Investigating Possibilities for E-Learning

An HCI Study with the Lundbeck Institute

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KA-CHE

Knowledge Acquisition in:

- Continued Healthcare Education

- Computer-Human Environment

Investigating Possibilities for E-Learning

– An HCI Study with the Lundbeck Institute –

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1. INTRODUCTION

This working paper presents the first results of a close collaboration between the HCI-Research Group, at the Department of Informatics, CBS and the Lundbeck Institute. KA-CHE is the abbreviation chosen as current project name for the e-learning project between the two partners. The name can be seen as dealing with two perspectives:

Knowledge Acquisition in

1) Continuing Healthcare Education - Lundbeck Institute perspective.
2) Computer Human Environments - HCI-Research Group perspective.

This report contains the resulting descriptions of analyses, investigations and evaluations carried out in the pre-phase by the HCI-Research Group, who has taken up the part as project leaders of the pre-phase and authors of the working paper[1]. However, the work carried out within the pre-phase has taken a co-operative approach between the two partners.

This working paper has a rather applied format, where the study of and with the Lundbeck Institute, human computer interaction issues as well as the first design ideas are disseminated. As such the report does not provide a thorough frame of references within the HCI-area (Human Computer Interaction) and e-learning area, as these are seen as implicit for the understanding of the empirical study. Rather high emphasis has been given to the analysis, interpretation and argumentation based on the empirical study. The working paper can be seen as an inspirational work for researchers and practitioners in similar projects in the same preliminary phase.

Below follows a description of the work process in the pre-phase and among the partners, also clarifying how we found the focus areas of the pre-phase, known as the project map (in section 1.1). The next chapter (chapter 0) provides a detailed account of the pre-phase project results, taking a holistic view to the e-learning project, envisioning the potential scenarios, possibilities and barriers, the user group and setting out the scene for the decisions and actions to come.

The following chapters present the basic themes and the analysis that constitute the foundation for the results in chapter 0. As such chapter 3 provides the more internal look at the Lundbeck Institute, investigating the current activities, the lessons learned within Continuing Medical Education (CME), the visions of e-learning and the people it is targeted at. Chapter 4 and 5 provides the more external perspectives being based on investigations of learning models and pedagogical tools, Learning Management Systems (LMS), Continuing Medical Education (CME) and Accreditation considerations. The computer human interactions perspective in chapter 6 provides again a more internal aspect concerning the resources and research potentials within the HCI-Research Group, at the same pointing to areas that are essential for the continuation and success of the KA-CHE project for the Lundbeck Institute. The reader should thus see chapter 2 as the resulting HCI

[1] With the exception of 4.4, a literature review, that has been primarily performed and written by Ole E. Mortensen, Lundbeck Institute.

interpretations and design considerations of the preliminary analysis described in the following chapters.

The working paper is written considering both the current and future context of the Lundbeck Institute and what we know and need to know more about with respect to the future users of the e-learning activities. Another of our concern has been to investigate the Lundbeck Institute current activities and raise questions that the Institute needs to consider when contemplating a relatively large e-learning project. However, we find that the concepts investigated and the processes we have been through have a general relevance. We are thus grateful to the Lundbeck Institute for allowing publication of these pre-phase results.

1.1. WORK PROCESS AND PROJECT MAPPING

The methodological approach used is Mind Mapping, a work tool which enhances development of the problem space of the project and the overall structure. Mind Map consists of two steps: Mind storming as the first and Mapping as the second. The first may be understood as a brain storm structured around each of the objectives above, asking: What do we understand with these concepts and what does this include. There are no constraints as to what may be included, the only rule is that if requested by the other team members one must be able to explain and give a rationale for the contribution one ads. The strength of this approach is allowing chaos to unfold in order to sketch as broad and as open ended a frame as possible. The second step is to organize the input and impose constraints. The main question asked is: Is there a pattern in all this input and how may it be organized. This is a long process (actually it continues in the life-time of the project). Though no open ends are closed, the problem area is narrowed down by clustering the different input and sketching relationship.

In the continued work, as knowledge is gathered, documents analysed, the Internet is searched and interviews are carried out, the project map is continuously refined and the figure (Figure 1) is a capture and translation of the project mapping as it looked on March 19th, 2003 (i.e. several versions of the project map were made as our work proceeded). Each box was generated during the second step, the mapping. They represent possible topics to be dealt with, the big boxes with bold font is a first draft of headings for the clusters and the lines connecting the boxes together with the placement of the boxes demonstrates the understanding of the perception of the project as a whole at the given time.

1.2. ACKNOWLEDGEMENT

The HCI-Research Group would like to emphasise that in our work process there have been close co-operation between the HCI-Research Group and the Lundbeck Institute, with Janne Pamsgaard and Ole E. Mortensen from the e-Education department as the main collaborators. The subjects investigated and results of out pre-analyses as presented in this workingpaper are thus the outcome of this teamwork. Funding of the pre-phase project came from the Lundbeck Institute.

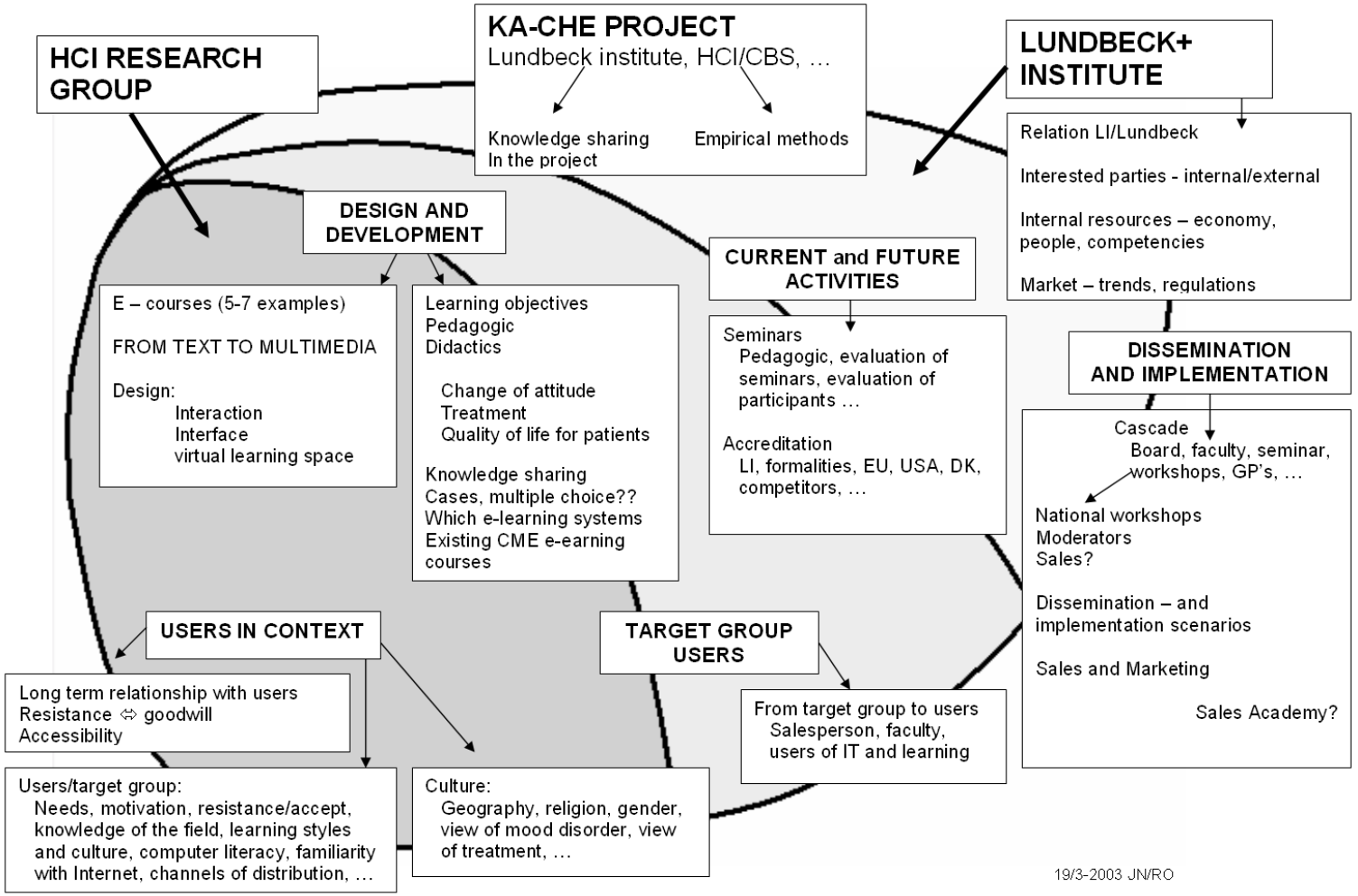

Figure 1 – Project Map (a work in progress)

2. PRE-PHASE PROJECT RESULTS

This chapter represent the main pre-phase project results, based on our analysis within the Lundbeck Institute as well as analysis of relevant subjects (primarily Continuing Medical Education On-line, Accreditation and Learning Management Systems), all of which are presented in the following chapters. The pre-phase project results should be read as a combination of opportunities for the Lundbeck Institute within e-learning and, at the same time, critical questions to ask and further steps to explore and investigate in order to benefit from these opportunities. For example further research to get to know the users of the e-learning systems, the General Practitioners (GP) and Specialists, who come from geographical diverse locations and maybe very different learning cultures.

This combination has been chosen to make the report as operational as possible and to enhance dialogue at the final seminar at Lundbeck Institute. Our results and thus this chapter focus on:

Possible Scenarios – outlining the visions and possibilities within e-learning that the HCI-Research Group see as promising for the Lundbeck Institute. These scenarios focus on the interplay between two subjects: 1) E-learning through accredited courses and Communities of Practice. 2) Establishing Quality circles by joining lasting partnerships with the users (GP's and specialists). This is done through a range of Knowledge Acquisition and Dissemination Scenarios.

Project Organisation and Quality Assurance – focusing on the importance of structuring the project organisation, so that it prioritises: 1) Managerial competences within the subject matter, design and technological areas as well as administrative issues and 2) The need for quality assurance both from the perspective of assessment of content, learning strategies and interaction design from experts, but also from the point of view of user groups' involvement.

Risks and Economical Considerations – highlighting some of the questions that first needs attention and discussion, particular within the Institute, prior to any decisions regarding project contracts with technical software/hardware partners or subcontractors regarding development of a technical solution.

Possible Development Models – presenting a number of implementation strategies, such as a full scale implementation of all KA-CHE scenarios as well as stepwise options. The next steps of the KA-CHE project are identified by looking at the specification phase and identifying some of the questions that now needs further investigation prior to being able to formulate requirement specifications to the e-learning project.

2.1. POSSIBLE SCENARIOS

Based on interviews and meetings with Lundbeck Institute it has become clear that there is not only one possible e-learning activity for the Institute to invest in, but rather a broad range of possible scenarios, which could be implemented at different levels. We find the Lundbeck Institute strategies of having a network (particular the faculty for content improvement, approval and quality assurance) and a selection method (for choosing the seminar participants between the most prominent or up-and-coming of specialists in the subsidiary countries) in place prior to convening the first seminar well chosen and have drawn on some of the ideas in relation to e-learning. As described in the overview of this chapter above, we have chosen to describe these e-learning visions and possibilities through a range of Knowledge Acquisition and Dissemination Scenarios. This differentiation is done explicitly to force focusing not only on learning issues, but also to consider how to disseminate and "gain access" to the users.

2.1.1. Knowledge Acquisition Scenarios

Below is a table of the knowledge acquisition scenarios, all together representing a **full scale e-learning project targeted at both specialists and general practitioners** (Table 1). They range from e-courses and e-seminars to Communities of Practice (CoP)[2] and consider local activities as well as additional e-applications. They may be considered independently, but may also be seen as interdependent and a logical construction for stepwise implementation. The factors mentioned in each column are described in more detail through out the report, and the number of question marks within the table indicates the areas that the Lundbeck Institute needs to consider, as one of the first steps. For example, it will be very difficult, if not impossible, to say anything about a suitable learning model within an e-course for GP's if the **users needs** have not been **analysed first**, if the overall learning objectives have not been agreed upon and if a plausible strategy for accreditation have not been made. These question areas are discussed a bit more in detail later in this chapter and in the report in general.

[2] Etienne Wenger defines and explains the activities of communities of practice as: "*Members of a community are informally bound by what they do together… and by what they have learned through their mutual engagement in these activities. A community of practice is thus different from a community of interest or a geographical community, neither of which implies a shared practice. …. Communities of practice develop around things that matter to people. …. Even when a community's actions conform to an external mandate, it is the community–not the mandate–that produces the practice. In this sense, communities of practice are fundamentally self-organizing systems."* Wenger, E. (1998) "Communities of Practice. Learning as a social system" published in *Systems Thinker*, 12 pages, available at http://www.co-i-l.com/coil/knowledge-garden/cop/lss.shtml (Accessed 6th of June 2003).

Name - and description of learning activity	Users - with different needs (?)	Ex. of competencies when running activity	Ex. of learning models/pedagogical tools referred to in pre-phase
E-courses Content or subject matter of the e-courses is based on a building block principle. I.e. each course is divided into a number of blocks. Provides the user with flexibility, making it possible to choose own starting and ending point, but based on which learning objectives (?) Each block contains modules of information or pieces of a patient case. Currently content is being developed, containing issues supported by the case history of "Elaine". Should cases be presented as solutions or open ended stories, which the users can work with (?) An e-course is accredited → for the Lundbeck Institute to obtain accreditation, the content should be easy identifiable. This may imply that the courses should be short-term and run in a closed environment (i.e. no links to other information external to the course, for example the Lundbeck Institute homepage or the Internet in general) (?) The format could be as a self-study course – but does accreditation of e-learning course require the course to have form of a self-study (?) Assessment strategies have to be considered – i.e. on which basis should accreditation be granted to users participating in the course (?)	GP's	Content and user management Administration of accreditation certificates Technical assistance University partner to allow for accreditation and provide "quality assurance stamp" to the users (?)	Awareness creation by presentation of information Case-based teaching / learning Problem based pedagogy
E-seminars As above (e-courses), but based on learning objectives, user needs and accreditation criteria for specialists. Would these be the same as the existing seminars (?)	Specialists	As above, though if a dialog based concept is chosen as in existing seminars, discussion moderatorsshould also be in focus.	As above, perhaps also emphasising dialogs between participants (the users and the moderator)

Table 1 - Knowledge Acquisition Scenarios

Name - and description of learning activity	Users - with different needs (?)	Ex. of competencies when running activity	Ex. of learning models/pedagogical tools referred to in pre-phase
Communities of Practice (CoP) A platform / community where it is possible for the users to exchange information, opinions and experiences. (refer to footnote 2 for definition of communities) The objectives (?) is thus to have a forum for general knowledge sharing between the users and between Lundbeck Institute and the users, activated through for example: - Moderated discussion supporting the e-courses and e-seminars, i.e. case based discussions, discussion based on latest knowledge / articles etc. all of which have some connection to the subjects in the courses or seminars. - Expert panel, where discussions are activated through experts input, e.g. by the option of having an expert start the discussion by writing an input to a topic of current interest or by allowing users to ask questions to an expert. - Concurrent discussions / chat sessions, with a direct dialog between users and invited experts. User groups have controlled access via the Learning Management System (LMS) – i.e. groups can be formed according to users and their needs.	GP's Specialists Network specialists	Administration of access rights, filtering, privacy issues (?) Moderators (could be local workshop organisers and particular local trainers) Invited experts Technical assistance	Knowledge sharing and management Case based learning Experience & dialog based learning
A user group is dedicated to **Coaching**, the facilities could be: - Support before and after the local sessions, with content matter, pedagogical plans and administrative issues - Mentor networks and sharing experiences among the users	Local Workshop Organisers Local Trainers	Coaches – should be experienced in learning and pedagogy online and within the subject area.	As above plus focusing on learning by individual coaching and communities sharing experiences within the practice of teaching/moderating dialogs.

