Initial Market Studies Alfanet

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D 72 – Initial market studies

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Contributors	OUNL, UNED, SAGE, KLETT, EDP			
Authors (Partner)	Marcel van der Klink (OUNL), marcel.vanderklink@ou.nl Jo Boon (OUNL), jo.boon@ou.nl Ellen Rusman (OUNL) ellen.rusman@ou.nl Mar Rodrigo (SAGE) mrodrigo@softwareag.es Carlos Fuentes (SAGE) cfuentes@softwareag.es Cristina Arana (SAGE) CARANA@softwareag.es Carmen Barrera (UNED) CBARRERA@invi.uned.es Ingeborg Hoke (KLETT) i.hoke@klett-mail.de Maria Amelia Franco (EDP) mariaamelia.franco@mrh.edp.pt			
Contact Person	Marcel van der Klink Open University of the Netherlands - OTEC Tel: + 31-45 5762865 Valkenburgerweg 177 Fax: + 31-45 5762802 6401 DL. Heerlen Email: marcel.vanderklink@ou.nl			
WP/Task responsible	OUNL			
EC Project Officer	Mrs. Elena Coello			
Abstract (for dissemination)	This deliverable describes the outcomes of the initial market studies which investigated: 1) new tools and products for e-learning, 2) expectations for adaptive e-learning in the European Union, 3) characteristics of potential clients for ALFANET, 4) and user characteristics which need to be addressed in the design of ALFANET. After a description of the key questions, design and outcomes of the market studies, the deliverable describes the conclusions and recommendations for the project ALFANET.			
Keywords List	e-learning products and tools, (future) application of e-learning, user requirements			

Executive Summary

Introduction

The initial market analysis, according to the description in the Annex, aims at the trends, competitors and products in circles of distance learning universities and centres, E-learning service providers, and content providers in order to assess:

- The viability of Alfanet

- Existing tools and products which could be Alfanet potential competitors

- The characteristics of the market for Alfanet

Assessment will result in a description of desired features that Alfanet must address in order to become a viable and innovative learning environment.

Chapter 1 describes the introduction of the study

Chapter 2 provides the methodology

Chapter 3 describes the outcomes of the study

Chapter 4 provides the conclusions and recommendations

Appendix 1 contains the references of the inspected sources (Internet sources as well as paper-based sources)

Description of conclusions/results

After the introduction and the methodology the report presents the outcomes of the study in chapter 3. Section 3.2 presents an extensive overview of various tools and products that may obtain appropriate characteristics for Alfanet. The following tools and products were described subsequently: Learning Space (section 3.2.1), TopClass E-learning Suite (section 3.2.2), Pyxis KMS (section 3.2.3), Blackboard (section (3.2.4), Cisco learning System Virtuoso (section 3.2.5), Generation 21 (section 3.2.6), WebCT (section 3.2.7), BSCW (section 3.2.8), ALIS (section 3.2.9). For each tool and product a description of characteristics was made, followed by an assessment of features contributing to the innovative concept of Alfanet. This was carried out in order to find out to what extend already existing products and tools could be included in the development of Alfanet. Learning environments such as Learning Space, Blackboard and WebCT, though quite popular at the moment, do not provide concepts or ideas that might be helpful for designing Alfanet. The other six tools and learning environments have some promising features that are worthwhile to take into consideration. These features are: personalisation of the learning process, customisation, reusability of content, and integration of learning environment with knowledge management systems. It is yet unclear to what extend existing tools and products can actually be used for Alfanet, due to suppliers commercial strategies, suppliers investments in the future development of these tools, and it is not always clear to what extend the tools and products actually support learning technology specifications (future standards).

Section 3.3 discusses the current and future application of e-learning in the European Union. The description is based on a review of literature and internet sources. Results show that the e-learning market will grow, though the actual increase in e–learning is difficult to predict. European countries differ strongly with regard to the application of e-learning, due to the different levels of access to Internet, and availability of hardware. The e-learning market is still in its infant years and predictions about the rapid increasement of e-learning are not always supported by empirical evidence. The market is instable, non-transparent, many providers operate on the market and the lack of accepted standards makes it difficult to provide sound predictions of the future. However, there are some indications pointing at the increase in use of e-learning. Especially in higher education there is substantial growth of the use of e-learning. In corporations there is also an increase observable. With regard of the near future, the following factors, among others, play a prominent role:

- There exists a need for providers offering full services (technology, content and support)

- The lack of pedagogical innovative examples and absence of training of educational staff are important factors that hinder the acceptance and implementation of high quality learning

environments. If staff is not aware of the full potentials of e-learning, there exists no need to switch to high quality learning environments such as Alfanet

- Reliable estimations of the costs attached to the design and delivery of e-learning are not available, causing reluctance of corporations and educational institutes to invest in e-learning

- Doubts concerning the quality and reusability of content

Though not all factors can be influenced by the Alfanet project, it is clear that these factors need to be addressed during the Alfanet design phase.

Section 3.4 discusses the German market for e-learning. Information in this section was gathered by literature review and additional interviews. There definitely exists a market for e-learning in Germany but the full potentials of e-learning are not used at this moment. In education and in corporations too the attention for e-learning grows but factors already mentioned above can be regarded as inhibitors for the future grow. The future technological developments, such as the emerging application of broadband, can be regarded as a positive development for the design of more advanced learning environments.

Chapter 4 summarises the main findings and some recommendations are discussed. The following issues are perceived as crucial:

- The issue of branding: it is necessary to develop smart and convincing strategies for competing with suppliers on the market of e-learning

- Sufficient attention for services, not only in a technological sense but also supporting users in efficient, pedagogical innovative use of Alfanet

- Alfanet needs to address the differences in expertise levels of users. In general Alfanet will be more suitable for users that are interested in high quality types of e-learning.

- Possibilities for personalization should be based on common sense.

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1. Introduction

1.1 Situation

In many cases e-learning is defined as a static process. Alfanet is a project that seriously takes into account the notion of learning as a dynamic process, meaning that the learning environment will be adjusted to the learners' needs. This can be regarded as a step forward. However, as with many innovations, not every step forward can be achieved easily. And this counts too for Alfanet. It requires therefore careful investigation of the market to determine to what extend the characteristics of Alfanet are valued.

In the design phase of the project plan it was therefore considered to be wise to investigate already existing tools that can be used for the development of Alfanet (T1.2). Furthermore it was decided to examine what the main (future) developments are in the area of e-learning, what barriers are to adopt innovative e-learning, and what conditions the adoption of innovative e-learning platforms like Alfanet will enhance. To shed more light on these matters, Task 7.1 intents a careful investigation and results into Deliverable 7.2.

This document provides answers about the viability of Alfanet. It is, however, not the only project deliverable that takes into account those questions. Additional information will be delivered by:

Deliverable 1.1, Compilation of user needs

Deliverable 1.2 State of the art learning technologies

As much as possible and necessary this document includes the outcomes of these two abovementioned deliverables.

1.2 Purpose

The purpose of the document is to provide a first definition of the desired features of Alfanet by considering the existing learning technology and market trends. This document intent to fulfil a significant role in the process of achieving agreement upon the initial form of delivery.

The audience for this document is first of all the Alfanet partners. It is, however, not a document for a restricted audience. The authors have the opinion that there exists possibly a broader audience that value the information gathered in this document.

1.3 Overview

The *methodology* is discussed in the following chapter. The key questions as well as the methods used for answering these questions will be presented. Chapter 3 discusses the outcomes of the study. A comparison of tools and products, the market for e-learning in Europe in general, a more closer look at the characteristics of the German market, and the user needs are the main topics of this chapter. The conclusions and recommendations are addressed in chapter 4. Appendix 1 contains all the references of the used sources (Internet sources as well as paper-based sources).

2. Methodology

This chapter discusses subsequently: the research questions, the instruments and methods used for addressing these questions and the consequences of the applied methodology.

2.1   Research questions

Drawing on the information described in Annex 1 – Description of Work, the following questions were formulated for Task 7.1.

1) What new tools and products are already available on the market with a high degree of similarity compared to Alfanet

2) What are, in general, the expectations for adaptive e-learning in quantitative and qualitative terms within the EU

3) What are the characteristics of possible clients that consider high quality e-learning encompassing the unique features of Alfanet (clients are: corporations, distance learning education, content providers, e-learning service providers)

4) What users' characteristics are important to take into consideration for the design of Alfanet

2.2   Instruments and methods

Figure 1 provides an overview of the instruments and methods that were used for answering the formulated questions.

Question	Methods and instruments	Partners involved
1. Available tools and products	Consulting websites	UNED, SAGE and OUNL
2. Future of E-learning	Literature search	OUNL
3. Characteristics of clients	Collecting internal information and literature search	KLETT
4. Users' characteristics	Reviewing reports Deliverables D11 and D12	UNED and OUNL

Figure 1. Methods and instruments

The following four sections provide additional information about the questions.

2.2.1 Question 1: Tools and products

Since some partners were very well informed about tools and products already on the market, it was decided to opt for an specific investigation of a limited number of products and tools provided by the main software companies. Partners involved in this activity agreed upon the investigation of the following:

OUNL:

- Blackboard – Blackboard, Inc (http:// www.blackboard.com/)

- Cisco Learning Institute – (http://www.ciscolearning.org/)
  The CLI e-Learning Solution offers authoring, delivery and management tools for online personalized learning.

- Generarion21 Learning Systems (http://www.gen21.com/)
  Generation21 Learning Systems is an open standard learning environment.

UNED:

- WebCT – WebCT, Inc. (http://www.webct.com/)

- BSCW – (http://bscw.gmd.de/)
  Basic Support for Cooperative Work is a web based collaboration/groupware environment. It is shared workspace system and supports document upload, event notification, group management, etc. The server soft is freeware

- Adaptative Learning Intelligence Suite (ALIS) – The Training Place (http://www.trainingplace.com/)
  ALIS is an innovative personalization product that takes advantage of the technology to serve each learner with the highest level of individual attention and service.

SAGE:

- LearningSpace – IBM/Lotus (http://www.lotus.com/home.nsf/welcome/learnspace/)

- TopClass – WBT Systems (http://www.wbtsystems.com/)
  Web-based training authoring, delivery and management. It provides personalized coursework for each student, online authoring based on open HTML standards, secure collaboration tools, and auto testing capabilities.

- Pyxis KMS – Pyxis Edu (http://www.pyxisedu.com/)
  It provides personalized learning platform with set of tools tightly integrated for online learning, knowledge exchange, and expert-led community capabilities.

The advantage of consulting websites is that these provide the latest information about the specific tool or product. Evaluation focused on the following three features:

1) General features: Product overview; Collaboration Capabilities; Content development and management; Testing and assessment; Support for standards; Interoperability; Technology Platform.

2) ALFANET innovative features: Adaptive presentation & navigation; Adaptive collaboration; Authoring features (EML standard-compliant); Auditing features (Assessment and integration with knowledge management); Pedagogical methods (Curriculum sequencing)

3) Experiences of users: When additional information is available about how users value and actual make use of abovementioned tools and products, then this will be included in the report of the deliverable.

General features

Product overview: Interface available in multiple languages, Browser-based interfaces, Tracks Web-based learning , Online help, Includes integrated e-commerce functionality, Platform allows for student monitoring, Course Management Features Within Platform

Collaboration Capabilities: E-mail supported, BBS file exchange supported, Newsgroups supported, Chat supported, Whiteboard supported, Virtual space supported

Content development and management: Built-in content authoring tools, Offers separate authoring tools, Built-in content management system, Offers separate content management tools

Testing and assessment: Built-in assessment tool for creating tests/quizzes, User can customize test/quiz instruments, Test/quiz uses variety of question types, User can set limits on test/quiz availability, User can set correct/incorrect response feedback for test/quiz questions, User can opt for computer-generated feedback in test/quizzes

Support for standards: AICC-compliant or certified, SCORM-compliant

Interoperability: Connectivity with ERP/CRM and HRIS systems, Special utilities for interconnecting with ERP/CRM and HRIS systems, Interoperability with third-party content libraries, Interoperability with third-party content authoring tools and/or LCMS products, Interoperability with virtual classroom products

Technology Platform: RAM, Disk Space, Server type(s) supported, Database(s) supported, Underlying technology and structure of the code, Scalability (number of users that can use the application concurrently)

ALFANET innovative features

- Adaptive presentation & navigation

- Adaptive collaboration

- Authoring features (EML standard-compliant)

- Auditing features (Assessment and integration with knowledge management)

- Pedagogical methods (Curriculum sequencing)

Experiences of users

When information is available about how users value and actual make use of above mentioned tools and products, then this will be included in the report.

2.2.2 Question 2: Future of e-learning

The gathered data need to allow to make estimations about the use of e-learning within the EU for the coming years, as far as possible specified to the use of Internet, learning platforms and stand alone programs. Also the data need to provide details of EU-initiatives and EU-measures that support the application of e-learning.

Descriptors for the literature search include: E-learning trends, related trends (such as developments on the labour market, developments in lifelong learning), current use of E-learning (what kind of companies and types of employees use E-learning), non-use of E-learning (what kind of companies and types of employees do not use E-learning), possibilities and barriers for using E-learning in general, estimations of the future use of E-learning, policies and measures within the EC to enhance the use of E-learning.

Databases that will be consulted are: PICA, a Dutch database containing (inter)national scientific references, EBSCO, an American database containing international scientific references, ERIC, an American database specialised in not officially published materials (such as conference papers), CEDEFOP: a portal containing information with regard of European vocational education and training, Leonardo Da Vinci: a portal of the EC containing information with regard of projects aiming at the renewal of vocational education and training within the EC, Internet search engines such as Google.

2.2.3 Question 3: Characteristics of clients

There is a difference between users and clients. Clients are defined as those who are in charge of deciding to buy (access to) a learning environment such as Alfanet, while users are those who will actual use the learning environment (e.g. workers, instructional designers, tutors and students). In labour organisations in most cases the decision for buying Alfanet lies with the head of the department of Human Resource Management or Human Resource Development, in institutes of vocational and higher education the board or the dean will be responsible for this.

The partner in the project with substantial knowledge and easy access to information about buyers' concerns and preferences – KLETT – will investigate information that is already available within their area with regard of how their customers value the use of personalised, adaptive learning environments and what the barriers are that customers view for using such learning environments:

- Quantitative (how many) and qualitative estimations (in what branches and for what type of employees/tasks/jobs) of the possible target groups for Alfanet (distance learning universities and centres, E-learning service providers, and content providers)

- Conditions and circumstances that inhibit/enhance the implementation and use of adaptive e-learning

- Conclusions and recommendations including possible implications for design and dissemination strategy of Alfanet

This investigation is carried out by reviewing existing data of clients and eventually by some interviews or internet searches to gather some more in-depth information. Data was gathered from the perspective of Klett's own clients and markets.

2.2.4 Question 4: Users' characteristics

The investigation of users' characteristics is part of the activities in WP1 of the Alfanet project. It is therefore decided that it is not useful to carry out similar activities in Task 7.1. Especially Task 1.1 will enhance insight in the: general characteristics of (potential) users of E-learning (job, age, educational background); specific characteristics (learning style, experience with self-directed learning, appreciation of e-learning in general and adaptive learning in particular), conditions and circumstances that inhibit/enhance adaptive e-learning from the user's viewpoint, conclusions (profiles of users) and recommendations including possible implications for design and dissemination strategy of Alfanet. The outcomes of WP1 will be included in this report. Outcomes of WP 1 will be reviewed to find information that provides additional views not yet included in the outcomes of the other three questions that were formulated for the initial market studies.

2.3   Consequences of the applied methodology

The instruments and methods applied for addressing the four questions of the initial market studies can be regarded as adequate. However, there are some small limitations that need to be considered.

Firstly, the consultations of websites to investigate available tools and products may have the disadvantage that it is not always clear to what extend these websites mix providing information with marketing purposes. Since not alternative exists for gathering quick and recent information about tools and products this means for the analysis of the information that a critical view is necessary.

Secondly, the initial market studies focus merely on collecting existing information, thus hardly no additional empirical research takes place. This implies that answering the questions relies heavily on the information sources that are available.

Thirdly, the investigation of clients focused on the available information KLETT has access to. This is however not a substantial problem. It provides on the contrary more detailed and in-depth information. Furthermore, any bias can be overcome by comparing this information with the information that is gathered by the literature search about e-learning in general in the EU.

Finally, the quality of the answer to question 4 (users' characteristics) heavily relies on the work that is carried out in WP 1.

3. Outcomes of the initial market study

3.1   Introduction

This chapter deals with the outcomes of the initial market studies. In total four questions need to be addressed. Each question will be discussed in a separate section.

Section 3.2 discusses the results of the investigation of tools and products. The future of e-learning is the topic that is discussed in section 3.3, followed by the characteristics of clients in section 3.4. Finally the users' characteristics are discussed in section 3.5. The conclusions of the initial market studies are discussed in chapter 4 of this report.

3.2   Tools and products

3.2.1 Learning Space

Developer: IBM/Lotus

URL: http://www.lotus.com/home.nsf/welcome/learnspace/

License: Commercial

3.2.1.1   Product overview

LearningSpace is part of an innovative family of services and technologies designed to make e-learning in organizations. It covers both one group or entire company training. The LearningSpace family of products includes LearningSpace Forum, and the LearningSpace 5 Core and Collaboration.

LearningSpace 5.01 brings capabilities to e-learning, providing a web-based learning system available. LearningSpace allows you to create an advanced environment for online learning. LearningSpace does not require an existing Domino infrastructure except for the collaboration module. Two modules enable organizations to choose the functionality that best matches their needs.

- Core Module uses active server page technology and relational database structures to support the delivery and tracking of online self-paced learning content. Self-paced courses can be highly structured with controlled paths and prerequisite assessments, providing flexible learner access designed to suit individual learning needs.

- Collaboration Module combines the self-paced learning capabilities of the core module with the extensive collaborative learning capabilities that enable learners and instructors to work and learn together using discussion databases or real-time virtual classrooms. This capability makes it possible to bring together groups located throughout the world and enable them to learn together.

LearningSpace Forum 3.6 consists of interdependent Domino databases that create a powerful e-learning environment for organizations using Domino. With LearningSpace Forum, instructors and training participants can take their classes with them and participate anytime or any place. LearningSpace Forum 3.6 for Domino R5 allow users to take advantage of Domino features such as disconnected use and database replication, document sharing, and threaded discussions.

LearningSpace Forum allows you to offer e-learning courses that learners and tutors can access whether they are online or offline. Learning and facilitation is accomplished from wherever users are.

Learners access Learning Space Forum through one of several learning centers:

- Schedule - Provides learners with a structured approach to assignments, materials, and assessments. Through the schedule, students can link to everything required to complete their courses.

- Media Center - Allows immediate and searchable access to all materials for the course as they are made available by the instructor.

- CourseRoom - Hosts collaborative interchanges between learners' groups and/or students and tutors.

- Profiles - Helps learners and instructors get to know each other to form productive teams and to network outside of class.

Tutors have additional power with:

- LearningSpace Central - Provides course management and administration capabilities.

- Assessment Manager - Allows for easy setup and tracking of student's growing knowledge and progress.

LearningSpace provides a Web-based interface for delivering to a worldwide audience.

LearningSpace is available in 15 languages: Chinese (Simplified), Chinese (Traditional), Danish, Dutch, Finnish, French, German, Global English, Italian, Japanese, Korean, Norwegian, Portuguese (Brazilian), Spanish, and Swedish.

The LearningSpace Global English version supports another 8 languages, providing a total of 23 supported languages: Czech, Greek, Hungarian, Polish, Portuguese (Iberian), Russian, and Thai.

3.2.1.2   Course Management

LearningSpace includes management capabilities that help you manage your entire program ensuring that your e-learning efforts are generating measurable results. All management and learner information is stored in a powerful relational database (DB2, Oracle, or SQL)

The entire e-learning program can be monitored, gaining detailed insights on learner progress. For example, course completion, session information, and learner progress can be tracked.

On the administration side, select events can optionally generate e-mail notifications automatically. Events -- such as changes in learner enrollment status or course availability -- can trigger delivery of easily customizable messages to administrators, instructors, and learners.

3.2.1.3   Collaboration Capabilities

The collaborative functionality in LearningSpace provides support for threaded discussions (with both public and private modes), document sharing, and chat messaging. Learners can learn from each other synchronously (at the same time) and asynchronously (at their convenience) to develop communities of learning and practice. Collaborative activities have proven to be especially effective for problem-solving exercises, a forum for questions and discussions initiated by learners and facilitated by tutors and mentors, and for reinforcing learning done through self-directed study. LearningSpace provides a built-in interface for composing and sending e-mail. Tutors and learners can send individual private messages or use class lists to send messages to larger groups.

LearningSpace Collaboration Module adds a "virtual classroom" environment for real-time sessions via audio and video, shared whiteboards, shared applications, electronic hand-raising, dynamic participant lists, and both private and public chat messaging. Learners can see who else is also online and send them instant messages, as well as participate in real-time virtual classrooms and small-group break-out sessions with an tutor and other learners.

3.2.1.4   Content development and management

LearningSpace is an open Web-based e-learning solution. It's a e-learning management and delivery system that lets you seamlessly integrate your course content, whether you create it yourself or purchase it from leading providers.

3.2.1.5   Testing and assessment

LearningSpace lets tutors create a wide range of assessments from a browser including tests, surveys, and quizzes (using new questions or by drawing on a question bank). Online quizzes include true/false, yes/no, multiple choice, fill-in-the-blank, and short answers all aimed at assessing learner progress and course effectiveness. LearningSpace lets use a built-in assessment tool, or choose to use any AICC-compliant authoring tool.

3.2.1.6   Support of standards

LearningSpace is designed to support a number of existing standards, AICC recommendations for tracking and compatibility between content and the learning platform.

LearningSpace offers full support of the API adaptor specification of the Sharable Content Object Reference Model (SCORM).

LearningSpace products are in line with the IMS specifications focused on the development for e-learning.

The collaborative delivery features of LearningSpace are driven by Lotus Sametime technology, which takes advantage of open standards (e.g., H.323 and T.120) enabling real-time sharing of information and communication. H.323 is the ITU-T standard for sending voice (audio) and video using IP on the Internet and within intranets.

3.2.1.7   Integration with other applications

Lotus LearningSpace has a documented extensibility architecture based on a Java API. The API can be used to integrate LearningSpace with back-end systems such as HR databases, ERP, and e-commerce systems.

