *Managing Multimedia*, 1st edition, Addison-Wesley, Pearson Education, Essex, England

England, E. and Finney, A. (2002): *Managing Multimedia – Project management for web and convergent media*, Book 1 and Book 2, third edition, Addison-Wesley, Pearson Education, Essex, England

Erskine, J.; Leenders, M. and Maufette-Leenders, L. (1998): *Teaching with cases*, Richard Ivey School of Business, the University of Western Ontario, Canada.

Ertmer, P. and Dillon, D. (1998): " 'Shooting in the dark' versus 'Breaking it down': Understanding students' approach to case-based instruction", in *Qualitative Studies in Education,* 1998, Vol. ll, No. 4, pp. 605-622

Faulkner, C. (1998): *The essence of Human-Computer Interaction*, Prentice Hall.

Filmakers (2002): *Writing treatments that sell*, the available on-line at the http://www.filmmakers.com/ or directly at: http://www.filmmakers.com/features/screenwriting/treatment.htm, pp. 4.

FOLDOC (2001): on http://www.foldoc.org, The Free On-line Dictionary of Computing, Editor Denis Howe

Forsberg, K and Mooz, H. (1997): "System Engineering Overview" in Thayer, R. H and Dorfman, M. (editors), *Software Requirements Engineering*, Second Edition, IEEE Computer Society Press, Los Alamitos, California, USA, pp.: 44-72

Frensham, R. (1996): *Screenwriting*, Hodder & Stoughton Educational, a divisions of Hodder Headline Ltd., London, UK.

Gallagher J. and Stevensen V. (1998): "Four cases and a simulation", *ECCHO*, Journal from the European Case Clearing House, issue 19, Autumn/Fall 1998, pp. 20-22

Garner, S. (1997): "Cost Effective Multimedia Production for Frequently Updated Courseware" in *ASCILITE 97 conference proceedings*, Australian Society for Computers in Learning in Tertiary Education, available in the 9th Online issue of the ASCILITE proceedings at http://www.curtin.edu.au/conference/ASCILITE97/papers-index.html, December 7th-10 th 1997, Perth, Western Australia, Australia, 5 pages.

Glaser, B. and Strauss, A. (1967): *Discovery of grounded Theory*, Aldine publishing, Chicago, USA.

Goldman-Segall, R. (1994). "Challenges facing researchers using multimedia Data: Tools for Layering Significance." *Computer Graphics Quarterly* 28(1), pp. 48-52.

Gomaa, H. (1997): "The impact of Prototyping on Software System Engineering", in Thayer, R. H and Dorfman, M. (editors), *Software Requirements Engineering*, Second Edition, IEEE Computer Society Press, Los Alamitos, California, USA, pp.: 479-488

Gordon, V.S. and Bieman, J. (1995): "*RAPID Prototyping Lessons learned*", paper in the magazine: IEEE Software, Jan. 1995.

Greenbaum, J. and Kyng, M. (editors) (1991): *Design at work - cooperative design of computer systems*, Lawrence Erlbaum associates publishers, New Jersey, USA.

Hagel P. and Mahoney, D., (1998) "Evolving a Case Study Model for On Line Delivery", in the proceeding of the *WACRA 1998 Conference*, World Association for Case Method Research & Application, Marseilles, July 9-13, 1998, 6 pages.

Hagel, P. et al (1996): "Value Adding: Adapting a Paper-Based teaching Case for the WWW Environment", in the *ASCILITE 96 conference proceedings*, Australian Society for Computers in Learning in Tertiary Education, Adelaide, South Australia, Australia, 2nd - 4th December 1996, p. 259-274

Hall, Wendy (1994): "Ending the tyranny of the button", in *IEEE multimedia*, Spring 1994., Vol 1(1), s.60-68

Harper, B.; Squires. D. and McDougall, A. (2000): "Constructivist Simulations in the Multimedia Age, *Journal of Educational Multimedia and Hypermedia*, Association for the advancement of computing in education, vol. 9(2), pp. 115-130

Harper, B.and Hedberg, J. (1997) "Creating Motivating Interactive Learning Environments: a Constructivist View" in *ASCILITE 97 conference proceedings*, Australian Society for Computers in Learning in Tertiary Education, pp 11-31

Hart J. (1999): *The Art of the Storyboard - Storyboard for Film*, TV and Animation, Focal Press

