CaseMaker: An Environment for Case-based e-Learning

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Abstract: Experience with case teaching, both at the Copenhagen Business School and also on a more large scale world basis, shows that students often do not carry out the kind of high level analysis of a case, which the case teaching paradigm claim it can encourage. Also, as the worlds of digital, multimedia and web-based educational environments emerge, case teachers want to use more than just paper-based cases, but have found that developing multimedia web cases is not a trivial matter. CaseMaker is an e-Learning environment, which supports: 1) Teachers in the development of cases. 2) Students in individual and collaborative analysis of cases. The system is currently under development and this paper reports on our first analysis and design phases, discussing the many possibilities and problems of case-based e-Learning.

1. Cases

This paper addresses some of the key issues in case-based teaching from a business school point of view. However, the research of case teaching and the design functionalities of CaseMaker described here, are believed to have a quite general applicability. And even within business schools a vast variety of case types with varying development processes, case content and learning objectives exists.

Teaching cases in business education present companies, and the problems / opportunities they are facing. (Barnes, Christensen and Hansen 1994, Maufette-Leenders, Erskine and Leenders 1997, Manninen 1997.) The primary characteristic of the North American cases or so called Harvard cases is that the case often follows a decision-making situation, up to the point where an important decision has to be made, of vital consequences to the organisation or the project presented. The case is almost always based on real events. (Mauffette-Leenders, Erskine, and Leenders 1997, Hazard 2000.) Other cases are more like case studies, reporting on both the events leading to a decision in the company and the first results of that decision, containing a more interpretative perspective to the situation. This is a case type, which could be said to be more of a European tradition.

The case content is either collected from research in organisations via interviews and observations (a field researched case), from public available material like newspapers, company reports etc (a desk researched case), or from the case developers own work/research experience (sometimes narrated into an imagined case company) (an armchair case). (Heath 1998).

A case is often prepared by students individually, then in smaller groups and finally discussed in class. Traditionally the discussion in class has been seen as a vital part of the case-based learning process. The objective of the class discussion is to have a dialog based on the analysis of the company's situation and to come up with viable strategies for the future or evaluate the decisions taken (Leenders and Erskine 1989, Heath 1998, Orngreen and Bielli 2001). Traditionally, teaching cases have been written descriptions, but as with everything else in this era, multimedia and web-based teaching cases began to emerge in the 90´ies.

2. Motivation for the CaseMaker project

The CaseMaker project is located at the Copenhagen Business School (CBS), and is a joint venture between the schools Learning Lab (known as CBS LL), and I, from the Department of Informatics. CBS LL is a faculty support organisation, which have years of experience with development of educational programs and software. I have a special research interest in case-based learning in e-Learning environments, and I focus on design, use, and human computer interaction issues. Both CBS LL and I have hands-on experience with development of multimedia cases.

In my discussions with teachers all over Europe and in my observations of many teaching situations, I have found there are quite a lot of teachers / researchers, who

would like to develop a case, but who feels they lack the necessary skills. E.g. a number of Ph.D. students write case studies in their thesis; during their studies or later in their carrier. Case studies that, with adequate support, could be transformed into multimedia cases. CBS LL are often approached by teachers, who would like the support to develop these cases, but this is a resource full task, for both the teacher and the project team (of pedagogical advisors, (graphical) designers and programmers). CaseMaker should enable teachers, without a lot of programming skills, to develop rich multimedia web-based cases (by use of different learning strategies and using different media types).

Through our work, we have seen a need for supporting not only teachers in making cases, but also a need for supporting students in learning how to learn the most from cases and case teaching. Case-based teaching has a constructivist and experiential approach to learning. The main advantages according to literature are that students: 1) Acquire knowledge when they analyse the case. 2) Actively discuss it with peers. 3) Increase understanding of ill-structured and complex situations. 4) Bring practice into the classroom relating the case to own work-experience (Colbert, Desberg and Trumble 1996, Mauffette-Leenders, Erskine and Leenders 1997). However, during my empirical research and literature studies, it has also become clear that it seems difficult for teachers to create a theoretical frame around a case. I.e. motivating students to analyse the case by use of models, discuss how a theory apply in the given situation etc. (See for example Orngreen 2002, as well as Williams 1992 and Argyris 1980 for a seldom provided critical view on cases-based learning).

For "*most case teachers the plenary discussion is at the heart of the case method*", (Heath 1998, p.16). My studies at CBS shows that at our business schools, teachers' signals to the students (explicit and implicit) that they expect the students to be able to participate actively in the discussion (whether it is a plenary discussion or the result of a group discussion presented in a report). They also expect that their students input to this discussion should be grounded in a high level analysis of the case. However, they seldom give any directions for how this high level performance could be reached, which relevant theories from the subject could be utilised, how to analyse the content, and how the student could benefit from collaboratively establish the

analysis in smaller groups. The consequence is often that students draw on their own experiences, but do not practice critical reflections on the case, and only attend the discussions from a knowing and understanding the content, not an analysis or evaluation of the content according to the subject/curricula at hand. (Orngreen 2002 and 2003a.)

The overall objective of CaseMaker is thus to provide a value-added learning process, by offering an environment that supports both case development (according to varied learning objectives and teaching process) and case use (particular high level collaborative analysis and a sound practice-theory relationship). Choosing to fund the development of CaseMaker, is a strategy, which promotes what the management of universities and business schools asks for, namely empirical research-based education, as well as e-Learning activities.