LearningSpace can also be part of your overall Lotus Knowledge Management solution, enabling to link e-learning with Knowledge Management. For example, LearningSpace courses can be integrated into the Lotus K-station knowledge portal.

3.2.1.8   Technological Platform

The minimum hardware and software specifications for LearningSpace 5.0 Core and Collaboration Modules are:

- Intel Pentium III or higher, 500 MHz or faster

- 512MB RAM

- NT 4.0, SP 6.0a or higher (SP 5 for International) or Windows 2000 Advanced Server, SP 2 or higher

- MDAC 2.5 or 2.6

Database Management Systems:

- DB2 7.2 UDB on NT4, Windows 2000, AIX, Sun Solaris

- Microsoft SQL Server 7.0 or 2000 on NT4, Windows 2000

- Oracle 8.1.7 on NT4, Windows 2000, AIX, Sun Solaris

End-User Systems:

- Windows 95/98/2000, NT 4.0 Workstation

- Internet Explorer 5.0.1 and 5.5, Netscape 4.5.1 (International) and 4.7 running on an IBM-compatible computer

- Java must be enabled in the browser in order for the learner interface to function.

3.2.1.9   ALFANET innovative features

No ALFANET innovative (adaptive presentation & navigation, adaptive collaboration, EML standard-compliant, self-assessment, pedagogical methods) feature has been detected in LearningSpace.

3.2.2 TopClass E-learning Suite

Developer: WBT Systems

URL: http://www.wbtsystems.com/

License: Commercial

3.2.2.1   Product overview

TopClass e-Learning Suite is a web-based training, authoring, delivery and management platform that enables easy conversion of existing content, rapid deployment to the web, and manages everything from the most basic level of Learning Objects to the highest level of organizational competency. It provides personalized coursework for each student, online authoring based on open HTML standards, secure collaboration tools, and auto testing capabilities.

- TopClass Learning Content Management System (LCMS) is a robust and scalable platform that offers e-learning content management and assembly, personalized content delivery, learner collaboration, learner tracking and assessment, web-based training administration, and database administration.

  TopClass LCMS is distinguished from other e-learning products through its usability with ease of installation, ease of administration, and ease of use. What further distinguishes TopClass from other e-Learning products is its support for rapid conversion of existing learning content to the web, and its unique Learning Object architecture.

- TopClass LMS enables businesses to provide employees with a single access point to all their training needs, and streamlines the management of Instructor Led Training (ILT) to increase the usage and effectiveness of training programs is critical to businesses today. It also allows blended delivery of the most effective learning methods with any combination of on-line self-study and instructor led training (ILT) including virtual classroom and other materials such as books, videos, and CD-ROMS.

  Fully integrated with the TopClass LCMS core platform, TopClass LMS provides extended catalog and registration functionality, and ILT management including wait-listing and workflow approval management. The core of TopClass LMS is a catalog that allows learners to find all the learning material in the enterprise from one central source.

- TopClass Competencies manages an organization's skills and competencies inventory, and assess resource allocation, while users themselves can identify skill gaps and map training programs specific to their competency shortfalls.

- TopClass Mobile allows learners to continue learning when an Internet or network connection is not available. It enables offline delivery for users without a network connection to access learning materials exactly as they would with TopClass, with the same interface, personalized learning, and assessments. TopClass Mobile also facilitates the deployment of content on CD-ROM and DVD.

  TopClass Mobile also allows course developers a convenient alternative for previewing and evaluating TopClass. Course developers can view their coursework just as it would appear if TopClass were delivering it, without the need for a network connection.

- TopClass Publisher is a desktop application for complete web-based course content publishing. it enables fast conversion of existing content and powerful course assembly with drag-and-drop ease. Quickly and easily create Learning Objects-based courses and integrated testing using content that can come in the form of Word, PowerPoint, Macromedia Dreamweaver, text, SCORM-compliant content and any HTML documents.

- TopClass Virtual Classrooms provides seamless integration with leading live e-Learning providers such as Centra, InterWise, and WebEx, enabling flexibility to choose the virtual classroom solution that best suits your needs.

- TopClass XML Toolkit provides everything you need to integrate TopClass with your existing business systems such as Peoplesoft or SAP. The toolkit ensures that TopClass can be tightly integrated with other systems such as HR and Financial Systems.

  The Toolkit takes the traditional approach to XML interfaces a step further. Not only is it possible to integrate 3rd party applications via the TopClass XML Interface, but this is, in fact, how WBT Systems products such as TopClass Publisher communicate with TopClass. It is not an afterthought or an add-on but a robust method of data communication - tested and used in-house.

TopClass provides a browser-based interface. This interface is available simultaneously in multiple languages. It serves all languages from one central server allowing users to choose the language appropriate to their needs instead of provide localized versions of their software with the need to run a different server for each language.

3.2.2.2   Course Management

TopClass LCMS also provides web-based training administration management, including course cataloguing, registration, enrollment, administration of user groups, and Instructor Led Training (ILT) management.

- Manage Administrator, Trainer, Learner, Competency Manager, and Guest/Concurrent User accounts easily with TopClass' powerful, scalable user group management. Search a database of users by user criteria.

- Manage users by groups based on their organizational department or job role. Allow administrative operations to be automated when adding, moving, or removing users from groups.

- Batch register and enroll learners into classes or have learners self-register and enroll.

- Create course lists. Search for classes by class criteria.

- Define, manage, and measure learner competencies, skills, and proficiency levels by job role, organizational group, or custom-defined groups. Search for courses needed to achieve skills and competency certificates.

TopClass LMS enables businesses to provide employees with a single access point to all their training needs, and streamlines the management of Instructor Led Training (ILT).

- Learners can easily find learning materials by browsing the catalog through administrator defined categories. TopClass LMS also allows unregistered users to browse the catalog and self-register.

- Learners can quickly find offerings that interest them by searching on keywords, category, language, title, description, or learning objectives.

- Learners are automatically sent email notifications of their enrollment once all approvals have been given, or for any changes in the status of enrollment.

- Approval processes can be defined and automatically routed by TopClass. Blended Learning Offerings Create offerings that consist of a blend of web-based training, ILT, Virtual Classroom events, and other learning materials.

- Learners can self-register easily, with additional privileges defined by administrators.

- ILT classes can be configured to allow waitlisting of students once the maximum for a classroom is provided. Waitlists may be handled automatically or manually.

3.2.2.3   Learner Competencies

TopClass Competencies is an integrated optional module to the TopClass e-Learning Suite and enables organizations to:

- Align training and expenditure with business requirements

  By making skill gap information available, learners, learning managers and trainers can focus their efforts in the areas required by business needs.

- Clearly map competency and skill requirements

  Ensuring current training resources are focused on the most appropriate area.

- Encourage workforce development and empowerment

  By enabling workers to identify areas upon which they should focus their attention and allowing them to identify the skills needed to perform other roles in the organization.

- Identify broad weaknesses and strengths in particular skills & competencies

  Aiding in the planning of recruitment and training programs.

The main features and benefits of TopClass Competencies management are:

- Employees performing a specific job or working within a specific organizational group can identify what skills, competencies and certificates are required of them not only for their current job or organization but also for a job or organization they may be interested in.

- Managers can define additional competency requirements at an individual level, in addition to those required by an employee's job(s) and organizational group(s).

- Learners can identify their existing competencies and individual competency requirements via skills gap analysis.

- Learners can quickly identify the learning material that will help them reach their required competency level.

- Learners can define personal competency requirements to facilitate their developmental and career aspirations.

- Learners can gain certificates that must be renewed on a specific date.

3.2.2.4   Collaboration Capabilities

Learners and trainers collaborate through built-in discussion groups, class announcements, and internal or external email. TopClass LCMS also seamlessly integrates with Virtual Classroom systems for live classes over the Web.

- Enrich the learning experience with powerful threaded discussion groups:

    - Moderate responses or leave the discussion groups unmoderated.

    - Organize discussion groups with folders and multiple levels of nesting.

    - Set access rights by user type to view, edit, delete, administrate, and create new messages or folders.

    - Include links to websites for reference.

- Learners can email a question to trainers or other learners through the internal email system and it automatically indicates where the learner is in the course. Learners and trainers can also use external email.

- Trainers can post bulletin board announcements to the class and learners can email and attach files in response.

- TopClass closely integrates with Centra's Virtual Classroom system:

    - Seamlessly enter Centra virtual classrooms without an additional login

    - Set up and update Centra and TopClass users simultaneously

    - Bulk load new users into Centra quickly and easily

    - Trainers can add Centra events as a page of their TopClass course

    - Learners can access the Centra learner home page and schedule directly from TopClass through the toolbar or utilities page

The collaboration functionality provided by TopClass Virtual Classroom are :

- IP Audio Conferencing. Including full duplex IP audio conferencing

- IP Video Conferencing. Real-time, multi-point video

- Evaluations and Quizzes. Can be optionally auto-graded

- Instant Surveys

- Virtual Whiteboard. Can be saved for later review

- Invite Participants to the Microphone

- Instant Feedback. (Hand Raising, Yes/No, etc.)

- Peer-to-Peer Interaction

- Application Sharing. Remote Application viewing and control

- Web Safari. Remote view of Web browsing/surfing

- Multimedia

- 28.8 kbps Dialup Support

3.2.2.5   Content development and management

TopClass Publisher is a desktop application for complete web-based course content publishing. It allows trainers to quickly convert existing training content into Learning Objects using a familiar and intuitive Windows user interface.

- Work Live or Offline: TopClass Publisher connects directly to TopClass for quick and easy uploading, updating, editing, testing, delivery, and management of TopClass courses and Learning Objects. Trainers can also work with TopClass Publisher off-line and even QA them in-browser with exactly the same interface as TopClass itself by using TopClass Mobile.

- Quick and Easy Content Conversion: Whatever format your existing training content is in, it can easily be converted into powerful Learning Objects. If it is Microsoft Word, Microsoft PowerPoint, HTML, Macromedia Dreamweaver, text, or SCORM-compliant content, it is as easy as dragging and dropping files into TopClass Publisher.

  - Publisher supports the implementation of all web-playable media types as Learning Objects, including Shockwave, QuickTime, Real Audio/Video, MPEG, Java applets, and JavaScript.

  - Includes step-by-step wizards for quickly converting Microsoft Word, Microsoft PowerPoint, and SCORM standard content.

  - Convert Microsoft Word files into hierarchical Learning Object structures by associating Word heading styles with Learning Object levels.

  - Convert Microsoft PowerPoint files into hierarchical Learning Objects by associating the number of slides, speaker notes, and audio narration files with Learning Objects.

  - When trainers add pages that have embedded images and multimedia, TopClass Publisher automates the process of adjusting the links to these files for their new location.

  - Trainers can link Learning Objects to websites, FTP sites, email addresses, newsgroups, or other Learning Objects.

- Support for Rich Media Content: TopClass Publisher supports any web-playable media content, including, but not limited to, Shockwave, Flash, QuickTime, Real Audio/Video, MPEG, Java applets, and JavaScript. Media may be defined as a Learning Object in its own right or embedded within an existing Learning Object, as required.

- Content Security and Control: Using TopClass Publisher's Digital Rights Management technology it is possible to control access to content. Learning Objects can be defined so course creators cannot edit them, but can still reuse them in multiple courses.

- Metadata: Implement your chosen Metadata strategy with Publisher's flexible Metadata editor. Set metadata at the individual Learning Object level or automatically cascade a set of metadata values through an entire course.

- Rapid Course Assembly: Trainers can assemble new courses from existing Learning Objects stored in TopClass or quickly create new objects with TopClass Publisher. TopClass Learning Objects include course, folder, page, test, question pool, question, and action objects. TopClass Publisher also offers a built-in HTML page editor or can tightly integrate with an external HTML editor of your choice, such as Dreamweaver or FrontPage.

  - Use the built-in basic HTML page editor or use an external HTML editor for additional functionality.

- Choose from comprehensive question options: questions randomly selected from a question pool, questions that appear one at a time or in groups, questions that can be retaken, add comments during questions and answers (use for reminders, hints, or to offer feedback), set the number of points awarded per question, set the time restrictions per question, Choose from several question types: true and false, Boolean, clickable images, multiple answer, multiple correct answer, pick an object, text response (for long answers), and send a file (for longer answers)

- Develop auto-corrected tests for fast learner feedback, tracking, certification, and compliance.

- Familiar and intuitive Windows user interface: collapsible hierarchical course structure outline/view , toolbars provide quick access to commands and functions, tabs enable easy switching between views, and customize your view however you like - set the font, color, size, and more

- Quick and Easy Course Updates: By updating a single Learning Object, all the courses that use that object are updated, significantly reducing the time it takes to keep courses up-to-date. TopClass Publisher supplies tools to make updating easy, including a built-in HTML page editor, global search and replace, and course tracking metadata information.

  - Updating courses is easy with global search and replace and metadata tracking information, including: name of course, date, location of document converted, name of document converted, time document was converted, name of user who converted document, etc

  - Customize your Learning Objects, including the font, background color, watermark image, copyright, multiple frames, commands for loading multimedia files, inheritance of attributes to sub-levels, and more.

    Reusable Learning Objects: Course Content is stored in a Learning Object library for scalable course management and easy editing, making it easy to assemble, reuse, and update courses.

  - Easily manage a large library of courses and tests through TopClass' hierarchical Learning Object architecture, which includes courses, pages, tests, question pools, individual questions, and conditional actions.

  - Trainers can assemble new courses quickly by reusing the Learning Objects from their library of courses.

  - Trainers can update multiple courses at once by updating just one out-of-date Learning Object.

3.2.2.6   Testing and assessment

On this topic no information was available.

3.2.2.7   Support of standards

TopClass complies with the leading industry standards, including AICC, SCORM, IMS, HTML, and XML.

TopClass is AICC certified and complies with the CMI web-based training guideline AGR-010. TopClass not only can accept AICC coursework, but it can also track learner access and progress, store learner test submissions, and report on learner and classroom progress for all AICC coursework.

TopClass not only can accept SCORM coursework, but it can also manage it as Learning Objects. TopClass can track learner access and progress, store learner test submissions, and report on learner and classroom progress for all SCORM coursework.

In addition to the ability to drag and drop AICC or SCORM content to import it to TopClass, Publisher provides the unique ability to allow any set of Learning Objects to be exported as SCORM 1.2 fully compliant SCOs, packaged using the Content Packaging standards of SCORM 1.2. Mix content originally from PowerPoint, Word, Dreamweaver and other tools and have it automatically exported according to the SCORM 1.2 specification.

Through XML TopClass provides a method for querying the TopClass database, and integrates with third-party applications.

3.2.2.8   Integration with other applications

Using its open APIs and XML interface, TopClass can also integrate tightly with complimentary applications to create custom "best-of-breed" solutions (Learning Management Systems, Virtual Classrooms, ERP systems, HR systems, and 3rd party content providers).

Typical examples of integration performed with the TopClass XML Toolkit are:

- An XML request for information on learner progress from the Enterprise HR system. The response to this request is used to keep the HR skills database completely up-to-date.

- An XML post from the HR system with the information required to create a TopClass user and enroll them in the Web-based 'Orientation for New Employees' course, thereby automating the e-learning process for new hires.

- Integration with LMS/Training Administration Systems.

TopClass make use of:

- Command Programming Interface (CPI) architecture that supports connection to Virtual Classroom systems, third-party content, and dynamic reporting applications

- Application Programming Interfaces (APIs) to extend its capabilities

- Test Question Programming Interface (QPI) to add more advanced testing capabilities, including user interface enhancements, language string access, object oriented management, and more flexible database storing options, and

- Security Programming Interface (SPI) to add additional authentication and security functionality.

TopClass offers engineered systems integration with Saba Learning Enterprise, Centra 99 and Symposium, NETg Web Player, and Oracle Reports.

3.2.2.9   Technological Platform

TopClass has been designed to store data in either an Oracle or SQL Server database. This provides the advantages of a relational database for acquiring, querying, and exchanging information. For best performance, WBT recommends, but does not require, that TopClass and the Oracle or SQL Server database are installed on separate machines.

The minimum hardware specifications for server platforms are:

- Pentium III or equivalent processor

- 256MB of RAM for Windows NT, Windows 2000 server or

- 256MB SPARC or UltraSPARC processors or

- 256MB of RAM for a Solaris server.

3.2.2.10   ALFANET innovative features

Personalized Learning: Through its comprehensive testing and assessment engine, TopClass LCMS dynamically creates personalized learning paths for each learner on the fly.

- Dynamically deliver courses based on learners' individual knowledge level. TopClass automatically adds and removes Learning Objects and coursework.

- Allow learners to adjust the format of their courses to the way they learn best, whether it is watching a demonstration, listening to an expert, or reading a step-by-step account.

- Customize courses by class or by user. TopClass reuse Learning Objects to construct multiple similar versions of courses.

- Track, assess, and promote learners. TopClass automatically enroll them in new classes or award them with achieved competencies and skills.

- Customize the user interface for each user, including colors, fonts, graphics, icons, window frames, and toolbars. Language strings can also be set to learners' language preferences to serve global workforces.

3.2.3 Pyxis KMS

Developer: Pyxis Edu

URL: http://www.pyxisedu.com/

License: Commercial

3.2.3.1   Product overview

Pyxis KMS provides a personalized learning platform with set of tools: KMS Enterprise Edition, LCM Tool, Desktop Course player, Offline course builder, Offline assessment builder, Performance analyzer, Virtual classroom. These tools are tightly integrated to have online learning experience, knowledge exchange, and expert-led community capabilities with learning object tracking and reporting to allow you measure and improve the learning process.

3.2.3.2   Course Management

The website does not provide any information related to course management.

3.2.3.3   Collaboration Capabilities

Pyxis KMS empowers collaboration and knowledge sharing between individuals and knowledge experts through chat rooms threaded discussions, emails, and document sharing.

Pyxis Virtual Classroom is a teaching and learning environment, which supports collaborative learning among learners. It supports a collaborative learning process that can exceed that of the traditional classroom, a process in which learners and tutors are actively involved in creating and carrying out learning activities together. Pyxis Edu's Virtual Classroom brings real-time training by experts right to your desktop over the Internet.

3.2.3.4   Content development and management

Pyxis KMS LCM is a learning Content Management Tool that empowers organizations to easily create and manage learning content on the Internet. It is standards-based system that goes beyond simple storage to manage the processes of creating, capturing, assembling, publishing, delivering, and storing content and learning objects. Its manages all forms of content including real time and unstructured content such as text, images, audio and video clips, modules, chapters, and test questions.

Pyxis KMS LCM includes a learning object repository that allows users to search, share, reassemble and store content and learning objects in a central location. Learning objects are reusable units of learning content such as a image, video clip, or a chapter of a course, and can be searched by name, content format, vendor, language, competency, date modified, creator, and date created.

Pyxis KMS LCM also has wizards-based import capabilities to easily import standards-based learning content and specialized content.

3.2.3.5   Testing and assessment

Pyxis Edu offline Assessment offers a comprehensive solution for an efficient design and execution of evaluation procedures. It offers extended flexibility to authorities and mentors, plan and execute their mean of evaluation. This tool delivers a comprehensive, scalable authoring infrastructure for enterprises and Assessment builders to create and deploy result oriented assessments, and quizzes.

It supports a wide variety of media files. With its supports to author any type of assessment objects, fill in the blanks, Ordering, Matching, Essays, True or False, Drag and Drop, Pyxis Edu's Assessment Builder is a handy tool to help simplify your evaluation process.

3.2.3.6   Support of standards

Pyxis KMS provides support to learning standards of AICC, SCORM, and IMS, which simplify the integration process to ensure that customers are not locked in to one particular type of content or vendor. Content build using the tool seamlessly integrates with Pyxis KMS and any other standard based learning environments

3.2.3.7   Integration with other applications

Pyxis KMS provides an inbuilt API that allows the integration of external applications such as HRMS, Financials, ERP and CRM platforms.

3.2.3.8   Technological Platform

Pyxis KMS is built upon an open architecture for cross platform compatibility using Java and XML and supports SUN Solaris, LINUX and NT operating systems with Tomcat, Websphere and IPlanet webservers and Oracle and MS SQL Server database support.

3.2.3.9   ALFANET innovative features

Personalized user interface at each level of the system. Pyxis KMS LCM is tightly integrated with Pyxis KMS to automatically and proactively deliver appropriate, personalized content to users based on in-depth profile information. LCM improves knowledge retention and performance by disseminating the right content to learners by tracking results down to the individual questions within a test and document level tracking.

3.2.4 Blackboard

Developer: Blackboard Inc, USA

URL: http://www.blackboard.com

Further a comparison of e-learning environments carried out by Droste (2000) was consulted.

License: Commercial, but educational licenses can be available for example via CHEST in the UK and Surfdiensten in the Netherlands (levels 1 and 2 only).

3.2.4.1   Product overview

Current version is release 5.5

The Blackboard e-Education Enterprise suite comprises the Blackboard Learning System [TM], the Blackboard Community Portal and Blackboard Transaction System.

3.2.4.2   Course management

It is available in three levels. The first level encompasses the course manager. This is the basic version, most suitable for an organization that is exploring its use. The portal manager is added in the next level. A portal function is added which allows every user access to specific services depending on his profile. The last level is an extended version of the previous.

3.2.4.3   Collaboration capabilities

Blackboard provides possibilities for group tasks.

3.2.4.4   Content development and management

It seems to be a user-friendly tool, especially for authors and teachers/tutors with no e-learning design experiences. In particular authors and tutors just starting in e-learning can make content available in a relatively simple manner. The design is via existing buttons. Content is made available via pre-designed structures. Adding new material is easy, changes in content and design only in limited fashion. A specialised authoring tool is not available.

3.2.4.5   Testing and assessment

Support for creation of tests and questions is offered. The integration with external assessment tools is not yet clear.

3.2.4.6   Support of standards

Blackboard is involved in IMS.

3.2.4.7   Integration with other applications

The Blackboard Learning System is a webbased server platform that offers course management and allows for integration with student information systems. It offers possibilities for integration with external systems. These have to be tailor-made.

3.2.4.8   Technological platform

The platform claims to be highly interoperable and customizable with its Blackboard Building Blocks architecture.

3.2.4.9   Alfanet innovative features

- There are few possibilities to define and specify roles. Personalization is not possible.

- The teacher/tutor environment is fixed, can not be adjusted.

- Content can be made available, but Blackboard does not provide an authoring tool, or integration with authoring tools. Content is course specific. When content is used in several courses, the content needs to be uploaded as many times.

- There is no student tracking, nor possibilities for automatic adaptive learning.