Hazard, H. (1999) "An 'action learning' teacher reflects on case teaching" carried beyond case teaching", article in *ECCHO, The Newsletter of the European Case Clearing House*, the European Case Clearing House, Cranfield University, Bedford, UK, Autumn/fall 1999, pp. 5-7

Hazard, H. (2000) "Action learning carried beyond case teaching", article in *ECCHO, The Newsletter of the European Case Clearing House*, the European Case Clearing House, Cranfield University, Bedford, UK, spring 2000, pp. 5-6

HBSP (2002): *The Harvard Business School Publishing on-line store*, contains among others a database of Harvard teaching cases, available through http://www.hbsp.harvard.edu, see for example http://www.hbsp.harvard.edu/products/cases

Heath, J. (1998): *Teaching and writing Case Studies - a practical guide*, The European Case Clearing House, Cranfield University, Bedford, UK.

Heiberg, B. (2002a) *Lær med Cases - Checkliste til individuel forberedelse,* (Eng: *Learn with cases - checklist for individual preparation)*, available from the CBS Learning Lab http://ll.cbs.dk/studtips_casemetode.asp, or directly at http://ll.cbs.dk/pdf_filer/CaseCheckliste1.PDF, pp 1-8

Heiberg, B. (2002b) *Lær med Cases - Checkliste til gruppe forberedelse,* (Eng: *Learn with cases - checklist for group preparation)*, available from the CBS Learning Lab http://ll.cbs.dk/studtips_casemetode.asp, or directly at http://ll.cbs.dk/pdf_filer/CaseCheckliste2.PDF, pp 1-4

Hemsley, James (1997): "*Multimedia system quality, problems and opportunities.*", paper in: Van Veenendaal, Erik and McMullan, Julie (editors) [1997]: "*Achieving Software Product Quality*", UTN- Publisher.

Herreid, C.F. (1997/8): "What Makes a Good Case? - Some Basic Rules of Good Storytelling Help Teachers Generate Student Excitement in the Classroom" in the *Journal of College Science Teaching*, Dec.1997/Jan. 1998, pp.163-165.

Hewett et al (1996): *ACM SIGCHI Curricula for Human-Computer Interaction*, published on the ACM SIGCHI website at http://www1.acm.org/sigs/sigchi/cdg2.html.

Hix, D. and Hartson, R. (1993): *Developing User Interfaces - Ensuring Usability Through Product & Process*, Wiley & Sons, Inc., New York, New York, USA.

Hofstetter, Fred (1997): *Multimedia Literacy*, second edition, The McGraw-Hill Companies, Inc.

Huff, S. L., Jelassi, T, Cash, J. and Pifko, J. (1995). *Teaching Information Systems Management with Cases*, available at http://ashley.ivey.uwo.ca/~isworld/article.html, pp. 1-6

Hughes, G.; Hall, W.; Hey, T. and Carr L. (1999): "Academic Information Management: an Open Linking Approach", from the *WebNet 1999 conference proceedings* (WebNet World Conference on the WWW and Internet), Honolulu, Hawaii, October 24-30, 1999, pp. 526-531

IDEA (2002): *The Idea Group Publishing case database,* cases on Information Technology (primarily on management of information systems), available at http://www.idea-group.com/cases/

Impart (2000): *An Introduction to Multimedia Pathways*, from the impart corporation of education and information technologies organisations in Australia, paper downloaded in 2000, available from http://www.impart.com.au/or specifically from http://www.impart.com.au/documents/Mini_pathways.pdf, pp. 1-27.

Ip, A. (2001): "Using, Moderating and Creating Web-based Role Play Simulations in Educational and Organisational Environments", workingpaper/material to the workshop of the same name on the *WebNet 2001 conference* (World Conference on the WWW and Internet), October 23-27, 2001, Orlando, Florida, USA, 66 pages.

Isakowitz, T; Kamis; A. and Koufaris, M. (1998): *The Extended RMM Methodology for Web Publishing*, Working Paper IS-98-18, Center for Research on Information Systems, 1998, available from http://rmm-java.stern.nyu.edu/rmm/, pp. 1-51

IVEY (2002): *Ivey Publishing,* The Richard Ivey School of Business teaching case database, available through http://www.ivey.uwo.ca, see for example http://www.ivey.uwo.ca/cases.