Before I go into details about user needs and design suggestions, I must add that these design suggestions are just that: Suggestions based on our analysis, design considerations and first workshop with potential users and technical advisors (Danish company representatives). Results and feedback from these first workshops are now used for our further work on design specifications. The revised design will then again be discussed and probably used as prototypes in a simulated walk-through of case development and case analysis situations, prior to the production phase. A first version of CaseMaker will, depending on the implementation strategy, be ready in the end summer/late autumn 2004. It will at this point contain many, but perhaps not all functionalities described in this paper.

3. Context and user analysis

The user group is potentially very large. Ranging from full-time students of bachelors and graduate students, to part-time (paying) students of either an MBA programme or at a corporate training executive course. The courses taught and the cases used in these programs vary a lot, just as do the time used by students on the programme. We as designers of CaseMaker have to consider, what the needs of the teachers and the students of these different groups are and if the diversity influence the design.

Most universities and business schools have invested in licensees for or developed their own e-Learning platform, a so called Learning Management System (LMS). These are used

for both 100% virtual e-Learning courses and in support of traditional face-to-face education. The objective with CaseMaker, is not to develop just another e-Learning platform, which would enable teachers to publish available material and let students discuss that material. Such an activity (or e-tivity as Gilly Salmon names them, Salmon 2000) might as well take place over any LMS. Rather, CaseMaker should co-exist with the current used platform, using them e.g. for online dialogs - whether synchronous (chat) or asynchronous (forums). So though collaboration is a high priority for the project team, we do not at this point see any need to incorporate environments for direct dialog between students in CaseMaker.

If we succeed in creating a program that supports a wide variety of teachers and their needs, there is a high probability that we increase the number of teachers wanting to develop a multimedia and web case using CaseMaker. However, teachers as one target group could have a very diverse technological literacy level. Even though the majority of faculty members, who would feel interested in using CaseMaker, are probably the same who already uses the LMS, we can not be sure that they are able to implement a multimedia web case, even if it does not require actual programming. So there should be room for the teacher who wants to develop a relatively small and straight forward case and case learning process, as well as for the one, who would like to be able to construct a more complex case and learning process (keeping in mind that sometimes the same teacher may want to do both).

Students and teachers are seldom trained in using the case method. But where teachers sometimes have the possibility to attend case-seminars (like those conducted at CBS LL) or talk to colleagues about their approach, students are left to themselves, to find out the hard way (Heath 1998 and Orngreen 2002). We see that an application as CaseMaker could assist here, not only by use of written guidelines to students, but by designing a platform that by its nature invite to a systematic and reflective analysis, as well as collaboration with peers.

4. Inspiration from State-of-the-Art software

While working with the design of CaseMaker, particular three areas served as inspiration: 1) The many projects on development of

multimedia cases, as stand-alone-environments. 2) The simulation or role-play games based on cases. 3) The qualitative data analysis software tools available.

4.1 Multimedia cases

When moving from developing paper-cases to using multimedia material, not only the media changes but also the issues that they mediate. Whether the case is a Harvard type case or more in line with a case study, when using multimedia material, particular in a web-format, the students often get a more direct link to the raw-data. Though the data can still contain the case developer's commentaries on the case, it will probably also contain: Internet links to the company and/or its competitor's homepages, the full reports of the annual accounts and balance sheets, (excerpt from) interviews etc. This provides the students with the opportunity to get a more refined and complex picture of practice.

The actual production of such media elements is a chapter in it self, and though not of special concern in this paper, a number of good advice can most certainly be given to teachers, in a sort of a developers-guide. The use of media does however, raise another issue of getting the case released (approved) by the case company, which has always been a delicate matter. According to good case teaching conduct and business ethics the case certainly needs to be released prior to its use. When moving from paper-cases to multimedia cases, it turns out that this issue becomes somewhat of a hassle, if the case uses a lot of company related information, which is not public available (such as video clips with employees or project descriptions etc.). It is more difficult for the manager to approve an interview clip of him/herself and of employees, for example criticising a project, than it is to approve a written interpretation of the same issue. It is also much more difficult to make any alterations to the material. For example, I learned in an EU project, where we developed 18 cases in the E-Case Series (ECCH 2003), that it took an average of 3 months to get such an approval in the larger well-known companies (Orngreen 2002). Though these were rather large cases, the issue of release and copyright, will be just as important in CaseMaker as in the stand-alone-applications.

4.2 Role-playing and simulation cases

Role-playing and simulations has for many years been used in conjunction with small case descriptions, where students act-out the roles

in the case. With the support of technology new ways of performing role-playing and simulations have emerged. Examples of simulation cases are: Web-TRECS (Parker & Swatman 1999) and DECT (Joyce 1999) from Deakin University (Australia), which both deals with the area of e-commerce. Students are able to act within an e-commerce company simulating and altering the size of different commerce variables, like selling and buying goods. Examples of Role-play cases are: Prof. Linda A. Hills from Harvard, who through the Managing Direct Reports (Hill 2001) and Coaching for Results (Hill 2000) applications, lets users act the role of a certain job-function. Even though these examples are based on small case descriptions, they to a large extend shifts the learning paradigm away from case-Learning towards more action based objectives. I.e. just-in-time actions in a simulated dynamic world as opposed to acquiring analytical competencies based on models and theories of real world happenings.