Table 1 - Knowledge Acquisition Scenarios continued

Name - and description of learning activity	Users - with different needs (?)	Ex. of competencies when running activity	Ex. of learning models/pedagogical tools referred to in pre-phase
Local Initiatives Are traditional (physical) learning activities arranged by Local Trainers – and perhaps also facilitated by use of information communication technologies (?) Some possibilities are: - Discussion of content modules and/or patient cases as they appear in relation to accredited course/seminar - Presentation & discussion with expert (perhaps via videoconferencing) - Exchange of experiences (also with other local groups via videoconferencing) They are thus all activities in support of the e-learning activities	GP's Specialists	Trainers as planners and moderators of discussions etc Technician to support with on-line issues and video conferencing Invited experts (also possible per distance)	Dialog based learning Presentation of information Case based learning and (participants own and experts) experience based learning…
Additional E-applications Applications, which are not all directly related to e-learning, but rather at the aim for the Institute to provide the latest information, and a high service level to their users. **Treatment options** - Database with different search / index possibilities, enabling a user to view different treatment options depending on a variety of factors, like pregnancy, diabetes etc. The institute considered?…. to develop the platform as an decision support system, dynamically changing the treatment options based on experts practice. (?) **E-booklets** – continuing the work with booklets, disseminated to a larger audience by use of pdf-files or e-books (?) **Existing initiatives:** Brain explorer, CNS-forum, etc.	GP's Specialists (Also more public avail. applications for medical students etc.)	Content providers Administration	Primarily presentation of information – probably in an interactive environment.

Table 1 - Knowledge Acquisition Scenarios continued

Reflections and Discussion

In this section the HCI-Research Group would like to highlight a number of issues from the table, which illustrates the nature of the suggested scenarios as a whole.

The HCI-Research Group have found that within the Lundbeck Institute there are many ideas and thoughts about accredited e-learning and about knowledge sharing within the target group of GP's and specialists. **Learning is a very broad term**, which may cover any form of knowledge acquisition activities, thus also knowledge sharing and the exchange of experiences between the users of the e-learning applications. It is perhaps particularly such initiatives which will support the building of long term partnerships between the Institute and their users. Consequently we see **the mix of scenarios as supporting**:

- the users need for accreditation points and knowledge sharing activities
- the Lundbeck Institute goal of enhancing life quality for patients through change of attitude and behaviour in diagnosis and treatment process
- the creation of long lasting quality circles
- the accreditation of Continuing Medical Education (CME).

The E-courses and E-seminars are seen as the accredited part of the e-learning project and the counterpart to the existing seminars held in Denmark. There are currently activities in progress both at the Lundbeck Institute and at the sub-contractor Oxford Clinical Communication (OCC) regarding the development of course content for GP's. This content is in the form of modules supported by a case figure (currently named Elaine) in order to emotionally engage the users of the course into the subject matter and to provide a patient case for identification.. The HCI-Research Group finds that such case-based teaching measures could expand into the more experience based and knowledge sharing activities that the Lundbeck Institute may want to support. E.g. patient cases, if seen by all participants prior to a local initiative (serving as a supplement to the e-courses/seminars), are rich foundations or baselines for discussions on how to apply new theories or findings of for example treatments to the case story.

The actual **design of the e-courses and e-seminars** and not only content as developed by OCC now, but media usage, interaction and navigation form etc., should, however, depend on a more thorough **knowledge about the users**. And, as the HCI-Research Group has heard and discussed with the Lundbeck Institute, too little is known about GP's in general, and specifically about GP's professional network.

Accreditation may be a main motive for the design of the e-courses and e-seminars, and in order to achieve accreditation for an on-line CME activity the content of the accredited has to be designed so that it is easy to identify. At the Lundbeck Institute it seemed, that such easy identification entailed a design of e-learning environments, which has a closed environment with no dynamics in content (enabling the accreditation committees to easily point to which information the users will "go through" in order to receiver their accreditation points). Though this may be the situation, we would highly recommend that the Lundbeck Institute prior to settling for a learning strategy also considers that such a choice of easy identified content

matter, do not automatically imply a rather passive "page-turning" pedagogy. Such decisions should be taken consciously and with the knowledge of the consequences the pedagogy may have on the accreditation strategy – i.e. should accreditation be granted:

1) solely on the basis of seeing / going through all the content, or
2) on the basis of evaluations, as for example multiple choice questions (which can be very sophisticated planned and not as simple and easy as it is often the situation in current CME applications – see chapter **4.3**) or
3) rather than base the accreditation on content seen then on the basis of active participation, for example in discussions taking place at the local events or in the on-line communities (CoP).

The accreditation strategy thus also influences whether the e-learning courses and e-seminars are seen as self-study or group activities. (For more about accreditation issues refer to chapter 4.4).

Though our pre-phase investigations have been concentrated upon on-line and digital activities, our experience with **e-learning** compared to what we have learnt about learning objectives and user needs at the Lundbeck Institute, have shown us that **face-to-face communication** is an important factor also in the KA-CHE project – for both learning and **dissemination reasons**. In general, given our broad definition of learning and overall learning objectives of the Lundbeck Institute, the HCI-Research Group sees interaction and communication in between users and between users and the Lundbeck Institute as a very important part. That is, both on-line interaction (e.g. via CoP) and traditional (face-to-face) education. Two examples of learning objectives and user needs, where experience shows that on-line and traditional interaction and communication may support and improve the e-learning activities:

1) The Lundbeck Institute learning objective of creating better life quality, by supporting GP's and specialists within their diagnosis process and treatment plan, may lead the Institute to explicitly formulate (sub-) learning goals of both creating awareness about the latest knowledge within the field, but also to try to reach a change of attitude and even change in behaviour within the user groups. Such higher levels of reflection on ones own practice may adequately be supported through discussions with peers. Both on-line e-learning (particular via CoP) and more traditional means of learning (i.e. face to face discussions, exercises etc.) may support this. The **adequate mix of on-line and traditional pedagogical tools** depends on the user group and their learning objectives, thus the content and form would thus most probably differ depending on whether the user is a GP or a specialist, but perhaps also whether it is in the western countries or in the Middle East.
2) The HCI-Research Group have learnt that seminar participants (the specialists now participating in the specialist network) have expressed interest in some kind of continuation of the seminar themes and co-operation/networking with the group of people with whom they participated in the seminar. Surveys supplied by the Institute, and statements made during interviews show that also specialists and GP's have a need for sharing experiences with

> peers, discussing with experts etc. It is possible and highly feasible to support communication through **on-line networks** / CoP, and as pointed out experience shows that on-line and traditional interaction and communication may support and improve the e-learning, particular if the organisation, management and technical support to the communities are in place.

As a consequence the scenarios show use of both CoP and Local Initiatives for on-line and face to face communications. These activities are coordinated and run by Local Trainers. The general idea is that the Lundbeck Institute establishes relations to specialists or GP's, which could see an additional CME training position as part of a career step/move. These people do not need to be experts within their area (yet), but rather should be people with interest in teaching and moderating sessions. Such trainers would be excellent resources for moderating discussions in support of the content and subject matter issues presented within the accredited courses, because they will have a strong commitment to the Lundbeck Institute (provided by daily contact and coaching via the CoP) as well as acquaintance with the national culture, network, organisations etc. However, taking up a trainee position is a large change compared to working in a practice, and even though a person may have educational experiences, the Lundbeck Institute must ensure that the content, discussions etc. are planned according to the Institute learning objectives, and must ensure that local alterations are done on the basis of the right arguments and motivations.

Coaching may be an adequate way of providing these local trainers with support. Coaching programs may take place in a virtual environment, perhaps again supported with traditional face to face meetings and supervision. In the next chapter the HCI-Research Group discusses how there may be good sense in supporting local workshop organisers, with their planning of the local workshops etc. within the CoP, see 3.1.2. (Local workshop organisers are the term we use for the network specialists, who choose to plan and perform local workshops within their own environments – hospitals, private clinics etc.) It may be possible, depending on the learning goals of a local workshop, to let it be the local trainers that have responsibility of providing guidelines and e-learning coaching initiatives to the local workshop organisers.

One of the features, that allow a verbal and visual synchronous discussion, is **video conferencing**. Use of video conferencing and other bandwidth occupying media are, in these scenarios, contemplated as taking place within the frame of the local initiatives (i.e. not on an individual basis at a private PC at home or at a clinic). This also enables the presence of a local trainer for moderation and a technical assistant for smooth operation.

The **communities of practice are also seen as divided into user groups**, with different access keys depending on the users affiliation, i.e. is the user currently participating in a e-course, has the user been on a e-seminar etc. This will allow the Lundbeck Institute to create spaces for more VIP type user groups, as for example the faculty. A group may also be created for the network specialists, providing an opportunity to communicate with the existing seminar participants 1) prior to the actual seminar: sending out seminar information, schedules, and datasheets and 2) after the seminars: with follow-up issues, questionnaires, local organisers' information, workshop manager content etc.

In section 4.4 is a reference to the development of a **European Post-Doc CoP-site**, which has been funded by the European Commission. The initiative is seen as a site where GP's can manage their CME activities. Such initiatives may in fact support the dissemination of the Lundbeck Institute e-learning activities, as it may be easier to provide information via this site to the users, who through signing up for such a service as Post-Doc, have already shown that they are interested in and motivated for on-line CME.

Finally, the Lundbeck Institute have used and are contemplating to use resources on developing **other types of e-applications**. These applications are not directly related to learning, but are rather seen as information presentations or information retrieval systems, often in a rather interactive format. Even though the applications may be developed as independent systems, and sometimes have a very broad target group (sometime even the general public) it is likely that from a users viewpoint they are seen as the portfolio of e-services that the Lundbeck Institute offers. Therefore these stand-a-lone applications have to be in accordance with the e-learning strategies chosen. On the other hand it is also likely that it is possible to benefit from these e-applications within the other e-learning activities, as an issue at a CoP discussion forum or at a local evening.

2.1.2. Dissemination Scenarios

As mentioned, the HCI-Research Group has been impressed with the dissemination strategies implemented at the Lundbeck Institute and the subsidiaries prior to commencing the existing seminar activities. In our experience users of e-learning applications do not appear by themselves and so planning for dissemination is of outmost importance.

As in the knowledge acquisition scenarios, face-to-face communication (including use of non-digital medias, such as folders that introduce the concepts etc.) are also vital dissemination tools, when wanting to create awareness about the e-learning features available, and even more importantly when wanting **to maintain and establish a long term loyal or dependable relationship with ones users**. The users need to know the "face" of the Lundbeck Institute, and "physical" contact is the best way to show such a "face". Contemplating the subsidiaries, the HCI-Research Group sees the local representatives as one way of providing such a "face". When visiting GP's and specialists they could draw attention to the e-learning activities, provide information (even a short demonstration) of the possibilities, which would be of interest to the individual in front of them. Local Introduction Meetings as short introductory evenings are another supplementary way. Here a more in depth presentation, the possibility of getting to learn the platform on which the e-course and e-seminar modules run as well as more social activities may be a good way of getting people, who are already interested to "sign-up".

Viewed in a long term perspective, the **Local Initiatives**, as suggested in the Knowledge Acquisition scenarios are, from the HCI-Research perspectives, a sound way of creating long-lasting relationships. An e-learning course or seminar is a relative short-term process and discontinues after achieved accreditation. Even when users continue to take other modules, this relationship is of a relative non-personal and disjoined character. The Lundbeck Institute should therefore carefully consider what happens: 1) if users are only offered an e-course or e-seminar scenario 2) if

these are designed within a rather closed self-study environment? If none of the interactive scenarios are implemented, and the user feels left too much "alone", it may in fact lead to a less beneficiary reputation about the Institute, than if no e-learning activity was offered. Because the user may have expected more group-dynamic and social activities as well, based on the good reputation the existing seminars have. But again, such a statement needs further analysis of the users and their needs, and considerations about the Lundbeck Institute goal with the KA-CHE project, prior to validation.

In other words, another aspect of the dissemination scenarios besides face-to-face marketing strategies, are the **creation of ambassadors**. Perhaps the most apparent way is by getting good success stories from users, who really enjoyed the set of e-learning activities at the Lundbeck Institute. Such word-of-mouth recommendations are probably also the best kind of marketing. However, when the set-up is new and no prior users exist, other measures are needed. The scenarios therefore points to the use of national organisations as ambassadors. Besides getting approval from the national accreditation organisation, approval from e.g. national organisations of general practitioners will most likely appeal to many a user. Likewise, approval from international organisations is a sign of a blue ribbon CME-initiative.

Attention should be drawn though, to the issue of **product association with an accredited CME program**, which may be a difficult issue for the Lundbeck Institute in order to get such a national or international organisation approves the e-learning project. This is also why the HCI-Research Group mentioned, in the Knowledge Acquisition scenarios, the possibility of cooperating with a renowned university within the e-course and e-seminar activities (see also the accreditation chapter 4.4).

The dissemination scenarios can be summarised into the following list:

- Subsidiaries/ Local Representatives,
- Local Introduction Meetings,
- Local Initiatives,
- National and International Organisations and
- University Partners.

2.1.3. Quality Circles and Building Partnerships

In conclusion, the HCI-Research Group sees all the scenarios of knowledge acquisition and dissemination strategies as non exclusives scenarios, which also hold the possibility for stepwise implementation. (For more about which steps these could be, refer to the possible development models later in this chapter 2.4) Below is a figure (Figure 2), which provides an overview of all the scenarios and which illustrates how they together could support the establishment of quality circles / partnerships between the Lundbeck Institute and its target groups – GP's and specialists.

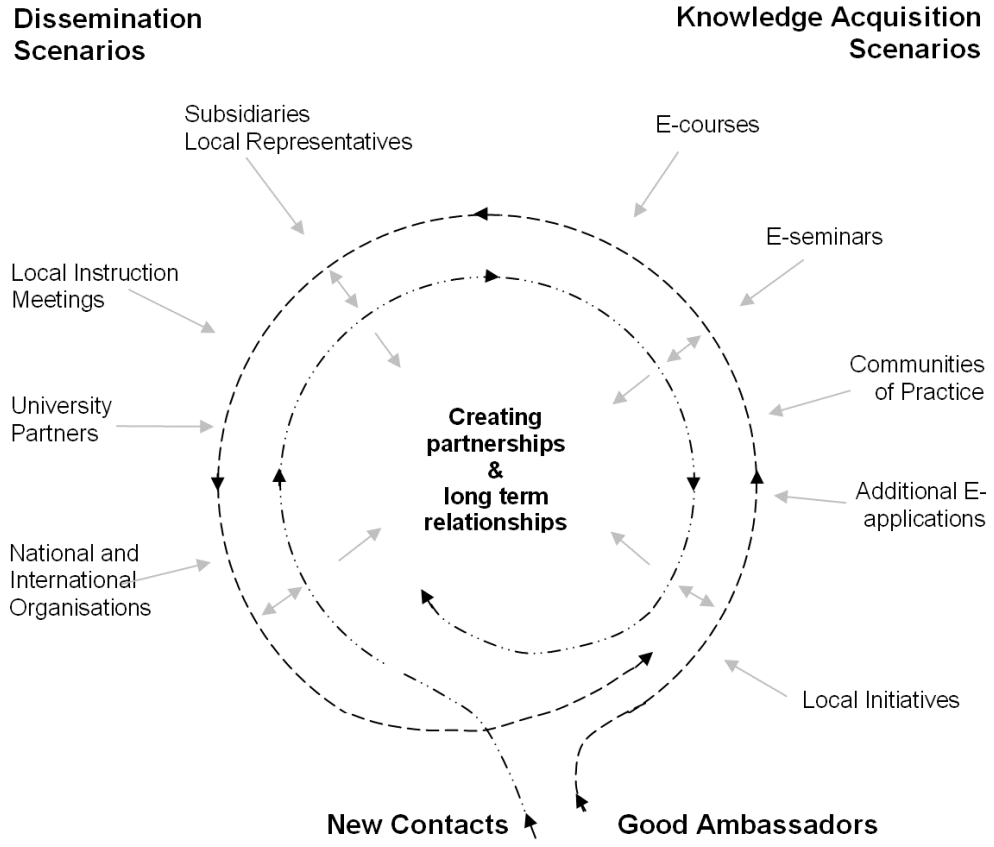

Figure 2 - KA-CHE Possible Development Scenarios

2.2. PROJECT ORGANISATION AND QUALITY ASSURANCE

This section contains suggestions and considerations regarding establishment of a project organisation, partnership opportunities, and subcontracting and particular issues concerning quality assurance for a continuation of the KA-CHE project.

