E-learning

A research note by Namahn

This research note aims at giving a general introduction to e-learning. After defining and situating e-learning in the business world of today, we aim at building a case for e-learning, examining the (possible) links with knowledge management and content management. Next, we discuss the tools and e-learning architectures. To complete this research note, we give a brief introduction to the costs and benefits of e-learning, followed by a description of ways how to implement e-learning.

"Wisdom is not the product of schooling, but the lifelong attempt to acquire it." (Albert Einstein)

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Origin of E-learning

Although e-learning has been around for decades, it has seen exponential growth in the last years, mainly because of the growth of the Internet. As a short introduction we present a retrospective.

1960 - The early years

Soon after computers were invented, psychologists and educators noted the educational potential of computers. Early computer-based instruction development focused on automating relatively simple notions of learning and instruction. However, the early group of computer-based instruction technologists split into two groups: the so-called applied scientists (engineers) and the so-called advanced researchers.

Computer based instruction

The first group of scientists focused on automating the simple notions of learning and instruction. During the decades, this group continued to develop and refine their tools, to include complex instructional constructs. However, throughout the development phases, costs were a major obstacle to the widespread use of computer-based instruction.

Initially, the migration and adaptation of computer-based instruction, based on mainframes to minicomputer, workstations and personal computers, absorbed much of the energy of researchers and developers. With each succeeding technological innovation, new capabilities and features became available to enhance the technological supported learning process. As the tools matured and personal computer proliferated, costs were dramatically reduced. Recent instructional content incorporate multimedia capabilities and sophisticated authoring features. These computer-based instructions are characterised by tightly bound instructional content and logic.

Intelligent tutoring systems

The second group of researchers focused on the potential of information-structure-oriented approaches to represent human cognition and learning. Rooted in the early artificial intelligence studies of how we learn and master skills, this approach led to the development of Intelligent Tutoring Systems (ITS). The functionalities of ITS are distinct from the more conventional approaches. The functionalities requires ITS to generate instruction in real time, on demand as required by the individual learners. Furthermore, ITS must support dialogue or discussion between the technology and the user. However, several factors also hindered the development of ITS technologies. The science of human cognition was relatively immature, and the complex modelling and rule-based systems require considerable computing power. The ITS systems are characterised by the tendency to separate control logic from instructional content.

The advent of the World Wide Web

The Internet and the World Wide Web has reset the agenda for both the groups of development. As the internet developed, it provided a widely accessible communications structure built on common standards providing easy access to information and knowledge. CBI systems progressed from direct adaptations of CD-ROM to the Internet to Web-based authoring systems, embracing the separation of content and control as server-based learning management systems emerge.

The 21st century

Now, moving into the 21st century, the boundaries between an organization's management systems seem to blur. As we live in a knowledge driven economy, the human resources systems (assessment, evaluation, career planning and development), knowledge management systems (supported technologically by content management systems), and learning management systems are said to be merging into holistic intellectual capital systems.

Introducing e-learning

E-learning is just one of the many terms which are used in literature and business about e-learning. E-learning is defined by many people, in many ways, and as it is most important to gain a clear understanding of what e-learning is, we present some definitions and related terminology of the e-learning world.

Defining e-learning

As there are many definitions available, we present here only a few of them to gain some understanding.

Definition 1

Tom Kelly, Cisco: "E-learning is about information, communication, education and training. Regardless of how trainers categorize training and education, the learner only wants the skills and knowledge to do a better job or to answer the next question from a customer."

Definition 2

"E-learning provides the potential to provide the right information to the right people at the right times and places using the right medium."

Definition 3

Brandon Hall: "…instruction that is delivered electronically, in part or wholly via a Web browser, (…) through the Internet or an intranet, or through multimedia platforms such CD-ROM or DVD." Brandon Hall argues that, as the technology improves, e-learning has been identified primarily with using the web, or an intranet's web. Increasingly — as higher bandwidth has become more accessible — it has been identified primarily with using the Web, or an intranet's web, forcing the visual environment and interactive nature of the web on the learning environment.

Definition 4

Learning Circuits[1]: "E-learning covers a wide set of applications and processes such as web-based learning, computer-based learning, virtual classrooms and digital collaboration. It includes the delivery of content via the Internet, intranet/extranet, audio and videotape, satellite broadcast, interactive TV and CD-ROM."

Definition 3

Rosenberg: "E-learning refers to the use of Internet technologies to deliver a broad array of solutions that enhance knowledge and performance." Rosenberg claims that e-learning is based on three fundamental criteria:

- E-learning is networked, instant updating, storage and retrieval, distribution and sharing of information is therefore possible.

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[1] electronic magazine, sponsored by ASTD (American Society for Training & Development)

- E-learning is delivered to the end-user via a computer using standard internet technologies.

- E-learning focuses on the broadest view of learning: learning solutions going beyond the traditional paradigms of training.

E-learning and friends

E-learning is not the only term used when referring to 'learning using the internet'. Related terms are sometimes broader in their meaning, sometimes not. A brief overview.