- Blackboard does not offer any tools for didactic design.

- There are no repository functions like version control.

- Course management, scheduling and planning is minimal, course tracking is absent.

- Communication facilities are available, but are limited in function.

- There is no multilingual interface. Only limited adaptations of the interface are possible.

- Although Blackboard claims to be standards compliant, only subsets of standards are implemented at this stage. The test generator is not QTI compliant.

- Several Blackboard customers indicate a poor customer support and high prices, but agree that it is easy to use and easy to integrate in traditional education. It seems especially equipped for those with no experience in the area of electronic teaching and/or electronic course development.

3.2.5 Cisco learning System Virtuoso

Developer: CLI Cisco Learning Institute, a non-profit organization founded by Cisco Systems Inc, but now operating independently from Cisco Systems Inc. USA

URL: http://www.ciscolearning.org

License: CLI intends to make Virtuoso™ available to organizations within its charitable class at little or no cost, under a licensing agreement. When the Solution is ready for distribution, any person or enterprise may license Virtuoso™ from CLI by paying fair market value for their use. CLI is currently developing its detailed plans for making Virtuoso™ available to licensees both within and outside its charity class.

3.2.5.1   Product overview

This evaluation is based on information from Cisco Learning Institute and UNICON. No other references could be found. CLI Virtuoso includes course authoring, course delivery (webbased), and course management (learner enrollment, tracking, and assessment) environments. It offers personalized learning experience, and provides a customized, on-demand curriculum, based on learner needs and requirements. It addresses specific learning goals using objects and assessment items. Evaluation of the learner's knowledge and skill before embarking on a course enables a personalized curriculum. It is not clear yet, whether the product is available. Cisco Systems Inc uses it for its Cisco Networking Academy Program.UNICON INC develops the delivery engine, CLI Virtuoso.

3.2.5.2   Course management

CLI Virtuoso consist of course authoring, course delivery and course management. The course authoring system provides content management and an authoring tool. It allows for creation of new content and organizing and manipulation of existing content. Many mediatypes are supported. There is version management of graphic media. Metadata can be added. User and access rights can be set. Several assessment types can be created. Courses can be delivered based on learner profiles. Personalized feedback is provided during the course. Performance levels can be set. Every content page contains a section with additional information. Assessments are dynamically rendered. Look and feel can be adjusted by the use of themes or templates.

3.2.5.3   Collaboration capabilities

The website does not provide any information about possibilities for group tasks and collaborative learning experiences.

3.2.5.4   Content development and management

This environment provides possibilities for authors to organize and manipulate content in various ways. Content and assessments can be imported from external authoring systems. There is automatic content delivery from the course creation to course delivery. A course portal provides links to course content for current enrollments, assessments, grade book, personalized curriculum, and instructor's website. The course management system is used by tutors/teachers to set or change assessment variables. It also stores results in a 'grade book'. The grade book is more or less a portfolio and is available both to student and teacher. This portfolio consists of records about students' progress and grades. Students get an overview of all their courses. A simple file format allows importing of external records and management systems. Instructors are able to view the grades of their students. They can also view statistical representations of class performance, which are automatically calculated and displayed by the system. These include class median, mean and students ranking within a class.

3.2.5.5   Testing and assessment

An assessment generation engine dynamically renders exams and quizzes for each learner using items previously authored and tied to specific topics. Exam attributes can be set by an instructor in the Exam Activation Screen. These attributes include such parameters as activation times, assessment duration, randomization of question order, personalized curriculum threshold, and specific learner groups assigned to

take the assessment. Assessments are graded upon submittal and the score is then made available to the management grade book. The following Question types are currently supported: 1) True/False: Learner is allowed to select one option from a list (true or false), 2) Multiple Choice Single Answer: Learner is allowed to select one option from a list, 3) Multiple Choice Multiple Answer: Learner is allowed to select one or more options from a list, 4) Fill in the Blank (short answer): Learner types the answer in one freeform field.

3.2.5.6   Support of standards

The website does not provide any information about the standards that are supported. A message is mailed to the webmaster for collection information about this item.

3.2.5.7   Integration with other applications

The system allows integrating with existing education management systems via a simple file format to import data. In addition to importing data from existing management systems, users may create learner and course information directly in the system's Management System.

3.2.5.8   Technological platform

The website does not provide any information about the minimum hardware and software specifications. A message is mailed to the webmaster for collection information about this item.

3.2.5.9   Alfanet innovative features

The following features can be regarded to meet the Alfanet demands:

- Personalized feedback

- The 'grade book' containing learner's progress, which can be regarded as a specific type of portfolio

- Customised course deliverance, based on learners' profiles

- Automatically assessment of learner's individual performance and whole class performance, using various descriptive statistics

3.2.6 Generation 21

Developer: Generation21 Learning Systems, wholly owned subsidiary of Renaissance Learning, Inc. USA

URL: http://www.gen21.com

License: Commercial, possible only in USA

The website provides only limited information. A search with the search engine Google did not result into additional websites.

3.2.6.1   Product overview

Started in aerospace industry as a knowledge management system. Now it claims to be "one solution for training, knowledge management, and learning management" ("TKM"). It relies on taking accurate information to employees in an efficient manner, whenever it is applicable. It uses a single-source demand-based knowledge database. In this respect it can be regarded as an Electronic Performance Support System, integrating information with the possibility of additional training. There is also a TKM for educational settings, used for training of staff and tutors.

3.2.6.2   Course management

It is a system that allows course developers to re-use information, accelerate learning, and provide on-demand performance support, based on Dynamic Learning Objects technology. Dynamic learning objects

can be re-used. Changed to dynamic learning objects are immediately reflected in all courses where the object is being used. Intake tests allow users to study only relevant parts.

3.2.6.3   Collaboration capabilities

The website does not provide substantial information about this topic. A downloadable brochure mentioned the possibility for collaboration but it remains unclear to what extend this actually means that group tasks and collaborative learning experiences can really be established.

3.2.6.4   Content development and management

Course development is based on common templates to ensure one common look and feel. It is possible to publish to web, print and CD-ROM. Users can search the database for additional information about the topic. There are LMS functionalities like scheduling, registration, tracking, gradebooks, reporting. Communication is available as e-mail, chat and forums.

3.2.6.5   Testing and assessment

The website does not provide substantial information on this topic. The downloadable brochure mentioned the possibilities of pre-testing as a functionality.

3.2.6.6   Support of standards

The TKM system use XML to define course structure and sequence. It claims to comply with the AICC communication protocols and SCORM. Generation21 participates in the IEEE computer-based training standards committee.

3.2.6.7   Integration with other applications

Intake assessment and library are add-ons to these systems.

3.2.6.8   Technological platform

The system is available for Linux, Solaris and Windows SQL. It requires a webserver, a database server and development server. Oracle 8i or MS SQL server 2000 are required. Users need an Internet connection with either IE5.0 or Netscape 4.7 or more advanced versions.

3.2.6.9   Alfanet innovative features

- possibilities to use the system in different versions, which are customized to the needs of specific clients (education, business)
- possibilities to integrate knowledge management with training, which is especially attractive for supporting on-the-job and self-directed learning of employees
- reusability of course materials
- possibility to publish in various media, such as the web cd-rom

3.2.7 WebCT

In the words of its author, "*WebCT is a tool that facilitates the creation of sophisticated World Wide Web-based educational environments by non-technical users. It can be used to create entire on-line courses or to simply publish materials that supplement existing courses*".

WebCT provides integrated e-learning systems for higher education, combining pedagogical tools with content management capabilities, options for personalization and customization of the learning experience and integration with an institution's existing campus infrastructure.

More than 2600 Institutions in 84 countries are currently licensed to use WebCT, including UNED.

3.2.7.1 General Features

WebCT software can be used to create entire courses online or to complement a classroom-based course. WebCT software resides on a server, allowing users to access it via a Web browser, such as Microsoft® Internet Explorer™ or Netscape®. It also allows you to make changes to your course readily — from any Web-accessible location — and to make these changes available to your students immediately. WebCT can be used to:

- Provide course materials that include text, complex equations, images, video, and audio
- Evaluate students with quizzes and assignments
- Facilitate learning using searchable indexes, glossaries, and image databases
- Integrate Web resources into your courses
- Create opportunities for students to be knowledge builders
- Encourage student interaction by using links to Websites, student Web pages, and a notetaking tool
- Communicate with students via discussions, email, real-time chat sessions, and an interactive whiteboard
- Manage grades
- Supply student feedback via an online grade book, self tests, and progress tracking
- Obtain data that allows you to analyze the effectiveness of your course

There exist two products:

- WebCT Campus Edition 3.8, a course management system (CMS) with a complete set of teaching and learning tools for course development, course delivery and course administration, and options for accessing, managing, and migrating course content, letting instructors direct and pace the learning experience based on time or student performance parameters.

    WebCT Campus Edition features are the following:

    World-Class Teaching and Learning Tools

    Customization and Personalization

    Student Performance Tracking

    Content Management

    Scalable Standards-Based Technology

    The latest release, WebCT Campus Edition 3.8, adds depth to WebCT's development and delivery platform, including drag-and-drop capabilities for simplified content acquisition, management of cross-listed courses, new multi-language capabilities, and support for failover (allowing administrators to ensure high system availability). It also features a number of updates to existing teaching and learning functionality, including enhancements to content modules, assignments, discussions, assessment tools and student presentations, and updates to existing administrative functionality, including IMS Event Tracking for improved management of integrated systems and a streamlined process for enabling SSL.

- WebCT Vista, an Academic Enterprise System (AES) which is a new e-learning system that goes beyond the boundaries of individual course management, providing higher education institutions with an extensible, enterprise-class e-learning system that mirrors their existing structure, operations, and workflow. WebCT Vista is an e-learning platform that includes course development and delivery capabilities, content management capabilities, and learning information management capabilities.

    WebCT Vista empowers higher education institutions with an enterprise-class e-learning system that actually mirrors and supports their existing structure, operations, and goals. Its features and functionality are the following:

    - A Flexible Learning Framework

    - An Integrated Teaching and Learning Suite

- [Dynamic Learning Information Management](#)

- [Powerful Content Management](#)

- [A Personalized e-Learning Gateway](#)

- [An Extensible, Enterprise-Class Architecture](#)

Therefore, WebCT provides ability to

- Uniquely support multiple educational entities in a central installation

- Create, store, tag, reuse, manage, and share content beyond course boundaries

- Define sophisticated role-based access to content, tools, and information

- Strategically leverage aggregate student learning data at the institutional level

All of WebCT Vista's teaching and learning capabilities are "aware" of each other with appropriate information rippling from one tool to others, which assures consistency and streamlines course development and administration.

3.2.7.2 Product overview

WebCT Campus Edition 3.8 incorporates support for Unicode (UTF-8), a standard for representing all of the world's languages, giving instructors the flexibility to display content in any language within their WebCT course. In addition WebCT offer plug-ins for 12 languages, including Czech, Dutch, Finnish, French, German, Italian, Polish, Portuguese, Russian, Spanish, Swedish, and UK English.

Regarding Accessibility, WebCT is working with leaders in the accessibility field to ensure that its software complies with both industry standards and government guidelines.

MyWebCT provides all users – students, faculty, and administrators – with a personalized, single point of access to the e-learning system

At the individual level, all users may be given the ability to personalize myWebCT with relevant content channels driven by course and section enrollments, calendars, discussions, and internal mail.

WebCT Vista is designed to support the organizational structure, operations, and workflow of the entire educational enterprise and gives institutions the ability to support multiple institutions (in the case of consortia or educational systems), or multiple colleges or departments within one institution, in a single installation by centrally administering their technical e-learning infrastructure. At the same time, institutions are able to maintain local academic control of the e-learning system to preserve the unique branding of their campus or college, create efficiencies in course administration, and facilitate content sharing.

WebCT allows institutions to track and mine student data related to their specific activities and progress in their courses by analyzing such factors as how frequently the system is being used, individual and class performance, and how students are spending their time while using the system.

3.2.7.3 Learners Management

WebCT Vista makes available aggregate student learning data at the institutional level, extending the capacity for institutions to access and strategically leverage learning data beyond the boundaries of the individual classroom. Institutions have the ability to extract cross-sectional student performance data that can be instrumental to program assessment, reviews, and broader institutional studies. Furthermore, instructors have the ability to access, track, and analyze student performance data to drive continual improvement of their courses and sections. WebCT Vista includes a full-featured Gradebook with spreadsheet-like flexibility for organizing, viewing, and managing course member information, grades, and groups.

3.2.7.4 Course Management

WebCT is designed to allow instructors to develop, deliver, and manage courses regardless of technical proficiency or time constraints using syllabus and course-building tools.

WebCT Campus Edition 3.8 allows institutions to manage cross-listed courses, providing greater flexibility and efficiency in course administration.

3.2.7.5 Collaboration Capabilities

WebCT Vista includes integrated communication tools to facilitate student-student and instructor-student interaction and collaboration, including chat and whiteboard, discussion capabilities, integrated course mail, and a "who's online" instant chat tool. Instructors have increased visibility of class participation, as well as the ability to moderate the flow of interaction to enhance the effectiveness of class sessions. In addition, WebCT Vista automatically maintains a log of all interactions, making is possible to continually reference and reuse the output of class communications.

3.2.7.6 Assignments Features

WebCT Vista features an integrated approach to individual assignments and group projects, facilitating the management of coursework for students and instructors alike. Students have access to tools that allow them to centrally complete and submit individual assignments as well as to collaborate and share information and files when working on group assignments. In addition, students have a centralized view of all assignments, organized by status or priority. WebCT Vista provides new assignment management conveniences for instructors as well, enabling them to efficiently and centrally manage the creation, organization, review, grading, return, and publishing of individual and group assignments.

3.2.7.7 Content development and management

WebCT Vista allows institutions to create, store, tag, reuse, manage, and share content beyond course boundaries in a central content database. Institutions have the ability to set role-based access to content to control which privileges and resources are available to users across the institution. At the course level, instructors have the ability to create and store content once and automatically distribute that content across sections. This content management enables instructors to manage multiple sections together, from a single point, and to share content between sections of the same course. WebCT Vista also provides options for content delivery. Instructors may selectively release course content based on pre-defined criteria, such as time or performance. The ability to selectively release any course element allows institutions to create personalized learning paths that address diverse student needs.

WebCT Vista's content authoring, delivery and management features include:

- Drag-and-drop Content Acquisition
- Sharable Media Library
- Interactive Course Map
- HTML Editor with Spell Check
- Equation Editor
- Search Capabilities

WebCT Campus Edition 3.8 gives course designers the ability to rapidly move content from their desktops into the WebCT environment using the WebDAV protocol for drag-and-drop upload and retrieval of course content. In addition, enhancements to the design and capabilities of the WebCT File Manager have made this tool even easier to use.

3.2.7.8 Testing and assessment

Respondus is the leading developer of third-party testing and assessment tools for the WebCT™ and Blackboard® e-Learning platforms." (www.respondus.com)

WebCT Vista's assessment capabilities integrate quizzes, self-tests and surveys in a single management interface with a unified database. Using a wizard-based approach to assessment development, instructors and course designers can create the assessments. Questions are automatically added to a sharable database, facilitating the reuse and repurposing of questions in subsequent assessments.

3.2.7.9 Support of standards

WebCT is both committed to supporting IMS and SCORM standards for student record data, content meta data, and student evaluation data, and it is also involved in their definition and acceptance. In addition, WebCT Vista's support LDAP and Kerberos authentication standards.

3.2.7.10 Integration with other applications

WebCT Vista includes a development toolkit for integration with either custom or commercial learning software, through exposed Java APIs. The IMS Enterprise API enables seamless integration with student information systems and portals. It also supports ERP Integration.

WebCT Campus Edition 3.8 will provide IMS Event Tracking for improved management of integrated systems. The enhanced logging of IMS events will provide system administrators the information they need for rapid troubleshooting.

The process for enabling SSL has been significantly streamlined in WebCT Campus Edition 3.8. Many tasks have been automated, allowing administrators to more efficiently enable SSL.

3.2.7.11   Technological Platform

WebCT Vista is a four-tier Web Application Architecture, Java™ 2 Platform, Enterprise Edition (J2EE) compliant application, leveraging the BEA WebLogic Enterprise Server at the application layer and Oracle 9i DBMS and Oracle IFS at the database layer. This architecture allows for cross-platform portability and scalability.

In addition to system server clustering, WebCT Vista adds session fail-over and facilitates database server clustering through Oracle to optimize performance while ensuring that students or faculty using the system work uninterrupted in the event of planned or unplanned server outages. WebCT Campus Edition also adds session fail-over.

- *Recommended System Requirements for WebCT Servers:*

The suggested minimum for delivering courses and course materials with WebCT is a department-level UNIX server or NT server. WebCT 3.x currently supports the following server operating systems:
  - Sun Sparc Solaris version 6 and above
  - Red Hat Linux 6.2
  - Microsoft Windows NT (Server or Workstation) 4.0/Apache
  - Microsoft Windows 2000 Server
  - IBM AIX
  - Compaq Tru64, Digital UNIX
  - HP-UX

For Unix Servers:
  - Average Installation (less than 15,000 user accounts)
  - PIII 550 [or equiv]
  - 256 MB of Ram
  - Large Installation (more than 15,000 user accounts)
  - dual PIII 550 [or equiv]
  - 512 MB of Ram

For NT Servers:
  - Average Installation (less than 15,000 user accounts)
  - PIII 550 [or equiv]
  - 512 MB of Ram
  - dual CPU a consideration
  - Large Installation (more than 15,000 user accounts)
  - dual PIII 550 [or equiv]
  - 1 GB of Ram
  - quad CPU a consideration

Hard Drive Space

Hard drive space is totally dependant on user usage. Here are some general guidelines for any type of WebCT system:
  - An installation takes approximately 40 MB
  - Each course requires approximately 2 MB
  - Allow 1 MB per user account
  - x MB for designer uploaded material

Browsers supported:
- o Netscape Navigator Version 4.76
- o Internet Explorer Versions 5.0 to 5.5, except Service Pack 1 (SP1)

- *Technical Requirements for WebCT Campus Edition v. 3.8*

Minimum system requirements for WebCT Campus Edition v. 3.8 include:
- o 1 Intel Pentium III 1-Ghz processor or 2 Sun UltraSPARC III 750-Mhz processors
- o 2 GB of RAM
- o 72 GB of hard drive space in a SCSI or RAID configuration.

Server Platforms
- o Microsoft Windows 2000 Server SP2
- o Microsoft Windows 2000 Advanced Server SP2
- o Red Hat Linux 6.2, 7.1, 7.2 and 7.3
- o Sun SPARC Solaris 7 and 8

Web Servers
- o WebCT Campus Edition v. 3.8 supports the Apache Web Server v.1.3.26.

Client OS
- o Microsoft Windows 98/ME/2000/XP
- o Mac OS 9.x and OS 10.1

Browsers for the Mac OS 9.x
- o Microsoft Internet Explorer 5.0 - 5.5
- o Netscape 4.7.6 and 6.2.x
- o AOL 7.0

Browsers for the Mac OS 10.1
- o Microsoft Internet Explorer 5.1
- o Netscape 4.7.6 and 6.2.x
- o AOL 7.0

Browsers for Microsoft Windows
- o Microsoft Internet Explorer 5.x and 6.0
- o Netscape 4.7.6 and 6.2.x
- o AOL 7.0

3.2.7.12   Comments based on experience using WebCT

The Oxford Centre for Staff and Learning Development undertook an evaluation to Brookes Virtual in which users with experience in using WebCT were interviewed. Some of the issues included in the report [http://www.brookes.ac.uk/mediaworkshop/brookesvirtual/files/BVReportPt2.pdf] regarding WebCT were the following:

- Three-quarters of the interviewees said that they found WebCT "clunky" or "frustrating to use".
- Some quotations conveyed distrust of the software and a fear that interviewees would not achieve what they wanted to, particularly with regards to online assessment.
- Some participants were put off using WebCT because of limitations in how it allows a course to be structured online.

From UNED's experience using WebCT, the following shortcomings from WebCT are identified:

- Although WebCT provides collaboration capabilities, it has not been designed as a tool for collaboration, and its performance regarding collaboration is not the desired.

- WebCT offers a large assorted of tools. However, users only use 20% of the resources of WebCT because it is not that easy to use them.

- Some tools are not implemented in the most suitable way for users' convenience. For instance, files management is not easy to use at all.

3.2.7.13   ALFANET innovative features

WebCT innovative features can be extended to any course management system tool, which are the features already described.

3.2.8 BSCW

3.2.8.1 Product overview

The BSCW (Basic Support for Cooperative Work) Shared Workspace System is a Web based groupware system developed at GMD that is used by more than 100,000 users world-wide.

The BSCW Shared Workspace System is an Internet /World Wide Web (WWW) based groupware system. It is an extension of a standard Web server through the server CGI Application Programming Interface. The central metaphor of the system is the shared workspace. A BSCW server (Web server with the BSCW extension) manages a number of shared workspaces, i.e., repositories for shared information, accessible to members of a group using a simple user name and password scheme.

Shared workspaces can contain various kinds of information such as documents, pictures, URL links to other Web pages, threaded discussions, member contact information and more. The contents of each workspace are represented as information objects arranged in a folder hierarchy.

Of course, in addition to the normal download of information from a Web site, users can also upload information from their local file system into a BSCW workspace.

The following are the main features of the system :

- **Authentication**: People have to identify themselves by name and password before they have access to BSCW workspaces.

- **Discussion forums**: Users may start a discussion on any topic they like and the system presents the threads in a user friendly manner.

- **Access rights**: The system contains a sophisticated access rights model which allows, for example, that some users may have complete control over an object in a workspace whereas others have only read access or no access at all.

- **Search facilities**: Users can specify queries to find objects within BSCW workspaces based on names, content or specific properties such as document author or document modification date. Furthermore, queries may be submitted to Web search engines and the result of the query can be imported into workspaces.

- **Document format conversion**: These facilities allow users to transform a document into their format of choice, e.g., a proprietary document format into HTML, before downloading it.

- **Version management**: Documents within a workspace can be put under version control which is particularly useful for joint document production.

- **Multi-language support**: The interface of the system can be tailored to a particular language by straightforward extensions. Several languages (e.g., French, Spanish, Italian, Russian, Greek, Catalan) have been created by users of the system and are publicly available.