The recommended project organisation is shown in Figure 3. It is suggested to implement the project organisation in a structure that 1) gives high priority to close co-operation between partners, and which 2) seeks to establish a rigorously net of quality assurance measures including user involvement. This second point is

illustrated in the figure primarily by use of the Cascade, here user groups from the groups of specialists and GP's can be formed as well as members of faculty or national and international organisation could participate in quality assurance activities. **The project organisation in the figure is described by competencies and functions, not by persons**. This means that one person can have more than one function in the project organisation. E.g. a person who is part of project management can also be part of the internal steering group as well as part of the project group.

The figure also demonstrates how the proposed mutual project organisation consists of an external steering group, project management and a shared project group. Superior to the project is a quality management group. The tasks of the quality group is to maintain the quality specifications concerning the professional quality of content: **Representatives of the Lundbeck Board and representatives of the Lundbeck Faculty, national and international organisations and accreditation council**s, as well as the quality of pedagogic, interaction design and use of media in relation to the educational objectives: **users and educational professionals**.

The HCI-Research Group supplies with knowledge and experience on all aspects concerning design and production of learning environments and applications: user analysis, pedagogy, interaction, use of media and interface design, usability test etc. Further the HCI-Research Group can provide contacts to possible partnerships and cross-cultural research networking due to the relations of the group in North America, Australia and European countries etc. The HCI-Research Group also have a large network of students who have years of experience in human-computer interaction. Off course the scientific research that the HCI-Research Group performs, will be of relevance to the KA-CHE project as such.

2.2.1. The Steering Groups

The internal steering groups of the Lundbeck Institute and the HCI-Research Group will have general tasks like:

- Follow-up on the progress of the project according to the time schedule
- General follow-up on the quality of the project
- Decide upon eventual deviation from contract and project plans, including the time schedule

The resources in the internal steering group at the Lundbeck Institute must at least be the project chief, competences from the project management and other people who are responsible of the success of the project.

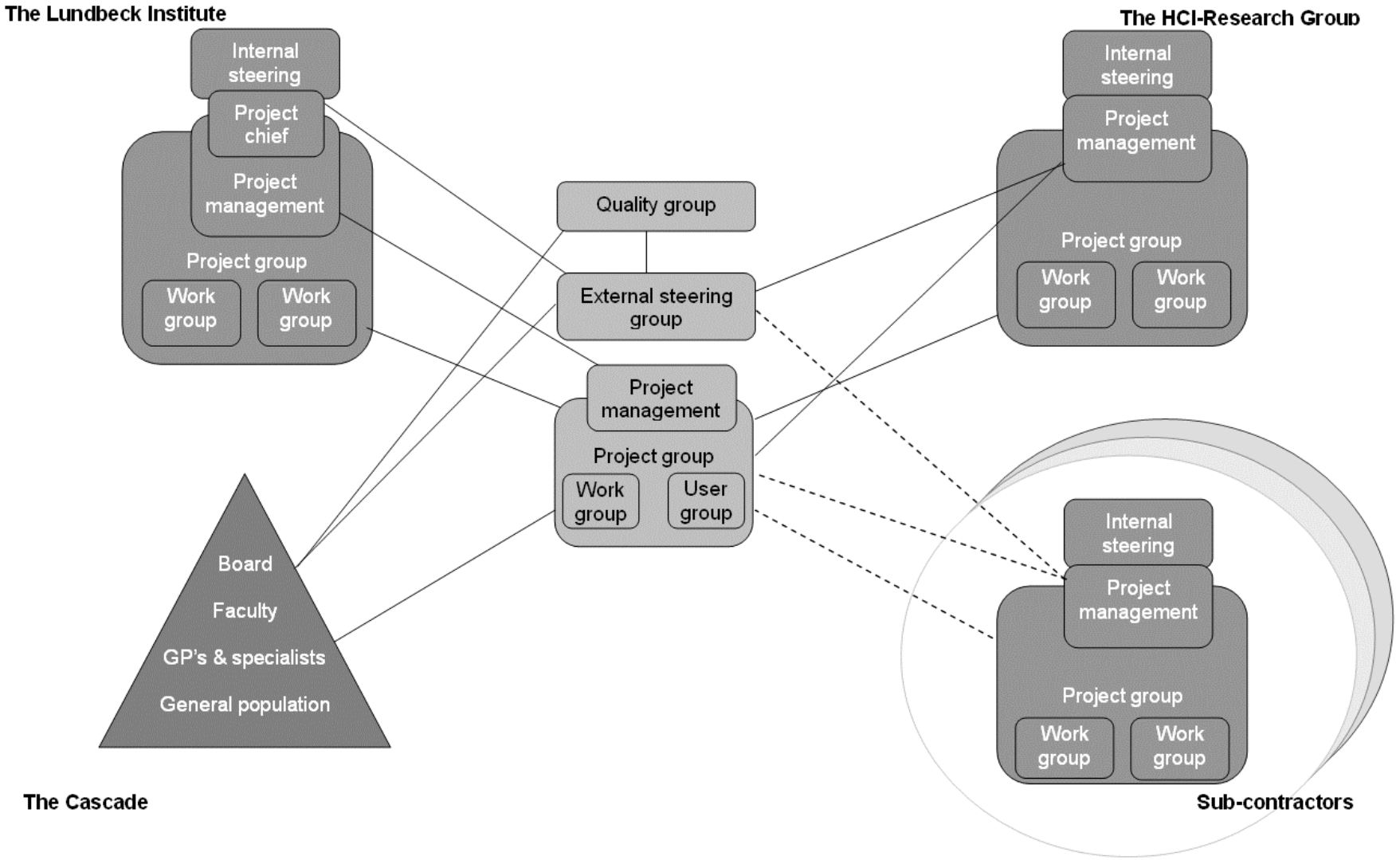

Figure 3 – The Project Organisation of the KA-CHE Project

We suggest that in such a large project, signing on/off agreements should be made a part of any contract, so that both continuation and discontinuation of the relationship is possible. In this instance, copyright agreements to both software and content, as well as the academic part of research results have to be agreed upon prior to the signing of a contract.

2.2.2. Project Management and Project chief

The project management is situated in the individual basis organisations and in the project organisation, but should be maintained by the Lundbeck Institute itself. Thus the responsibility of the KA-CHE project is located within the project management and the project chief at the Lundbeck Institute according to the contract and in accordance to the daily steering tasks. The mutual project management group should consist of the project chief and at least one person from each contractor: The Lundbeck Institute, HCI-Research Group and other relevant sub-contractors / suppliers.

The project management at the Lundbeck Institute will refer to the project chief, who must be at least one fulltime allocation of resources as the daily tasks will be rather extensive. A project the size and type of KA-CHE is generally considered as a **high-risk project. Therefore we propose that Lundbeck Institute divides the project management assignment into three competences**. 1) Managerial and administrative competences that enable the management to take responsibility for the project in terms of contract, cooperation, progress and quality. Furthermore the project management must have primarily 2) content matter knowledge and knowledge about the users, as well as 3) technical expertise, enabling solid decisions regarding technical and content matter accomplishment of the project.

2.2.3. Project and Workgroups

The project managers and selected representatives from each contractor participate in and constitute the mutual project group.

Project groups in the basis organisations, as well as in the project organisation, constitute the link between the steering group and the individual working groups. Competences of the Lundbeck Institutes project management should be attached to the Lundbeck Institute project group together with representatives from the different involved professional groups. The competences of the project management of the HCI-Research Group project should likewise be attached to the HCI project group.

The individual project groups are subordinate to both the internal project group and the external steering group. The project groups are responsible for the daily administration, organisation and control, within the frames defined by the external steering group. If it is considered necessary, a project group can establish internal working groups with responsibility for a concrete activity. These working groups are closed when the activity is finished. The participants of a working group are professionals within specific areas or resources in the project group with specific competences to the area. Procedures according to tasks, manning, reporting etc. will vary through the lifecycle of the project.

2.2.4. User Groups

The success of the KA-CHE project depends on involving users during the design - and production processes.

As the users – coming from all over the world – obviously will possess different cultural, social, professional, geographical, technological and economic sets of values, **the KA-CHE project is vulnerable to misjudging of users needs, preferences and usability issues.3** As an example, it is important to identify the basic knowledge of the users, whether they express their knowledge primarily as linguistic and/or cognitive qualifications, as empathy, senses and emotions. This information is a precondition for performing any pedagogic - or interface design.

To ensure an appropriate product from the KA-CHE project, it is thus important to **involve users as early as possible**, as much as possible and as differentiated as possible.

2.3. RISKS AND ECONOMICAL CONSIDERATIONS

In the continuance of the KA-CHE project, the Lundbeck Institute has to consider risks involved in the project, as well as evaluate which factors, e.g. technical features of a system, dissemination strategies, user design requirements etc. can be classified as a need-to-have or a nice-to-have basis. Throughout the rest of the report we have pointed to areas and raised questions that need further investigation in a user analysis phase and design requirement specification phase. We would like here to draw attention to the following issues, where the expectations and economical consequences are particularly important to consider during a decision and budgeting phase and continue to refine during the analysis phase.

The Lundbeck Institute may choose to make e-learning a major part of their strategic area. Though such a decision has large economical consequences, it is vital to make more than budgeting considerations. **The impact on current activities**, the institute as a whole and each individual employee's tasks, as well as the scheduling and acquiring of necessary in-house competencies for running the project is vital. Also, the Institute has to consider whether for example the accredited part of the e-learning activities (the e-courses and the e-seminars) should be **user charged or paid by the Institute or the subsidiaries.**

The KA-CHE project will involve many subcontractors, at different stages of the development as well as during maintenance and update. Ensuring the continuity of such a long term project depends on the project organisation structure, particular the **handling of documentation and knowledge sharing.** A scarce documentation strategy could be problematic if a partner, or just a person, leave the project – not necessarily due only to unforeseen departure of persons with crucial knowledge of the project, but also because partners will come and go throughout the project period, and need to communicate their project result to others, who can continue the work in their field of expertise. On the other hand a detailed level of documentation is very costly to produce and maintain, particular measured in man-hours, but also by

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[3] Christensen et al. (1993): *Projektstyringens problemer og værktøjer – fra kaos til resultat* [eng: Problems and Tools of Project Management], 2. edition, Jurist- og Økonomforbundets Forlag, Denmark

establishment of a knowledge sharing culture / knowledge management system, that may be useful for the Institute to draw upon in their implementation, operation and future development of the system.

Such lower and higher boundaries for when to invest in the project capacity or features of the final product are also relevant in other issues. For example, we have found that everyone we talked to at the Lundbeck Institute pointed to that even though an effort has been made to acquire knowledge about the target group of general practitioners, **not enough is known about the GP's in general, and nothing is knows about GP's as a user group**. Using traditional marketing and target group analysis, will not give us any knowledge about the GP's needs and how they will use the e-learning system, because these analysis do not contemplate learning models, design and usability. Investing in marketing surveys will tell us about the GP as a segment of potential and this has to be complimented by investigations of GP's as users, - participating in learning, communicating with peers etc..

The learning models and pedagogical tools have to be adapted to the learning goals of the Lundbeck Institute and the accreditation strategy chosen, and these issues needs consideration in order to exist in harmony. For example the HCI-Research Group understands that it is important for the Institute to obtain and maintain a long term relationship, a partnership, with GP's and specialists. We understands it is important to **obtain change in attitude** and perhaps even change in behaviour, but also that **provision of the latest knowledge**, and providing awareness and recognition of diagnosis and treatment are in focus. These overall goals require **very different (e-)learning strategies** and also accreditation strategies. Different perspectives to learning afford different design solutions, different user groups. The design and requirement specification should for example be able to answer: whether accreditation will be given on the basis of active participation, should accreditation be giving as mean of getting the GP and specialists to reflect upon their own attitude and behaviour (as is done in the seminars currently), and if a course participant at Lundbeck Institute may risk not being accredited?

Choice of Learning Management Systems (LMS) is also a risk area, since the choice of an appropriate LMS depends on the needs and future development potential of the system. On the short term it may seem cheaper and at a lower risk to buy a standard LMS. However, if the LMS does not provide the adequate support for the users and the Lundbeck Institute needs - e.g. capacity (number of licenses), features available (media usages, broadband, server solutions), errors / up-time - this may in the long run end up more expensive to correct, maintain and operate.

In the following section a number of **implementation strategies** are shown, and depending on whether a large scale project or a smaller prototypical implementations strategy is chosen, different economical consequences have to be contemplated. One issue of great economical influence is the decision to have a one language (probably English), one format, and same content for a worldwide market strategy, i.e. using an internationalisation strategy or if there is a need for having several national adapted solutions, i.e. using a localisation strategy[4].

[4] England, Elaine and Andy Finney (2002) Managing Multimedia – project management for Web and Convergent Media, third edition 2002, Addison Westley.

If accreditation of e-courses and e-seminars are of great importance to the Lundbeck Institute, accreditation at the same also represent a high risk area. Not only are standards under development, and it could thus be very difficult to foresee the necessary design decisions in order to achieve accreditation once the standards have been endorsed. It is also possible that new demands, due to for example laws and regulations, mean that the accreditation standards changes, particularly it seems that two issues are relevant to notice: 1) in CME, product independence seem more and more vital, 2) in any e-learning activity security and privacy issues have to be under very strict control prior to any form of organisational or university approval.

2.4. POSSIBLE DEVELOPMENT MODELS

The intention of this part of the report is to outline the tasks, the next steps and their internal relations in the KA-CHE project - the specification phase. By focusing on different implementation strategies and the interdependencies between questions, research, analysis and decisions, as they are linked together in the specification phase, this part of the report points to a series of questions that now need to be investigated further, in order to progress the KA-CHE project.

2.4.1. Implementation Strategies

We have proposed a range of possible scenarios and aspects concerning the target group/user analysis, which points at a series of questions that help us describe possible implementation strategies.

How do we choose to implement scenarios?

The figure below shows four possible scenarios:

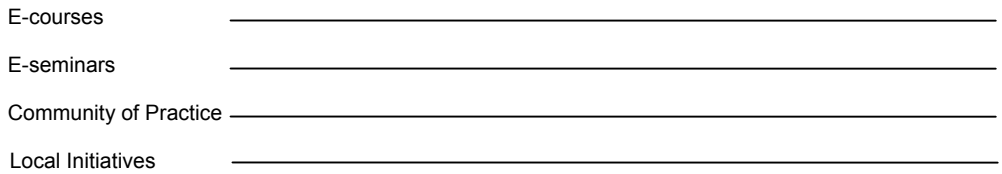


Figure 4 – implementation by application type

We may choose to implement one scenario and not the others, or we may choose to implement all. Most of all this is a question of the resources available.

Do we want to make a pilot first, or go for a full project right away?

If the analysis in the specification phase comes out pointing at important insecurities, a pilot might be a very sensible choice. If on the other hand everything seems straightforward and the time schedule is considered to be the major risk factor, then going for a full implementation right away, might be a sensible choice.

Do we want to reach a specific segment of the users or do we want to reach further?

Independent on the choice of scenarios, users can be divided into segments according to different criteria. The purpose of this division is that the individuals

belonging to a specific segmentation are expected to be able to benefit from the same educational solution. Therefore the criteria(s) chosen must be the one(s) that most probably ensures the success criteria of the whole KA-CHE project.