Joyce, P. (1999): "Teaching Electronic Commerce: The Deakin Electronic Trading Community", from the *BLED conference proceedings*, 12th International Bled Electronic Commerce Conference, Bled, Slovinia, June 7-9, 1999, pp. 481-496

Kagan, D. (1993): "Context for the Use of Classroom Cases", in *American Educational Research Journal*, winter 1993, Vol. 30, No. 4, pp. 703-723.

Karagiannidis C. and Tarabanis K. (1999): "Enhancing ´Traditional´ Classes with Advanced Web-Based Courses", from the *WebNet 1999 conference proceedings* (WebNet World Conference on the WWW and Internet), Honolulu, Hawaii, October 24-30, 1999, pp. 610-613

Kemmis, S. and McTaggart, R. (2000): "Participatory Action Research" in Denzin, Norman and Lincoln, Yvonna (editors), *Handbook of Qualitative Research*, second edition, Sage publications, Thousand Oaks, California, pp 567-606.

Klassen, J.; Stone, D. and Vogel, D. (1999): "Design Issues for Development of Interactive Multimedia: Electronic Commerce & Business Simulation Application" from the *BLED conference proceedings*, 12th International Bled Electronic Commerce Conference, Bled, Slovinia, June 7-9, 1999, pp. 513-528

Koppl, R. (1998): "Lachmann on the Subjectivism of Active Minds", in Koppl & Mongiovi (editors): *Subjectivism and Economic Analysis: Essays in Memory of Ludwig Lachmann*, Londons & New York, Routledge, USA.

Kratwohl, D. R. et al (1964): Taxonomy of Educational Objectives – The Classification of Educaitonal Goals. Hanbook II, Affective Domain, David Mckay Company, Inc., New York, USA.

KSGcase (2002): *The John F. Kennedy School of Government*, website for their caseprogram, available at http://www.ksgcase.harvard.edu/

LabanLab (2002): *LabanLab - Interactive Labanotation Tutorials,* an extensive website including theory, tutorials, and video of dancers using the examples. See http://www.dance.ohio-state.edu/labanlab/, Created at the Ohio State University Department of Dance with grants from the Dance Preservation Fund

Landay, J. (1996): *Interactive Sketching for the Early Stages of User Interface Design*, Ph.D. Thesis, School of Computer Science, Computer Science Division, Carnegie Mellon University, Pittsburgh, PA December 19, 1996, CMU-CS-96-201 Also appears as CMU-HCII-96-105.

Laurel, B. and Oren, T. and Don, A. (1992): "Issues in multimedia interface design", in *Multimedia Interface Design,* Blattner, Meera & Dannenberg, Roger (Editors), ACM Press, Addison-Wesley Publishing Company, New York, New York, USA, Chapter 3, pp. 53-64

Laurillard, D. (1993): *Rethinking university teaching - A framework for the effective use of educational technology*, (reprinted in 1996), Routledge, London, UK.

Leavitt, H.J. (1965): *Applied Organisational Change in Industry in March: Handbook of Organisations*, J.G. March, Rand McNally, Chicago, USA.

Lee, V. S. (1999): "Creating a Blueprint for the Constructivist Classroom", *The National Teaching* and Learning Forum - NTLF, May 1999, Vol 8 No. 4, pp 1-6

Leenders, M.R. and Erskine, J.A. (1989): *Case research: the case writing process*, 3rd edition, Richard Ivey School of Business, the University of Western Ontario, Canada.

Levinsen, K. (2002): *The interaction designers' perspective on Interaction - Towards a reunion of theory and practice,* The Human Computer Interaction group, Department of Informatics working paper-series, April 2002, no. 5

Lexico LLC (2001): on http://www.dictionary.com, by Leciso LLC.

Lundskov (2002): *Hvad Storm P ikke sagde* (Eng. *What Storm P. did not say*), a list of citations and non-citations are found on http://www.lundskov.dk and this particular quote on http://www.lundskov.dk/side/citat/citat_stormp2.htm

Machlup, F. (1975): "Marginal Analysis and Empirical Research", reprint from "American *Economic Review*, 1946 in Machlup (1975), *Essays in Economic Semantics*, New York: New York University Press.