Online learning

Online learning is defined as broadly as possible by giving the following description: "Online learning refers to learning and other supportive resources that are available through a computer." Some of the definitions of online learning include other means than a computer (interactive television), others do not.

Web-based training

In the term web-based training, there is already the restriction of the 'web'; which plays a more dominant role when offering the training. Web-based training is commonly described as "a form of computer-based training, referring to courses on the intranet, extranet or Internet and that are linked to learning resources outside the course, such as references, electronic mail and discussions and video conferencing." For the term internet-based training a matching description is found in various sources.

Web-based training

Technology based training is again a term with a very broad meaning. A common description of the term is the following: "technology based training refers to any training through media other than the classroom. This includes computers, but it also refers to television, audio, tape and print.

This is clearly what Ravet and Layte has in mind. They offer a full overview of how training using technology has developed over the past thirty years from mainframes, transistors or printing terminals providing users with tapes, real life exercises in class up to internet and videoconferencing offering live online tele-tutoring.

Computer based training or instruction

The last term in our list is computer based training or instruction, which is defined as "presenting courses on a computer. The computer does not provide links to learning resources outside the course. Often, the computer is not connected to a network." Here, we notice a built in restriction. Various sources stress the fact that the course taken is not connected to any network. The user will only be able to be instructed about the available course and is not able to explore information related to the courses via links or define the learning speed to his or her will.

E-learning versus instructor led training

E-learning is often compared to traditional class-room training or instructor-led training. To make the case, advantages and disadvantages of the two are often compared. However, it is not possible to plead against one or the other, rather to examine each learning situation carefully and evaluate

which method is best to be used, or even more interesting to work towards a blend of both methods.

Instructor led training

Instructor led training is the classical formula of a teacher in front of a classroom full of students. This method has proven its value over many years, and this way of training is certainly not becoming obsolete.

There are however a number of (new) circumstances and trends where this traditional way of training runs into problems:

- Distance: the strength of a classroom-based training is the intense interaction between the instructor and the students. But bringing together the people costs time and money. In the growing competitive market situation, these costs are often no longer justified.

- Audience size and response time: a traditional classroom-training requires an instructor, and infrastructure. This is needed for a large group of students, but also for a small group of students. In this last case, the traditional instructor-led training is not an efficient solution. Even with an infrastructure and teacher at hand, the traditional training methods require some planning: planning of resources, of infrastructure, bookings for hotels, it is often difficult, maybe impossible to set up training 'now', immediately when the training needs are there.

- Off-the-job time: Employees attending classroom training are off their jobs. In some cases, additional personnel are necessary to replace people participating in training. In the worst case, there are no replacement personnel and business might be lost.

It could be argued therefore, to leave the path of traditional classroom training, to reduce the extra costs of this training and replace the instructor led training by e-learning altogether.

However, e-learning is not a cheap alternative for ILT. It should be seen as a system enabling the building of capabilities across the enterprise. It should be the backbone of how a company thinks together. If cost reduction is the only objective, then the results of e-learning might be rather poor. E-learning is best used as one of the assets to create and sustain a strategic advantage.

Research supports the intuitively appeal of technology based instruction. The speed with which individuals can progress through instructions varies by factors of three to seven, even in classes with carefully selected students. On average, a student in a classroom asks about 0.1 questions an hour. In individual tutoring, students may ask or be required to answer as many as 120 questions in an hour. The dilemma presented by individually tailored instruction is that it combines an instructional imperative with economic impossibility. With few exceptions, one instructor for every student is not affordable. Instructional technology promises to provide most of the advantages of individualized instruction at affordable cost while maintaining consistent, measurable, high-quality content.

Blended learning

By blended learning, a mixture of traditional learning and TBT training is offered to the learners. The best resources and providers are selected to match the company's culture and business environment. An array of options (but with constraints) is available to match individual, team and organisational learning priorities.

Blended learning combines e-learning tools with traditional classroom training to ensure maximum effectiveness. Students can prepare for, consolidate and recall classroom experiences

online, while gaining the benefits of interaction with teachers and students via an actual or virtual classroom. Student learning and retention rates improve without sacrificing the convenience, cost-effectiveness and customisation of self-paced Web-based coursework.

E-learning is not the whole solution. Classroom training is social. It is often considered a perk. You get out of the office, get a break in your daily routine, and get to meet your peers in person and share stories. You get direct, face-to-face feedback from the experts. Most e-learning is boring, requiring greater discipline on the part of the student. It is hard to make sure a student has actually completed a course.

Blended learning offers:

- Social benefits from classroom training, focusing on learning that gains the most from face-to-face interaction.

- Individualization benefits of self-paced, online learning for content that requires minimum interaction.

- Cost savings through minimizing the time away from the job and travel/classroom/instructor expenses.

- Improved retention and reinforcement through follow-up mechanisms on the Web.

- Greater flexibility to meet the different learning styles and levels of the audience.