Interesting enough, there also exist generic role-play generators, supporting teachers in setting up role-plays, and conducting them online, similar to the idea of cases in CaseMaker. One of these is named Simplay.Net. (Simplay.Net 2003). While I was working with the E-Case Series (ECCH 2003), we several times discussed an idea similar to the part known as the Case-Developer in CaseMaker. The idea was to have a sought of generic framework supporting teachers in making cases. Seeing an early version of Simplay.Net, demonstrated late 2001, was one of the event that really let me to see that a similar idea within case-based learning was possible. To develop cases without having the resources, and at the same time allow students to collaboratively work on a case (Ip 2001). So when I almost one and a half year later was contacted by the CBS LL, who had a similar idea, I was only happy to participate.

Though we in the CaseMaker project team see the role-plays and simulations as stimulating the motivation and engagement of the students, we do not see CaseMaker as supporting dynamic case content. I.e. CaseMaker may use the concept of seeing the case as was it through the "eyes" of a manager, a sort of role-play; but the user can not act actively in the case and change the course of events. However, the case teacher may choose to use the sense of a simulation or role-play by releasing part of the case content over various periods; allowing the

students to reconsider their analysis based on the new data available.

4.3 Qualitative data analysis software tools

The final aspect, which has certainly inspired to the kind of functionalities that I particular foresee of use for the students, are those of qualitative data analysis tools. In software programs such as ATLAS.ti (ATLAS 2003), NUDIST/NVIVO (NVIVO 2003) and HyperRESEARCH (HyperRESEACH 2003) an explorative perspective on analysis is provided. This means it is possible to define and assign codes and write free text memos while going through the material. The tools allow for coding of several media types of: text, video/sound and graphics, but also for collaboratively assigning such codes and memos to the material, while keeping the individual perspective of seeing who defined what and where.

Since the tools are meant for research, coding can be performed on a very detailed level, assigning codes not only to all the material, but also to a specific word or line in a text-document. In ATLAS.ti one can even assign to a specific segment in an audio or video clip. This and other tools also permit for hyper-linking. That is, rather than just assigning two related segments with the same node /code, a relationship between existing data can be made.

Once all or part of the material has been coded, the user can choose to see the result through different forms of filtering. I.e. looking at all the codes assigned to a specific material, or all the material assigned to the same code. Similarly many of these software tools today allow for dynamic netviews, which is a graphical illustration of the codes and memos assigned to the material (netview being the expression ATLAS.ti uses for this function). I.e. in the graphical layouts, a visual perspective is given to how many and where are links established between the codes, memos and the material.

With respect to CaseMaker it is the functions of defining, assigning and filtering codes and memos that may provide rigour into the students' analysis process, particular when these are established in a collaborative manner. These facilities would support the creation of a sound argumentation and interpretation process.

5.   Design considerations

In the project we have developed a number of storyboards (visual illustrations of the system – see e.g. Orngreen & Pries-Heje 1999) and scenario descriptions (a narrative description of the system as it is intended to work – see e.g. Carroll 2000). We use these to clarify and document, which are the features CaseMaker shall include, and how shall they work. The screen layout of the storyboards presented here are not intended to present the visual interface in any way. The design is thus

deliberately chosen to be of almost "bad taste", to show that it is a mock-up of functionalities, not a running system.

CaseMaker can be seen as a suite of elements, which will support the whole learning process of case-based e-Learning. CaseMaker is divided into a kind of "student-domain" known as Case-User; and "teacher-domain", known as Case-Developer. Each of these two areas has their set of functionalities and facilities available – see figure 1.

Figure 1: Elements in CaseMaker

5.1   Case-developer

When the teacher logs-on to the Case-Developer, the Planner interface begins. Here the case-developer can choose to work on an existing case, open a new case, or to look at case data available. We expect that the teacher already have a number of data available. Because material in one case often can be made into a similar case, but with a new perspective, or can be used as additional material in another case, we would highly recommend re-using material. However, as Roy Williams has pointed out, there is a paradox, which both teachers and students face, when it comes to sharing knowledge in a distributed learning environment: *How can they be expected to share information and resources in a competitive, commercial market*? (Williams 2003, p. 48) Though perhaps not commercial, there is a strong degree of ownership and competitiveness both among students and their work and researchers and their empirical research data. Williams solution is to work with a private and public domain (Williams 2003).

The CaseMaker project team imagine allowing data and cases to be private or public available to other teachers at the school, and we also

contemplate to implement a third category, namely restricted access. I.e. a case or a case data element is restricted to be used by a group of teachers, from e.g. the same department or research centre.

Taking the development of a new case as an example, the case-teacher will from the planner proceed to the Organise Case area of the application. In the situation of a new case the first objective is to choose data, as illustrated in figure 2. Case data can either be inserted directly, by choosing existing material from the CaseMaker database (including uploading to this database from local disc drives) or by inserting a URL to the Internet site containing the data. These data will then appear in the case as is, whether it is a word®, pdf® or video document or it is an html-page at another site. (Arrow 1 in the figure).