Macis consortium (1999): *Macis Case Study Collection 1 and 2*, enriched digital cases, the consortium consisted of the following partners: Athens laboratory of business administration, Copenhagen business school, Erasmus universiteit Rotterdam, ESADE, INSEAD, London Business School, University of Cologne.

Manninen, A. (1997): "ECCH Workshop Contributes to Finnish Case Project" *ECCHO*, Journal from the European Case Clearing House, issue 16, summer 1998, pp. 6-7

Mauffette-Leenders, LA; Erskine, J.A. and Leenders, M.R. (1997): *Learning with cases,* Richard Ivey School of Business, the University of Western Ontario, Canada.

MediaNet (1997): *Final report – Part 1,* MediaNet was a project within the framework of ESSI, ESSI Project No 21360, pp. 1-30.

Merriam-Webster (2001): on http://www.m-w.com, by Merriam-Webster, Incorporated.

Merseth, K. and Lacey, C. (1993): "Weaving stronger fabric: the pedagogical promise of hypermedia and case methods in teacher education", *Journal of Teacher and Teacher Education*, vol. 9., no. 3, pp 283-299.

Microtonic (1996/8): *Case material about Microtonic A/S*, extended multimedia case material developed by the Learning Lab at the Copenhagen Business School in 1996 and updated in 1998, distributed by this lab as well, see http://www.ll.cbs.dk

Miles, M. and Huberman, M. (1994): *Qualitative Data Analysis,* Second edition, Sage Publications, Thousand Oaks, California, USA.

Molin, L. (2000): "Vad kan systemutvecklare och multimediautvecklare lära av varandra – planera eller parera!" (Eng: What can system developers and multimedia developers learn from each other - plan or parry"), paper in Nilsson, A.G. and Pettersson, J.S. (editors): *Om metoder för systemutveckling i professionella organisationer*, Studentlitteratur, Lund, Sverige

Morton, S. (1991): *The Corporation of the 1990s*, Oxford University Press, University of Oxford.

Maaloe, E. (1996): *Case-Studieer af og om Mennesker i Organisationer*, (Eng: Case Studies by and about people in Organisations), Akademisk Forlag, Denmark, 1996.

Nardi, B (editor) (1996): *Context and Consciousness*: Activity Theory and Human Computer Interaction, MIT press, Harvard Massachusetts, USA.

Neo, M. and Neo, K. (2001): "Innovative teaching: Using multimedia in a problem-based learning environment", in *Educational Technology & Society,* 4(4) 2001, *ISSN 1436-4522,* pp. 19-31

Newman, William and Lamming, Michael (1995): "*Interactive system design*", Addison-Wesley Publishing Company.

Nielsen, J. (1990): *Hypertext and Hypermedia*, Academic Press, Inc., San Diego, California, USA.

Nielsen, J. (1995): *Multimedia & Hypertext*, AP Professional, Inc.

Nielsen, J. (2000): *Designing Web Usability,* New Riders Publishing, Indianapolis, Indiana, USA.

Nielsen, Janni; Christiansen, E. and Blincoe, K. (1997): *CLIVE* (Creative Learning In Virtual Environments) Research proposal to the interdisciplinary research program on multimedia, The Research Councils, Copenhagen, Working Paper, CBS, p. 1-14

Nielsen, Janni; Orngreen, R.; Siggaard, S. and Christiansen, E. (2002): "Learning happens - rethinking video analysis", in Dirckinck-Holmfeld, L. and Fibiger, B.: *Learning in Virtual Environments*, samfundslitteratur, Frederiksbeg, Denmark, p. 310-339.

Nielsen, L. (2002): *From user to character - an investigation into user-descriptions in scenarios*, The Human Computer Interaction group, Department of Informatics working paper-series, Januar 2002, no. 1

Orngreen, R. & Bielli, P. (2001): "Learning with Multimedia cases in the Information Systems Area", in the *IRMA 2001 conference proceedings* (Information Resources Management Association), May 20-23 2001, 10 pages, Toronto, Ontario, Canada

Orngreen, R. (1998): *Struktureret og kontrolleret Multimediedesign - en empirisk afprovning af en metode til design af multimedieapplikationer* (eng: Structured and Controlled Multimedia Design - an empirical evaluation of a method for design of multimedia applications), thesis for the master degree, 01-07-1998. [Unpublished but can be borrowed from the CBS library]

Orngreen, R. (2001) "Framing the Interface - Determining the Level of the Interface", from the *WebNet 2001 conference proceedings* (World Conference on the WWW and Internet), Orlando, Florida, USA, October 23-27, 2001, pp. 957-958.