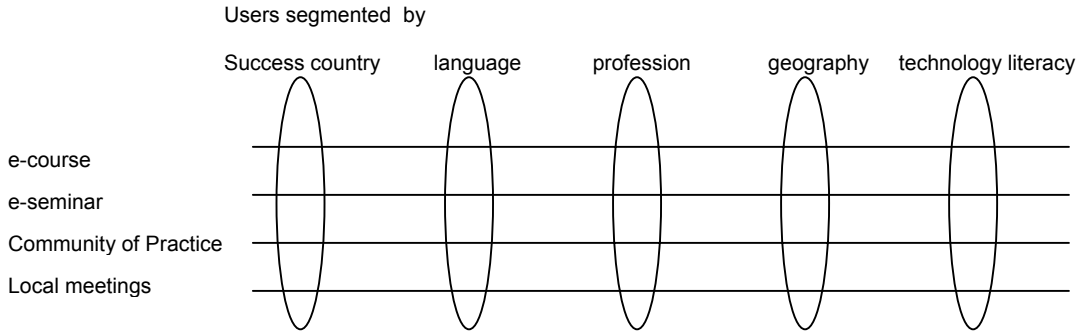


Figure 5 – Implementation by user segments

The figure shows five divisions after the following criteria's: Countries where the chance of having success is big, language, profession (GP, Specialist), technology literacy or geography. At this point the choice of implementation strategy starts to become complicated and a matter of risk. That is why we stress the importance of thorough research in order to ground decisions. The criteria for segmentation of the users, and the consequences these segmentations imply for the pedagogy, LMS strategy and design of interaction and user-interface, are not a matter of decisions grounded on opinion – it is a product of knowledge gained from the user analysis.

If we start with one segment - i.e. all English speaking – can we then be sure that all English speaking learners in the world who Lundbeck Institute wants to reach, have enough in common culturally, in their professional conception of mood disorders, in personal learning style, in access to the internet etc., that it is reasonable to expect that they all can all benefit from the same educational solution?

If it is reasonable to expect one solution for English speaking target groups, is it then possible to expand the solution to other language groups in the same form, but just translated?

If the answer is yes, we must aim at a solution that can be internationalised. Internationalisation means that all aspects of the design is prepared for translation into any language, and the style of addressing users in any way (visual, formulations) is totally anonymous in order to avoid misinterpretations. Choosing an Internationalisation strategy makes it easy to update the solution, but the cost is very strict limitations on the amount of text (some language take a lot more space than others), on visual design (the reading direction is different in the Arabian world and the far east) Internationalisation means creating a shell where all is foreseen and which can therefore handle any variation without crashing. A risk, because to miss important aspects can be a very costly affair later in the process.

If the answer is no, we must aim at a solution that incorporate localisation. Localization means designing specific solutions to specific segments. With this strategy it is easier to adjust to language and cultural differences, but it is more difficult to update as we now talk about several separate solutions.

Can we expect the target groups to share learning style?

Depending on the answer, there could be several strategies according to choice or pedagogy.

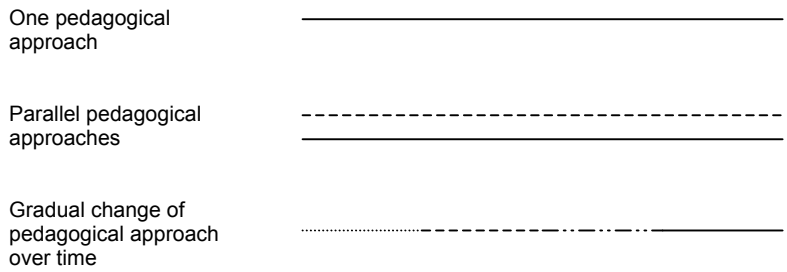


Figure 6 – implementation by pedagogical approach

2.4.2. Specification Phase and Next Steps

In the report we have stressed that knowledge about users/target group is essential for the KA-CHE project. We have thus listed a range of aspects, which are considered important.

The figure (Figure 7) demonstrates the major categories and their relations within the specification phase. In the sub-phase of defining the goal, we work with the formulation of the goal. The goal should be formulated as an output of specifications for the next sub-phase, where the pedagogical strategy is specified. Only after this work is done, it is possible to formulate specifications for the design of solutions.

Of course the full specification phase is progressing towards its own product, i.e. a specification report, which is the basis for the work in the design phase that comes after. However, within the sub-phases the processes are iterated before formulating the output for the next sub-phase. This is because significant insight will be gained as the process unfolds, and because many aspects might come as surprises – therefore space for adjustment and rethinking at this stage is very important.

In a project this size and extension in time, it is only possible to stage phases, focus and tasks in a general way. What we DO know about this kind of projects is that the work in the phases of **concretisation (design and production) is utterly dependent on the work done in the specification phase**. The specification phase therefore has to be very thorough, in order to ground the planning of the succeeding project, as well as being a tool for adjusting the project to unexpected circumstances that most likely will appear later on.

METHODOLOGY

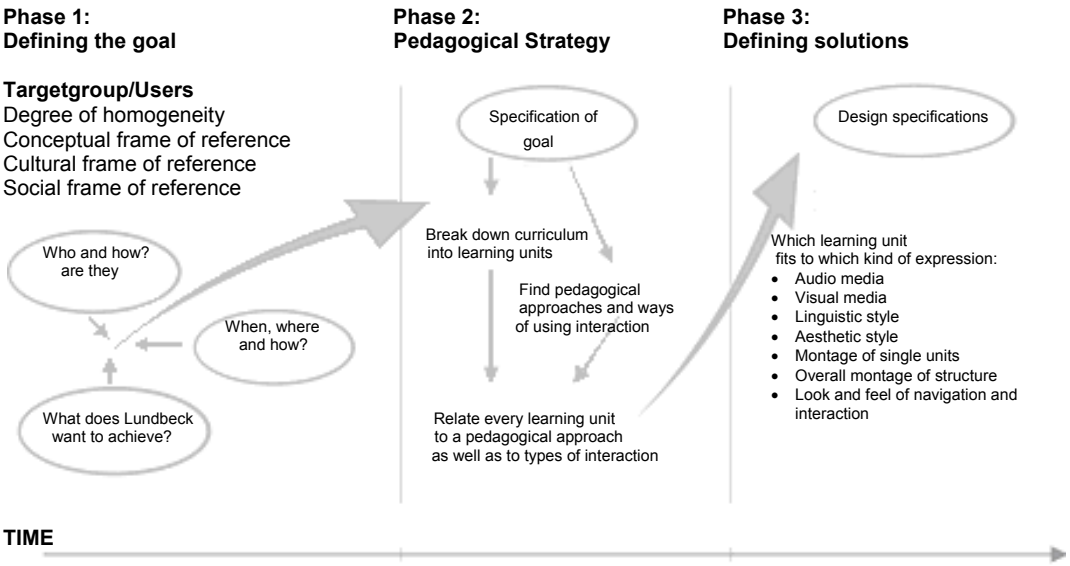


Figure 7 – Specification Phase

In **sub-phase 1**, the figure shows that the output is a product of the correlation between the three major areas: 1) target group/users, 2) the commissioners (the Lundbeck Institute) goal and 3) the environment of the project in a broad sense.

Examples of the questions when analysing the target group/users will be:

- How do we find people for the analysis
- What are the criteria for selecting a sample among the users
- What do we want to investigate about these people
- How do we collect the data
- Which kind of data do we collect
- Who performs the investigation
- How do we process the data
- ……

All these questions have to be decided upon in order to design and perform the target group/user investigation.

Before this can be done, it is essential that Lundbeck Institute specify at this point in the process and as far as possible, questions like:

- What do we want to achieve:
  - Learning goals
  - First overall strategy of choice according to the proposed possible scenarios
  - Commitment to Lundbeck products (CME, medicals etc.)
- What are the resources available:
  - Time
  - Competences
  - Economy
  - Where are resources (people) located?

        - How is the priority and commitment of the KA-CHE project within Lundbeck as an organisation?
    - How is the distribution of resources along the projects lifecycle?
    - …….

Specification on these questions, provide the basis for decisions about the design and performance of the target-group/users analysis.

The output of the target group/users analysis and the resource-framework provides the basis for beginning to specify how, when and where the users could use the CME. With a couple of iterations, the resulting output provides material for the next sub-phase.

Sub-phase 2 involves research into and decisions in relation to the strategies of implementation, earlier mentioned in part 2.4.1. The answers to these questions and the decisions made in this part of the specification phase, produces the output of sub-phase 2, upon which the work in sub-phase 3 must be grounded along with knowledge of the chosen user group's familiarity and access to pc's and the internet.

The major questions in **sub-phase 3** narrows down the scope to the concerns of the pedagogic strategy:

- Decisions about the pedagogical strategy
- Overall specifications of the solutions proposed
- Specifications of demands to the LMS.

2.5. CONCLUSION ON THE PRE-PHASE PROJECT

The proposed scenarios point in various ways to how to realise Lundbeck Institute's learning objectives. These individual scenarios can be carried out independent of each other or thought into a more coherent solution that takes into account the development of Lundbeck Institutes long term goals, such as creating basis for a growing Community of Practice and participant's continuous involvement with Lundbeck Institute. Another important aspect to consider now is the overall combination of e-learning and other Lundbeck Institute CME-activities. **If Lundbeck considers e-learning to be an important strategic achievement, at least the following areas must be thought through and decided upon:**

- What is the role of e-learning compared to the current CME activities?
- Can e-learning be integrated directly into the current CME activities, or do these activities have to be adjusted?
- Is e-learning implemented into the CME strategy by allocating extra resources, or do e-learning and other activities have to share the current resources?

A project with the size and scope of KA-CHE is generally considered to be a high-risk project both in terms of managing the process and in terms of actually producing the right product. We have proposed ways of designing the project organisation and quality assurance, as well as methods of integrating users in order to meet these challenges.

By going into different implementation strategies and the interdependencies between research, analysis and decision-making, we have tried to concretise the processes behind the risk evaluation.

By going into the chronological interrelations of the specification phase and its sub-divisions, we are proposing how the project organisation and quality assurance, at a concrete level, can meet the challenges of being in a high-risk project.

3. THE LUNDBECK INSTITUTE ACTIVITIES

This chapter should be seen as the HCI-Research Groups analysis of the Lundbeck Institute's context, needs and visions regarding the KA-CHE project as we saw them appearing at the institute prior to the initiation of the pre-phase. It is not intended as a historical view of the Lundbeck Institute, thus the chapter presents issues that we have seen as important for the establishment and success of the institute's current activities, and a brief mentioning of some of the visions that we found in the organisation. Some of the information here is obtainable from public available material, but the vast majority present perspectives from the HCI-Research Groups analyses, based primarily on meetings and interviews with the Lundbeck Institute.

3.1. CURRENT ACTIVITIES

The Lundbeck Institute was founded in 1997 as a non-product related - educational initiative of H. Lundbeck A/S. The vision is to: "*Through educational activities to contribute to improve quality of life for patients suffering from psychiatric and neurological diseases*" (From a Lundbeck Institute folder, presenting the organisation and its activities)[5]. Furthermore the goals of the Institute are: **to reach consensus within diagnosis and treatment, to educate and to establish networks in between the target groups (of GP's and specialists) and between their target groups and the Lundbeck Institute.6**

The Lundbeck Institute are fully dedicated to **non-product related activities**. During our meetings with the Lundbeck Institute we have found that product-independence is stressed as the important factor by the whole institute and saturates its activities and culture. However, it is also clear that **H. Lundbeck plays a significant role, with respect to the Institutes financial scope and also the general identity.**

3.1.1. The Cascade

The Lundbeck Institute uses a model named the Cascade. The Cascade illustrates the vision of the Institute. The vision is that through a well established network consisting of hierarchical levels, they are able to reach all the way out to a broad spectrum of the general public. Figure 8 illustrates the different levels in the Cascade.

The Board of the Lundbeck Institute is at the top of the Cascade and is consisting of three people from H. Lundbeck and four people from the Neuroscience Foundation. The Board is placed on an two-year contract.

[5] Lundbeck Institute Folder: Red information folder about the Lundbeck Institute, publishing year unknown, Lundbeck Institute.

[6] **Consensus:** To achieve consensus in an international forum on how to improve diagnosis, treatment and compliance in CNS diseases. **Education:** To develop practical and supportive educational elements for health care providers within CNS. **Network:** To build and maintain partnership and a network with specialists within CNS. (From same Lundbeck Institute presentation folder)

The Faculty consists of 91 very prominent specialists (and two GP's) from all over the world. The faculty supports the Institute, for example with content and quality assurance of content, and represent in the mind of HCI-Research Group an important of the successful implementation and dissemination strategy that the Institute have with its existing seminars. The Lundbeck Institute spends significant resources to ensure communication and dialogue with the faculty, and is aware of the necessity of building and maintaining the relations, e.g. by inviting them not only to yearly faculty meeting (taking place over 2-3 days), but also on a personal level, by remembering birthdays etc.

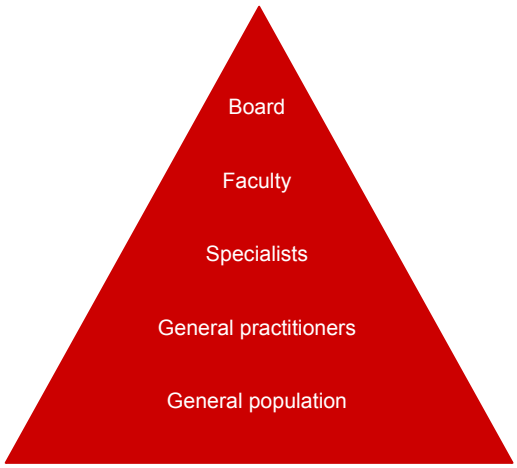


Figure 8 – The Cascade[7]

Seminars

The existing seminars are the spearhead of the Lundbeck Institute activities. They are held in Skodsborg, Denmark where approximately 25 "top seeded" specialists participate each time. More than 1.500 people have participated in such seminars. **Having been on a seminar the specialists** are offered to participate in network meetings at conferences, receive newsletters etc. **They are also encouraged to organise local workshops.**

A survey has been made giving data about the number of specialists organising workshops, the number of workshops held, and the number of people participating in them,. But very little is known about who the participants are, if there is achievements of better diagnosis and treatment for patients and if there is a diffusion of knowledge to the rest of the cascade. However the survey did show that quite a large number of the people responding are interested in conducting such local workshops. These findings suggests that it is **worth while investigating if the organisation of workshops could be enhanced and if some advantages could be drawn from further supporting these specialists.** This would ensure both higher quality of the workshops, but could also be a way to get into closer contact with the people participating in the workshops;, who they are, why have they come, are they interested in more information, in courses etc. It would also give us more

[7] Adapted version of figure in the Lundbeck Institute Newsletter, August 2002 , p. 1, here based on the interviews performed describing the placement of the board and the faculty in the cascade, thus the figure now has a target group perspective rather than activities performed focus.

knowledge of the local workshop organisers; what they do for the mission strategies of the Lundbeck Institute, i.e. are they good ambassadors for the Institute or …?

Even though highly successful**, the seminars are also bottlenecks in the Cascades** dissemination strategy. There are two reasons for this, the primary being that with 25 participants per seminar a bit more than 1.500 have participated so far, and this is a small number compared to the target group size of specialists. Secondly, even though around 30.000 people have participated in local workshops, only a few of these are (probably) GP's. GP's are among the users of some of the other activities the Lundbeck Institute offers, e.g. the CNS-forum or the small booklets, which the Institute publishes, but these are all more passive types of information up-take, or CME offers, and do not create the same commitment to change behaviour and attitude, nor do they establish long term relationships to the Institute, as the seminar have a reputation for doing. Besides, in general people from the other large target group, the group of GP's are rarely reached.