It should also be possible to design a case page consisting of several data elements. By choosing to insert a new case page (arrow 2 in the figure), the case-developer has the opportunity to design the layout of a page, containing for example both a small 30 seconds video clip with the manager, as well as a commentary to the managers statement,

plus URL to the case company website and the competitors site (arrow 3 in the figure). This feature is planned to be implemented by use of drag-and-drop techniques. Once a case page has been made, it too will be saved in the

CaseMaker database, making it possible for the case-developer to re-use this particular page as case data in another case.
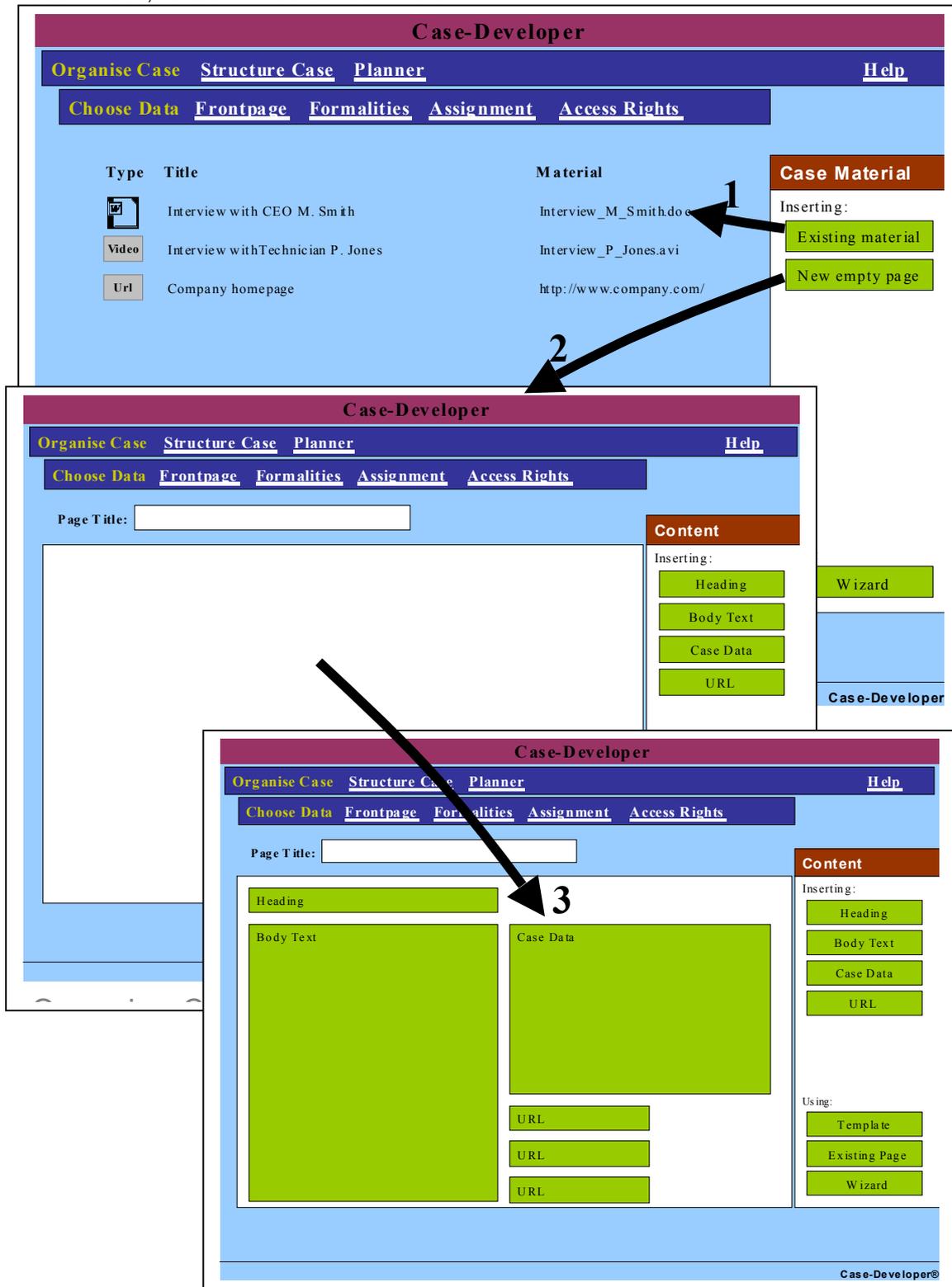
Figure 2: Features of Organise Case in Case-Developer®

Besides choosing data for the case, the case-developer can in the Organise Case area

choose to establish: 1) A front page, e.g. as an appetiser in the form of a pre-story / trailer or

just showing a case name and a picture of the case company. 2) A formalities page, clarifying the course, for which this case is intended, the number of people allowed in each group, deadlines for handing in case assignments, etc. 3) An assignment page, where e.g. a certain perspectives is asked to be applied in the case analysis. 4) An access rights page, where the case is provided with a password, and the developer have the opportunity to temporarily close access to the case, while the case is being updated with new/further/revised data or pages.

As content has been chosen to the case, the case-developer shall be able to structure this content, which is done through the Structure Case area. Here the case-developer can work with three structures, enabling the use of cases of very different characters:

1. Unstructured cases, where the case content is provided in an unformatted manner. The content is presented in one large table or list containing file name, date etc. This leaves it entirely up to the student to (re)structure and make sense of the issues presented, perhaps initiated through a teacher provided assignment.