Orngreen, R. and Pries-Heje, J. (1999): "Designing the Design - Need-based Storyboard Adaptation for Multimedia Systems Design" In the *IRIS-proceedings of the 22nd IRIS conference* (Information systems Research seminar In Scandinavia), 7-10 August 1999, vol. 3, pp. 39-56, Finland, 1999

Parker, C. and Swatman, P. (1999): "Web-TRECS: The Design and Use of an E-commerce Business Solution" from the *BLED conference proceedings*, 12th International Bled Electronic Commerce Conference, Bled, Slovinia, June 7-9, 1999, pp.497-512

Parker, J et. al (1996): "Collaboration using Internet for the Development of Case-based Teaching Files: Report of the Computer and Instrumentation Council Internet

Focus Group" in *Journal of Nuclear Medicine,* the Society of Nuclear Medicine, vol. *37,* pp. 178-184.

Pilgrim, C. and Leung, Y. (1999): "Site Maps - Where are we now?", from the *WebNet 1999 conference proceedings* (WebNet World Conference on the WWW and Internet), Honolulu, Hawaii, October 24-30, 1999, pp. 883-888

Preece, J. et al (1994): *Human-Computer Interaction*, Addison-Wesley Publishing Company

Preece, J.; Rogers, Y. and Sharp, H. (2002): *Interaction Design – beyond human computer interaction*, John Wiley & Sons, Inc., New York, New York, USA

Rogers, Y. (2001): *Knowledge transfer in a rapidly changing field: what can new theoretical approaches offer HCI?*, yet unpublished working-paper (Submitted to TOCHI), now available at http://www.cogs.susx.ac.uk/users/yvonner, pp. 1-31.

Rogers, Y. and Scaife, M. (1998): "How can interactive multimedia facilitate learning?" In Lee, J. (editor): *Intelligence and Multimodality in Multimedia Interfaces: Research and Applications*. AAAI. Press: Menlo Park, California, USA, availeble in an interactive schockwave version at http://www.cogs.susx.ac.uk/users/yvonner/ecoihome/IMMI.html, pp. 1-15.

Rosson, M.B. and Carroll, J. (1995): "Narrowing the Specification-Implementation Gap in Scenario-Based Design", in Carroll, J. (editor) *Scenario based design – envisioning work and technology in system development*, John Wiley & Sons, Inc., New York, New York, USA:

Saito, R.; Rathbun, G and Goodrum, D (1995): "Creating the enriched Case: Using Aestetics as an Alternative Approach to Designing a Multimedia Case", in *CSCL95* conference proceedings, Computer Supported Co-operative Learning, October, 1999, Bloomington, Indiana University, Indiana, USA, available http://www-csc195.indiana.edu/csc195/saito.html

Sano, D. (1996): *Designing large-scale web-sites - a visual design methodology*, John Wiley & Sons, Inc. New york, New York, USA.

Schank, R. and Cleary, C. (1994): *Engines for education,* an online hypertext book from The Institute for the Learning Sciences, available at http://www.ils.nwu.edu/e-for-e/

Schuler, D. and Namioka, A. (1993): *Participatory design- principles and practices*, Lawrence Erlbaum Associates, Hillsdale, New York, New York, USA.

Shulman, L. (1992): "Toward a Pedagogy of Cases" in *Case Method in teaching Education*, J.H. Shulman (editor), New York: Teachers College Press, pp. 1-30

Shulman, L. (1996): "Just in case: Reflections on Learning from experience", in Colbert, J.A., Desberg, P. and Trumble, K. (editors): *The case for education: Contemporary Approaches for Using Case Methods*, Allyn and Bacon, Boston, Massachusetts, USA, pp. 197-217

Smith J., Egert C. Cudduhy E. and Walters D. (1999): "Implementing Virtual Robots in Java3D using a Behavior Based Architecture", from the *WebNet 1999 conference proceedings* (WebNet World Conference on the WWW and Internet), Honolulu, Hawaii, October 24-30, 1999, pp. 975-980