Other CME and on-line activities

The Lundbeck Institute has initiated and implemented several CME activities as well as a patient communication network (DepNet). The activities are very different, as they vary in matter of target groups and interaction form. The main activities are:

- **CNS-forum**, a professional website containing news and knowledge on evidence-based medicine in psychiatry and neurology. According to the website it is aimed at optimising the daily work of CNS healthcare professionals by providing non-product related information and an opportunity to exchange knowledge and experiences on-line.[8]
- **Luinst.org**, the Lundbeck Institute's homepage. It contains information about the seminars and other institute activities, the drug database **Psychotropics** and structured information about CNS diseases (via deep links to Brain Explorer – see below). Within the context of Luinst.org there has been arranged "meetings of minds" sessions where experts discuss topics of current interest. These sessions have been motivators for letting other users of CNS-forum begin a dialog on these concepts.
- **Brain Explorer**, a stand-alone application that runs via the web (for definition of this concept see 4.3 Pedagogical description of CME stand-alone applications on the web). It is thought as a educational tool explaining the brain functions and its disorders. Even though it is aimed primarily at GPs and specialists in training /medical students, it is accessible by everyone.
- **Booklets,** describing different subject within psychology and neurology. Currently a handful of publications are available and the latest edition contains information which is primarily targeted at GPs. They are, from what the HCI-Research Group has learnt, quite popular. E.g. when the booklets are brought to conferences, the stock is cleared out quickly. The booklets are written in a quite easy to grasp language, have a clear set-up, and since they are also relatively small in

[8] source: http://www.luinst.org/cp/en/CNSforum, 2002

size (volume wise - the booklets have a format of around 10 *15 cm and have approximately 60-70 pages), they may reach a broader audience as electronic versions as well.

- **DepNet,** is a site that is targeted at individuals, namely: patients, family and friends as well as individuals, who think they may be depressed. It is a forum in which people can chat, exchange experiences and gather information on depression. There is also a mailbox feature, where an individual may describe how they feel, live or any questions they may have. The answers come from a panel of medical professionals, patients, a welfare worker, a clergyman as well as from the Depression Association.[9] With DepNet the Lundbeck Institute seeks a direct link into the base of the Cascade. The DepNet site is implemented using a localisation strategy, i.e. the site run using the national language, professionals etc. of the country it is implemented in.

As described in the previous chapter (2.1.1) it is possible that these applications may support the e-learning initiatives, depending on the learning goals and chosen strategy of the Institute. It may also be that the applications are explicitly chosen to be independent activities that are covering other areas or other target groups than GP's and specialists. Nevertheless, if the existing seminars as well as the e-learning project represent CME initiatives that are chosen to be the main strategic area of the Institute, it is important that these other CME activities (as well as those which will come in the future) are not, at least, in conflict with the main activities. For example, even though the CNS-forum may quite readily co-exist with the CoP initiatives described in the knowledge acquisition scenarios, it may not be particularly economical or in the best interest of Lundbeck Institute to maintain two fora for discussion and interaction. A possibility may be to merge the features of the CoP into the facilities of the CNS-forum or vica versa depending on what provides the largest flexibility.

3.1.2. Existing Learning Models and Pedagogy

This section gives a first analysis of the learning models and pedagogies we see applied at the seminars and through the workshop manager at the local workshops. This evaluation is quite scarce as the pre-phase project did not involve a full analysis of the seminars. However, we are able to raise some critical issues that need further reflection and investigation, particular in connection with the e-learning project. This gives us input to both the re-use discussion in the following section as well as the scenarios presented in the previous chapter.

Seminars – Influence of the individual

Through our interviews and by studying the day-programs of the seminars, the HCI-Research Group learnt that active group sessions, containing exercises and case discussions are important fundaments of the pedagogic chosen. Another prioritised activity, (or rather we can see that it is allocated quite a lot of time) is the "meet the expert" sessions. We understand that similar features are important for the activation

[9] source: The Lundbeck Institute newsletter, August 2002, p. 6

of network evenings and discussions carried out at the "meetings of minds" at the luinst.org

But what happens when such a large number of experts are brought into a seminar, which types of subject points are given to the students, the ones supporting the seminars learning objectives or the ones of the expert? It may be that the experts are in agreement with the learning objectives, and that much co-operation between the seminar organiser (the teacher that is, not the administration) and the expert take place prior to the actual activity, thus assuring a larger degree of alignment. However, it may also be that quite different things are talked about, than what would have been mentioned by the teacher.

In our own university teaching of both under graduates, graduates and adult master educations, we (the HCI-Research Group) have experienced, that the students / participants find it quite motivating and very interesting to have "guest lecturer" visits, whether the expert is a well-known research professor or a well-reputed person from the industry. As professional teachers we also find that sometimes these **guest lecturers, however qualified they may be, talk them selves out of an argument or point**, which is important for the topic of the session. This is simply because they are not familiar with the whole content of the course/seminar and hence the value of this sessions to the whole course/seminar.

It should thus be of high priority for the Lundbeck Institute to consider what their primary objectives are. I.e. it may be that the Institute would consider **compromising the learning objectives and the continuity of the seminars, for the participants feeling of getting interesting and stimulating expert visits.** These considerations are true for both the existing seminars and the e-learning project.

However, before we are able to say something concrete about the actual pedagogy of the seminars in the light of the e-learning project, it **is necessary to perform a more in depth investigation** of a number of topics:

- How does the group work run – do the participants work alone, are there moderators present to support the discussions etc?
- Are there any follow-up on the group work – and not just presentation of what took place, but critical reflection on what happened and why?
- How are the pre-seminar data gathered, and the concurrent and post-seminar data from evaluations, and base-line questionnaires used? E.g. we can see that in one of the seminar programs, there seems to be a systematical comparison with the base-line questionnaire after each group work session. However, what does the comparison lead to, and may the neglection of this activity in the other seminar programs simply be because the level of detail is different?

Workshop Manager –Current Knowledge vs. Change of Attitude and Behaviour

At first the HCI-Research Group would like to give an evaluation of the immediately impression when working with the Workshop Manager:

Content and form of slides:

- Seems quite easy to grasp (which is somewhat surprising for us, who are not educated doctors or specialists – but sometimes the "straightforward knowledge" are the most difficult to get people to live by, so if this is the intention the knowledge provided seem to be given in a very neat and precise way)
- However there are no notes, giving the "full story" or back ground information to the stated facts of surveys, making it difficult for others to present the information in the intended way and making it necessary for people to re-think the concepts, which have already been thought upon in the making of the slides.
- There is no description about how to use the slides in a pedagogical manor
- There is no description of the teaching goals, or intended visions when making the slides

Video clips:

- Again, there is a lack of notes on learning goals, objectives and idea of the video.
- And since the video are drama / rich narratives it must be difficult / time consuming to think about the ways that they could be used for the network specialists planning a local workshop.
- The nature of the video clips is again rather simple and it is often quite clear to us, with an untrained eye, what patient are saying and are not saying. This simplicity may work extremely well as a discussion media. Overplay and exaggeration can make people remember their own cases in their practice/ hospital and may lead to further examples, or can help a lecturer make a point from a theory / model or survey. But is has to be used consciously, and we can not see from neither the workshop manager or from the seminar programs that this is the situation.

When analysing the seminar program, the workshop manager and the data from the interviews, it seems to the HCI-Research Group that **even though the stated objective are change of attitude and behaviour, the material and the activities focus largely upon providing current knowledge.** The slides provide a lot of factual information, results from survey etc, but there are only a few slides on how to plan and stage group work and follow-up on these, on conducting discussions and getting a dialog started between the participants. It is these latter kinds of activities that are important and necessary if changes in attitude and behaviour are wanted. The processes of working with the current and up-to-date knowledge becomes the Alpha and Omega, and it is therefore important that questions are asked in the group work sessions, an exercise is stopped if it has taken a wrong turn and a dialog about what happened is initiated, rather than have focus on disseminating numbers from a survey (however important such surveys are as material for grounding the participants and creating a base-line for a dialog).

The format of the workshop manager and the seminars make the HCI-Research Group raise the following two issues, in respect to the local workshops already held:

1) Since it looks as if there are only 30 min. available in the seminars for presentation of the workshop manager. This time is probably

(though we do not know) used for introducing "how to use the manager" rather than "how to work with planning a lecture, teaching goals, working with points and examples etc."

2) Besides the 30 min. for the workshop manager, almost half a day is put aside for presentation techniques at the seminars. **Could it be that the local workshops conducted by network specialists (former seminar participants) are only in a presentation format (no group work etc.)?**

There seems to be room for offering e-learning courses for seminar participants on how to plan and conduct successful local workshops, with the intended learning goals: I.e. the kind of points and meanings that the Lundbeck Institute wants to generate, and not the objectives of a specialist. Though not necessarily colliding, they are perhaps not the same.

3.2. E-VISIONS

This section looks at three factors of the visions of the Lundbeck Institute (whereas the coming chapters take a more general CME, e-learning and interaction perspectives. First, we discuss the e-visions as the HCI-Research Group saw them appearing in the Institute prior to the start of the KA-CHE pre-phase project. Secondly, factors regarding the target groups of the Lundbeck Institute are discussed, pointing to the necessity of investigating the needs and behaviours of the users. Thirdly and finally a first evaluation of the possibility to re-use existing material is made, due to different comments during the interviews.

3.2.1. The Lundbeck Institute Visions (Prior to Pre-Phase Project)

The Lundbeck Institute has started an initial exploration of the problem spaces and possibilities for a Continuing Medical Education project in an on-line or e-learning environment. According to a presentation at the yearly faculty meeting the vision was: "*To create state-of-the art accredited CME programmes in CNS (central nervous system) which will become important courses for physicians on the Internet*"[10] Much of the issues mentioned here are based on that presentation, which was also given to the HCI-Research Group in our initial meeting with the Lundbeck Institute.

The use of the Internet are seen as a way to offer customisable, interactive, practice-based learning that can be accessed 24 hours a day, seven days a week, from anywhere in the world.. Furthermore the use of the Internet can meet the demand for **e-learning activities to keep tighter and better relations with the network specialists.** (An issue mentioned several times in interviews.) The HCI-Research Group also understood from our first meetings that even though an implementation may be carried out in steps, the goal is to have e-learning activities that covered the world market of both specialists and GP's.

[10] From the slides of that same presentation.

To ensure the users gets a full and effective CME experience, the Lundbeck Institute has formulated **7C's, which the e-learning activities should accommodate**:

1) Content - up-to-date, high quality and relevant
2) Convenient - whenever, wherever
3) Continuous - tracking progress
4) Collaborative - content provider/physician and physician/physician
5) Customisable - addressing unique needs
6) Case-based - relevant and practical content
7) Credits - ensuring the courses are accredited, where applicable

It was from the beginning of the process clear for the Institute that too little is known about the target groups and GP's in general, and specifically about the GP network. The Lundbeck Institute had already, prior to the pre-phase initiated investigations about the GP's and their needs of CME, for example from the survey from Medical Rader investigating "Unmet Needs in the Treatment of Depression". The survey shows that GP's in Europe feels unsure particular about some aspects of treatment and diagnosis, which could **be indicators of the need for and adequateness of a CME based e-learning project.** This is seen particularly in the document containing the written statements from the GP's, rather than in the tables collating the numbers of the survey of the different countries into tables and diagrams. Also, other studies find that GP's does not apply clinical guidelines and evidence based medicine (as can be seen in 4.4.1 containing literature reviews). However, since we, in the HCI-Research Group, are not experts within the medical subject areas, we will not here evaluate or even point to the medical consequences of these findings.

What these data does tell us, is that they are collected from a target group type of perspective and now, after the pre-phase and prior to decisions about design and system requirements, there is a need for more in depth analysis of the future users.

3.2.2. From Target Groups to Users

The types of arguments we have met in the Lundbeck Institute when validating the need for e-learning, are based on segmentation or a target group perspective. These types of data are vital when determining the target groups and their needs, enabling an actual buying of the product/service to happen. **Traditionally it is factors of cultural, social, personal and psychological nature, that has been used when trying to determine the way ones target group may behave in a buying process** (see the typical factors that should be investigated, listed in the table below).

The Lundbeck Institute knows quite a lot about the specialists due to their current activities. They also have experience in reaching hospital and private clinics healthcare personnel via the local workshops (though as stated earlier little is known about the consequence and the actual participants in the workshops). Now, the Institute is contemplating to expand from specialists to also GP's and from hospitals and private clinics to also general practises, and there are large differences between these two groups.

Cultural Factors	Personal Factors
▪ Cultural (geographical, national…) ▪ Subculture (localisation… but also learning culture, religious culture…) ▪ Social Class	▪ Age and Stage in the Person's Life Cycle ▪ Occupation and Economic Circumstances ▪ Life Style ▪ Personality and Self-concept or Self-image
Social Factors	**Psychological Factors**
▪ Reference Groups ▪ Family ▪ Roles and Statues – roles are the activities that a person are expected to perform, Statues are rules that are being imposed upon members in a group (i.e. rules about required accreditation)	▪ Motivation ▪ Perception ▪ Learning ▪ Beliefs and Attitudes

Table 2 - The Major Factors Influencing Buying Behaviour11

The HCI-Research Group presume that the specialists represent a very qualified group within the subject area, with a work related motivation from the beginning, and they may also have research interest in the topics presented and discussed in a e-learning environment. The GP's on the other hand, have a more broad perspective and need to keep them selves updated on a number of subject fields, thus the Lundbeck Institute may find that they are competing with several fields within CME than with the specialists. The awareness creating and dissemination strategies, i.e. activities that make the target group – the future users of the e-learning system – aware of its existence, the possibilities and the service provided are not a trivial matter. The buying process or the decision-to-buy process are quite complex when it comes to information communication technologies as a e-learning product, compared to more trivial industry products as food, clothes etc.

An e-learning project as it is envisioned in this report and in the frame of the Lundbeck Institute can be viewed as an innovation within the area. As such Rogers (see footnote 12) famous curve showing a percentage distribution of the diffusion of any innovations (Figure 9) point out that some people have a later adoption of innovations than others.). Comparing the Roger adoption curce with the Kotler cultural and social factors, we find that it may be interesting for the Lundbeck Institute to **begin with the group of early adopters and good success stories**. Based on the knowledge of the effect such success stories have, compared with the evolution of technology literacy, the long term aim is to get other groups on to e-learning at a later stage. A suggestion or strategy we have also heard voiced in our interviews with the Lundbeck Institute.

However, these are the factors Kotler and Rogers ascribe influence in a buying process. Though factors within these may be determining for the Lundbeck Institute with respect to which implementation strategy should be used (see chapter 2.4.1), there are other factors of relevance to the use context.

[11] Derived from P. Kotler (2002): *Marketing Management: Analysis, Planning and Control*, Prentice Hall, New Jersey, USA. The wordings in the parenthesis are added.

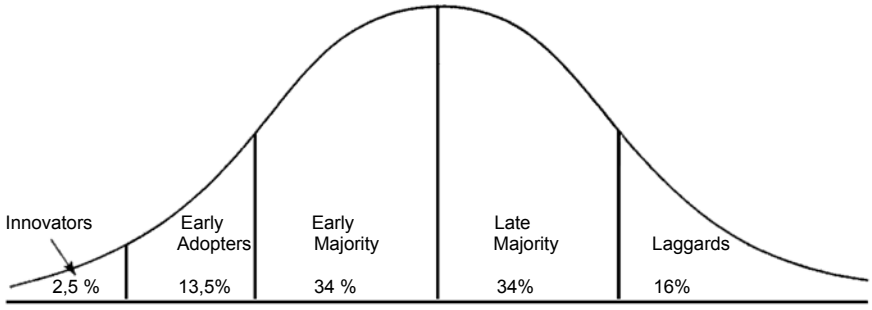


Figure 9– Adoption of Innovations[12]

Some of these factors are related to design and system requirements, where one has to clarify the problems of the e-learning project and identify future use situations. The design of a system has to fit its users, and here the concept of users is a much more refined term than just knowing the social status of ones target group. **A user is an individual with a particular learning style, interaction / communication preferences, with a way of acting and being and working and living.** A user is a person, not a group. In that setting of envisioning the possible solutions, a number of trade-offs and dependencies have to be defined, both from a user and a Lundbeck Institute perspective. These are factors that the HCI-Research Group have identified more clearly in the specification phase, and which represent the next steps of the e-learning KA-CHE project (see the specification phase in 2.4.2).