2. Structured in themes, where the case content is provided in a menu structure, which the students can navigate through. The content is thus pre-structured into different issues, e.g. organisation, products, people, financial information etc., or just into a collection of events, which is

of importance in this case. The student can then navigate within these menus.

3. Linear cases, where the case content is tied together in a timeline or story. (It is noteworthy that our first designs had timelines and stories separated as two structures (see Orngreen 2003b), but since both had the linearity in common, we have merged them together.) In timelines the material is presented in a chronological order. An example is when the students follow an implementation process in a company. This means the students can choose to view the material from time 1 to x, but they can also navigate back and forth in the content, starting perhaps at the centre of the timeline. In stories the material has a narrative plot, which is important in order to grasp the concept at hand or to motivate. The narrative may be chronological as in the timeline, but could also be jumping in time or telling a story backwards etc.. The important aspect is that the teacher would believe viewing material *a* prior to *b* and *c* is important. I.e. navigation wise, the students "are forced" to view the story sequentially, before being able to navigate back and forth in it.

Figure 3 illustrates the thematic structure (a) as well as the linear case structure (b) of Structure Case. Notice how it is possible to have varying release dates on the material, enabling the case developer to use the case in the stepwise longitudinal manner addressed in 4.2.
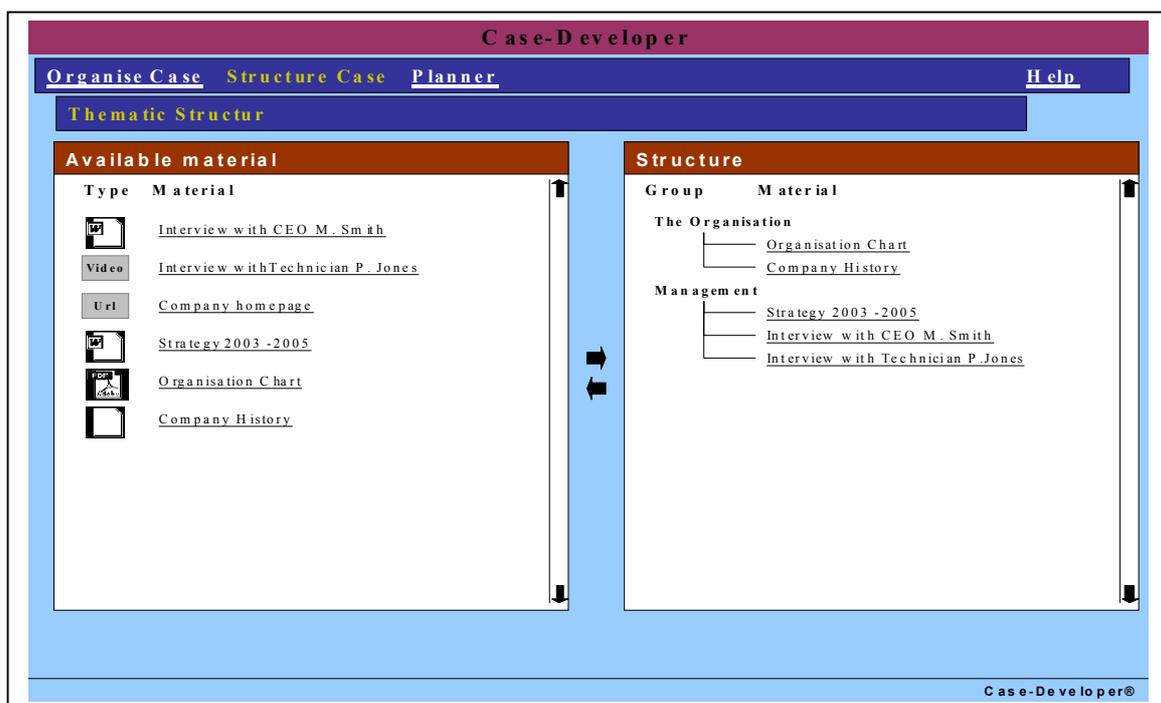
3a
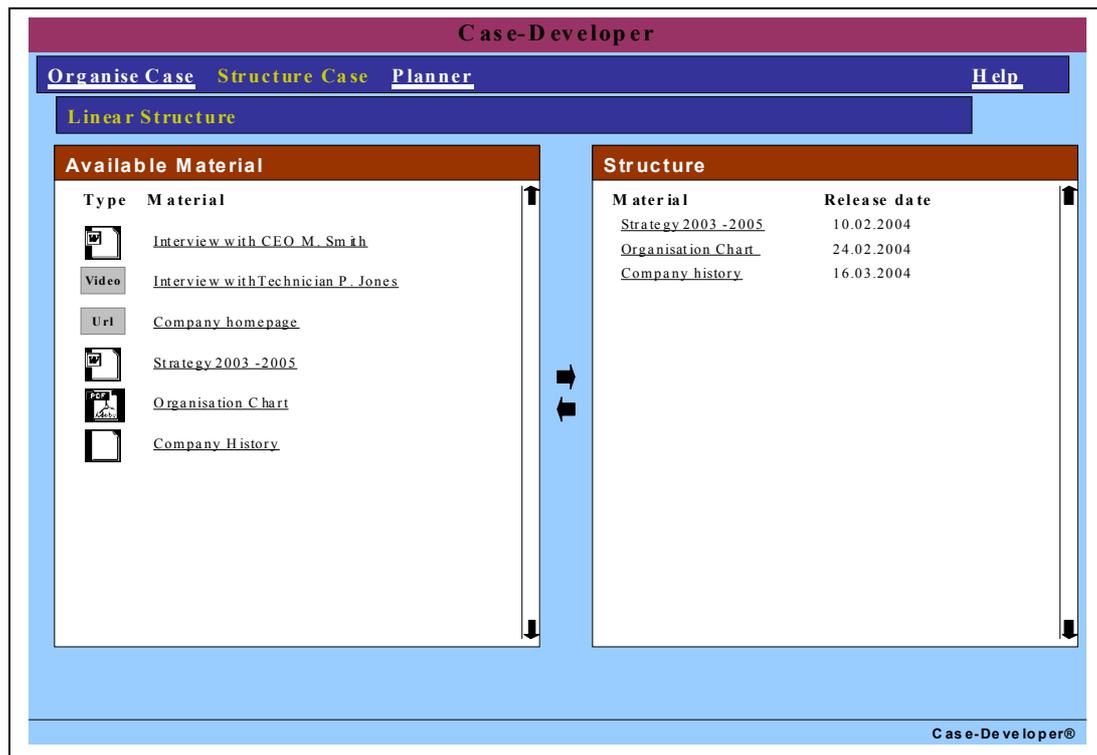
3b