- **Event services**: A cooperative system has to provide awareness information to allow users to coordinate their work. The event services of the BSCW system provide users with information on the activities of other users, with respect to the objects within a shared workspace. Events are triggered whenever a user performs an action in a workspace, such as uploading a new document, downloading ('reading') an existing document, renaming a document and so on. The system records the events and presents the recent events to each user. In addition, users can request immediate email messages whenever an event occurs and so-called daily activity reports which are sent to them daily and informs them about the events within the last 24 hours.

The main interface between the BSCW Server and the BSCW clients -these are normal Web browsers- is HTTP and HTML. Since HTML is not very powerful with respect to interface design, the system contains also an additional Java based interface (using XML).

3.2.8.2 Collaboration Capabilities

The main emphasis of BSCW is on Collaboration Capabilities integrating both synchronous and asynchronous communications facilities but giving more relevance to the last one.

For **synchronous** (simultaneous) cooperation, BSCW provides tools for

- planning and organizing meetings,

- starting 'virtual' meetings on the basis of conferencing programs or by telephone,

- ad hoc communication with partners who are currently logged in to a shared workspace and therefore are likely to be working on a common task.

For **asynchronous** (not simultaneous) cooperation, BSCW offers **shared workspaces** that groups can use to store, manage, jointly edit and share documents.

Discussion & Notes: Discussions may either be individual objects within folders or they are attached to objects such as documents or links. A discussion consists of 'Notes' -- basically short pieces of text "pinned to a bulletin board" for all members of a Workspace to read and react on.

One specific type of reaction is to write another note that refers ("replies") to an earlier one, as

- answers to a question;

- counter-arguments to an argument;

- additional pieces of information to a piece of information.

a note may reply to several earlier notes.

Notes may contribute different types of content to a discussion, possibly reflecting the author's attitude. BSCW lets characterize each contribution by assigning a type of contribution (configurable in each BSCW server). GMD's public BSCW server offers the following types:

- neutral note

- pro -- approval

- con -- disapproval

- angry -- strong disapproval

- important -- significant contribution to the discussion

- idea -- sudden inspiration

Using the Notes feature, BSCW offers a flexible and powerful function to **annotate documents and URL** objects. Notes may complement description and rating as meta information on these types of objects.

One major difference is that BSCW lets control who may read a discussion or reply to a note by turning the discussion into a shared workspace of its own and by setting differentiated access rights.

An important BSCW function for supporting cooperative work is to inform the members of a shared workspace that something has happened. For this purpose, BSCW records each action on an object as an **event**. Each member of a workspace will be informed about the events "inside" the workspace.

BSCW allows to specify in detail how a user want to be informed about events in their workspaces. This may be specified on a per object basis, but for the general case a default configuration is set.

3.2.8.3   Other Capabilities

Document Management:

 BSCW provides several types of objects to create, manage and share in a Workspace.

- Document

- Document under version control   - Folder

- Note   - Calendar

- URL (Link)   - Discussion

- Search Result   (these are containers that includes other objects)

In BSCW, a *document* can be any file uploaded from the local system. A document may contain text, spreadsheets, graphics, print, files, pictures, sound, video etc., typically stored in various proprietary file formats.

The system allows to establish version control for the document, allows to temporarily lock the document and provides its history with a list of the complete log of actions on the object.

Search Capabilities. BSCW helps users to:

- submit a query to one of the popular *Web search engines*;

- find *objects* (folder, document etc.) in their folder, calendar, clipboard or wastebasket;

- check if someone is a user of the BSCW Server or is listed in the address book.

The resulting object can be stored in the workspace to be shared, modified or processed again.

BSCW lets users create and manage sets of **interlinked** documents (HTML files, GIF or JPEG files, audio or video files etc.). They can share them with the other members of the workspace and even publish them for anonymous access on the Web. Links may also be included in notes, in the 'description' attached to an object and in various other text fields.

Conversion helps users share documents when not all members of the workspace can use the same programs. Conversion translates a document from one (typically program-specific) file format into another one that all may be able to read and edit more easily than the original format.

Encoding typically reduces the file size of a document, i. e. the storage space requirements and the time to download a document.

Work flow planning and management. With the BSCW extension package *"Project Flow"*, the "Project" folder enables task forces to plan the time flow of a project and to visualize deadline shifts. For this purpose each project folder additionally contains a bar chart to visualize temporal relations of the individual process dates of a project.

The *project manager* defines specific processes of the project, with the specification of a process start and end date. The bar chart permits the visualization of all processes within the project in terms of a *Gantt* chart. The bar chart displays the time flow of the complete project and its individual processes. In particular agreed deadlines, suggested deadline shifts and delays of dependent sequential processes are shown.

Appointments in the BSCW **calendar** let users organize events of different types. An appointment is described by at least a date and a name for the appointment. Users may provide additional information on the appointment, e.g. a category, description and location. Furthermore, appointments can manage a list of invited participants with associated status (invited, accepted, declined). Finally appointments may be used to manage events of *synchronous* cooperation.

JMonitor provides support for more informal, spontaneous communication and cooperation among the members of a group, using BSCW as the infrastructure. It basically allows users to monitor their co-workers availability and activity within BSCW. The JMonitor tool allows to see who's online, to receive instant notification about other user's actions inside the shared workspace and contact the online co-workers by sending short text messages or starting a chat session.

3.2.8.4   Content development and management

BSCW does not provides elaborated content development capabilities. It allows to edit some file MIME types (text/plain or text/HTML) and to generate zip and tar archives. The Document Generator facilitates a comfortable management of document sets which need to be continually revised and periodically published. Based on hierarchically structured templates, documents within such document sets can be automatically created by an evaluation process using the templates. The Document Generator can thereby help to reduce redundancies and to achieve a consistent structure or layout of the documents.

Administration Capabilities:

Registration. A BSCW server may be configured by its administrator to

- enable users to register without any intervention from the administrator (self-registration).

- allow only the administrators and selected persons to register new users.

A BSCW **access right** permits a user to perform a cluster of actions on an object. As BSCW aims to support cooperative work, its basic idea is that an object is either

- private, so that only the user who created it in a private folder may access it, or

- shared, with particular access rights for the members of the shared folder (workspace) that contains the object. The access rights may vary for different members.

Access rights are assigned to members via the **role** which a member has in a particular folder. The system provide a set of pre-defined standard roles (member, restricted member, manager of a workspace or document or owner of an object) and users may define roles of their own in a workspace as user-defined roles.

The system allows to manage a users' group as a user when assign access rights. In order not to necessitate to much role assignment when creating new folders, role definition and role assignment for most roles are inherited along the containment hierarchy. Access rights may be extended or restricted for individual folders by redefining a role or by changing the assignment of roles to folder members.

Anonymous access across the web is permitted, by inviting the user *anonymous* as a member. The anonymous access can be restricted by defining actions to do, and to "Moderate/ No" the anonymous contributions.

As summary, BSCW provide a very flexible and powerful **access rights** politics from complete decentralization (every member is allowed to add or remove members) to strict centralization (only the manager of the workspace is allowed to add or remove members)

3.2.8.5   Testing and assessment

BSCW does not provide specific tools for testing or assessment.

3.2.8.6   Support of standards

BSCW does not declare learning standards support.

3.2.8.7   Integration with other applications

BSCW supports the exchange format for **calendar tools**, e.g., Outlook and StarOffice

Integration with synchronous cooperation tools , such as the following **computer conferencing programs**:

- Microsoft NetMeeting

- CU-SeeMe

- Connectix Videophone

- Intel Internet Video Phone, Proshare Conferencing

- Netscape Conference, Netscape Cooltalk

- Teamwave Workplace

3.2.8.8   Technological Platform

The BSCW system runs on Windows NT and various Unix dialects (including Sun Solaris and Linux). As the underlying Web server the Microsoft Internet Information Server, the Apache server and the AOL and CERN Web servers can be used.

Security options: The BSCW server may also be operated using a secure **SSL (Secure Socket Layer)** compatible Internet connection. Additionally, each user may self-authenticate using **X.509 Client Certificates** instead of the comparatively unsecure basic authentication.

3.2.8.9   ALFANET innovative features

Some details on shared workspaces and the functionality available depends on:

- the role a user fulfills (reduced access rights;)

- the level of proficiency with BSCW that a user has chosen for itself. At the *Beginner* level -- the default when starting to use BSCW -- the user will see fewer objects and actions.

- the configuration of the BSCW server.

Tailorability of the interface is possible on an individual basis and directly by the user, i.e., each user should be able to specify his or her own interface. There are three essential areas of tailorability:

a. Visibility of the different object types of the system (i.e., which types of objects are presented to users and accessible for possible interaction);

b. Visibility of the actions that can be performed (i.e., which operations on objects are offered to users);

c. Layout of the user interface (i.e., how are the objects arranged at the user interface).

BSCW gives support for customisation of a) and b) and leave end-user control of the user interface layout as a future feature.

The customisation is implemented based on:

- user preference profiles used to "filter out" information that the users do not want (select their preferred interface language at run-time, specify whether or not they wanted to use Javascript enhancements or ActiveX enhancements in the HTML pages delivered by the BSCW server, or in what form (HTML or plain text) they want to receive system email messages, etc.

- pre-configured "novice", "advanced" and "expert" interfaces to provide the access the full functionality but with the opportunity to get used to it gradually

- a powerful and flexible access rights concept that allows different setting for different workspaces.

The user may customise the Web-based user interface, and the system is flexible enough to permit each user to adapt the workspace for a number of system functions to the specific requirements of the tasks at hand or the personal workstyle. But this is long of an automatic adaptation provided by the system.

The event service, which provides users with information on the activities of other users and automatic notification of changes in the workspace and the Notes, which are a first step for structuring the collaboration, are two interesting features provided by BSCW.

3.2.9 Adaptive Learning Intelligence Suite (ALIS)

It has not been possible to find some more information about ALIS than the one provided by the Training Place on its homepage (http://www.trainingplace.com/). No research articles have analysed ALIS at any level.

The Training Place Homepage states the following:

> *"ALIS provides a full range of critical Web-based training features. It delivers object-oriented course content as a continuous, high-speed series of adaptive performance tasks arranged in work models and specific competencies that help the learner progress toward expertise. Using this model, less sophisticated learners can achieve basic objectives and improve learning ability in scaffolded environments while more sophisticated learners can enhance inductive, problem solving, and discovery learning skills in more exploratory, learner-controlled environments".*

> *"ALIS is unique because first it predicts what learners need to learn (mass customization) and dynamically supports how individuals intend and want to learn (personalization)".*

> *"ALIS is important to our clients because first it enables them to select their modular components to customize their learner-centric learning environments. Secondly, it enables them to offer flexible solutions that dynamically adapt content to fit individual real-time needs".*

These descriptions are very close related to the idea of the system to be developed for the ALFANET Project. And that is the main reason why this platform is included in the market analysis. However, it is not possible to study this platform in detail since there is no such information available, and the analysis is based on what it is said in its homepage. It is not possible to have access to the platform either since the way to get it "*starts with a strategic planning process to analyze the organizational and operational needs, business goals, and desired results for e-learning. From there, we devise a comprehensive solution that considers*

solution

design, implementation, and evaluation" (e-mail response from The Training Place).

Clients that are using this platform (according to GATE) are U.Texas A&M University, U.Brigham Young University and E.Chello & United Pan Communications, Holland.

3.2.9.1   General features

The Adaptive Learning Intelligence Suite (ALIS) is a Learning and Content Management System. ALIS is a family of personalization products that takes advantage of the theories of personalized learning, online learning communities and inferential technology to serve each learner with the highest level of individual attention and service. This adaptive learning system automates, manages and personalizes critical e-learning relationships and processes, such as dynamic and personalized content presentation, practice, feedback and assessment, knowledge management, tracking and reporting, and updates to learner profiles and shared data.

ALIS also includes self-service learner access, registration, profiles, and transcripts; competency and performance management with gap analysis; activity tracking, progress maps, and reporting; events manager and reporting; catalogs, scheduling, and logistics for all types of training and knowledge management; and e-mail, collaboration, and tutor support. All ALIS products are compliant or exceed industry-wide standards and offer enterprise-wide strength, increasing levels of scalability, reliability, interoperability and compatibility, and unlimited performance reporting using standard reporting tools. ALIS also ensure efficient enterprise-wide use of integrated resources.

ALIS implements strategies to integrate:

- Agent technology, logical rules, and standards for online learning

- A sound learner-difference model based upon the key psychological factors that influence human interaction and online relationships

- Learning objects and XML to individualize presentations and features (using all learning media types, including text, video, graphics, and audio)

- Flexible, open architecture that shares resources across HR, ERP, CRM, and other enterprise-wide systems.

The product uses:

- Learning orientation research to predict and support learning

- Learning objects to store sharable content

- XML to manage and present reusable data dynamically

- Adaptive learning (inference) technology

- Scalable, open architecture that easily integrates with enterprise-wide systems

ALIS presents three kinds of interaction for the different learning orientations, Humanizing Learning with Learning Orientations and Personalization, including:

1. Varying propositions for presentation, progress, advisory, and practice and feedback,

2. Concepts for pattern recognition so that appropriate propositions can be retrieved, reviewed, and increasingly learner-managed, and

3. Different levels of strategic knowledge mapped to competencies for planning, setting goals, sequencing tasks, solving problems, and monitoring progress in developing successful solutions.

ALIS is a combination of software products (the Core, made up of the Learning Center, the Learning Object Architecture, the Manager, the Reporter and the Assessor, and the Add-On Components, made up of Authoring Tools, Diagnostic Tools, the Knowledge Manager and the E-Commerce Manager) designed to provide personalized instruction, practice, assessment, analysis, reporting, and evaluation. Each modular,

Web-based component is an integral part of ALIS' object-oriented platform architecture, which easily integrates with other open-standard enterprise-wide systems.

3.2.9.2   Product overview

The ALI Suite is a sophisticated combination of learning orientation research, object-oriented architecture, eXtensible Markup Language (XML), and powerful learning agent technology that shares the data, powers the database, and customizes content presentation. This platform provides all these features without the need for proprietary plugins, helper applications, cookies, or Java on the customer machines. As an open architecture, it is also a perfect fit for any existing IT infrastructure.

The architecture is a 100% web-based, OBDC-compliant architecture that enables easy implementation of fully integrated modular components and XML presentation of learning objects. The interface is in English, although content can appear in multiple languages.

It includes integrated e-commerce functionality with the E-Commerce Manager. ALIS E-Commerce Manager helps businesses gain competitive advantage by collecting and managing data to build and integrate e-Commerce solutions expeditiously. This module provides an interface to credit card software and supports the centralized online administrative activities that facilitate learning, assessment, and reporting, including customer interactions, learner login and enrollments, merchandising, accounting, managing costs, and providing customer services.

The platform allows student monitoring since it helps clients measure learning outcomes by tracking individual group achievement, progress, performance, completion, competency, satisfaction, learning efficacy, and skill acquisition. Meaningful measurement tools, before, during, and after courses with diagnostic tools, pre-tests, post-tests, and self-assessments are provided, including a short- and long-term progress information.

ALIS offers a set of pre-course diagnostic tools to assess learning orientations, cognitive ability, preferences, and knowledge and performance skills. The most important of these tools is the Learning Orientations Questionnaire. It measures key learner-difference variables that significantly influence learning success. The Learning Orientations Questionnaire scores identify learning orientations to describe how the learner may generally want to approach the learning experience. The Training Place works with customer specifications (aligned with competencies and instructional objectives) to provide pre-course diagnostic tools that determine what the learner knows and identify the gaps towards achieving performance objectives.

3.2.9.3   Learners' Management

The Learning Center is a web gateway (portal) that provides access to multiple learning, user, training, and curriculum management functions and features through one interface, with multiple key options for learning and performance management.

The Learner Center offers multiple interactive features:

- provides an entry point, individual learning paths, customized communications, channels (links for information on a specific topic) for corporate information and learning needs, and collaborative connections to any number of learning groups.

- displays an interactive control panel for self-directed learning

- provides a search engine for specific topics that contain particular value for the learner

- enables learners to create custom views of interfaces, a tool kit, and information they need regularly

- customizes communications among advisors, managers, training professionals, and among team members

- provides up-to-the-minute workflow and short- and long-term progress information

This module encourages learners to model, monitor, and then internalize learning expertise (increasing over time) as they accomplish learning objectives. These special resources help the learner examine the content of the course, set goals, reflect upon content presentation preferences, sequence tasks, and review cumulative and comparative information about performance and overall progress.

3.2.9.4   Course Management

The product offers a complete online training solution, providing high-quality course development along with learner-intuitive Web-based course administration and management.

The Manager provides different types of users with customizable views for user, training, and curriculum management and use. The Manager has several standard choices (Learner view, Group View, Manager view, Instructor view, Administrative view and System view) that can be chosen to customize further depending on their roles, relationships, and privileges. Whether learning, doing administrative tasks, scheduling, or curriculum management, customized views can help users streamline tasks. Depending on the type of view, the functionalities provided are different:

- Learner View - Enables learners to view schedules, updates, competencies, catalog, recommended content and courses, and training history, do simple and advanced searches of content, select and enroll in approved courses, monitor progress and assessment, send special requests, and produce profiles, portfolio, and transcript reports.

- Group View - Enables learning teams to view group schedules, updates, competencies, catalog, recommended content and courses, and training history, select and enroll in approved courses, monitor group progress and assessment, send special requests, and produce group reports.

- Manager View - Enables managers and supervisors to view schedules, updates, catalog, and recommended content and courses by group and individual, do simple and advanced searches of content, review enrollments, progress, competencies, and training history, approve special requests, send individual or group e-mail, and produce reports.

- Instructor View - Enables instructors and facilitators to update content, activities, and recommendations, do simple and advanced searches of content, browse enrollments and logistics, track progress, monitor competencies and training history by group and individual, approve special requests, append online content, course material, or assessment, send individual or group e-mail, assign grades to portfolio, and produce reports.

- Administrative View - Enables training professionals to update schedules, content, catalogs, activities, and recommended content and courses by group and individual, do simple and advanced searches of content, manage enrollments and logistics, evaluate progress, monitor competencies and training history by group and individual, approve special requests, and append online content, course material, or assessment, send e-mail, manage administrative tasks, and produce reports.

- System View - Enables system administrators to manage general activities by groups and individual, establish privileges, interfaces, and groups, customize interfaces, append online materials, and produce system reports.

This module provides functionality for:

- user management (add/delete/modify/import companies, learners, instructors, or managers, manage assignments, privileges, authorizations, and collaboration, evaluation, and reporting)

- training management (add/delete/modify/import/manage costs, staffing, forecasts, and program evaluation and reporting).

- curriculum management (add/delete/modify/import (1) all types of content and courses (e.g., ILT, CBT, WBT, powerpoint slides, video, and audio), (2) meta-content or course information, scheduling, course registration and assignment, evaluation, and reporting).

3.2.9.5   Collaboration Capabilities

ALIS includes collaboration support, and most collaboration tools are supported, although the e-mail is the only one explicitly mentioned.

3.2.9.6   Content development and management

The Composer is ALIS' learning object authoring system for curriculum development and acquisition. With a click, designers navigate to Composer and log in using authorized user IDs and passwords. It allows course architects to create content objects using a friendly interface, icons, fill-in-the-blank forms, useful design strategies, and shared learning components from a central repository of reusable learning objects. Composer designers have key strategies to mass customize and personalize courses as they assemble

learning objects into lessons and modules and modules into courses and curricula that meet diverse business and training objectives. This software focuses on the practical aspects of designing Web training and integrates learning orientation research, instructional design strategies, and emerging technology to ensure satisfaction and success.

3.2.9.7   Testing and assessment

The Assessor closely aligns with competencies and instructional objectives. It tracks and reports basic learning and performance activity. It allows test builders to create learning objects for formal and informal assessment. In later versions, ALIS' Assessor will use a more sophisticated, friendly interface, icons, fill-in-the-blank forms, useful design strategies, and shared components from a central repository of reusable learning objects. It purpose is to provide test development and acquisition functionality to support performance measurement. The Assessor lets businesses create and deliver effective assessments quickly, easily, and economically -- wherever and whenever they are needed. This component focuses on the practical learning and business aspects of assessment by measuring performance and progress, capturing data, and analyzing results with key business and learner variables.

The Training Place goal is to ensure learning, performance, and financial goals aligned with high standards, profitability, and return on investment. Supporting this goal, ALIS' products offer unlimited performance reporting using standard reporting tools. The Reporter also reports on implemented Business or Learning Logic (how am I performing?) and gives recommendations for revising and refining learning rules and logic. Once measurement scales align with competency dimensions, the Reporter tracks and manages enterprise-wide learning activity and predict reliable improvement strategies. Another goal is to analyze and understand the learner's expectations and key business needs and ascertain learning improvements that need to occur. The commitment is taking business solutions to the next level by measuring, reporting, and addressing tomorrow's critical learning and performance issues. Clients save time and money and improve performance by automating the assessment, analysis, reporting, and evaluation process.

3.2.9.8   Knowledge Management

For most successful employees, a virtual source for reviewing and acquiring job-enhancing knowledge is vital for peak performance and satisfaction. The Knowledge Manager is a highly accessible, granular source of information for a specific community of users intent on improving business performance and job enjoyment. Knowledge Manager's special focus is providing resources for a community of learners, where they can network, share information, and find answers to key business and learning issues. The Knowledge Manager integrates key learning resources (including job aides, FAQs, scripts, and links for resources) with communication links from the Learning Center to help busy professionals when they need a place to go, need to read about hot issues or new trends, or need additional support or resources to solve a difficult problem.

3.2.9.9   Support for standards

Currently ALIS is semi scorm-compliant; they feel that the standard is not yet instructionally sound and they are working on making SCORM objects more instructionally sound.

3.2.9.10   Integration with other applications

They assure that ALIS easily integrates with other open-standard enterprise-wide systems.

3.2.9.11   Interoperability

They state that ALIS is an open architecture that shares resources across HR, ERP, CRM, and other enterprise-wide systems.

3.2.9.12   Technology Platform

- **OS:** Microsoft Windows NT 4.x or higher

- **Processor:** Minimum Pentium 200 MHz+ Server

- **RAM:** 64 MB

- **Disk Space:** 2 GB

- **Server type(s) supported:** Microsoft IIS 4.0

- **Database(s) supported:** Microsoft SQL 7.0 Server, Oracle 7.3 and higher, Sybase 4.x and higher

3.2.9.13 ALFANET innovative features

ALIS covers topics already taken into account for the ALFANET system, such as the distinction between mass customization and personalization, the idea of producing a flexible solution that dynamically adapt content to fit individual real-time needs, learners monitoring by tracking, the use of XML to manage and present reusable data dynamically, the use of inferential and agents technologies, the collaboration support and the knowledge management integration.