3.2.3. Re-use of Material

The material in available applications, such as the Workshop Manager and the BrainExplorer, which the HCI-Research Group is aware has been quite costly to produce, may be re-usable within the e-learning project, depending on the learning goals and strategies of the Lundbeck Institute. However, **the material as it is presented now is in a visually poor quality,** which may be due to a conscious choice of bandwidth-limitations of the user in Internet applications. It does not, however, explain the poor quality in for example the workshop manager, which is a CD-Rom application. In short, if the material still exists in their raw format, i.e. high-resolution format, some may be applicable for re-use.

The HCI-Research Group have identified the following issues / barriers (based on how the material appears in the workshop manager):

1) **Using long sequences** - The sequences are relatively long, which is seldom a good choice in an interactive environment. Because it is difficult to keep users motivated throughout long passive sequences, unless a video sequence is used as an introduction in a longer module/block – as for example patient case histories etc.
2) **Using short sequences** – When using shorter sequences users have the possibility to relate to and reflect upon the messages of the clip, e.g. by letting users themselves evaluate a patient prior to

[12] Figure 7-2, p. 262 in E. Rogers (1995): Diffusion of Innovations, Three Free Press, New York, USA, 4th edition.

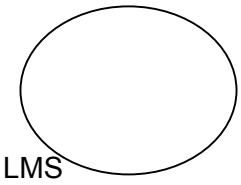
hearing the diagnosis of the specialist in the clip. However, in the HCI-Research Group opinion, the stories in the sequences available through the Workshop Manager are almost too obvious to be divided into shorter sequences (i.e. as non-professionals within the area of medicine we were able to quite easily evaluate the patients and their case history and provide the same type of diagnosis as the professionals in the movie).

3) **Using sequences with no clear learning strategy** – It may be difficult to apply the sequences, because there is no guidance in the material as to why this clip is made, what to look for and when it could be used. If no such considerations exist, they would have to be contemplated and specified prior to using them in any learning environment, whether e-learning or traditional learning processes. This may turn out to be more if not costly then certainly time-consuming than preparing new material from the beginning.

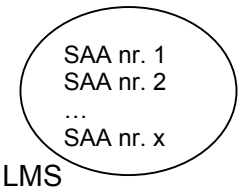
Lack of the details or sub-learning goals may turn out to be the most prominent barrier for re-using material. I.e. defining learning goals are not only essential for knowing the general outline of where one want the seminar, workshops or e-learning project to head towards. Learning goals are also necessary at a much more refined level in any form of mediation. For example within each section of this report the HCI-Research Group asked ourselves: what are the purpose here? What is it we want to say? What are the important points of this section that we would like the Institute to think about etc? In order to do this for the e-learning project the Institute needs to acquire fundamental knowledge about their target groups and the subsequent users of the systems being developed.

4. KNOWLEDGE ACQUISITION IN CONTINUING HEALTHCARE EDUCATION

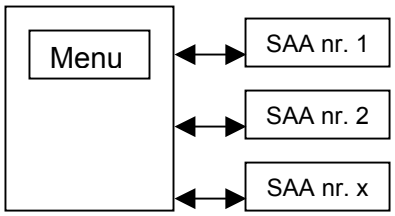
With healthcare education as point of departure this chapter provides an **overview from analysis of Learning Management Systems (LMS) and Continuing Medical Education as Stand-Alone Applications (SAA), seen in the context of the KA-CHE project.** Before turning to the subject matter, it might be useful to outline the difference between an LMS and a stand-alone application.



A LMS is a complex application designed to manage and administrate any kind of on-line education. A LMS offers facilities for communication among participants, structures for building and running courses and allows for integration of content from various sources.



Content could be different packages consisting of text, animations, video or SAA. A SAA is an individual interactive content package, i.e. problem-based cases or a multiple-choice test. Thus a SAA could be integrated within a LMS, but it does not have to be.



SAA can exist on the Internet as individual files, that can be accessed form i.e. a menu on a web page.

This is the way in which the SAA are organised on the www.docguide.com website that is referred to below.

In the HCI-Research Group analysis we have worked through a large number of applications and LMS platforms, the purpose being purely explorative, uncovering issues that need further analysis and investigation prior to making a requirement specification (in relation to the pre-phase project objectives, as mentioned in the introduction to the working paper). Thus the text in this and the coming chapter are chosen to provide an overview of the possibilities and features within the existing LMS, CME applications and standards, rather than showing all available features found in our investigations.

4.1. LEARNING MODELS AND PEDAGOGICAL TOOLS

Before choosing a LMS, questions concerning the education, the pedagogy, learning objectives and form as well as planning, must be considered and clarified. This is a precondition for evaluating whether the features a system offers, 1) are the right ones, 2) at least are adequate for the purpose or 3) whether missing features are putting unwanted constraints on the objectives.

At this point in the KA-CHE process we will direct attention to the following relevant questions when choosing a LMS:

- The Lundbeck Institute operates with several target groups diverging according to professional level, geography, culture, technical skills and access to the internet
- The learning objective for the Lundbeck Institute is change of attitude and behaviour in relation to diagnosis and treatment, not just mediation of information.
- The Lundbeck Institute wishes to establish long term relations to participants i.e. as a Community of Practice (CoP)
- The Lundbeck Institute wishes their educational offerings to be accredited

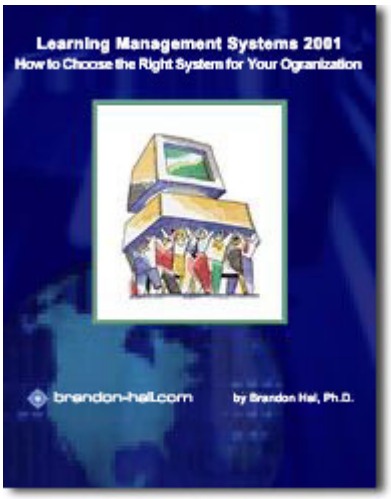
These questions – and probably more -, cannot be answered on the basis of the current data material, but point towards the thorough analysis that must be carried out in the beginning of the next phase (specification phase) of the project. These analyses are necessary in order to properly ground a realistic specification report.

4.2. LEARNING MANAGEMENT SYSTEMS

LMS is short for *Learning Management System*, and a LMS is a shell or platform into which most aspects of running an educational institution is implemented – that is: administration, content, student and teacher activities including communication, testing etc.

In the Lundbeck Institute CME context, any LMS will provide basic features that allows:

- Learners to
  - Log on in order to get access to study
  - Select courses
  - Receive content
  - Complete exercises: quizzes, multiple choice.
  - Communicate with instructors and other learners
- Instructors, administrators and managers can
  - Monitor learner's participation through records contained in an LMS.



All LMS have these basic features, but from this point on, there is a diversity, which makes choosing difficult. There is not really a pattern, which makes it easy to group LMS in categories to choose from. **The Brandon Hall Study is the most in-depth study found when searching the web.** We have used part of this material, which is available for free on http://www.edutools.info. The full report can be bought from http://www.brandon-hall.com/learmansys.html.

Most LMS do not call themselves LMS. They are called learning portal, best-of-breed technology, an end-to-end solution, an e-learning solution, a total solution etc. Some LMS are even found under the category of Knowledge Management Systems. Some systems might offer very sophisticated features in one area and be very simple in other areas. Other systems offer something in most areas but on a very general level.

It is estimated that there are some 200 LMS in the market, of which The Brandon Hall study has evaluated 60. From an overall point of view some LMS provide authoring tools for teachers others do not. Some contain competency instruments that help students select courses to match gaps in their skills and knowledge.

LMS can also vary in their look and feel. Interfaces can differ from visual design that supports navigation – also in a growing amount of content, to interfaces displaying endlessly growing lists in plain text. Some LMS are strong on video and other bandwidth requiring media. Others don't offer video or any kind of dynamic media. Some link competencies to courses and allow students to select courses to bridge gaps in their personal competencies. Others simply list courses.

Among available LMS, it is always a choice of

- Either getting some features on behalf of others
- Or have the producer develop specific tailored extras

Or if no existing LMS is found suitable for the purpose to end up buying a full special tailored solution.

4.2.1. Important Features - Pedagogical and Learning Environment Point of View

Communication- and collaborative tools features

Discussion forums – If the pedagogical method produce long and content rich discussions, all users (instructors and learners) should be able to choose among various views: date, thread, title, author, working group, topics and full view of all the text in the conference. It might be of interest whether the users can integrate illustrations in their writings, be able to print text and in other ways make the content of the conference useful in other contexts. Depending on the pedagogy, instructors

may want to associate discussions with course content. They may want to create separate discussion environments for smaller groups, or to make certain discussions open only for a limited period of time.

Collaborative features - If the pedagogy lean on a collaborative learning approach, features for sharing documents are a must, along with the ability for groups to create their own sub-conferences, some of which may be private (not accessible for the instructor). It may also be a useful feature, depending on the purpose and context, to provide learners with a personal work area. It must be possible and easy to transfer material between the different content areas.

As collaborative systems content tend to grow rapidly, searching facilities are a necessity - the best is the ability to search both categories like: titles, subtitles, page content, course notes, topics or by free-text-search. Especially for long-term education courses, learners need to keep track of events in an online calendar. Instructors might need to assign tasks to the learners using an online calendar.

The chat tool – In most cases, the chat tool is a synchronous text-based communication tool. Text produced in a chat quickly becomes confusing and impossible to overview, hence it is necessary to develop rules of behaviour e.g. use of signs as meta-comments and assigning of roles etc. Dependent on the number of participants and the topic in question, the chat tool opens for a wide range of learning events: asking questions or having discussions with an expert, learners having discussions with the Instructor, discussions in smaller groups of learners etc. The chat logs can be saved as text and be reviewed for later use.

Audio – video support – Here is a distinction between

- Pre-produced material that can be effectively integrated as part of a course content, when carefully designed for the purpose.
    - Online seminars delivered as recorded sessions to hundreds of participants
    - Recorded broadcasts to thousands of participants
    - Integrated parts of interactive applications
- Live transmissions
    - One-to-one mentoring when high-touch interaction is required. Other learners could be observers as part of the pedagogic design. In a CME context this could be training interview skills, deducing diagnosis etc., in a more realistic setting than interactive simulation - or case applications.
    - Online seminars delivered as live sessions to hundreds of participants
    - Live broadcasts to thousands of participants
    - Video conferencing, as a collaborative tool for small group meetings and project team collaboration events

Whiteboard – an instructor using this feature can demonstrate an experiment or a software utility to an online student, and allows a student to use the demonstration software from his or her own computer. Group Web Browsing allows an instructor to guide learners on a tour of web sites using a shared browser window. Voice chat allows two or more to communicate in real time via microphones, conference call style, over an Internet connection. A whiteboard can archive a recording of whiteboard sessions for future viewing. Instructors can share snapshots of a running application through the whiteboard.

Instructor and administrator tools

Depending on the organisation of the education and the educational environment, it might be necessary for administrators or instructors, to be able to **define different roles and access rights – i.e.: guest, learner, staff, faculty, manager, system editor, system administrator, team leader, course assistant, course designer, and instructor.**

Some aspects of pedagogical design can be designed within the frame of communication tools alone, and with these tools **the pedagogic approach does not have to be limited within specific learning paradigms**. Therefore the possible pedagogical design created by these tools is rather flexible. In these designs, the test of learners' performance is difficult to reduce to formal testing. In these cases an evaluation of the performance as a whole, is more appropriate. In contrast, build-in authoring environments for instructors as well as build-in testing features, often determines a choice of instructional pedagogical approach.

As CME is about keeping up with new developments in the field, and training professional skills up to recent standards etc., ways of providing specific tailored informative and/or interactive content is of interest. **Does the LMS allow for implementation of external produced stand-alone applications like cases, simulations and other interactive learning applications** (see part 4.3 on stand-alone applications (SAA)). To what extend does the LMS allow for data transfer between the LMS and an implemented SAA. This is an important feature, if the SAA is supposed to provide the learner with accredited CME points.

If the CME course tend to be dynamic in the sense that

- Number of offered courses, learners and instructors involved, etc. is expected to increase
- The amount of content is expected to grow
- The content is expected to change at intervals

Instructors will need tools for constructing a course as a time plan, providing content, making references and all the other tasks that a course manager performs before, during and after a course. Of course these needs are relative to the task.

4.2.2. Questions to Ask Vendors about Administration, Licence, Costs etc.

Revised and elaborated by author (in *italics*) from the original source: Brooke Broadbent (http://www.e-learninghub.com/articles/#Brooke)

Criteria	Questions
Administration	Does the package include features such as tracking, auto grading, and document manager, artwork customisation, syllabus, projects, and assignment administration? *Does the package deliver a suitable number of licences?* *How easy is it to establish learner's access to the LMS?*
Authoring	Does the LMS include an authoring tool and how robust is it? *Does the LMS support multiple pedagogical design approaches?* *Does the LMS provide for informal learning, self-study, instructor led e-learning and performance support?*
Blended Accessibility	*Is the LMS flexible in relation to different needs of different user-groups* *Some learners have small and slow pc's and 28 kbit-modems, others have modern pc's and broadband access to the web* *Learners differ in learning style according to age and culture* *Does the LMS support localisation and/or internalisation* *Does the LMS support accessibility (also psychiatrists could be handicapped in some way)*
Compatibility	Is your technology robust enough to run the courses you *purchase in an LMS?* *To what degree is the LMS capable of transferring data in and out in relation to state-of-the-art administrative – or knowledge management systems?* *Does the LMS allow for communication with external devices?*
Cost of courseware	How does the cost compare to the functionality received?
Effectiveness	Does the vendor have indicators of effectiveness? What do they reveal? *Is the Vendor established in the market? (do we have support next year)*
Expansion	Can the platform expand to accommodate future growth and new technology? Sometimes referred to as scalability.
Hosting	Do you have the option of hosting the LMS on your server or on the vendor's server in an application service provider (ASP) arrangement?
Integrated services	Does the package include features like courses, course management services, development tools, technical support, instructor training, content integration, licensing, and e-commerce? *That is – features that supports the specific needs of Lundbeck CME? In both pedagogical, economical, technical, administrative perspectives?*
Maintained	Is the site automatically maintained and updated?

Standardization	Do the course material comply with one of the standards that make it possible to combine course materials from more than one vendor of course? i.e. AICC, IEE, IMS or SCORM.
Technology	Which technology is supported? Video, audio, chat, threaded discussion, self-study? Can your system run these technologies? *Whiteboard, videoconferencing and other collaboratory tools*
Unique features	What unique features does the package have over the competition?

4.3. PEDAGOGICAL DESCRIPTION OF CME STAND-ALONE APPLICATIONS ON THE WEB

On the web there are **two kinds of CME stand-alone applications (SAA). Webcasts are accredited courses, and cases are learning material for informational and self-tuition purpose.**

Most of the material, we have found through www.docguide.com, a portal for CME courses. (See Figure 10). Docguide displays the two groups as listed separately, and each group can be sorted through a filter according to different topics. We have been looking at examples of both webcast and cases within the topic *depression*.

The material is presented (see Figure 10) on the portal with basic information like provider, CME accreditation, purpose, media type, payment etc. and a link to the actual course on the providers' website. On these provider sites there are other CME courses. We have looked through these courses as well.

All sites we have looked at, requires the learner to join by filling in a form. On some sites, anybody can join and get access to both material and CME points. On other sites, learners must have a doctors' license number in order to join, and yet other sites require an American Social Security Number. Some sites offer free courses, on others a test cost from 12 $ and upwards, depending on the number of accredited CME points the learner gets.