Sommerville, I. (1992): *Software Engineering*, Fourth edition, Addison Wesley Publishing Company, USA

Staylor, J. (1994): *Scriptwriting for the Eyes and Ears*, paper available at http://www.staylor-made.com/scripteyes.htm, pp. 1-3

Staylor, J. (2001): *Basic Principles of Multimedia Design & Development,* available at http://www.staylor-made.com/basicmultimedia.htm (written in 1999, but with an addendum from 2001), pp. 1-5

Strauss; A and Corbin, J.(1998): *Basics of Qualitative Research, Techniques and Procedures for Developing Grounded Theory*, 2nd edition, SAGE Publications, Thousands Oaks, California, USA.

Subrirana, B. and Zuidhof, M. (1996): *Readers Inn-teractive - virtual distribution on the internet and the transformation of the publishing industry,* enriched case in a web environment, IESE International Graduate School of Mangement.

Suchman, L. and Trigg, R. (1991): "Understanding Practice: Video as a Medium for Reflection and Design", in Greenbaum, J. and Kyng, M. (editors): *Design at Work: Cooperative design of Computer Systems*, Hillsdale, New Jersey: Lawrence Erlbaum Associates, USA, pp. 65-89.

Susman, G. and Evered, R. (1978): "An Assessment of the Scientific Merits of Action Research", in *Administrative Science Quarterly*, Vo. 23, no. 4, dec 1978, p. 582-603

Szpiro, D. and Neufeld, D.J. (1996): *Learning Information Systems with Cases*, available through the ISWorld Network Teaching and Learning Pages at http://www.ISWorld.org, pp. 1-9.

Teaching Human Rights On-Line (2002): A website of interactive teaching cases emphasizing international law and cross-culturalism, the cases found now (April 2002) are from 2000 to 2002, available on http://law.about.com/gi/dynamic/offsite.htm?site=http%3A%2F%2Fwww.oz.uc.edu%2Fthro%2Findex.html

Thayer, R. H and Dorfman, M. (editors) (1997): *Software Requirements Engineering*, Second Edition, IEEE Computer Society Press, Los Alamitos, California, USA

The joint task force on computing curricula (2001): *Computing Curricula 2001- Computer Science*, Final Report, IEEE Computer Society, Association for Computing Machinery, December 15, 2001.

Upton, D. (1997): *Pacific Dunlop*, a multimedia case study, distributed by Harvard Business School Publishing, at http://www.hbsp.harvard.edu/products/cases

Van Maanen, J. (1988): *Tales of the Field - On Writing Ethnography,* The University of Chicago Press, Chicago, USA

Verenikina, I. and Gould. E. (1997) "Activity Theory as a Framework for Interface Design" in *ASCILITE 97 conference proceedings,* Australian Society for Computers in Learning in Tertiary Education, available in the 9th Online issue of the ASCILITE proceedings at http://www.curtin.edu.au/conference/ASCILITE97/papers-index.html, December 7th-10 th 1997, Perth, Western Australia, Australia, 4 pages.

Waterworth, J. (1991): "Introduction", chapter one in Waterworth, J. (editor), *Multimedia - technology and applications,* Ellis Horwood series in information technology, Sussex, England

Watts, V. (1998): "History of Notation" in *Ballet.Magazine*, on-line journal available at www.ballet.co.uk/mar98/notation_history.htm, published issue: March 1998, pp. 1-4.

Williams, S. M. (1992): "Putting Case based instruction into context: examples from legal and medical education", *The Journal of the Learning Sciences,* 2(4), pp. 367-427

Wilson, G. and Sasse, M. A. (2000): "Investigating the Impact of Audio Degradations on Users: Subjective vs. Objective Assessment Methods" in the *Proceedings of OZCHI'2000,* Sydney, Australia, December 2000. pp. 135-142

Winograd, T (1995): "From programming environments to environments for designing", *Communications of the ACM*, 1995, no. 38(6), pp. 65-74

Winograd, T. and Fernando, F. (1986): *Understanding Computer and cognition – a new foundation for design,* Addison-Wesley Publishing Company, Norwood, New Jersey, USA

Yin, R. (1994): *Case Study Research - Design and Methods*, 2nd edition, Vol. 5, Applied Social Research Methods Series, SAGE publications Inc., Thousand Oaks, California, USA.

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