It is also conforting to see the different roles predefined as customized views, the learner, the group, the instructor or tutor, the course manager and the system manager, which are quite similar to those already suggested for ALFANET system.

The most innovative features for ALFANET are ALIS focus on learning orientation research to predict and support learning, the use of a learner-difference model based upon the key psychological factors that influence human interaction and online relationships and the use of pre-course diagnostic tools to assess learning orientations, cognitive ability, preferences, predict performance, match solutions, and support learning and performance improvements, and knowledge and performance skills. This tool, the Learning Orientation Questionnaire, provides scores that are unique indicators of the individual's approach to learning and describes attributes that characterize learning ability. Results offer explanations for individual differences and guidelines for improving learning and performance. These tools focus on how learners want to learn successfully and support those that may learn less successfully. The Training Place believe that self-motivated, self-directed, and independent learners are successful online learners.

Another point to emphasize from ALIS is the Learner Center, which displays an interactive control panel for self-directed learning. The Learner Center is intended to encourage learners to model, monitor, and then internalize learning expertise as they accomplish learning objectives.

3.3   Literature search on E-learning in the European Union

3.3.1 Introduction

A lot of information is collected about the topic of e-learning in the European Union. In this chapter we first present a definition of e-learning In the next sections the e-learning marketplace, the use of e-learning, the trends, the possibilities and barriers will be discussed. The final sections of the chapter are a description of major initiatives in the EU-policy in the domain of e-learning and the conclusions and recommendations.

3.3.2 What's in a name

This section discusses the problems attached to defining e-learning. This may look as merely an academic debate. However, since many publications use various descriptions of e-learning the issue of definition has a great impact on topics such as the barriers for e-learning, the use of e-learning and so on.

As e-learning is a new shoot on the educational tree, many definitions are being used. Two examples, which are illustrating main differences, are:

> *'Learning that is supported by information and communication technologies (ICT). E-learning is, therefore, not limited to 'digital literacy' (the acquisition of IT competence) but may encompass multiple formats and hybrid methodologies, in particular, the use of software, Internet, CD-ROM, online learning or any other electronic or interactive media.'*
>
> **- Cedefop, used since 2000**
>
> *'the use of network technology to design, deliver, select, administer, and extend learning'*
> *-* **Elliott Masie, The Masie Center**

The main distinction between these definitions is whether 'e-learning' is defined in a broad way including use of ICT or whether it is restricted to the use of networks (Internet, intranet, extranet) to facilitate learning.

In this report we propose to define 'e-learning' in a broad sense, as proposed by Hambrecht & CO (2000). They define the term in relation to related terms as 'distance learning' and 'online learning':

> **e-Learning = Technology-based Learning**
> *The term e-learning covers a wide set of applications and processes, including computer-based learning, Web-based learning, virtual classrooms and digital collaboration.*

> *We define e-learning as the delivery of content via all electronic media, including the Internet, intranets, extranets, satellite broadcast, audio/video tape, interactive TV and CD-ROM. Yet, e-learning is defined more narrowly than distance learning, which would include text-based learning and courses conducted by written correspondence* (Figure 1).

> *Online learning = Web-based Learning=Internet-based learning. Online learning constitutes just one part of technology-based learning and describes learning via Internet, intranet and extranet.*
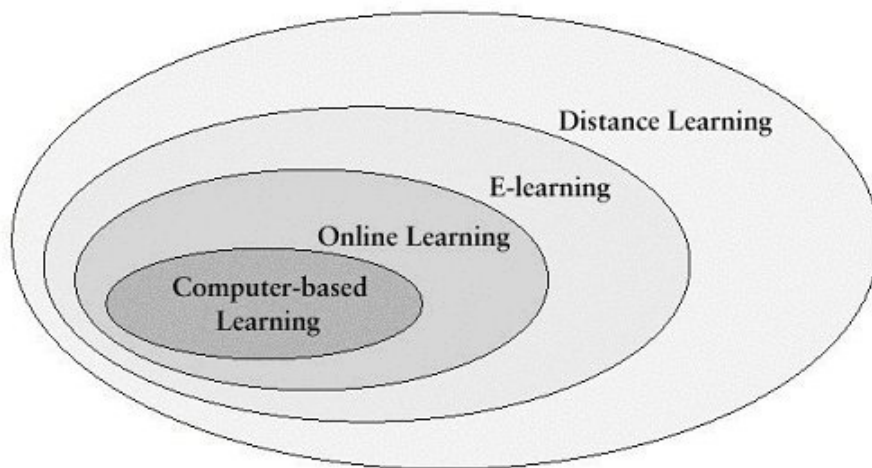
Source: WR Hambrecht + Co

Figure 1: definition of 'e-learning'

It may be obvious that the broad definitions presented in this section do not correspond completely with the exploration of existing tools and products in the previous sections. The existing tools and products were selected on the premise that they could deliver promising ideas or available infrastructure. In this section however we do not look at specific tools and products but on a more abstract level investigation of current and foreseen trends takes place.

3.3.3 The e-learning marketplace

In the next sections we discuss the e-learning marketplace. First we have a look at the general characteristics of this new market, next we have a closer look at the players in the market, the supply-side specifically the supply of content, services and technology. On the demand-side a distinction is made between corporations, educational institutions and the public market.

3.3.3.1 General characteristics

The overall e-learning market in Europe is in a very early stage of development (Hambrecht 2000, IDC 2002). It is highly fragmented and has a low transparency, showing a wide array of products and services offered by many different types of suppliers. According to Hambrecht (2000) the supply side of the global e-learning market comprises approximately 5,000 participants offering every imaginable method of e-learning. The market share of different suppliers is still small, for the content part for example no single competitor accounts for 5% market share or more. The intensity of the competition is still low, several explanations could be given for this phenomenon: the demand for e-learning is tremendous, business strategies and target groups vary widely across participants and there is still little overlap in product line. The transparency and information flow in the market are still low. Training companies focus on their clients' needs and many have little knowledge of what their competitors are doing. The investment predictions for e-learning vary across different sources (IDC 2001 & 2002, Pastore 2001, Hearts, 2002, CyberAtlass, 2001), but they all agree on a prediction of growth of the e-learning market in the coming three years. The predictions given at

start of 2001 were a bit more rosary then at the end of 2001 (higher amounts of money mentioned, higher growth-rates), but then they are still quite positive.

In March 2001 IDC predicted a growth of the worldwide corporate e-learning market to more than $23 billion by 2004. In this prediction North America is expected to maintain the dominance of this market, accounting for two-thirds of worldwide revenues by 2004. IDC identified Western Europe as the fastest-growing market, predicting that corporate e learning revenues would increase by a compound annual growth rate (CAGR) of 97 percent from 1999 to 2004, growing to $4 billion in 2004. In comparison, revenues in the worldwide market will increase at a CAGR of 69 percent.

In November 2001 however, after the disaster of September 11th causing a general economical condition, which did not come up to expectations, the market is not growing as fast as was predicted. It is nevertheless thought that the economic climate could be favorable for firms in the e-learning market, as companies are looking to control costs (CyberAtlas, 2001). The worldwide corporate e-learning market generated nearly $2.3 billion in 2000, and is still on track for a growth rate of more than 50 percent, which will allow it to exceed $18 billion in 2005.

Not only businesses take advantage of the opportunities present at the market. The number of colleges and universities offering e-learning will double, according to IDC: from 1500 in 1999 to more than 3300 in 2004.The student enrollment in these courses will increase 33 percent annually during this time.

The growth in the market is attributed to several factors, such as increased internet use, faster and cheaper access to the Internet, advances in technologies that facilitate distance learning, changing needs and interests of students, acceptance of the medium by employees of businesses, globally distributed workforces and expected improvements in the quality of e-learning products (e.g. see factors mentioned in Figure 2).
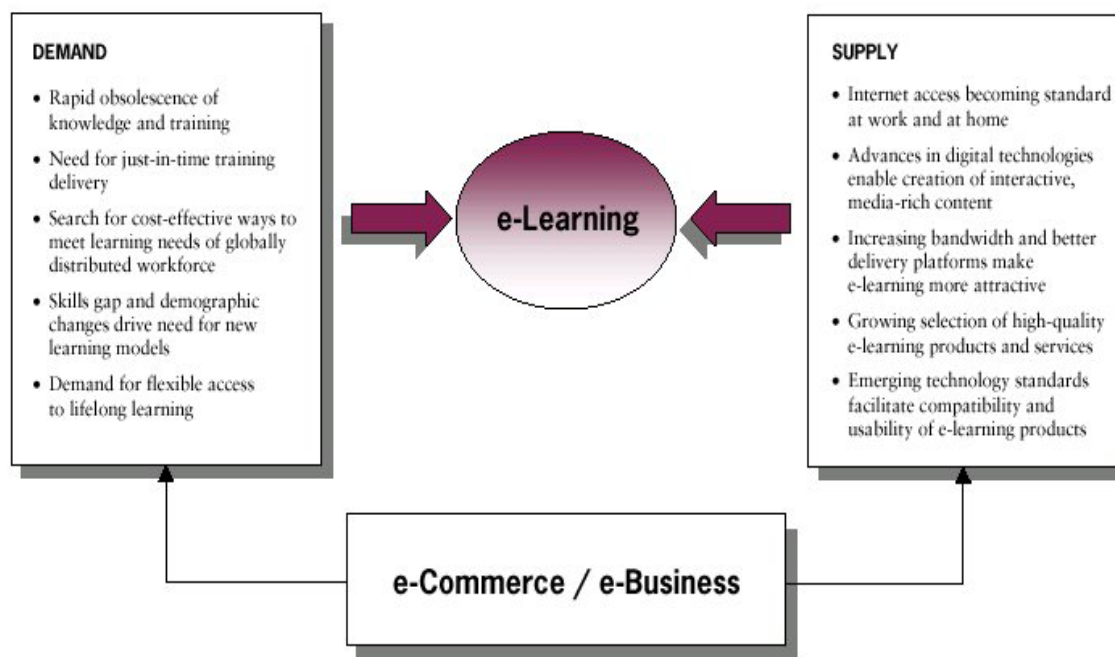
Sources: SRI Consulting and WR Hambrecht + Co

Figure 2: driving factors of e-learning

In Western Europe (Pastore, 2001, IDC) the United Kingdom (UK), the Netherlands and Scandinavia (especially Sweden) are forerunners in the adoption and development of e-learning because Internet adoption levels are already high in those countries. In addition, there is less of a language localization issue in these countries as a high proportion of the population speaks English and is used to conducting business in English. Hearts (2002) mentions that the UK is positioning itself as the dominant force in the European market. More than 50% of European e-learning revenues are being attributed to the British Isles. Investment in e-learning is running an all time high, according to the study. It estimates that 83% of UK companies through 2002/3 will be looking to increase their training budgets and that much of the investment will be poured into e-learning initiatives. Currently, some 73% of UK firms utilize e-learning practices and this study suggests that figure is going to increase substantially over the coming years. 32% of organizations that don't currently use e-Learning practices are planning to introduce such methods in the next two years.

The characteristics of the present market are expected tot change in the coming years. Suppliers are trying to find a position in one of the existing market segments or are creating new ones. According to Hambrecht (2000) the following dynamics will contribute to the transformation of the e-learning industry:

-   emergence of new Internet technologies and training delivery methods

-   innovation of new learning products and value-added services

-   compression of research and development cycles

-   acceleration of consolidation activities and formation of partnerships

-   entrance of new competitors and emergence of market leaders

Participants are starting to realise that consolidation is important for future market success. Competition will grow, as the market becomes more transparent and consolidated. Next to this, many European companies are increasingly turning to outsourcing to focus more on core competencies (IDC, 2002). An increasing number of companies will turn to outsourcing of business skills training (content segment of e-learning market), as a result of the technology developments that have rendered training less costly and more effective. Also IT- skills training is increasingly offered through the Web and companies acknowledge its value in terms of solving business problems, as a consequence the business skills market is expected to outpace these skills trainings as well.

3.3.3.2   The players

According to a recent Cedefop report (2002) around 60% of all those involved in e-learning in the EU are at the same time both suppliers and users of e-learning. As in the academic publishing market, most of those producing e-learning content or equipment are also consumers of such content or equipment. Large organisations involved in training are more likely to supply or use e-learning than smaller ones and are also more likely to be both users and suppliers, though at the same time, small organisations involved in e-learning rely on it (as a user) more than larger organisations and make less use of classroom tuition.

3.3.3.2.1   Supply

There are many different types of market participants the global e-learning marketplace, offering a wide array of products and services. These products and services can be classified according to different points of view. One division of the market in segments is made in a report of Sun Trust Equitable (Learnframe 2000) presents the different market segments in a e-learning value pyramid (Figure 3), referring to critical characteristics for success in the market place
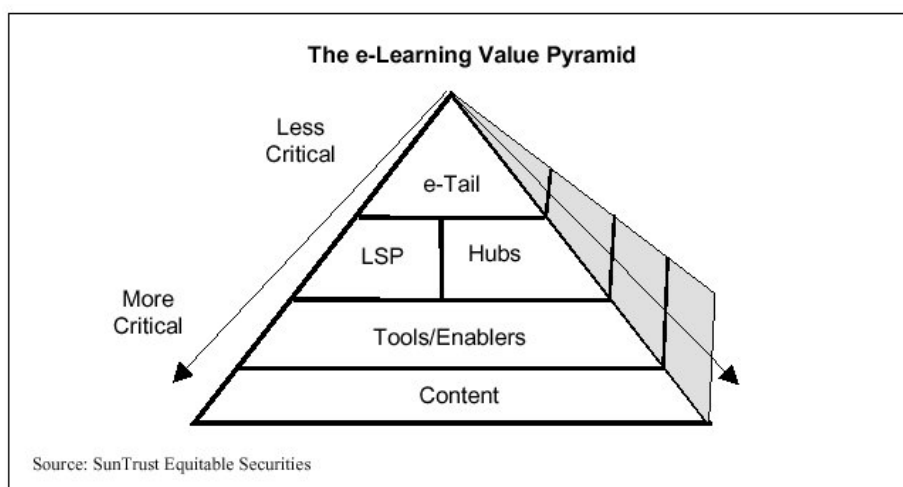

Figure 3: e-learning marketplace divided in five segments

Hambrecht (2000) offers another description, dividing the market in three segments (Figure 4).
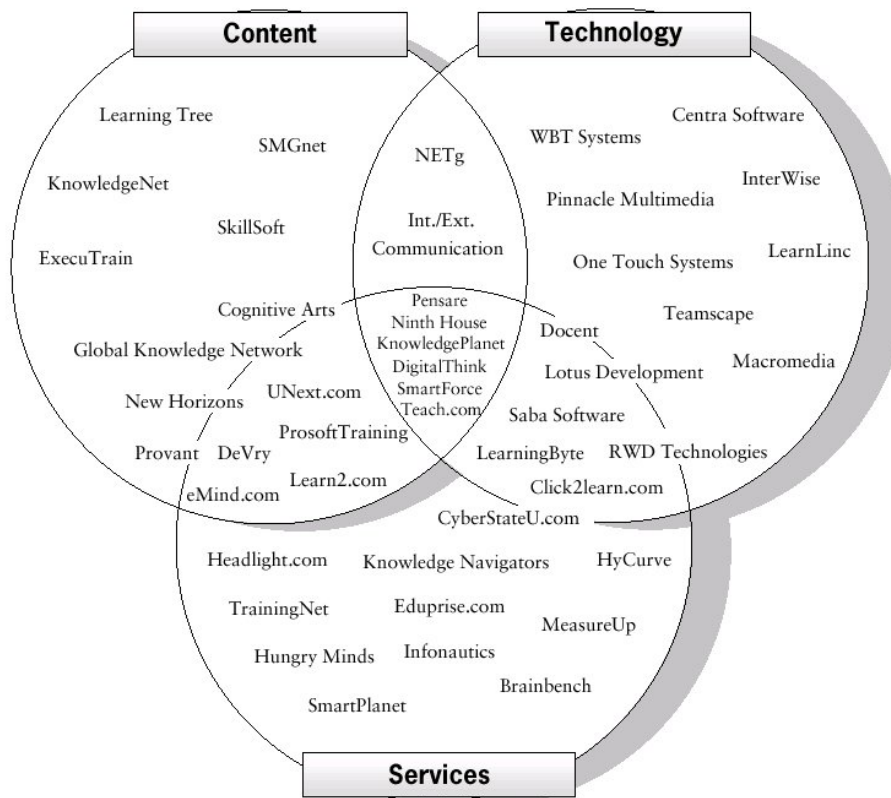

Figure 4 : corporate e-learning universe (source: Hambrecht & Co)

Content suppliers

Content providers author and publish intellectual property that may use a variety of training delivery methods and media. This segment includes customized and off-the-shelf courseware, synchronous and asynchronous course delivery, linear and branched content, and complex multimedia simulations for soft skills and/or IT training. Content will play the greatest role in the success of new e-learning applications. A number of old and new players are seeking to enter the e-learning sector in Europe, but IDC believes that traditional companies will shape the future consolidation of the market.

In Europe the content segment has built up the strongest market position (I Business, 2002, Cedefop 2002). In five out of eleven countries examined, content providers have captured the biggest share of the market in the e learning sector. The strong position of the content segment not only goes for Europe, but also can be seen worldwide. According to IDC (Hambrecht, 2000) content should continue to be the largest segment in the training market, with a compound annual growth rate (CAGR) of 74%. However, its overall market share is expected to decline from 66% in 1999 to 54% in 2003, giving up territory to the services segment.

So far standard content has played a subordinate role in Europe, according to I Business (2002). The findings of this survey show that standardized content dominate only in two countries, namely Denmark and the Netherlands. With the exception of Sweden and Finland where the emphasis lies on personalized and/or customizable contents, companies that offer both standardized as well as personalized content form the greater part.

The content provided by e-learning is actually widening (I Business, 2002). Until recently the IT content provision dominated the market. IDC (Pastore, 2001) predicts a shift in this domination. In 2000, IT contents accounted for 72 percent of worldwide demand. By 2004, non-IT content will be the larger market, accounting for more than 54 percent of revenues. The widening of the range includes increasingly courses in business and management (e.g. leadership skills), law and finances, languages, technical, medical and chemical sciences as well as product training and soft skills (e.g. sales and marketing).

Live e-learning represents a fledgling segment of the e-learning market in the United States, one that is expected to grow more rapidly than asynchronous e-learning (CyberAtlas, 2001). Live e-learning technology and training providers generated more than $125 million in annual revenues in 2000, and these revenues are expected to continue growing at approximately 50 percent per year, reaching $750 million of annual revenues by 2005.

Despite the temporary economic slowdown, the European business skills training market is rising at a five-year compound annual growth rate (CAGR) of 14.9% and will reach $13 billion in revenue in 2006, according to IDC research. By 2005, IDC estimates that over 27% of business skills training content will be provided via e-learning, representing a CAGR of 108.2% over a five-year period. IDC predicts that market growth will be affected by the global economic slowdown but "this will only be a temporary set-back in 2001 and 2002. We expect normal market growth to resume in 2003".

Only half of the e-learning providers, public and private, develop their own e-learning content on all occasions (Cedefop, 2002). The majority of training companies who usually outsource the development of e-learning are those who work either as a private or as a public training provider supplying e-learning as well as other forms of training.

Service providers

Service providers offer a variety of learning-related services, which can be categorized in three groups: portals, learning service providers (LSPs), and other professional services.

Portals provide consolidated access to learning and training from multiple sources by aggregating, hosting, and distributing content. A number of portals operate online communities, either as stand-alone learning communities or in combination with course offerings. Certain content providers and tool companies have launched portals in addition to their original core business. Most of the distributors and communities target other market segments, such as the post-secondary and continuing education markets, as well.

LSPs, a specialized type of ASP, offer learning and content management services, training delivery software, and/or other enabling technologies and services on a hosted/rental basis via diverse business models. Categories of LSPs also include providers offering assessment and testing services, certification and degree granting, online tutoring and mentoring, Internet-based collaboration services, and media production and delivery services.

'Other professional services' include contract content developers, consultants, Web integrators and hosts, and network and IT service providers.

Whereas the provision of content is the largest market segment, according to IDC the services segment is the fastest growing part (Hambrecht 2000). Training services, such as systems integration, needs assessment, hosting, maintenance, and online mentoring, are forecasted to be the fasted growing component of the market, growing at 111% annually. Online e-learning support comes from within the organisation in 77% of cases. 5.3% always outsource online support and 47.6% of the respondents occasionally outsource online support. Within the next three years, services are expected to double their current market share, reaching 36% in 2003, or $4.1 billion in revenues. (Cedefop 2002),

The North American market for learning management and learning content management systems will grow to $11.7 billion by 2005, according to research by Kinetic Information and Collaborative Strategies (Cyber Atlas, 2001), which also predicts a fresh opportunity will arise from the marriage of enterprise content management and hosted Web-based learning services. The combination of content management and e-learning should appeal to customers' eagerness to gain access to all relevant learning materials while also addressing the all-important bottom line and recent concerns over travel.

It is not yet clear whether outsourcing will occur via straight subscription with an ASP or through the auspices of a third-party hosting agency, but the services route is an excellent way for customers to familiarize themselves with e-learning while not losing focus on their core activities

Also in Europe the full service providers are gaining ground (I Business, 2002). In four out of eleven countries examined the providers put together mainly a full service package. The trend that one and the same provider is offering both content and technology is with 67% and 58% respectively the most widespread in Austria and Germany.

Technology providers

Technology vendors provide creation and capture tools, enterprise systems, and learning-specific hardware enabling the creation, deployment, delivery, and management of technology-based training. Within these three technology segments, the education technology market includes companies offering one or more of the following products: authoring and Web publishing tools, capture and edit tools, training management and administration systems, ERP systems, knowledge management systems, performance support systems, collaborative software & virtual classroom technology, distribution hardware, interaction hardware, audio/video streaming and conferencing technology, testing and assessment tools, simulation tools, and other enabling technologies.

According to IDC (Hambrecht 2000) the smallest element of the training market consists of delivery technologies, including training management systems, authoring tools, add-on tools, collaborative software, and virtual classrooms. The technology segment is expected to have an annual growth rate of 80% through 2003.

For suppliers of capital equipment and infrastructure (Cedefop, 2002), e-learning-related sales accounted for an average of 23% of total income in 2001, up from 19% in 1999, representing a small growth.