Figure 3: Features of Structure Case in Case-Developer®

5.2   Case-User

The case-user first arrive at a management interface, named the Manager. To avoid too much administration with the constitution of groups, students can create their own groups and invite others to join. A group could even let a teacher join, if they e.g. need some guidance in how to proceed with their case analyses. Once students have chosen a case, they can (provided they have the correct password) begin working with the case in the Analyse Case area. Besides seeing the pages of formalities, assignments etc., they are able to analyse the case content in the way illustrated on figure 4. In this figure the top example is of a case page. Here an individual approach to the case analysis is chosen by the student, unlike the one underneath, which shows all group members keywords and comments to a specific case data. Searchable keywords and comments can thus be made to a specific piece of data or objects on a case page.

To improve the students' development of case solutions and interpretations, the analysis can be viewed through different filters in the Summarise Case area. E.g. a filter could be to view all the material and all comments which have been assigned a specific keyword, or to view all the keywords and comments written by one of the group members. In this way the analysis will be able to contain some of the rigour known from qualitative data analysis and grounded theory coding practices. Here, the concept of keywords and comments are similar to nodes/codes and memos. (See for example Miles & Huberman 1994 and Strauss & Corbin 1998). In the Summarise Case area it should also be possible to assign keywords and comments to the whole case, as kind of conclusions or case interpretations.

Exporting these filtered reports or all available comments and keywords, is another facility, which should be available in the application. This is useful for a plenary discussion, but also in situations where students have to write an essay or even an examination report. In the latter example (of examination) it is important to be able to distinguish between case content and additional information. I.e. similar to the concept of required readings. For example, if the case uses an external link to a company homepage, in order for the student to view the company year reports, it is vital that the teacher can clearly communicate that year so and so is part of the case, and should be known to the student to the exam, i.e. is on a "need to know basis", but that all other information on that homepage is additional and on a "nice to know basis".
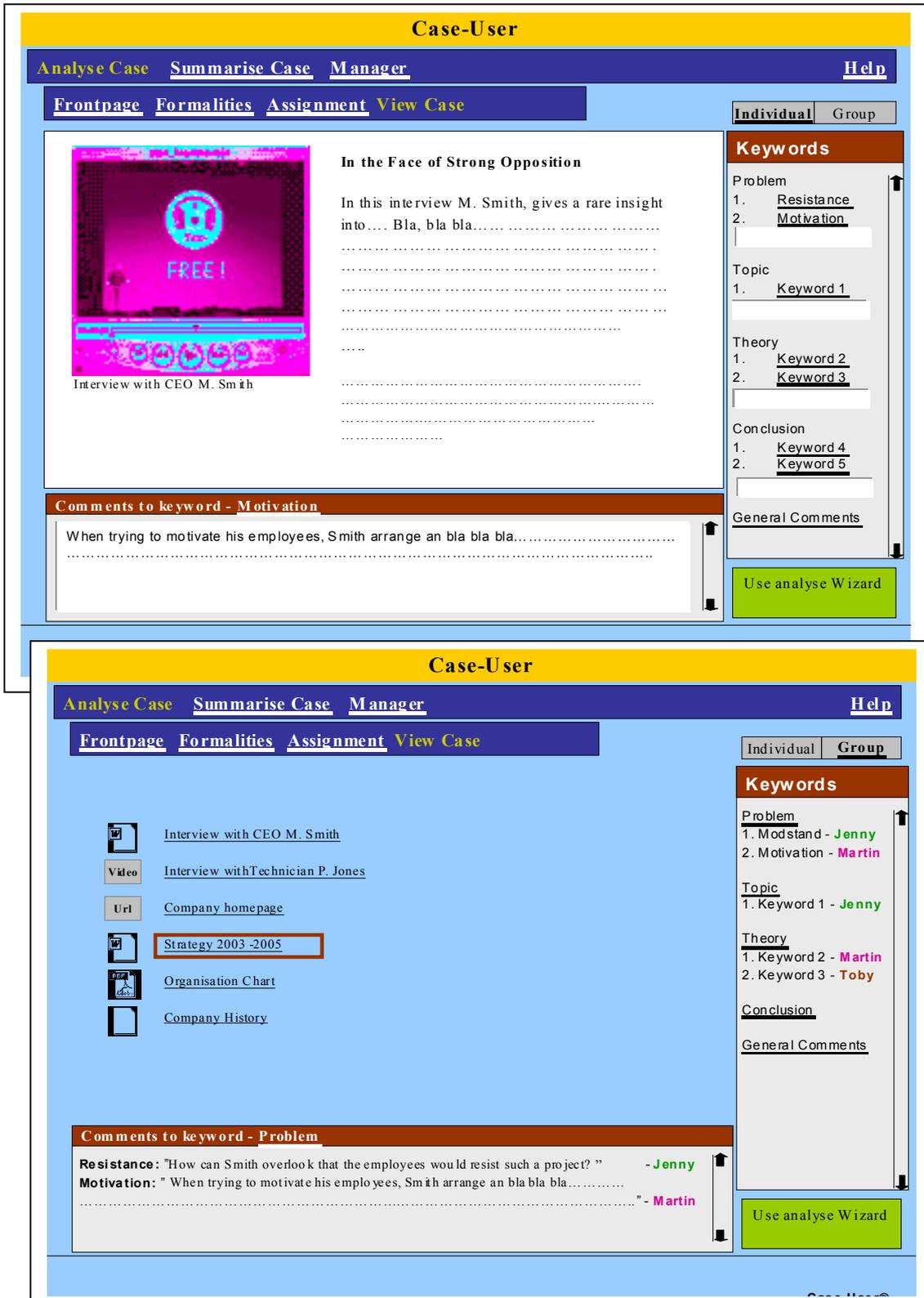
Figure 4: Features of Analyse Case in Case-User®