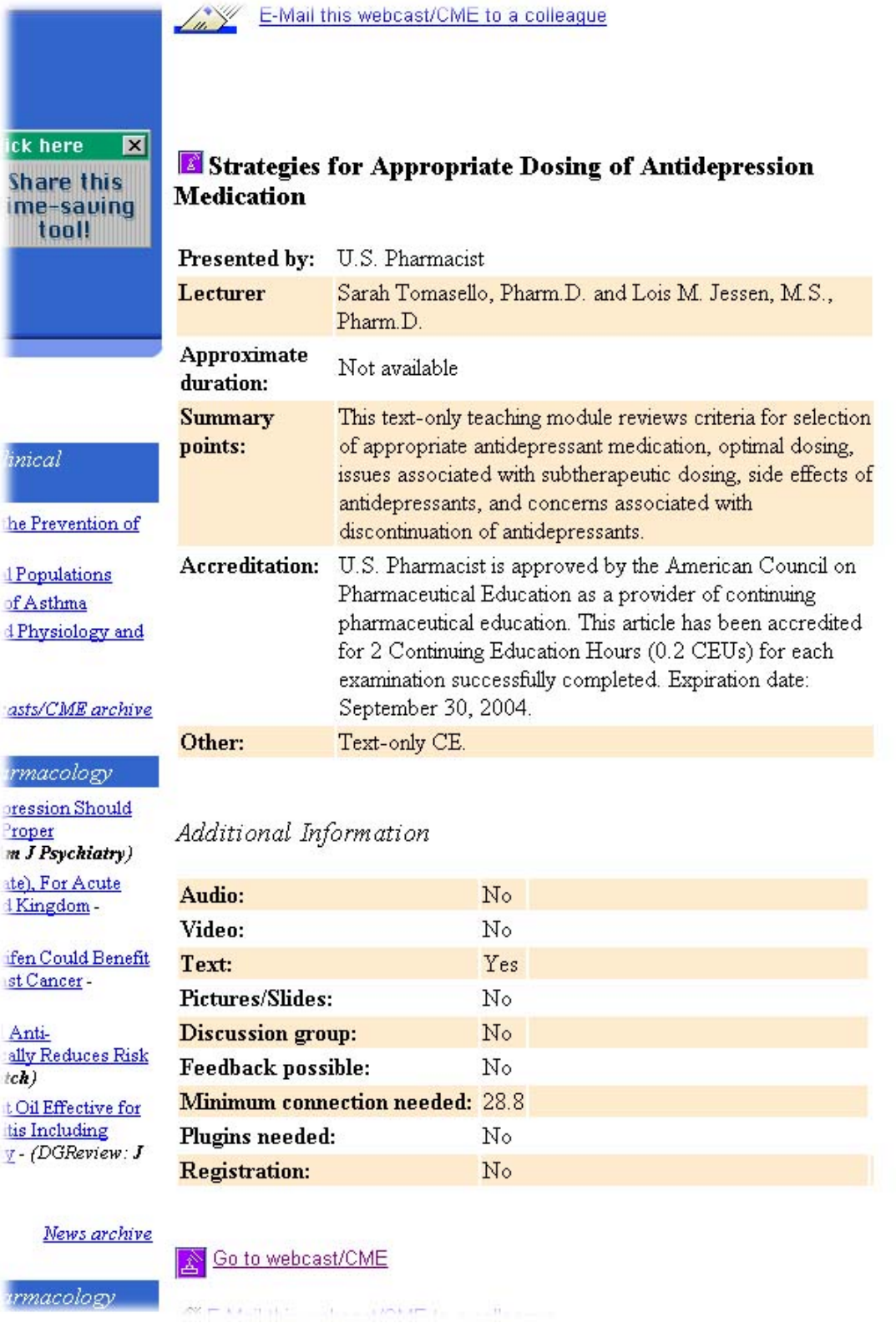


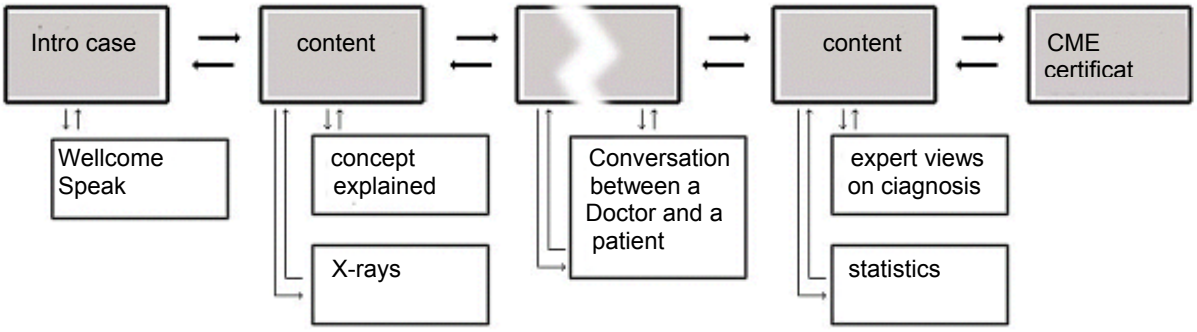
Figure 10 - Docguide' s presentation of a webcast with basic information

The presentation of the content and the learner's possible interactions can differ – but mostly interaction is limited to *go next – go previous* (model 1). Model 1 is often called *the linear model*. In some examples of cases it is possible to go to a deeper level

in the structure for an explanation of something (model 2). Model 2 is often called *the footnote model*. The content in model 2 is fictitious.

Model 1: linear model

Model 2: footnote model



We have found some examples of applications offering simulations of real situations, but most of these can only be seen as demo-presentations.

If there is a test of the learner's acquired knowledge, it is always a multiple-choice test. This pedagogical approach, called Instructional Design, relies on the epistemological view, that there exists one and only one right answer to any question.

In the cases we have looked into, the learner can always get the right answer to the test and try again. The consequence of this procedure is that there is no control of whether the learner actually has learned anything in order to deserve the CME points.

4.3.1. Relevant References & URL's

This section provides references and URL's to the CME activities, which the HCI-Research Group found gave a broad insight into the world of on-line CME, as it looks at the moment.

Survey of Stand Alone CME (Continued Medical Care)
Source: www.docguide.com

Other portals CME courses and stand-alone applications

- Electronic CME: Online and Software Resource: http://www.medicalcomputingtoday.com/0listcme.html
- Online CME Sites: http://www.cmelist.com/list.htm
- Medscape CME Center: http://www.medscape.com/pages/features/cmelinks/public/index-pediatrics

Webcast: Accredited CME Courses

Text based

Depression in Adults

The University of Michigan Medical School
ACCME
this educational activity for a maximum of one hour of category 1
December 1, 2003.
http://cme.med.umich.edu/iCME/depression/about.asp
Picture and Sound Slideshow

CME-WebCredits

Health Communication Research Institute, Inc. (HCRI), is a 14-year-old nonprofit organization headquartered in Sacramento, California
Accredited by the California Medical Association to sponsor continuing medical education in Category 1 toward the California Medical Association's Certification in Continuing Medical Education and the American Medical Association's Physician's Recognition Award.
http://www.cme-webcredits.org/index.html

Video Graphic Slideshow

CME-WebCredits

Health Communication Research Institute, Inc. (HCRI), is a 14-year-old nonprofit organization headquartered in Sacramento, California
accredited by the California Medical Association to sponsor continuing medical education in Category 1 toward the California Medical Association's Certification in Continuing Medical Education and the American Medical Association's Physician's Recognition Award.
http://www.cme-webcredits.org/index.html

Quiz

Diagnosing and treating depression in primary care patients:Looking beyond physical complaints

The Cleveland Clinic Center for Continuing Education
0.5 hours in Category 1 credit
AMA Physician's Recognition Award.
ACCME
http://www.clevelandclinicmeded.com/ccjmcme/cmemodls.htm

Cases

Some cases gives access to accreditation, others do not. When they do, the learner submits a multiple choice test after going through the case, but the learner does not have to go through the case in order to do the test.

From docguide.com we found cases ranging from simple text and multiple-choice designs to more complex designs. The text-based cases have the same design as the text-based webcast. Sound-based cases have the same design as the text-based webcast.

On the Virtual Lecture Hall site, we found cases that were more evolved. See: http://www.vlh.com/index.cfm?tocon=/myvlh/courses/130/index.cfm?&badcookie=2

For every step through a case, there would be footnote-links to relevant medical papers, background material, X-rays, animations (fig. 8) of i.e. Echocardiograms: Cross-section Views etc.
This means that the learner can do a lot of independent research on relevant material, before trying to answer the multiple-choice on every page of the case.
American College of Physicians

Clinical Problem-Solving Cases (CPSC)

Each case allows physicians to earn 1 category 1 CME credits.
ACCME
http://cpsc.acponline.org/

Simulations
On Department of Pain Medicine and Palliative Care, we have found a demo of an advanced simulation application:.
Clinical Management of Neurophatic Pain: A Problem-Based interactive Module

Beth Israel Medical Center and St Luke's-Roosevelt Hospital Center Clinical Problem-Solving
Cases (CPSC)
Receive 2 CME credit hours in Category 1 by mailing the evaluation form and post-test embedded within the module, as well as a check in the amount of $25.00
ACCME
http://www.stoppain.org/for_professionals/interactive_module/elearn.html

EBDM Network's Continuing Education page

http://icu-10.med.usyd.edu.au/ebdm/index.html
This is another type of simulation in this Australian CME course that can be viewed on http://icu-10.med.usyd.edu.au/ce/case3/frameset.html. The case is real time in progress and is about shortness of breath.

4.4. MAIN POINTS FROM ARTICLES ON CME

In the following some main points of relevance for this project are presented. They have been extracted from a number of scientific articles on CME in general, as well as online CME (the references are listed below.) This survey demonstrates that general CME-resources for GP's have been of limited use and that CME initiatives:

- should be based on the physician's needs
- should be implemented as continued and progressing learning units
- should build on modern interactive pedagogic, that is a movement from behaviourism to constructivism.

4.4.1. Quotations from articles

- GPs' implementation of guidelines and evidence based medicine in clinical practice has been limited until now.

> "*Despite (…) the level of participation in and resources for CME, many studies have demonstrated a lack of effect on physicians'*

performance of current practice guidelines or sizable gaps between real and ideal performance. "[13]

"*Despite wide promulgation, guidelines have had limited effect on changing physician behavior.*"[14]

"*Although evidence based medicine has heightened awareness of the most effective management strategies for many conditions, much of the evidence is not acted on in everyday clinical practice. Numerous strategies to implementation of such evidence have been tested, and various impediments have been tested identified.*"[15]

- In order to have an impact on physician behaviour and practice CME should[16]:
  - build on an assessment of the physician's needs
  - have a practical perspective
  - be sequenced and multifaceted[17]
  - be interactive
  - be case based
  - facilitate discussion among participants
  - be self-directed
  - use didactics that let the learner construct his own meaning in stead of being a passive receiver of information

- Attempts to change physician behaviour should include more than one educational intervention.

"*A multifaceted approach is supported by a recent study[18] in which investigators interviewed 100 general practitioners and*

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[13] "*Impact of Formal Continuing Education*"

[14] "*Why Don't Physicians Follow Clinical Practice Guidelines?*"

[15] "*Why general practitioners do not implement evidence: qualitative study*"

[16] List generated from

- "*Continuing Medical Education and the Physician as a Learner – Guide to the Evidence*"
- "*Changing physician behaviour*"
- "*Impact of Formal Continuing Education*"
- "*Psychological myths in e-learning*"
- "*Closing the gap between research and practice: an overview of systematic reviews of interventions to promote the implementation of research findings.*"

[17] Example from smoking cessation: Physicians received educational material for patients, a reminder to offer them nicotine gum and a 4-hour training session on counselling.

[18] "*Why general practitioners and consultants change their clinical practice: a clinical incident study*"

consultants and asked why they changed their clinical practice. For each change, the physicians cited an average of three reasons per change."[19]

- Traditional CME – building on traditional didactical interventions like lectures – has little or no effect on behaviour. There is a need for new CME interventions - like online CME – to help remedy this situation.

  "*The AMCC (Association of American Medical Colleges) believes that changes are needed in CME, which will result in the development of CME activities that will be effective in improving physicians' practice behaviours*"[20]

  "*The use of traditional CME activities such as lectures have been widely criticized. This criticism appears justified because didactic interventions analyzed in this review failed to achieve success in changing performance or health care outcomes.*"[21]

- One interview study highlighted an interesting inconsistency: Although studies indicate the opposite, physicians themselves think that any kind of information has an effect on behaviour.

  "*Whereas reviews of changing physician behaviour usually do not find that passive educational efforts (…) change behaviour, physicians report that information, in any form, contributes to change.*"[22]

- However, traditional CME – building on traditional didactical interventions like lectures – may have other effects than immediate impact on behaviour.

  "(…)(traditional) *interventions may change other elements of competence, such as knowledge, skills, or attitudes, or may act as predisposing elements to change*"[23]

- The type of change discussed in the various studies is *short term* change in physician behaviour. Only few studies of sustainability of behaviour change have been conducted.

- The term "CME" covers many different types of knowledge and skill acquisition including even basic activities like reading journal articles.

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[19] "*Changing physician behaviour*"

[20] "*Continuing Medical Education: The Paradigm Is Changing*"

[21] "*Impact of Formal Continuing Education*"

[22] "*Changing physician behaviour*"

[23] "*Impact of Formal Continuing Education*"

- While GPs often report to be influenced by consultants and hospital organisations, consultants are rarely influenced by GPs or practice organisations.

  "*A future role for education could therefore be to aid two way learning between consultants and general practitioners.*" [24]

- Education is among the three most frequent reasons for change of clinical practice mentioned by GPs and consultants in a survey (the two others being organisational factors and contact with other professionals).[25]

  "*Education accounted for one sixth (16.9 %) of the reasons for change and was involved in one third (37.1 %) of the changes. Education was seldom mentioned as a reason for change in referral practice but was more often mentioned in management and prescribing changes.*"[26]

- Good results have been achieved with facilitator led case based group work using e-mail or bulletin board systems.[27]

- There is a shift from behaviourism to constructivism in learning theory that should be implemented in practical e-learning as well.[28]

  "*In practice, training is still largely grounded in behaviourist theory and on external factors, ignoring internal thoughts, feelings and cognitive factors (…) E-learning is not just another method of delivery. It forces us to address fundamental issues in the psychology of learning*"

  - An EU funded trans-national university based project – entitled Post-Doc – has set up a model for a European online learning environment to support GPs' individual CME activities (as well as communication facilities, event calendar, access to other information sources etc.)

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[24] "*Why general practitioners and consultants change their clinical practice: a clinical incident study*"

[25] ibid.

[26] ibid.

[27] Reported in the following articles:

- "*Using e-mail based continuing medical education for family physicians – Can it work?*"
- "*Negotiating the Maze: Case based, collaborative distance learning in dentistry*"
- "*The development of a collaborative distance learning program to facilitate pediatric problem-based learning.*"
- "*Evaluation of a CME problem-based learning internet discussion.*"

[28] "*Psychological myths in e-learning*"

Different regions in Europe is intended to create regional websites in local languages building on the central prototype.[29]

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[29] "*Post-Doc: Satisfying the Information Needs of General Practioners in Continuing Medical Education and Daily Practice*" **and** "*WWW-based Continuing Medical Education: How do General Practitioners Use it?*"

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5. ACCREDITATION COMMITTEES AND CRITERIA FOR ACCREDITATION

The general picture **worldwide on course accreditation shows large differences** in the rules applied in the individual countries with respect to what is required in order to obtain accreditation. The analysis has been carried out from the assumption that as there is no consensus in that part of the world we normally associate with standards and organisational collaboration (i.e. Western Europe, USA, Canada) then neither is there consensus in the rest of the world. At the end of this chapter references to different organisations and URL´s to sites regarding accreditation is given, which the HCI-Research Group found relevant for our analysis is given.