3.3.3.2.2   Demand

Corporations

According to Hambrecht (2000) corporate e-learning is one of the fastest growing and most promising markets in the education industry as a whole. They expect the online training market to nearly double in size every year through 2003, reaching approximately $11.5 billion by that time. Investment opportunities in online pure plays will emerge, as numerous e-learning companies are now preparing to tap the public markets as well.

What kind of companies is investing in e-learning? Throughout Europe banks and financial services rank at the top (I Business, 2002). Lagging clearly behind this sector, IT sector together with further education institutions come second. Telecommunications takes third place, followed by public authorities and the automotive industry. Information and communication technology, chemicals/pharmaceuticals, communications/media and finance business sectors have adopted e-learning most quickly (Cedefop, 2002). By 2003, corporate training will expand to $62.5 billion with $15 billion in outsourced training (Learnframe, 2000). Currently, small- to medium-sized businesses are being overlooked in the emerging e-Learning space but probably not for long. Nearly 60% of the workforce is employed by small- to medium-sized businesses and employees of these smaller businesses are more likely to turn to the web for training resources.

Reasons for companies to invest in e-learning are driven by economic factors. Pastore (2001) states that delivery of training materials over the Internet in Europe has been accelerated by the need to provide a broad, relevant range of training to a geographically dispersed workforce at a lower cost (e.g. travel costs). E-learning is sometimes also believed to be more effective from a managerial point of view (Cyber Atlas 2001). The consensus view is that while e-learning definitely is valuable, it is difficult to justify in terms of hard-dollar savings. Many organizations, therefore, will begin utilizing the technology on an outsourced basis. This enables organizations to familiarize themselves with e-learning while not losing focus on their core activities.

Corporations also increasingly demand a more comprehensive 'one-stop-shopping' approach to meet their training needs, leading to convergence within the e-training industry. Value-added services in particular- such as needs assessment and custom curriculum design, online mentoring and performance support, reporting and tracking and hosting are expected to be needs of customers in the next several years. One factor driving the demand for value-added services is that vendors sell increasingly complex e-training programs, which require more assistance with integration and implementation. According to a survey conducted by IDC, approximately 75% of corporate training managers acknowledge that value-added services play an important role in selecting an external training provider.

For the Netherlands Streumer, Van der Klink and Van den Brink (1999) investigated the implementation of e-learning in enterprises by surveying HRD professionals from 156 HRD departments and HRD agencies. Respondents were asked to assess developments on their likelihood to become influential for the coming five years. Six developments relating to the impact of new technologies were presented to the respondents. Of these, five appear to have a good chance of being realized. Development 1 clearly stands out as the development with the greatest likelihood of occurring with the next years.

Development	Effect on respondent's own organization (7-point scale)
1. Digital electronics such as the internet will change the way information is created, stored, used and shared	5.15
2. Technology in the workplace will become more portable and user-friendly	4.81
3. The computer will be seen and used less as a main frame, and more as a portable desktop	4.57
4. Organizational growth will spur on further exchange of information with clients and suppliers via the computer	4.77
5. Computers and electronics will play a role in even more work environments	4.85

Table 1 :   Technological developments with anticipated trends for the coming five years in The Netherlands

Further analysis revealed that only development 5 varies with the size of the business. In small businesses, (with one hundred employees or less), as well as in large business, (with over 500 employees), computers and electronics are expected to play a role in even more work environments. As for the other four developments, businesssize appears to have no in influence. In other words, the size of the organization does not seem to be an adequate predictor for measuring the impact of new technologies on the respondents' own businesses.

In general the use of 'new' technologies (like portable computers) does not seem to be applied on a large scale. Could this be related to ignorance or resistance? Have the respondents had experiences of a less positive nature with information technology developments in the last few years ? Was CBT (computer-based training) or CAT (computer-assisted training) not the optimal solution for functional shortcomings? Do many businesses still work with mainframes, and if so, are they still waiting (for financial reasons) to replace these with even more portable and flexible systems?

Educational institutions

Educational institutions have to deal with different kind of demands from students and changing characteristics of student groups. An illustration: today, traditional students in higher education within the USA – age 18 to 22- make less than 20% of all students. The fastest growing group attending higher education institutions are working, part-time students older than 25 (Hambrecht 2000). This trend can be expected in Europe as well. This new group of "learning adults" is seeking education principally to advance their careers and increase their salaries. For universities, these individuals are excellent candidates for education delivered to their homes or offices. Declining birth rates, aging population and lack of skilled labor also require an evaluation of the training needs of older age groups.

Also children are becoming computer literate at a very early age and are not seldom more skilled than their teachers. Situations are rising where children are helping teachers to become computer literate. Widespread availability of the needed technology (PC and a connection to the internet) is not a major problem anymore. 50% of the USA households have PC's- up to 70% of households with kids. Schools are generally not lacking technology as well. Nearly every teacher has access to the Internet at his or her school and 80 percent of classrooms have computers that are online. This widespread use of www by employees as well as students (CEDEFOP 2002, Learnframe 2000) is creating new possibilities for the delivering of education. In an effort to meet the demands of their communities, educational institutions feel it is necessary to offer low-cost education (Hambrecht 2000). E-learning enables colleges to extend their reach to learners who would otherwise not have the time or opportunity to attend college. In addition to this, educational institutions look to e-learning as a way to leverage their investment in IT technology, thus making IT infrastructure expenditures less of an overhead item and more of a direct cost of doing the business of education.

Although there is a generally optimistic view on the use of internet in education, teachers experience problems with how to integrate the internet in their education. More than eight out of ten teachers in the USA (84 percent) believe that computers and access to the Internet improve the quality of education, according to a survey by education technology nonprofit NetDay, and 75 percent of teachers said the Internet is an important tool for finding new resources to meet new standards (Pastore, 2001). Seventy-seven percent of teachers agree that teachers without Internet access in the classroom are at a disadvantage. Teachers cite multiple uses for the Internet, but most primarily see its potential as a research tool, and say it has not

changed the way they teach. Across every demographic group of teachers, half or more use the Internet at school for less than 30 minutes a day.

Many (44 percent) teachers cite lack of knowledge about how to use the Internet, and 32 percent list lack of leadership from the principal or administrators as reasons for not logging on. A critical challenge and a need within educational institutions is to find ways to help teachers go beyond the research functions of the Internet and broaden their skills to significantly apply technology in a pedagogical way .

Nevertheless the overall picture that emerges from European evaluation studies among users is positive (Williams ao, 2000; Williams, 2002, Monteith ao, 2001). Studies among teachers describe a positive impact on teaching. Likewise studies among students show a positive attitude towards e-learning, especially the possibilities to communicate.

There is a great deal of interest and motivation to learn more about the potential of ICT and e-learning and acknowledgement that this is the direction things are likely to take in the future. It is beyond doubt that it will take a long time from making daily or weekly use of ICT in an educational context. The use of ICT and e-learning seems to rise with the educational level; primary education making lowest use of e-learning.

Public market

From public point of view, education is increasingly seen as a mean to improve personal chances in the future. Personal investments in education are often made. Educational software was a $7 billion global market in 1997 and is expected to grow by 14 % over the next few years (Hambrecht 2000). $ 2.5 billion of the $6.1 billion supplemental educational markets is sold to consumers and educational toys are the fastest growing segment of the toy market. These figures seem to reflect demographic and societal views on education: providing a chance for every person and providing better education for anyone who wants to learn. In the lifelong learner market, self-help books grew at a 21% rate from 1993-1997 and 87% of people that go online do so to pursue information about a hobby or lifelong interest. People have realized that competitiveness in e.g. the job market and continual learning are strongly correlated. The Internet presents a mean that makes life-long learning a reachable goal for all.

A study among working adults within the USA shows a widespread believe (54%) that college courses offered via the Internet are the future of higher education (Pastore 2000). The study also found that while people see education as a top priority, busy schedules (42%) and family and travel commitments (10%) may keep people from continuing their education. Nearly two-thirds (64%) of respondents said they are interested in continuing their education, but 48% said that a busy schedule is the largest barrier to hitting the books, one-third cited high costs as an impediment.

Assuming the quality of education was the same, 32% of respondents said they would rather take courses through the Internet than go to a classroom. More than half (53%) of respondents said the biggest benefit of taking courses online was the ability to work from home, while 19 % cited time saved from not having time to commute.

A substantial majority (63%) of respondents said nighttime was the right time for courses, including 22% who said late night was an ideal time. Another 12 % said early morning before they went to work was a good time. Given the option of studying in exotic locations around the world, 34% opted to stay at home with their family. More than half (54%) said the greatest advantage of taking courses from home was the ability to attend call in pajamas.

Although people are investing in education, in the area of e-learning some improvements need to be realized. Almost two thirds of Europeans rate quality of e-learning either 'fair' or ' poor' (IDC 2002). Only one-third of respondents rated the quality as 'good', while 46% rated it as ' fair.

3.3.4 Use of e-learning

3.3.4.1   General characteristics

Groups making use of e-learning differ in many aspects, and obviously the amount of money and time spent by different users varies enormously. Although a pattern of growth can be seen, expenditures are actually rather modest and the growth rate is limited.

Some 14% of total spending by users of training went on e-learning related content in 2001, this is a small increase compared to two years earlier when the figure was under 10%

On average around 30% of time spent by users on training in the EU involved e-learning, though this varied considerably across countries (e.g. around 50% in Sweden, compared to 15% in Belgium)

Looking at employers data show a modest share in the training expenditures directed to e-learning. The majority of employers are obviously still hesitating about investment in e-learning. Currently 58% of companies spend less than 5% of their training budgets on e-learning and a further 35% spend between 5% and 30%. In two years time only 25% will spend less then 5%, 51% will spend between 5% and 30% and 24% spend more than 30% European Communities, 2002).

In the field of education and teaching a similar picture emerges. 20% of respondents in this sector said that 10-25% of their teaching was supported by technology. Only 13% said they used technology in more than 50% of teaching. Other data point to a future increase, though no rapid growth in the percentage of teaching supported by technology.

Special attention should be given to the field of adult education. Nearly 70% of those working in the field of adult basic skills development utilise technologies by the end of 2001. Little difference can be found between the public and private sectors. A further 19.4% of those actively involved in adult basic skills say they plan to use e-learning methods and content sometime in the future. Those responsible for training teachers and trainers have a similar percentage (30%) currently using e-learning but for those that are not, the timescale is somewhat later than other categories; they are less likely to adopt e-learning in the next 12 months. This has some worrying implications, given that teacher and trainer skills are considered to be one of the most important issues to be addressed (Arthur Andersen, 2001).

3.3.4.2   Specifications of use

E-learning is used in different subject areas. Specifically the corporate training market is divided between two broad product groups: 1) business and soft skills training, encompassing areas such as general management, leadership, communication, team building, sales and marketing, human resources, and professional development; and 2) IT training, comprising application development tools, application software, and system infrastructure software. (Hambrecht, 2000) Sectors using Internet and intranet most are banking, industry and insurance Traditionally, content providers have specialized in either soft skills training or IT and desktop training. The offer in IT training content has always been the largest share of the content provision, but a development towards a more soft skill related content offer is emerging. Recently these areas are beginning to overlap, as soft skills training providers add IT training courses and vice versa.

Two thirds of those using online training do so for information and communication technology skills, although a shift to more soft skill oriented training is expected in the near future.

At the same time it is important to realise that a lot of work has to be done. Effective delivery of online training is still often hindered by interruptions at the desktop. Both this and successful implementation of online training is affected by lack of commitment from senior management.

The kind of technology used is clearly evolving towards a growing share of the Internet. Although CD-ROMs and videotapes are still very important, they are losing market share to the Internet. The Web is likely to become the largest electronic delivery vehicle for corporate training and, by 2003, should exceed the use of CD-ROMs by the factor of four (Hambrecht, 2000).

With regard to the technology used in training either for administration, training or learning- the worldwideweb comes highest at 88% as the most widely used technology. E-mail comes in second with 82% (interesting given that e-mail is often overlooked). CD-ROM/DVD is important too as medium for learning with 80% stating they used it.)

3.3.4.3   User needs

Most e-learning occurs in the workplace, although a third of individuals do most of their learning at home. Almost all e-learners feel a need for learning support, though less than two-thirds of employers offer such support. A majority of respondents use informal means of professional development to improve their e-learning expertise. Informal learning tends to be highest among respondents from non-training public sector organisations and consultants. Some 30.5% have had formal classroom-based training. The most common reasons for not undertaking any professional development were lack of time or funds. Ratings concerning the quality of these training are rather low. (Cedefop, 2001)

Clearly a need seems to exist for Information about what products are available and an evaluation on how effective they are In a survey respondents answer to be interested in 'news items that focus on technology in education and training were requested by 83% of respondents. ' Products and services information' is of interest to 70% of respondents, nearly 40% are looking for reviews of technology-supported learning products and services and over 70% are interested in research behind the use of technology in learning. 60% would like case studies and 55% information on technologies and tools. At the same time there is a strong need among practitioners to develop the necessary skills, especially a need for training in technical skills is expressed.

A general concern exists to improve the value of the content with better pedagogical quality. Large numbers of respondents expressed concerns about quality and reusability of content. Concern about the poor quality of current e-learning offers is widespread. Widespread adoption of e-learning will be constrained if purchasers are unsure of its quality. A number of respondents strongly advocated to need to tailor e-learning products and services to specific user needs and expressed concerns about the costs of this level of localisation.

This implies a growing need for pedagogical and didactical competencies, allowing to develop e-learning. Only 11.3% of all respondents say they have some formal education and training programme in e-learning and 44.7% say they have learned through trial and error without formal expertise being provided. Half of respondents working in universities or colleges of further and higher education said they learned through trail and error. For trainers in public or third sector organisations this rises to 56%. Some 25% if trainers in private enterprises have not acquired any e-learning expertise to date. (Cedefob, 2000,c). Using new technologies does not automatically improve courses; they need to be redesigned with reference to pedagogical theories (Williams, 2002).

A number of respondents favour tailor made e-learning products and services to specific user needs. But they also expressed concerns about the costs of this level of specialisation, especially for small firms. They criticised generic e-learning products and services being rarely fully effective. New flexible means to localise and update e-learning is required if small and medium sized enterprises (SME's) are to adopt e-learning.

A strong need is expressed to have access to models to calculate return on investment (ROI) in e-learning, to increase effective decision making, to have evidence of improved performance impact, demonstrating real cost-effectiveness Many respondents felt they lacked the expertise and the models to calculate the costs and the returns on e-learning investment (Cedefop, 2000, d).

Special attention is drawn upon the usefulness of e-learning for learners with disabilities. Some 79.8% believe e-learning should be provided to learners with disabilities to improve equality of access to learning. Between 45% and 66% of all respondents consider e-learning suitable for learners with sight, hearing, speech, motion and learning disabilities. Despite the very positive attitudes expressed, only about a third of respondents are actually doing something about it. (Cedefop, 2001, f)

3.3.4.4   Expected future use

In all EU countries, apart from Spain where it has declined, the proportion of total expenditure on training going to e-learning methods increased in the two years 1999 tot 2001, though the growth in spending varied from almost 100% a year in Finland to 9% a year in Germany.(Cedefop 2002)

It is widely believed that e-learning will blend, meaning that traditional training methods and e-learning are not seen as alternatives to each other but as complementary. There is a high level of optimism about the contribution that e-learning can make to the teaching and learning of basic skills for and among adults. Policy-makers and planners are however rather more optimistic than teachers. Teacher and trainer skills are insufficient to take advantage of the opportunities offered and teacher skills development remains the most important issue to be addressed. Access to resources needed to develop teacher and trainer skills is considered lowest among those working in teacher and trainer training (Cedefop, 2000).

Looking at the expected future use it is most common to consider factors affecting the use of e-learning from a technological point of view. Although it provides useful information perhaps the most important obstacles for e-learning are to be found in other areas. Carswell *et al* (2000) carried out experiments to compare traditional distance education (corresponding courses) to a group students who were taught using electronic communication exclusively. Their data reveals that students highly rewarded the many possibilities to interact with each other and also the fast feedback on assignments was valued positively. Furthermore, using the internet did not result in a decline in learning outcomes. The biggest obstacle for using the Internet was inexperience, technically but mainly cultural inexperience. Internet requires a cultural shift by students and tutors. Both must learn how to communicate with each other in a different way as they are used to.

Besides new ways of communication, the use of internet requires a different set of competencies, for example of teachers and instructional designers. Williams (2002) concluded after extensive literature review that traditional courses need to be redesigned to be interactive, and conferencing and on-line tasks should be incorporated in order to take advantage of the pedagogical benefits offered by Internet technologies. Such benefits include the potential to encourage both relational and abstract conceptual learning outcomes and the possibilities for collaborative learning activities. The problem of participation should be addressed and decisions need to be made in terms of whether or not to make participation in the electronic learning environment an essential part of the course. The amount of work needed to prepare and run an on-line course should not be underestimated and it is important to be realistic about the workload and time involved.

The nature of the student support and staff development needed to accompany changes to on-line learning is complex and multifaceted. On one level people need to learn how to use the technology itself, while on another they also have to learn how to learn and to teach, with this new technology. Despite these warnings, the technology does offer exciting opportunities for new ways of learning and teaching. With the right kind of training and support, successful electronic learning environments can improve the learning experience, and students tend to be enthusiastic about using the new technologies. Thoughtful planning and careful implementation, along with a commitment to this new learning culture, can produce a stimulating and effective electronic learning environment that can enrich the learning experiences of students. The technology itself is constantly and rapidly changing and offering new opportunities, which is why it is essential that these underlying issues are dealt with when implementing courses that make use of such technology.

A recent review of Boon *et al* (2002) showed that not only the competencies of instructional designers and tutors shift as a consequence of the implementation of e-learning but faculty management too is confronted with new issues. Successful implementation requires abilities to manage faculty-wide implementation. If this is not available implementation fails. This is not only important for educational institutes but also a concern when implementation in a business environment is at stake. The higher the expectations, the more the competencies of those who are involved become a crucial factor.

With regard of the use of e-learning in business environments the following factors are, according to Van der Klink (1999), crucial. First, traditional classroom-based learning is downsizing for various reasons (high costs, low transfer to the workplace) and traditional types of learning are replaced by learning on the job. This has several consequences:

- Learning must takes place during the prosecution of work tasks. Small pieces of electronic content have the advantage they can be studied quick (just-in-time, just enough), larger parts of content are not valued, or only consulted in a superficial way;

- There is a strong tendency to integrate learning and working by using Electronic Performance Support Systems (EPSS), which combines task support and training facilities. EPSS does not result into better learning outcomes but it is a very cost effective approach for training workers on the job.

- Large enterprises tend to establish corporate universities. Although this does not imply that all courses are offered on an academic level, enterprises feel the need to deliver courses that contain the look and feel of their business (e.g. providing workers with the organisation's cultural values and norms). Here there are hugh possibilities for e-learning because it can save costs for travelling and lodging.

3.3.5 Trends

3.3.5.1 Technological

It is to be expected that the technological barriers to e-learning, such as lack of access, interactivity, content availability, technology standards, infrastructure and bandwidth, will disappear. One of the biggest trends affecting the size of the e-Learning market is the astounding growth on the Internet. International Data Corporation (IDC) forecasts that there will be 350 million Internet users worldwide by the end of 2003. Several factors are facilitating this substantial growth:

- a large and growing base of installed computer in homes and workplaces

- network security, infrastructure and bandwidth improvements

- advances in the speed of personal computers and modem performance

- cheaper and more reliable access to the Internet
- consumer acceptance of online commerce

The mid 2000s also seem to be the indication for the general availability of voice synthesis, voice recognition and voice input into telephones and computers, whether fixed or mobile. There should again be benefits for distance systems rather than on campus, because of the greater reliance of distance students on correspondence, assignment preparation, and assignment submission(Keegan, 2002).

New technological developments influencing the development and the use of e-learning are broadband[1] and multi-platform access (driven by common standards), i.e. the possibility to connect to the Internet via other means than the PC, such as interactive digital TV and third generation (3G) mobile systems. Broadband connections significantly increase the speed of transmission between computers, mobile phones, TV set-top boxes and other digital devices. This will improve quality of Internet access, making it more user-friendly and convenient for consumers and enable the full scope of multi-media applications to be applied (Commission of EC, 2002).

Lack of compatibility between existing learning technologies and current IS infrastructure is one of the main barriers to adopt web-based training. There is a need to connect the 'legacy systems', which are inherited by an organisation, with new technological possibilities. The move to defined, open standards (e.g. as developed in initiatives by IMS, IEEE) is crucial to the continuing successful adoption of e-learning. Authoring tools will need to operate across different platforms and communicate with other tools used to build learning systems. Content and courseware must be reusable, interoperable and easily manageable at many different levels of complexity throughout the online instructional environment (Hambrecht 2000). Corporate customers need to be able to easily track content created by multiple content providers through one training management system and search local or distributed catalogs of content to identify learning objects or modules on a particular topic. Education technology standards are important to reach this objective. Advances in a wide range of technologies supporting diverse education and training tasks are currently being made. Issues such as content interoperability, metadata tagging and bandwidth are being addressed.

The challenge for distance systems is to develop didactic environments for mobile phones and mobile computers as the availability of mobile devices spreads to a billion users. The mobile telephone is becoming a trusted, personal device with Internet access, smart card usage, and a range of possibilities for keeping the distance student in touch with the institution's student support services, in contact with learning materials and fellow students, while at home, or at work, or travelling. Also for these technologies the creation of standards will be an important enabling factor.

3.3.5.2   Economical and societal

The economy is evolving to a knowledge-based economy. The European economy became a service-based economy during the last decennium. Life-long learning is quickly becoming a requirement for all employees of all ages. However knowledge and human skills need regular update. Enterprises view learning and a trained workforce as an asset and are willing to invest in training, as a competitive weapon rather than an annoying cost factor. Business success depends more and more on high-quality employee performance, which in turn requires high-quality training. Corporate executives are beginning to understand that enhancing employee skills is a key to creating a sustainable competitive advantage. In the quest to remain competitive in today's labour-tight market, companies are exploiting advances in technology to train employees more rapidly, more effectively, and at less expense than in the past.