5.3 Flexibility through developer- and user-guide, and case history

CaseMaker should both in the Developer and User domains be as flexible as possible. With flexible I here refer to the way the application assist the teachers and students. It should be possible to opt in or out, whether a guiding hand is needed. The developer and user guides thus consist of both passive guidelines

(on how to develop and use cases) and more active tools, as templates and wizards. This is illustrated in both figure 2 and 4, where templates and wizards are seen as icons.

To speed up the process in beginning and primarily as inspiration, a number of pre-defined case page templates are provided to the case-developer. Wizards on the other hand assist in for example carrying out the case analysis, not on how to technically write a keyword, but rather on when, where and why keywords are used. Since using CaseMaker on your own, without the assisting wizard, is probably the fastest and most effective way, it is also our intention to learn developers and users not only to navigate and interact with the program it self, but also to learn about the best ways of organising and analysing cases, depending on the case at hand. Consequently, we foresee the wizards to be as translucent as possible. I.e. whenever a choice has been made in a wizard, the returning act in the Organise Case or Analyse Case area should be shown. This perspective on learning with the CaseMaker is action based (Vygotsky

1962) and based on situational learning (Lave & Wenger 1991).

Another aspect of flexibility is thought implemented by the use of a Case History function, which is so far only described in the case-user domain as it has let to some commotion with respect to the case-developer domain. The idea is, as shown in figure 5, to keep a complete case history of all activities within the group, as well as a log of the changes that may take place by the case-developer during the groups analysis work. This function not only makes it easy for one group member to spot the changes the other group members have made since the last time he logged on, but also enables students to analyse on a meta-level their own work process. It is in the case history that the group later can see, which keywords have been merged, which have been deleted etc. However, a complete different issue is whether such a case history should be available for the teacher, even if on a more statistical general level.
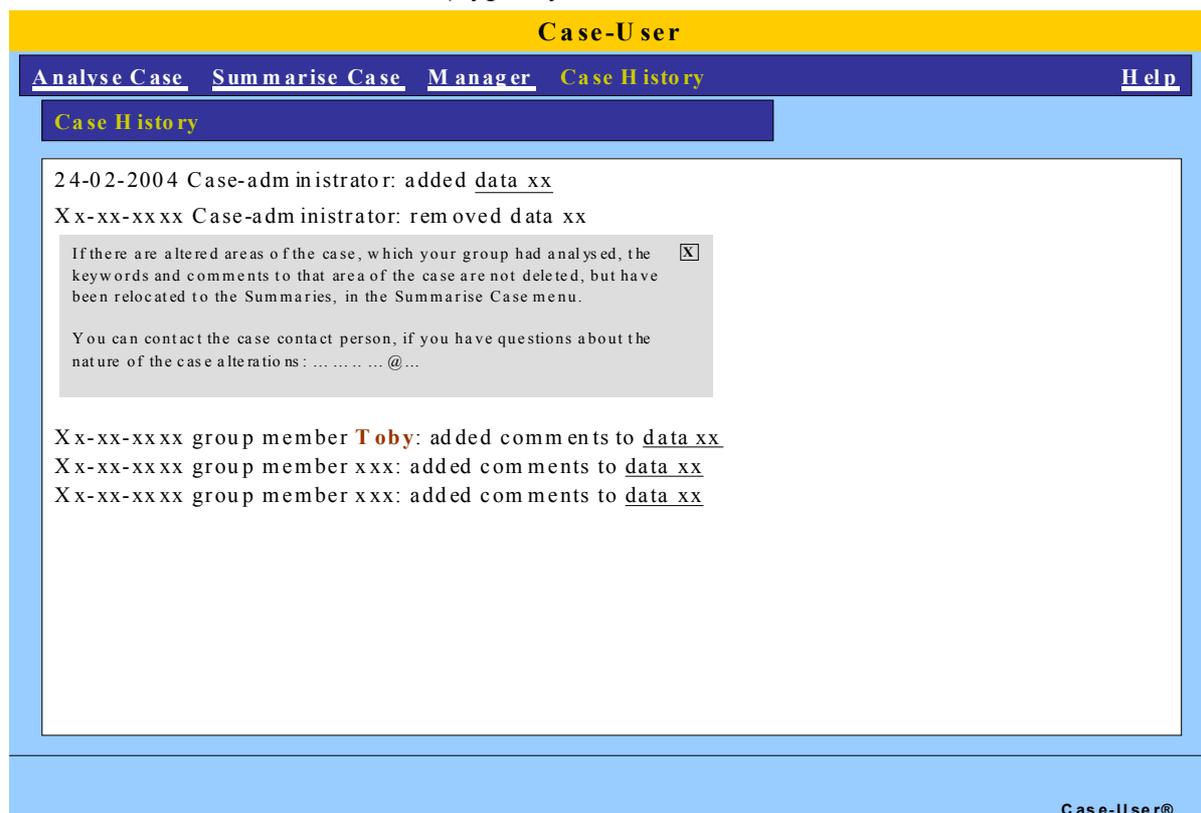