It would take a thorough research to get an overview and a fundamental understanding of the diversity of accreditation criteria through out the world. That is, who may be credited in other geographical areas than their own, and are the accreditation credits that a GP has obtained in a specific course, acknowledged across borders? This is also true for a comparison of North American accreditation rules compared to European rules. However, it does appear that there is less diversity in the USA than in Europe – and within EU. Yet**, to an individual general practitioner or specialist it must be unclear if and how many CME credits are needed per year, just as it is unclear if 1 CME credit in one context equals 1 credit in another context.**

It has only been possible to identify explicit criteria for accreditation in the North American organisations. The introduction, which the European Accreditation Committee (EAC) has written leans towards similar criteria as the North American criteria. Traditionally there is a difference between North America and Europe concerning the understanding of learning and pedagogy. However, it is not possible to see, whether these differences also exists within the area of CME. At present EAC is running a pilot project "Developing Cross National CME", within the discipline of neurological diseases. The partners in this project are The European College of NeuropsychoPharmacology and The Association of European Psychiatry.

An overall review of the criteria from the different organisations (see references later in this chapter) for accreditation show that **generally the accreditation is evaluated on the basis of:**

- the producers of content are highly qualified
- the disciplinary quality and relevance of the content is high
- the content is well written
- there is a correspondence between content and form
- and specifically on the pedagogical dimension – quoted from CPME 720 (see URL later):

  3.0 The sponsor establishes explicit objectives for each continuing education activity.

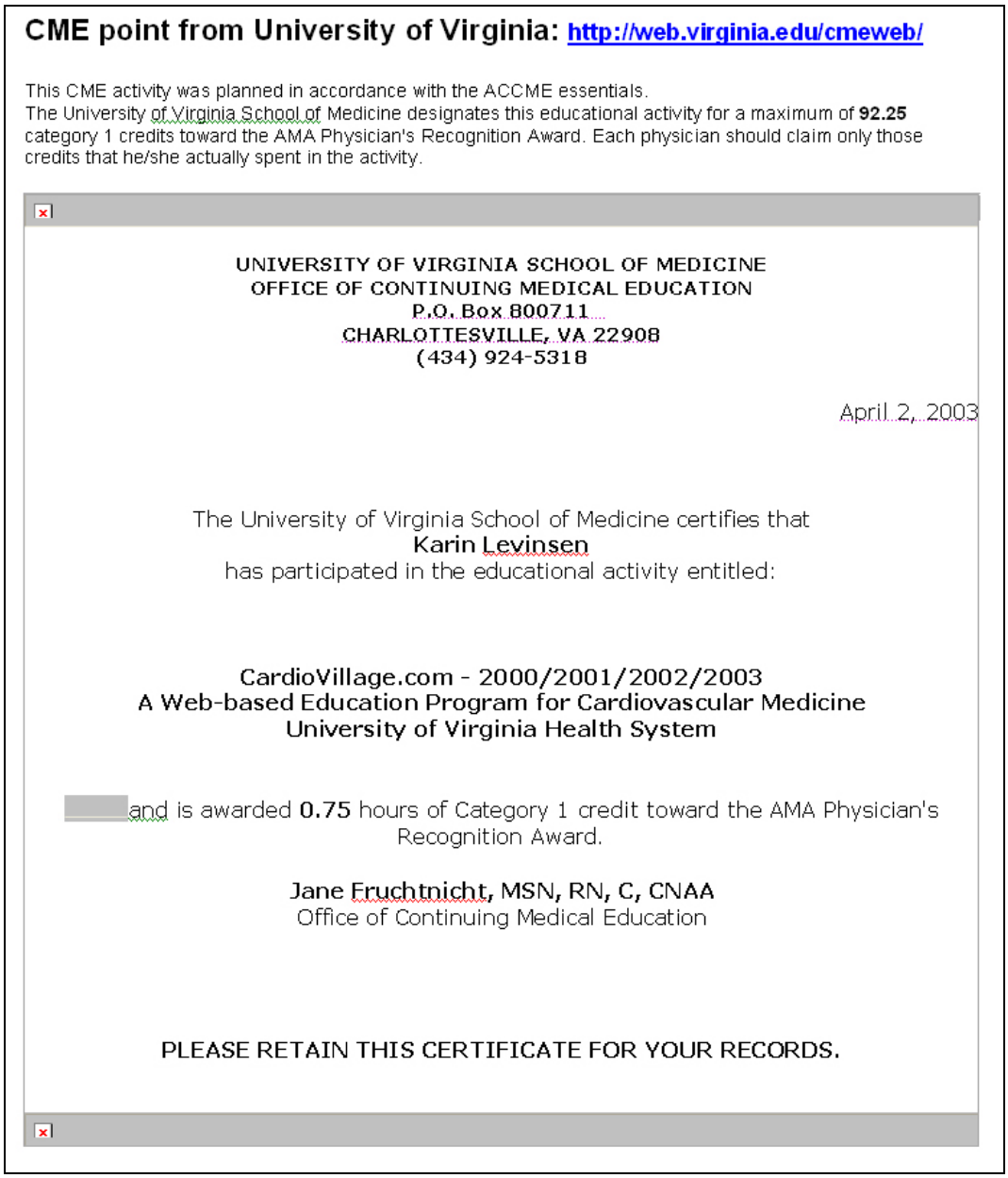
  4.0 The sponsor utilizes educational methods for each continuing education activity that are effective in view of the format, content, objectives, and intended audience of each activity.

5.0 The sponsor conducts appropriate evaluation processes related to individual continuing education activities and its program of continuing education.

What we know about accredited CME at present is:

- the diversity is large and differences from one country to the other is significant
- requirements to content and producer seems to be high, however there are no precise requirements to didactic and pedagogy nor to the quality of learning as such
- the kind of activities which are accredited are diverse: from being present at a given conference or seminar to participating in an online-course. In the latter case we find, at one end of the spectrum "read a text plus answer multiple choice questions" and at the other end of the spectrum we find quite sophisticated interactive applications where the learner has to reflect, evaluate and make decisions.
- the design of the programs (see part 4.3 on CME stand-alone applications), and the way in which tests are carried out, shows that the pedagogical concepts fall within - or lay very close to - Instructional Design (operant conditioned learning, reproductive learning-by-heart). Whereas more modern pedagogy (constructivism which enhances decision making, evaluation, reflection on the basis of acquired facts act.) only play an insignificant role.
- there seems to be a consensus world-wide that one has to participate in and obtain CME points in order to qualify for continuation of medical praxis
- there seems to be consensus world-wide that CME points are obtained by being present and by working though content (though "working through" may take place at many levels)
- there seems to a consensus world wide that one cannot fail in an accredited CME test
- there seems to a consensus world wide that applications for accreditation should be made by independent programme providers.
- there is no control of learning having taken place *)

*) E.g. different members of HCI-Research Group, has acquired CME point at UNIVERSITY OF VIRGINIA SCHOOL OF MEDICINE in Cardiovascular Medicine (As an example we have inserted a certificate from one of the group members in Figure 11). This was done by logging in on the site, and by choosing ad hoc with cursor we went through the application from one end to other (app. 1 minute) and then submitted the questionnaire. In one case a certificate was received immediately – in other case the researcher had less than 50% correct answers. But by printing out the correction, which was automatically sent to her, she went back, logged in and did the course once more, and obviously obtained the certificate. We have logged into a number of other courses, with the aim of investigating the interactivity – not in order to cheat – but also here we could repeat the course and obtain the certificate.



CME point from University of Virginia: http://web.virginia.edu/cmeweb/

This CME activity was planned in accordance with the ACCME essentials.
The University of Virginia School of Medicine designates this educational activity for a maximum of **92.25** category 1 credits toward the AMA Physician's Recognition Award. Each physician should claim only those credits that he/she actually spent in the activity.

UNIVERSITY OF VIRGINIA SCHOOL OF MEDICINE
OFFICE OF CONTINUING MEDICAL EDUCATION
P.O. Box 800711
CHARLOTTESVILLE, VA 22908
(434) 924-5318

April 2, 2003

The University of Virginia School of Medicine certifies that
Karin Levinsen
has participated in the educational activity entitled:

CardioVillage.com - 2000/2001/2002/2003
A Web-based Education Program for Cardiovascular Medicine
University of Virginia Health System

and is awarded **0.75** hours of Category 1 credit toward the AMA Physician's Recognition Award.

Jane Fruchtnicht, MSN, RN, C, CNAA
Office of Continuing Medical Education

PLEASE RETAIN THIS CERTIFICATE FOR YOUR RECORDS.

Figure 11 – CME points earned in on-line activities

5.1. THE EUROPEAN ACCREDITATION COMMITTEE (EAC)

We know that applications may be sent to EAC ecnp.nl/Matters/number1/cme.htm concerning:

- accreditation of CME-courses
- individual course participants who wants to obtain point/credits for having participated in an accredited course

For more information: http://www.hoise.com/vmw/00/articles/vmw/LV-VM-08-00-10.html

The table below summarises the different conditions in Europe (data obtained from Lundbeck Institute)

Country	Psychiatrists	Neurologists	GPs
Austria	Points: unknown	Points: unknown	Does not exist
Belgium	Points: 200 per year	Points: 200 per year	unknown
Croatia			
Cz. Republic	Points: During 5 years :5 certificates =150 credits; 1 points = 2 credits	Points: During 5 years :5 certificates =150 credits; 1 points = 2 credits	Points: During 5 years :5 certificates =150 credits; 1 points = 2 credits
Denmark	No	No	no
Estonia	Points: unknown	Points: unknown	Unknown
Finland	unknown	unknown	unknown
France			
Germany	Points: 50 per year	Points: 50 per year	unknown
Greece	No	No	No
Holland	The Dutch psychiatrist association is working on the topic	unknown	unknown
Hungary			
Ireland	Points: 20 external –30 internal	Points: unknown	Points: varies
Italy	Experimental phase		
Latvia			
Lithuania			
Norway	No	No	No
Poland	No	No	No
Portugal	In process	unknown	unknown
Russia	No	No	No
Slovakia	Local system Points: 200 per year Lundbeck Institute seminar 50 points		
Slovenia	Slovenian Medical Chamber Points: unknown	unknown	unknown
Spain	Unknown	Unknown	unknown
Sweden	Not implemented	Not implemented	Not implemented
Switzerland			
Turkey	Will be implemented soon	unknown	unknown
UK	Courses 1 year or more: RCGP Points: External 20/ internal 30 Requirement 50 hours of CPD	Royal College of Physicians Continuing Professional Development CPD Voluntary system CPD Events Approval Education Department Royal college of Physicians 11 st. Andrews Place	Continuing Professional Development Plans (PPDPs) IS UNDER DEVELOPMENT.

5.2. CANADA, SOUTH AMERICA, AUSTRALIA, HONG KONG AND SOUTH AFRICA

The table below shows the other countries where information was available (data obtained from Lundbeck Institute).

Country	Psychiatrists	Neurologists	GPs
Argentina			
Australia	**Points: 100 per year or 1000 over 5 years**	Points: 500 points over 5 years **Minimum 50 per year**	**Points: 130 points over 3 years**
Brazil			
Canada	Points: 40 per year 400 points over 5 years	Points: 40 per year 400 over 5 years	**Points: 50 per year**
Hong Kong	**Points: 30 points per year**	**Points: unknown**	**Points. unknown**
South Africa	Points: 50 CPD points and 2 ethical points	Points: 50 CPD points and 2 ethical points	Points: 50 CPD points and 2 ethical points

Again the overview shows that the diversity is large and there is no common ground. With respect to the individual countries we do not know:

- how do points and credits correspond to the actual participation in a given course of a given length
  - how do they respond to the level of quality
  - to the level of difficulty
- how is the relevance of a given course within a given country etc.
- criteria of accreditation in relation to extend of education, quality level, level of difficulty, relevance etc.
- how are criteria specified for point/credits in Denmark? on the basis of which criteria is the pedagogy and the quality evaluated?
- what are the concepts of diseases and what is not – this is rooted in culture and stresses that there will always be national (even local) interpretations of when a depression is a depression – even though a world wide definition of the depression exists.

5.3. RELEVANT REFERENCES & URL'S

North American examples:
Hawaii Medical Association (HMA CME)
Source: http://www.hmaonline.net/
The Virtual Lecture Hall
Source: http://www.vlh.com/index.cfm
Illinois State Medical Society (approved by ACCME)
Source: http://www.isms.org/professional/accreditation.html
The Medical Society of DC's Recognized Accreditation Program
Source: http://www.msdc.org/body_whatwedo.htm

Canada
McGill University
Source: http://tetis.medit.mcgill.ca/cme/

Interesting meta links
Source: http://medicalmeetings.net/ar/meetings_worldwide_cme_faces/
CME industry hits billion-dollar mark
Source: http://medicalmeetings.net/ar/meetings_cme_industry_hits/
The ACCME's Essential Areas and their Elements
Source: http://www.accme.org/accreditation/sec_acc_sta.asp
Download the entire ACCME's Essential Areas and their Elements document(152K,PDF) from
http://www.accme.org/pdfs/essential_areas2.pdf
The Council on Podiatric Medical Education **CPME 720**
Source: http://www.apma.org/CPME/continueed.html
standards, requirements, and guidelines for approval of sponsorsof continuing education in podiatric medicine **Source:**
http://www.apma.org/CPME/cpme720.html

6. KNOWLEDGE ACQUISITION IN COMPUTER HUMAN ENVIRONMENTS

In the following we have identified a number of areas where we see the **competencies of the HCI-Research Group coming into play** in the KA-CHE project. This is in relation to research and development, in relation to design test and evaluation, and in relation to pedagogy and different worlds of learning.

Identify user needs in the specification phase

Investigate users and their needs in relation to the KA-CHE project. E.g. what is their motivation, level of subject specific knowledge, learning culture and their level of accept/resistance, and what are their expectations? What is the geographical, cultural, social, technical, professional and economical set of values and how will the differences influence the KA-CHE project?

Based on the conceptualisation of the target groups we need to understand how to extend the project from the classical meaning of target groups to include the meaning of users, of IT- system, engaged in e-learning processes.

Furthermore we have a research interest in obtaining knowledge concerning how target groups are described in general and how the target groups are related to e-learning projects in practice. A part of this research is to discover how the knowledge within the medical field of the GPs and specialists will be part of the KA-CHE project.

Knowledge sharing during the life-time of the project

Project development and knowledge sharing both across and in between the different phases as well as within each phase, and securing that users are involved at the right time at the right place is necessary in the project. How and through which media is communication in interdisciplinary project teams carried out? When and how are different tasks handed over from one part of the team to another?

Identification and specification of pedagogy and learning strategies

For the development of a learning system it is necessary to identify and specify the pedagogy and learning strategies in relation to the content and goals of learning. HCI research focus will be in the field of user needs and learning goals. Our special interest is the relationship between pedagogical methodologies, goals and content. Learning may be analysed from different content perspectives. Here the Lundbeck Institute is the owner of the detailed knowledge of the character of the content, where the HCI-Research Group brings knowledge to the project in terms of virtual/web/multimedia based learning systems, specifically case- and problem based learning.

Our research aim is to obtain knowledge about planning and design of virtual systems that enhance learning- and awareness processes in practice, as well as testing techniques and tools within this context.

Studies of virtually supported communities

In order to improve the life quality of patients it is essential to study the virtual communities, and in relation to this also to enhance improved dialogue between patients and GPs, as well between GPs. This may improve diagnosis and consensus in treatment. A study of the GPs and the artefacts (the virtual/web/multimedia based learning systems) will contribute with knowledge of the context in which the Lundbeck Institute will have to operate. A long-term study will show the extent to which GP communities, as a result of virtual learning initiatives, becomes a success or failure.

Methodological framework, techniques and tools

Irrespective of the development model chosen for the KA-CHE project, the HCI research will contribute with a methodological frame for techniques and tools, primarily focusing on interaction, learning, communities and interface design and evaluation to be applied throughout the project development process. Among possible techniques are:

- Qualitative and quantitative analysis in real use situations: field studies, workshops, questionnaire etc.
- Methods and techniques for visualisation: visual cognition and communication, mind-mapping, visual design, storyboards etc.
- Methods and techniques for identifying users: model user descriptions and scenarios relative to prototyping etc.
- Methods and techniques for user testing and evaluation: thinking aloud, mind-tape, visual reading test, testing interaction etc.