A fast growing group attending higher education institutions are working, part-time students older than 25. This new group of "learning adults" is seeking education principally to advance their careers and increase their salaries. For universities and business-to-consumer training providers, these individuals are excellent candidates for education delivered to their homes or offices. Providers should focus on quality and define branding as a key strategy element for the conquering of the e-learning market. Low market transparency and limited knowledge of e-learning products will likely represent serious challenges for corporate customers in the next several years. Companies will increasingly prefer the "safe choice" and retain e-learning providers with established brand names. Content will play the greatest role in the success of new e-learning

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[1] There is no universally accepted definition of broadband, but its key characteristics are high speed and always-on functionality. Currently, broadband access is mostly offered over the telephone copper network using ADSL technology or over cable TV networks using cable modems.

applications. A number of old and new players are seeking to enter the e-learning sector in Europe, but IDC believes that traditional companies will shape the future consolidation of the market.

In this process, more e-learning partnerships will develop. Because the e-learning market is still young, a lot of players are not able or do not prefer to work alone in the market. Instead, publishers of content are entering into <u>strategic (exclusive) alliances</u> and partnerships with education technology vendors, training services suppliers, or other content providers to enhance their product offerings, expand their distribution channels, explore new market segments, and capture a larger share of the fast-growing IT and soft skills training markets. Others team up with learning portals or even diversified e-commerce sites, leveraging their distribution capabilities in order to reach a broader audience. Since partnerships are critical in growing an Internetbusiness, we should see many more of them in the year ahead.

An increasing number of companies are <u>outsourcing</u> part or all of their training activities to outside consulting firms or training companies in order to reduce their overall education training and administration costs. Because the lack of quality content in the market, this process is going slowly.

One of the most important growth areas in online learning is the creation of Internet/intranet meeting places <u>("surrounds")</u> for instructor-led classes to provide community, communication, and supplemental materials online. An increasing number of educational institutions and corporations are utilizing online authoring and delivery systems to build surrounds supporting the learning process.

This new learning model facilitates studying, note taking, class discussions, and "catching up," all of which enhance classroom instruction. Surrounds also help to overcome anxiety and reservations, especially among older age groups, and build learner acceptance and familiarity with online learning. In our view, this step-by-step solution should make more learners willing to take pure Web-delivered classes, contributing to the rapid growth of the industry (Hambrecht, 2000).

3.3.6 Possibilities and barriers

3.3.6.1 <u>Possibilities</u>

For students the most important possibilities for e-learning are that they can access their courses, and can communicate with other students and with tutors anywhere and anytime.

E-learning is at the same time cost saving due to elimination of travel expenses. The learning process and the possible effects of study are maximized by the possibilities to personalize learning and to focus the learning process on the needs of students.

From business side, organizations are looking to both reduce costs and maximize the performance of training investments. With new product releases, new marketing pitches etc. it is imperative that organizations find ways to impart this information to employees at lowest cost possible. They often see it also as effective use of an investment which is already done: the widespread availability of computers and internet within companies.

At the same time technological changes increase the complexity and velocity of work environment. Today's knowledge workers have a non-traditional orientation to time and space, believing that as long as the job gets done on time, it is not important where or when it gets done. By the same token, they want the opportunity to allocate time for learning as needed Training becomes more important but at the same time cost effectiveness is a major issue.

With traditional training methods, companies generally spend more money on transporting and housing trainees than on actual training programs. Approximately two-thirds of training costs are allotted to travel expenses, which represents a major drain on bottom-line profitability*.*

Not only in business education but also in regular higher education e-Learning is now broadly recognized as a viable learning vehicle. Approximately 31% of high school students rated "expert" or "highly proficient" in their computing or technical skills. (Source: Student Monitor LLC)

Offering full service is a major possibility for the future. To secure a sizable market share, competitors need to play on all three major fronts – Content, Technology, and Services – to deliver an integrated, complete e-learning solution.

3.3.6.2 Barriers

The current e-learning landscape remains fragmented despite the consolidation of LMS vendors and the integration of collaborative and synchronous learning environments. As a consequence the rate of return to the investment in e-learning is still unsure; as a consequence employers remain undecided about the potential of e-learning.

Access to hardware and the Internet remains an issue but is no longer the main concern. Teachers' and trainers' technology skills and their capacity to use the technology to innovate pedagogically are of much greater concern. This highlights the increased perception of a need for much more teachers and trainers training in this domain.

Rapid obsolescence of knowledge is another important barrier. The need to update employee skills in the implementation of complex technologies, due to the continuous introduction of new technologies and the release of new software products, is one of the most important drivers of IT training. "Internet time" makes the delivery of timely and relevant IT training a more significant problem than ever before. It has become crucial for companies to train IT professionals before information is obsolete.

Shortage of skilled IT professionals is hampering growth. The worldwide lack of IT workers is a critical concern and is expected to continue in the new millennium

Shortcomings of e-learning: E-learning may require more dedication and discipline than c-learning (classroom-based).Frequently, it also does not yet yield the degree of interactivity and collaboration offered by classroom-based training.

The largest proportion of respondents expects the cost of content (44.1%) and support (45.6% to rise in the next two years**.** Support costs added to content costs mean that the overall costs of e-learning are often higher than classroom training and there is strong concern that planners and suppliers underestimate the costs of support. Clearly, e-learning does not always reduce costs. ROI models should take into account that a large proportion of e-learning will be used by target groups for which there will be no commercial return and these providers need good cost models that reflect their measurement for value criteria.

3.3.7 EU-policy

In this paragraph we take a closer look at EU-initiatives and EU-measures supporting the application of e-learning. The Eu takes the point of view that the development of services and building infrastructures are mainly tasks for the private sector, to be sustained by EC-projects. At the same time Europe will create a favourable environment for private investment. This means not only developing an investment appropriate legal framework but also taking action to stimulate demand and so reduce uncertainty to private investors. To this end, the Council and the Commission developed a *"… comprehensive eEurope Action Plan …. using an open method of coordination based on the benchmarking of national initiatives, combined with the Commission's recent eEurope initiative as well as its Communication 'Strategies for jobs in the Information Society'."(*Commission of the EC, 2000).

The e-Learning Action Plan, developed in this context, brings together a number of strategic actionAreas. More specifically policy is directed towards the following areas.

3.3.7.1 infrastructure and equipment

The Action Plan identifies three key measures relating to infrastructure and equipment for 2001-2002. The first measure, which involves the drawing up of a report on the development of e-Learning indicators, focuses on the development of a tool to assist decision-making in order to develop quantitative and qualitative indicators suitable for setting up a strategic and high-quality information base.

The second measure concerns the creation of a European research area for new learning environments which will focus, in particular, on the development of educational and technological systems, virtual systems (access to education resources without constraints in terms of time or space), individual differences in learning, and special-needs education. The Action Plan also identifies the following specific measures: "*e*-Learning futures" to contribute to the development of future learning environments; "*e*-Learning for European youth in a digital age" involving all the key players in different fields in pilot experiments; an "*e*-Learning Summit" on the theme of public-private partnerships; a feasibility study relating to a European "Technology and Education" laboratory; a study to promote the use of ICT; the analysis and exchange of best practices to help disadvantaged people learn about ICT and the exploitation of European know-how in this field.

The third measure relates to encouraging the development of infrastructure with a view to creating multipurpose places of learning accessible to all, developing virtual infrastructure and setting up multilingual portals on the Internet which will allow structured and user-friendly access to existing resources.

3.3.7.2   training

The Action Plan identifies two key measures on training. The first focuses on developing new skills in order to counterbalance the observed failure of supply to meet demand for a skilled workforce, while the second focuses on the training of teachers and trainers. Among the specific measures recommended by the Plan are improving the definition of the skills required and access to training (e.g. http://www.career-space.com), the introduction of a European diploma for IT skills, the creation of an inventory of projects run and an analysis of models developed, the development of a guide to existing resources and experts in the field (identification of best practice), and the organisation of a seminar on the theme of skills for tomorrow's teachers and trainers.

3.3.7.3   services

Various measures are envisaged with a view to creating a suitable environment: developing recommendations to improve consumer protection, examining ethical issues, promoting appropriate means of ensuring the security of educational and cultural sites, development and promotion of standards adapted to education and training and the definition of 'metadata' (e.g. CEN/ISSS), examining matters concerning intellectual property rights and developing a coproduction, exchange and distribution system. Moreover, in order to rectify the shortage of European *e*-Learning content, the Plan identifies three subjects of strategic importance: modern languages; science, technology and society; art, culture and citizenship.

3.3.7.4   Co-operation and dialogue

The Plan identifies the following key measures: creating an *e*Learning Internet site by the end of 2001 (reference centre for all matters concerning eLearning in Europe), reinforcing the European education and training networks by developing the PROMETEUS (Promoting multimedia access to Education and Training in European Society) partnership as a discussion forum, organising an *e*Learning conference in cooperation with the successive European Union Presidencies and organising an eLearning event at the IST 2001 conference. Also the ARIADNE project can be mentioned in the context of cooperation and dialogue, being a research and technology development project pertaining to the "Telematics for Education and Training" sector of the 4th Framework Program for R & D of the European Union. ARIADNE produces specifications and develops methodologies for producing, managing and reusing computer-based pedagogical elements and telematics supported training curricula. All parties active in the field are strongly encouraged to participate. There will be special emphasis on ongoing dialogue with industry in order to anticipate training requirements and exploit the training models developed by companies. Use will be made of main channels existing at European level, e.g. European Trade Union Committee for Education and CEDEFOP, networks: EUN-European Schoolnet (http://www.eun.org), the thematic networks under Socrates, the European Parents Association, European Teachers' and students' organisations.

Specifically EU measures considering e-learning included support to the provision of equipments, co-operation and exchange of good practices, teacher training, pedagogical research and the development of e-learning content and services. Specific proposed actions related to e-learning are:

- Broadband connections: By end 2005, member states should aim that all schools and universities have Internet access for educational and research purposes over a broadband connection. Museums, libraries, archives and similar institutions that play a key role in e-learning should also be connected to broadband networks.

- E-learning Programme: by end 2002 the EC intends to adapt a proposal for a specific eLearning Programme. The EC will also publish an analysis of the European market for e-learning, including the private sector. It will review the market situation and analyse legal, economic and social issues with a view to identifying obstacles to the development of the e-learning market in Europe and where necessary make proposals to remedy them.

- Virtual campuses for all students: ensure that all universities offer on-line access for students and researchers to maximise the quality and efficiency of learning processes and activities

- University and research computer-supported co-operative system: by end 2003 the commission will launch research and piloting actions to enable the deployment of Europewide computer-supported

networks and platforms, based on high performance computing infrastructures and GRID technologies.

- Re-skilling for the knowledge society: by end 2003, member states, where appropriate using structural funds and supported by the commission, should launch actions to provide adults (e.g. unemployed, women returning to the labour market etc) with the key skills needed for the knowledge society, to improve their employability and overall quality of life. These actions will take advantage of the possibilities offered by e-learning.

3.4   Investigation of possible clients

This section deals with the issue of possible clients of Alfanet. Investigation was made from the viewpoint of Germany.

3.4.1 The German market

Germany is the largest e-learning market in Europe in terms of turnover. The turnover is estimated at approximately 106 million US dollar. In terms of per capita expenses on e-learning, however, Germany takes only the 12th place in Europe (the Scandinavian countries spend by far the most money on e-learning in terms of per capita expenses) (NFO 2002, p.439f.).

The German e-learning market, particularly on the supply side, is very heterogeneous, split up and intransparent (for more information on the provider side cf. below).

On the other hand, from the point of view of e-learning providers the most important target markets for e-learning are: the corporate market, the training provider market and the consumer market. For technology providers training providers play a more important role as potential customers (but still less important than the company market) than for other providers (Berlecon 2001, p.6.) The potential target groups for a system like aLFanet are looked at in more detail in the following sections.

3.4.1.1   The corporate market

According to the Berlecon Research study's estimation (that was, however, from today's point of view definitely too optimistic) the market volume of e-learning in the sector of vocational training in Germany amounts to 330 Mio. EUR (which in relation to the whole amount of vocational training costs amounts to a market share of 2,4 %). Berlecon expected even in a conservative scenario for 2005 a market volume of 1.5 billion EUR, that would amount to an e-learning market share of approximately 11% ! (Berlecon 2001, p. 5, p. 71-78). Other studies predicted similar or even more optimistic growth rates (e.g. CGE&Y 2001: increase in German e-learning market from 230 million 2001 to over 2 billion 2004, p.8f.) Yet so far the expected growth rates (at least 46% growth rate annually, other prognoses predicted growth rates of over 90% annually) have not been fulfilled. Still expectations are quite high as far as the potential of e-learning for the future is concerned. Nevertheless the e-learning hype following the boom of the new economy has to a certain extent at least been replaced by disillusionment. Still only less than half of the large German enterprises (companies with more than 1.000 employees) use e-learning.

The use of e-learning in Germany varies very much depending on company size and branch. Whereas only 38% of the companies with between 1,000 and 2,000 employees use e-learning, 47% of the companies with 2,000-5,000 employees do so and 60% of the really large companies with over 5,000 employees (MMB 2001). These figures show that the demand side is clearly dominated by the large and very large enterprises. This is in accordance with the evaluation of our marketing experts who confirmed that the focus in e-learning so far has been definitely on the big players, the top 100 companies in Germany. These companies are up to now the only ones that employ e-learning to a considerable degree. The large groups mainly demand customised solutions and need above all modules and applications for particular clearly defined fields of applications. Still the use of complex e-learning solutions is not very common. According to NFO, to give an example, only 19% use virtual classrooms and 12% use LMS (NFO 2002, p. 452). So there might be seen great potential for e-learning in this sector. And this is also obviously the general opinion within large companies in Germany, for according to another study 80.5% of the top 350 enterprises in Germany consider the perspectives for e-learning very positive or positive (unicmind 2002, p. 27). The small and medium sized enterprises (SME) that make up the huge majority of German companies is much more heterogeneous and much more difficult to tackle. Attempts to offer e-learning portals for small and medium

sized companies have so far been not very successful**.** According to MMB 24 % of small and medium sized enterprises use multimedia applications (e-learning) for vocational training, another 17 % are planning to, and 49 % declare they won't use e-learning for training purposes. From the above mentioned e-learning users 84 % used CBT, 14 % used WBT, and 23% a combination of CBT and WBT. For the second generation they expect an increase in WBT: 21 % using intranet/internet, 46 % CBT combined with internet (MMB 2000, p. 5-7). As far as the different branches are concerned: the branches where e-learning is most current in Germany at the moment are: financial services, insurance companies, banks, automobile industry, technology and IT sector, energy provider. DEKRA presents the following data: vocational training via e-learning/ WBT is offered to the employees above all by companies from banking sector (49% / 52%), insurances (16% / 6%), financial service provider (6% / 6%), management consultancy firms (12% / 12%), IT consultancy firms (17% / 24 %) (DEKRA 2002, p. 16-17).

Summing up, one can state that the corporate market for e-learning exists – though it is still much smaller than has been expected - but it exists so far almost exclusively for large enterprises. The SME in their overwhelming majority have so far been quite reluctant to invest in e-learning, and if they did they mainly employed CBTs.

3.4.1.2 Distance Learning Institutes

Distance Learning is becoming more important in Germany, participation numbers rose during the last few years. In 2000 150,878 participants were registered (according to the Deutsche Fernschulverband e.V. (= German distance learning association) in Hamburg. The distance learning market (without publicly funded institutions) is dominated by few large institutes and a large number of small ones. The two biggest players on the German distance learning market are: the sgd = Studiengemeinschaft Darmstadt in Darmstadt and the ils = Institut für Lernsysteme in Hamburg (both belong to the Klett Group*).* The ils is with over 170 distance courses (approved and licensed by the Staatliche Zentralstelle für Fernunterricht, ZFU, in Köln) and 30,000 participants annually the largest German distance learning institute.

Recently the large distance learning institutions have begun to employ e-learning to a considerable extent and have partly started to implement own platform solutions (sgd: wavelearn, www.wavelearn.de). But for them the focus is clearly on the mix of traditional distance learning methods (i.e. printed material for self-study at home plus occasional presence phases) and new technologies. That is why, for example, ils calls its new learning concept "DistancE-Learning" trying to replenish the classic distance learning with the potential e-learning offers, using e.g. WBTs, chats, etc.

This market might be a very interesting one for aLFanet because there is a high potential for e-learning - as replenishment not as replacement - in the distance learning market, although partly the big (private) players in the distance learning have already started to look for their own solutions.

3.4.1.3 Providers (E-learning Service Providers and Content Providers)

The market for e-learning providers in general can only be described as confusingly heterogeneous and intransparent. Though there are some big players the large majority of providers are small and medium sized companies (3/4 of the providers employ between 6 and 27 employees). In the current situation the provider market is dominated by increasing competition and business failures suffering from the current economic situation. Many companies, especially smaller ones, have not survived the slump of the market that followed the initial e-learning hype.

According to the leading study on e-learning in Germany the German provider market can be divided as follows (for the figures cf. Berlecon 2001, p.79ff.):

- technology provider (offering LMS, learning platforms and/or specialised tools): make up for 24% of the provider market

- content provider: 30%

- service provider: 12%

- full-service provider: 34%

Berlecon sees chances above all for providers with the following focus (Berlecon 2001, p.9):

-   full-service providers who manage to meet the needs for high quality and standardised content and also provide tutoring and customer care

-   ASP providers who offer learning environments with didactical know-how as one-to-many platforms

Of main relevance as potential clients for aLFanet probably are: e-learning service providers and content providers.

<u>E-learning Service Provider</u>: The market mainly consists of providers of learning platforms and providers offering specialized tools (particularly authoring tools and content management systems). Among German providers of learning platforms are e.g.: Hyperwave, T-Systems,... Moreover, there are full-service provider offering their customers solutions rather than products, from analysis of demand to implementation and customer care. Among German full-service providers are e.g. M.I.T., imc or Athemia (within Klett). US providers (e.g. Saba, Docent...) have entered the German market only at a relatively late phase and are often cooperating with German (sales) partners.

The German market for e-learning services is divided mainly into IT services, consulting and customer care/teletutoring. In this market there are on the one hand big system integration houses and (IT) consultancy firms, on the other hand there are small specialized consultancy firms and IT service providers.

<u>Content Provider</u>: According to Berlecon the content provider market consists of approximately 50 companies with a focus on providing e-learning content, most of them have only recently started to explore the chances of e-learning (Berlecon 2001, p.86ff).

Content provider for e-learning applications mainly fall into the following categories:

-   universities, business schools

-   publisher, particularly those with special focus. Most publishing companies process and sell their content themselves. Klett itself has recently started considerable e-learning activity in the field of language courses for self-learners (PONS e-learning courses using the eQuadriga platform)

-   training provider

-   company experts and departments that often produce their content themselves

This market may be interesting for aLFanet as well, though many providers already have started to look for their own solutions or cooperate with technology providers offering platforms/LMS.

3.4.1.4   Public Administrations and (private) Associations

Public administrations might be another interesting target group for aLFanet. E.g. the probably largest single user of e-learning on the German market nowadays is the German army. The Bundeswehr produces most of the content it uses itself; therefore it demands easy authoring and content production tools. Other potential customers that have employed e-learning (above all standardized CBTs) to a greater degree so far are local public transport providers and also the Deutsche Bahn. But in these times of decreasing budgets training expense has been sharply reduced in this sector as well.

The German Industrie- und Handelskammern (IHKs = industry and commerce associations) also belong to the potential clients, there are already cooperations with e-learning providers for offering an IHK online training portal (e.g. with ets GmbH; product: DLS Distance Learning System, <u>www.ets-online.de</u>) The IHKs in general also demand mainly standardized content and have so far not put great emphasis on advanced didactic concepts.

3.4.1.5   Drivers and risks at the German market

-   Saving cost has been a factor in the use of e-learning from the beginning. According to DEKRA cost reduction is the strongest argument for e-learning (33%) followed by reduction of (travelling) time (21%). Other arguments like increase in self-reliance of employees, flexibility in time and place are of minor importance (ratings below 8%) (DEKRA 2002, p. 26). Human resources managers mention on the side of learners flexibility in time, positive experience as well as adaptability to personal speed of learning (DEKRA 2002, p. 45).

- Small and medium sized enterprises state that the opportunity for self-guided learning (70 %) and minimizing time (57 %) and cost (47 %) are the most enhancing factors (MMB 2000, p. 6).

- Multinational companies with employees in various countries in particular gain a profit from e-learning: Training costs for e-learning saves 50-70% compared to traditional training costs. Distribution via internet is much cheaper. Also the effort to keep the data up to date is less. Another big advantage for e-learning is interactivity as well as individualisation. Online students are more motivated, they spend more time on learning, keep more contact with other students, and understand better than students taught in traditional courses (NFO 2002, p. 434-435).

- A very great advantage e-learning offers is that it is better suited than traditional forms to answer the need for short-time training to (very) large numbers of learners, e.g. when a company needs to prepare the market entry of new products or when quick, flexible reaction to new legislation, etc is needed. This so-called shortened time-to-competency is an asset that is particularly relevant for example in the financial services branch or in the automobile industry (where information and training on a new model has to take place on short notice and to a large number of sales and service employees).

The following conditions and circumstances inhibit the use and implementation of e-learning systems:

- Generally speaking, the boom is over and has on a large scale given way to disillusionment. Psychological factors play a role as well. "E" is out at the moment. And the e-learning market suffers from this negative trend as it has profited from the boom.

- Obviously, e-learning providers so far have not managed to convince their customers that e-learning offers results that are as efficient as traditional solutions and are worth the high expenses in the starting phase.

- Another inhibiting factor is that the costs for initial investment are extremely high, especially when companies want to implement complex solutions, that is complete e-learning systems. So far only large companies therefore have risked the investment. (And some of them have now stopped their investment into e-learning, as e.g. the Deutsche Bank).

- Small and medium sized companies claim that the social isolation of the learners (32 %) and (initial) costs (12 %) are the most inhibiting factors (MMB 2000, p. 6)

- Moreover, e-learning programmes often suffer from the qualitative point of view: Mostly they consist of text files without multimedia elements. They lack flexibility and personalisation and therefore cause users' rejection.

- Other drawbacks are: technological restrictions, shortcomings in security, intransparent prizing models, missing knowledge of PC and internet on the side of the learners. Half of e-learning participants complained that they miss the personal contact with colleagues. Half of the companies won't accept the new ways of training (NFO 2002, p. 435).

- According to DEKRA human resources managers mention bad motivation and problems with the technology on the side of employees, difficulties to control the learning results. They also mention that German learning culture differs from the American one (DEKRA 2002, p. 45).

Among conditions and circumstances that inhibits the use and implementation of **adaptive** e-learning the most important are according to our experts:

- Most companies (and other potential clients as well) value performance and speed (short time-to-competency) more than didactic aspects and an advanced learning approach and do not put too much emphasis on pedagogical concepts (they rather demand the capability of transfer from their employees). The didactic concept, however, plays a more important role for the distance learning institutes.