Figure 5: Case History in Case-User®

5.4 User workshop and technical panel

In a user workshop held very recently, the project group first gave a 5-10 min.

presentation of the CaseMaker idea and then we conducted a longer brainstorm session. Afterwards storyboards were presented and a dialog on the concepts, functionalities, as well as problems and opportunities with the design

began. This gave us access to both the "unbiased" ideas of what a programme like CaseMaker should be able to, as well as the opportunity to get a first review of our design ideas. Unlike the user workshop, the technical panel was introduced to the storyboards and our design ideas from the very beginning, since we wanted the advisors to have a dialog on the issues of technical relevance in relation to the design as it appears now.

The workshop and panel both provided interesting discussions, where many issues that we had not yet contemplated and even ideas to new or revised functionalities were given. The primary issues, which were brought to attention, were:

The students had an interesting idea of expanding the concept of case-developers to include students. I.e. allowing students to make material available to themselves through CaseMaker and then code this material. This is relevant when they have projects with companies, as is often the situation in for example the final bachelor and master exams. Both teachers and students were quite pleased with the possibilities of coding the case content with keywords and comments, though the teachers – being researchers – thought this feature should be available not only on a data level, but also on a word/frame level as in the qualitative data analysis software tools. The technical panel had a long dialog on the feasibility of this, and though almost everyone agreed that it was possible and they came up with different solutions, they also found that it programming wise would be a complex task.

Providing teachers with resources to develop cases within CaseMaker, educating teachers and students in case-based e-Learning, as well as getting good ambassadors was seen as the key issues for the success of the application by the teachers and technical advisors. Also, the idea of actively learning case-based e-Learning by use of wizards were by the technical panel considered a good and sound pedagogical idea, though they pointed out that wizards were not always easy to moderate or extend if necessary at a later point.

The students had clearly some restrictions towards the degree of openness in the system. Both with respect to whether it should be possible for the teacher to view their case history, and particular whether one group should be able to view another group analysis. The latter they were completely against and

the former were only acceptable on a group, not individual level. (The competitive factor was certainly visible here – Williams 2003) This discussion let a project member to suggest that the analysis could be shared in a more visible/open way. The teacher could arrange the case process so that every group hands in a short written report of their results, which were then made part of the case data for everyone to see and learn from.

We had a long dialog on the issue of whether CaseMaker can be integrated directly into an existing platform of a LMS or content management system. CaseMaker had according to the teachers the potential to increase cross-institutional work. The same teachers also said they liked the idea of having not only private and public data, but also restricted data, enabling sharing with smaller groups. But the teachers at the same time mentioned that once a case was made in CaseMaker is should be possible to distribute it to other environments, thus bringing the issue of standards up. It was clear to the technical advisors from the beginning that the issues of standards and whether we should choose to integrate in an existing platform and which one, would be dominant in the project, once the design requirements are clearer. In order to reach this clarity, the advisors suggested that data models are drawn, focusing also on the more strategic demands the business school might have to suppliers etc. According to the technical advisors, copyrights were another issue, which needed more consideration. Copyrights, may both relate to a media element, but could also apply to a whole case.

6. In conclusion

The vision of CaseMaker, a project which is currently in the design phase, is to develop a case-based e-Learning environment, which supports:
1. Teachers in the development of cases and case teaching processes.
2. Students in individual and collaborative analysis of cases

Through a critical view on case development, case teaching and case learning a number of areas were identified in which case-based education could be improved. These areas are implemented in the current design functionalities of CaseMaker. I am aware that it is equally easy to design a poor case, to conduct poor case teaching or to perform a poor analysis of a case with CaseMaker as it is without. But the members of the project team do believe that it is also possible with this

framework and the tools described to easier promote and learn teachers and students some of the more in depth considerations regarding case learning objectives and carrying out a high level analysis of cases, which research has pointed out is necessary.

7. Acknowledgement:

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