3.5   Characteristics of users

As discussed in the methodology chapter, the data of this section stems from the outcomes of Deliverable 11 and Deliverable 12. Since these deliverables have not completed yet, it is not possible to describe the outcomes in an integrated manner. Although some data analysis is still expected to be done, based on the outcomes of section 3.3 some trends can already be expressed.

➢ Identified needs reflect and call up our attention to already known aspects that can and must be improved, rather than to innovative ones;

➢ The scope of the requirements already stated (over 85), is a comprehensive one, including all key aspects of a platform interaction. The majority, is related to the interaction between Learners – Tutors – System (machine);

➢ The identified needs call for high quality courses, easily adaptable and easily brought up to date. There should be a authoring tool, flexible and comprehensive, user friendly enough to be used by anybody with no programming experience;

➢ The requirements showing an adaptive "flavour" and the needs not yet translated, shall be further explored, assuring that every bit of innovation associated to the needs, is effectively caught.

4. Conclusions and recommendations

After the extensive discussion of various topics in chapter 3, this chapter integrates the various data and draws conclusions concerning the desired characteristics of Alfanet.

4.1   Appropriateness of tools and products for Alfanet

Section 3.2 of this report presents an extensive overview of various tools and products that may obtain appropriate characteristics for Alfanet. The following tools and products were described subsequently: Learning Space (section 3.2.1), TopClass E-learning Suite (section 3.2.2), Pyxis KMS (section 3.2.3), Blackboard (section (3.2.4), Cisco learning System Virtuoso (section 3.2.5), Generation 21 (section 3.2.6), WebCT (section 3.2.7), BSCW (section 3.2.8), ALIS (section 3.2.9). For each tool and product a description of characteristics was made, followed by an assessment of features contributing to the innovative concept of Alfanet. This was carried out in order to find out to what extend already existing products and tools could be included in the development of Alfanet. It may be obvious that it was not possible to investigate all available tools and products. Therefore it was found necessary to limit the number of tools and products to those who were regarded as promising by the partners of the Alfanet project. Promising with respect to contributing information and ideas that are in line with the intended innovative features of Alfanet.

The description shows that the following tools and products do not have any characteristics that may contribute to the idea of Alfanet: Learning Space, Blackboard, WebCT. These three learning environments are these days quite popular but can be regarded however as 'first generation learning environments' which mean that they are rather user-friendly but only provide very limited (pedagogical) possibilities. In fact these type of learning environments enhance substitution (they replace paper-based communication and learning materials by electronic communication and learning materials) but they do not contribute to the innovation of the learning process itself. Learning is still regarded as classroom-based learning and these learning environments provide additional information for students and tutors. So to conclude Learning Space, Blackboard, and WebCT do not have substantial features contributing to the design and delivery of high quality, innovative, adaptive e-learning processes.

The other six tools and products that were reviewed contain one or more of the following features:

- Possibilities to personalise the learning process by taking into account learner's individual competency level and various learning preferences. In particular TopClass and ALIS provide elaborated possibilities to adjust the learning process to the learner's preferences

- Customisation of the learning environment to learner's preferences. Several tools and products provide possibilities to customise for example the interface, or the options (e.g. BSCW)

- Reusability of learning objects is explicitly mentioned in the sections concerning TopClass and Generation21

- Integration with knowledge management systems is described explicitly in the sections concerning Pyxis KMS and Generation21

Although these six tools and products have promising features and maybe are worthwhile to take into account in the design phase of Alfanet, at this stage it is not possible to draw final conclusions because of the following reasons:

- It remains unclear whether (parts) of these systems can be used for inclusion in Alfanet (due to suppliers' commercial policies)

- Information is needed regarding to what extend suppliers are still investing in the development and improvement of their tools and products

- Not for every tool it is clear to what extend learning technology specifications ('standards') are really supported

4.2 The European market for E-learning

Section 3.3 discusses the outcomes of a literature review on the characteristics of the European e-learning market. Section 3.4 provides in-depth insight into the German market that can be regarded as one of the most important markets for e-learning. In this section the main findings are summarised.

4.2.1 The European market at a glance

- The quality of the information on e-learning used in this search of literature was sometimes hard tot evaluate. The nature of the data, qualitative and quantitative, is not always mentioned in the literature sources, research procedures are not always made explicit; in case of survey research it is not always clear how the non-response is handled and interpreted, how large the response is etceteras. More scientific sources on the other hand, are generally focused on the evaluation of case studies relying on small respondent groups and only provide very specific information that is not applicable to a larger context.

- For the literature review a comprehensive definition of e-learning was used. Thus not only Internet-based learning was taken into account but also learning with the use of CD-rom was taken into account. It was decided to opt for a broad definition because most literature sources also use a broad definition.

- A great deal of information is based on trend watching, describing global world-wide trends without making assumptions explicit. Obviously we take into account that information gathered by making use of research instruments (e.g. questionnaires on the Internet) has a strong bias specifically on subjects related to the use of the Internet, for example e-learning.

- It is clear that the countries of the European Union differ largely on the subject of e-learning, not only in terms of infrastructure or accessibility to ICT. Acceptance is also related to factors as socio-economic climate, cultural differences in learning, business and language. The various EU initiatives and measures to support e-learning are directed to the reduction of these differences in a period of 5 years. In the policy reports however we miss the description of measurable success indicators allowing sound evaluation the EU policy. There is a special action planned for the coming years, but these good intentions are not realised in practice yet.

- The market of e-learning is still in its infant years and still highly instable. An indication that this market is still new is the fact that 60% of all players involved in e-learning in the EU are at the same time providers and users. This instability is caused by factors as
  - ➢ Many different providers operate on the market, supplying largely different products and services.
  - ➢ The heterogeneity of the supply causes non-transparency of the market for customers either corporate, from the regular educational sector or individual customers.

- The rate of growth of the e-learning market last years was less prosperous than expected, growth rates being smaller than expected. Most sources forecast a growth in the future due to amelioration of the infrastructure, spread of internet facilities, and expectations about low implementation costs of e-learning. Corporations increasingly demand a more comprehensive 'one-stop-shopping'approach to meet the training needs.

- Although the segment of content provision is momentarily the largest one, it is to be expected that the segment of providers offering full service ('all in one package': offering content, technology and support services) will take the market lead in the years to come. Providers of technology, offering hardware, Web publishing tools etc., represent the smallest segment of the market. Thus the most prosperous growth is expected for full-services providers.

- Serious doubts exist about the quality and reusability of content offered at the moment. Use of new technologies does not automatically improve courses. A strong need exists for pedagogical and didactical competencies allowing and assisting designers, trainers and teachers to develop e-learning.

- In educational institutions a growth in the use of e-leaning can be recorded. This use seems to be related to the level of education, meaning that higher education is a more prominent user than primary schools. Although a positive attitude and motivation towards e-learning exists, training of teachers on how to use ICT in a pedagogical innovative manner is strongly needed.

- Users mention a lack of personalised content and point at a low interest in this topic from the side of providers.

- Especially small and medium sized corporations express a need for personalization but are afraid to be overlooked while a lot of attention is directed exclusively towards large corporations.

- The sector of e-learning needs reliable models to calculate the return on investment in e-learning, demonstrating real cost-effectiveness. From the literature it turns out that the estimates of costs of developing and delivering e-learning differ strongly. As a consequence the argument of costs is sometimes used as an argument in favour of e-learning, sometimes as an argument against e-learning.

4.2.2 The case of Germany

Review of recent literature and consultation of German experts result into the following conclusions. The main shortcomings and their solutions to overcome the gap between usage and potentials of e-learning are:

- lack of transparency of market → remedy: overview of technology and market

- few applications for SME → analysis of individual requirements

- lack of learning efficiency → progress in e-learning didactics

- negative social effects → new forms of e-collaboration

- lack of organisational embedding → change management

There definitely exists a market for e-learning. Standardised possible solutions are emerging, but still there is no general breakthrough concept and the future technological development (broadband, DSL) will be crucial. Starting points for the development of a new e-learning system might be: didactical support is essential, integration in knowledge infrastructure is necessary, keep focus on social aspects (motivation, involvement), exchange of experiences/ best practice.

To increase the acceptance of e-learning in vocational training the following recommendations are often mentioned:

- strengthening the aspects of multimedia and virtual communication

- combining CBT/ WBT with traditional forms of teaching to meet learners' needs ideally

- training objectives must be well defined and clearly structured; learning progress needs to be tracked and controlled

- technical requirements for the course need to be defined and learners must be able to handle the system

- qualified tutors must be available and communication among learners as well as between learner and tutor is imperative (NFO 2000, p. 435-436)

According to DEKRA the future role of e-learning in vocational training will be complementary to other/ traditional forms of learning (blended learning) (DEKRA 2002, p. 31 ff.). Summing up this as well as other sources and also according to the overwhelming opinion of experts blended learning seems to be the new trend. As stated before many LMS already exist on the e-learning market. So to have a chance on the market a new e-learning system like aLFanet needs to offer all the functions that have become standard and are therefore generally expected by customers. But, moreover, to be successful on the market aLFanet needs to take into consideration above all the following aspects – and offer good solutions to each one:

- performance (speed, data capacity...)

- offer the basic standard features

- offer advanced authoring tool in order to make use of the innovative options for adaptation and to apply more elaborate pedagogical concepts. An authoring tool is also important because many customers prefer to be able to process their own content.

- user-friendliness

- smooth integration into company IT infrastructure (firewalls!) and adherence to common standards for interoperability, content integration

- marketing and sales strategy and organisation are important: how to sell the system, looking for sales partners

4.3   Final conclusions and recommendations

The main conclusion of this report is that it remains questionable to what extend there exists a commercially attractive market for an innovative adaptive learning environment such as Alfanet. Is the e-learning market, and its expected future growth, willing to buy such an advanced learning environment? What are the strong and convincing arguments to underpin the need for Alfanet? Here the following recommendations are provided to underpin the need for Alfanet and guidelines that need to be considered for the design of Alfanet.

- It is recommended to take into account already existing tools and products for the design of Alfanet. However, some additional review work must be done to assess the suitability of the tools discussed in this report.

- Especially new learning environments will face the problem how to compete with already existing suppliers of learning environments with strong market positions. Though learning environments such as Blackboard and WebCT provide only limited educational options, they do have the advantage that they are well known brands. Branding is one of the key factors for the success of learning environments. This suggests that a lot of emphasis must be placed on the development of smart and convincing (marketing) strategies.

- In order to make Alfanet a successful project it is necessary to define Alfanet not only as a system but to place sufficient emphasis on the development of services for Alfanet users. Not only technical services. But especially educational services, such as various examples of content (best practices) that demonstrate in a convincing manner the advantages of the learning environment (e.g. pedagogical flexibility, easy authoring strategies, reusability learning objects) a help desk for educational questions, various training and coaching possibilities to support users to make optimal use of the possibilities of this learning environment.

- In order to remain commercially attractive it is recommendable to design Alfanet in such a way that the system can be used at various expertise levels, ranging from novice users to more advanced users (compare for example the product BSCW that also can be adjusted to the user's expertise level). The system provides more possibilities as the level of expertise increase. This makes it possible to serve a larger target group of possible clients.

- It is to be expected that in the near future the need for more advanced types of learning environments will grow. In many cases there is a growing consciousness that e-learning is a powerful mean to improve the quality of learning processes. And above all the applications of new technologies, such as the increasing use of broadband, provide possibilities for more demanding and complex use of learning environments. Thus substitution (replacement of written learning materials by electronic learning materials, e-learning as an additional learning source for classroom-based learning) will be replaced by strategies focusing on the improvement of flexible learning, implying a truly innovation of our thinking about learning and education. It would be therefore wise to define clearly the intended Alfanet target group of users. Alfanet is probably not focusing on every user of e-learning, but will be geared toward the users that are interested in designing and delivering high quality, flexible learning processes.

- Finally, a critical recommendation concerning options for personalisation. The more variables are used to personalise the content, the more complex becomes the design of Alfanet and the more complex it becomes for instructional designers to use the learning environment. Further, for various variables such as learning styles and motivation there is no overwhelming scientific evidence that personalisation contributes substantially to more effective learner's performance., And above all, reliable instruments to measure these psychological constructs are scarce or require substantial time from learners during the intake procedure. Therefore, it is recommended to limit the number of variables that are used for personalisation purposes to those variables that are quite obvious, such as prior expertise, educational background, and learner's learning ambitions.

Appendix 1   References

A 1.1 Literature

Appelt, W.(2001). *What Groupware Functionality do Users Really Use?* In Proceedings of the 9th Euromicro Workshop on PDP 2001, Mantua, February 7-9, 2001. IEEE Computer Society, Los Alamitos.

Appelt, W (1999). *WWW Based Collaboration with the BSCW System*, in Proceedings of SOFSEM'99, Springer Lecture Notes in Computer Science 1725, p.66-78; November 26 - December 4, Milovy (Czech Republic)

Appelt, W., Hinrichs, E., Woetzel, G. (1998). *Effectiveness and Efficiency: The Need for Tailorable User Interfaces on the Web*, in Proceedings of the 7th International World Wide Web Conference, Brisbane, April 1998.

Berlecon Research GmbH (2001). *Wachstumsmarkt E-Learning. Anforderungen, Akteure und Perspektiven im deutschen Markt.* Berlin: Berlecon Research GmbH.

Boon, J. et al (2002). *Competentieprofielen. Over schillen en knoppen.* Utrecht: Digitale Universiteit

BSCW 4.0 Help (Copyright 1995-2001 © FIT Fraunhofer, 2001-2002 © OrbiTeam.)

Cap Gemini Ernst & Young (2001). *"CGE&Y eLearning Marktstudie 2001 – Management Summary"*. München: CGE&Y.

Cedefop (2002). *Users' views on e-learning : Cedefop online surveys* / [edited by Cedefop ; in cooperation with Jane Massy ; published under the responsibility of Johan van Rens, director, Stavros Stavrou, deputy director]-- Luxembourg : Office for Official Publications of the European Communities, c2002 -- 74 p. : ill.

Commission of the European Communities, (2000) *Communication from the commission, e-learning-Designing tomorrow's education.* Brussels:

Commission of the european communities. Brussels, 28.5.2002. *eEurope 2005: An information society for all. An Action Plan to be presented in view of the Sevilla European Council*, 21/22 June 2002.

Droste, J. (2000). *Advies keuze teleleerplatform 2000.* Den Bosch : CINOP

E-learning and training in Europe : a survey into the use of e-learning in training and professional development in the European Union /-- Luxembourg : Office for Official publications of the European Communities, c2002 -- 65 p. : ill.

Graumann, Sabine et al. (2002). *Monitoring Informationswirtschaft. E-Learning" (on behalf of Bundesministerium für Wirtschaft und Technologie).* München: NFO Infratest GmbH & Co.

Hettrich, Alexander / Koroleva, Natalia (2002). *Einfach? Schwierig? – Einfach schwierig! – Auswahl eines bedarfsgerechten Learning Management Systems"* (unpublished lecture, Information Day Fraunhofer Institut, Universität Stuttgart, 10 July 2002).

Janson, André (2002). *E-Learning Potenziale und Risiken"* (unpublished lecture, Information Day Fraunhofer Institut, Universität Stuttgart, 10 July 2002).

Littig, Peter (2002). *Klug durch E-Learning? Eine Marktstudie der DEKRA Akademie*. Bielefeld: Bertelsmann.

MMB Michel Medienforschung und Beratung (2000*). Zukunftsperspektiven multimedialen Lernens in kleinen und mittleren Unternehmen. Ergebnisse einer Potenzialerhebung*. Essen: MMB.

MMB Michel Medienforschung und Beratung/PSEPHOS Institut für Wahlforschung und Sozialwissenschaft (2001). *eLearning zwischen Euphorie und Ernüchterung – Eine Bestandsaufnahme zum eLearning in deutschen Großunternehmen* (Summary of Results). MMB.

Monteith Moira et al (2001). Learning in a Virtual Campus: the pedagogical Implications of students' experiences. *Innovations in Education and Teaching international*, 38, 2

Scheffer, Ute / Hesse, Friedrich W. (Hg.) (2002). *E-Learning. Die Revolution des Lernens gewinnbringend einsetzen.* Stuttgart: Klett-Cotta.

Streumer, J.N., Klink, M.R. van der & K. van den Brink (1999). The future of HRD.   *International Journal of Lifelong Education 18*(4), 259-274.

Unicmind.com AG (2002). *Die Nutzung von e-learning-Content in den Top 350-Unternehmen der deutschen Wirtschaft. Eine Studie im Auftrag der unicmind.com AG*. Göttingen: unicmind.com AG.

Walther, Petra (2002). "Application Service Providing. Lernsysteme auf Abruf" in: *e-le@rning*, 02/2002, p. 14-20.

Williams, C,(2002) Learning on-line: a review of recent literature in a rapidl expanding field. *Journal of Further and Higher Education,* vol 26, n3,

Williams D, et al (2000). Teachers and ICT: current use and future needs. *British Journal of technology*, vol 31, no 4,

A 1.2 Websites

http://www.ecc.org.sg/Standards/StandardsBodies.htm E-learning Competency Centre

http://learning.ericsson.net/leonardo/ From e-learning to m-learning

http://europa.eu.int/comm/education/elearning/what.htm What's new in eLearning?

http://www.mainescience.org/happenings_policy_internatl.html International Policy

http://www.e-learning.nl

http://www.e-learningplaza.nl/start.asp

http://www.cisco.com/warp/public/10/wwtraining/elearning/

http://europa.eu.int/scadplus/printversion/en/cha/c11050.htm

www.ets-online.de

www.wavelearn.de

Advanstar Communications (2002). Group Unveils Analysis of E-learning Market and Products. http://www.elearningmag.com/elearning/article/articleDetail.jsp?id=12915

Attitudes to e-learning: a national survey 2000, UK, demand and supply-side analysis. http://www.campaign-for-learning.org.uk/new/e-learning.htm

BSCW http://bscw.gmd.de

BELGIAN CAMPUS: http://www.belgiancampus.net/article_185_plate_formes.htm

Corporate foundations for e-learning success. 2000, demand and supply-side analysis (Training magazine readers). http://www.xebec-online.com/new/trngtalk/resources/pdfs/survey2000.pdf

Corporate e-learning-realising the potential (UK, 2001), demand and supply-side analysis: readers of Training magazine + other training and human resource professionals. http://www.xebec-online.com/new/trngtalk/resources/pdfs/survey2001results.pdf

DANIELLE VALLEE E-LEARNING RESOURCE CENTER: http://www.daniellevallee.com/rescent/lms.html

'Efficient learning': e-learning and efficient training, 2001, Arthur Andersen, Demand-side analysis of e-learning users (directors of companies). http://www.andersen.com/Resource2.nsf/AssetsByDescription/e-learning_es_0301%20FRENCH/$File/e-learning_es_0301.pdf

E-learning and the UK IT training market (UK, 2001), supply-side only. Analysis of major e-learning vendors in UK. http://www.ovum.com/go/product/flyer/HLL.htm

E-learning market expanding beyond IT training (November 2001)
CyberAtlasstaff, http://cyberatlas.internet.com/markets/education/article/0,,5951_914901,00.html

E-learning: survey june 2001 (France, 2001), demand and supply-side analysis of human resource managers.http://www.rhinfo.com/servlet/com.rhinfo.home.doc.printDoc?ID_DOCUMENT=966&ID_LOCATION=1143

E-learning: survey september 2000, Demand and supply-side analysis of human resource managers.
http://www.rhinfo.com/servlet/com.rhinfo.home.doc.printDoc?ID_DOCUMENT=695&ID_LOCATION=852

ETV: Europeans unimpressed with elearning
http://www.nua.ie/surveys/index.cgi?f=VS&art_id=905358138&rel=true

European corporate e-learning: market forecast and analysis 2000, IDC, supply-side only, analysis of major vendors in Europe. http://emea.idc.com/press/20010105.htm

European e-learning market forecast and analysis, 2000-05, supply-side only. Analysis of major vendors in Europe. http://www.itresearch.com/alfast4.nsf/UNITABSX/WTT03H?OpenDocument

FAQs about E-learning
http://www.brandonhall.com/public/faqs2/faqs2.htm

GATE (UPM): http://hermes.gate.upm.es/plataformas/plataformas_estudio/index.php3

Hearts, Jack of (2002). E-learning UK set to surge. http://www.it-analysis.com/article.php?id=2008 (results study Irish Government)

Hambrecht & CO. Corporate eLearning: Exploring A New Frontier, 3/2000
http://www.internettime.com/itimegroup/articles/hambrecht.pdf.pdf

I Business (2002). The European E-learning Provider Market in 2002. markets, customers, service enterprises and trends in Europe and 11 regional partial markets
http://www.ibusiness.de/shop/db/shop.4018jg.html

IDC Press Release (2002). European Business Skills Training Defies Slowdown to Reach $13 Billion by 2006 - eLearning gains Share. http://www.idc.com/getdoc.jhtml?containerId=pr2002_01_16_124925

IDC Research: Corporate elearning market to skyrocket
http://www.nua.ie/surveys/index.cgi?f=VS&art_id=905356515&rel=true

IDC Research: Elearning to pick up in Europe
http://www.nua.ie/surveys/index.cgi?f=VS&art_id=905357583&rel=true

IDC Research: Lucrative prospects for elearning in Europe
http://www.nua.ie/surveys/index.cgi?f=VS&art_id=905356320&rel=true

IDC Research: Schools to double spending on elearning
http://www.nua.ie/surveys/index.cgi?f=VS&art_id=905356263&rel=true

Internet Usage and commerce in Western Europe, 2001-2006, May 2002,
http://www.idc.com/getdoc.jhtml?containerId=fr2002_04_19_115126

Nordic corporate e-learning market, 2000-05. supply-side only, analysis of major vendors in Nordic countries. http://www.itresearch.com/alfast4.nsf/UNITABSX/WN560100H?OpenDocument

Pastore, M. (april, 2001), Companies, universities moving towards e-learning
http://cyberatlas.internet.com/markets/education/article/0,,5951_737341,00.html

Pastor, M. (april 2001). Teachers say internet improves quality of education.
http://cyberatlas.internet.com/markets/education/article/0,,5951_734761,00.html

Pastore, M. (26 july 2000 Working adults like online education),
http://cyberatlas.internet.com/markets/education/article/0,,5951_423331,00.html