Types of e-learning

In literature, various types of e-learning are described by using the criteria time and distance. The following table gives a brief overview of these 'types' of e-learning.

	Near in place	Partly distant in place	Distant in place
Distant in time	Asynchronous e-learning. For example, taking a self-paced course, exchanging e-mail messages with a mentor and posting messages about a topic to a discussion group.		
			Trainers and trainees never meet. For example, courses are distributed via the internet and communication via e-mail only
Partly distant in time	Face-to-face training is combined with for example electronic conferencing within one organization or campus.	Trainers and trainees meet for a kick off, and for an evaluation. The learning goes on at a distance in time and place.	Trainers and trainees use for example IRC or other tools to communicate about a problem or the courseware.
Near in time	Synchronous e-learning: communication occurs at the same time between individuals and information is accessed instantly. For example, real time chats, audio or video conferencing.		
			Trainers and trainees do not meet physically, but by using for example a video conferencing system a course is given or students are able to ask questions.

Why does e-learning matter?

As the industrial era gave way to information era, employees must now have critical thinking skills to identify process improvements, works as a team, change processes, products, tools and more. The average employee switches jobs many times, more than seven times is said to be probable. The need to learn new information (in its broadest sense) is unlikely to decrease. In this new knowledge based economy, the gap between the existing knowledge of employees and what is necessary to know is growing day by day.

However, with the growth of the internet, online education is accessible to more people than ever: people in corporations, schools and universities, government and other sectors profit from its growth.

Drivers

In this information age, some drivers push e-learning technologies to the foreground. These drivers, enabling and pushing e-learning to companies indicate that the future will be about acquiring and acting on knowledge. As creating knowledge is the context for learning, the two will merge. Not only will companies focus on learning management, to centralize and strategically employ the benefits of their skills, they will also focus on their knowledge management. In the process of converting implicit knowledge (know-how) and experience into explicit knowledge (knowledge that can be shared with others, diffused within groups), new, actionable knowledge needs to be created.

Marc Rosenberg states it as follows: "Providing access to information that contains the collective wisdom of the company can be a powerful adjunct to training. So when we have a learning need that requires instruction, we use training, and where there is a learning need that more appropriately requires information, we can use knowledge management."

The knowledge based economy

Information is everywhere, overwhelming us and difficult to find when we need to use it. However, what is done with information is more and more important for organizations. Knowledge about customers drives the product development of an organization. Knowledge and experience differentiates one organization from its competitors, but only if the organization is quick enough to take the advantage.

A shortage of skilled workers

Acquiring and keeping good and qualified people is harder than ever. Organizations have to alter the way they look at employment, culture and benefits. Not only will employees demand a clear career development, only organizations that will succeed in satisfying their employees need for knowledge will succeed in the growing markets.

Technology as enabler and driver of the economy

No matter what function an employee has, he or she has become in the first place a knowledge worker. The information technology and telecommunications which are used on a daily basis are driving the need for e-learning and at the same time creating the means to accomplish it.

The corporate university

If knowledge becomes a corporate asset, then learning and training becomes a strategic initiative and a corporate advantage. Corporate universities are not only a training aid for employees, they are becoming profit centres, responsible for training 'a corporate's complete ecosystem' or customers, partners, channel partners and suppliers. Walter Baets states is as follows: "More and more companies are starting their own (virtual) corporate university. The accent is put on an integrated curriculum focusing on skills and competencies, and closely related to company knowledge management."

The global economy

As employees around the world work either at home or at the office, learning resources and knowledge databases must be available 24 hours a day to cover every time zone.

Time-to-market

The time companies have to take their products and services to the market has been drastically reduced. New product introductions, training in new technology, on-demand tasks or skills references becomes a key asset in order to meet the organization's objectives.

Cost savings

According to researches, corporations may save from 50 up to 70 % when replacing traditional instructor led training with alternative electronic delivery.

Need for flexibility

When changes happen faster and faster, making a company flexible in every aspect is the only way to survive.

Multidisciplinary operational excellence

Excellence in all processes and projects is necessary to compete in the current market.

Innovation

Constant innovation has to be driven from within the company, empowered by the employees. The question on everyone's mind should be: How can we do this better?

Worldwide competition

In a global market, not only the market has grown, also the number of competitors has grown exponentially. New strategies, differentiating an organization from another becomes more important in the growing market.

Knowledge management and learning management

Knowledge management was defined by Karl Wiig as follows: "the systematic, explicit and deliberate building, renewal and application of knowledge to maximize an organization's knowledge related effectiveness and returns from its knowledge assets".

When evaluating research about e-learning and knowledge sharing across organizations, it is clear that knowledge management and e-learning could be more aligned. Reasons for this integration include:

- Learning and knowledge management share a similar focus: how to enhance human knowledge and its use within organizations. Both learning and knowledge management are looking for ways to categorize and store knowledge.

- There is a growing awareness of the fact that knowledge in an organization is distributed among its people's minds and a variety of knowledge artefacts.

Learning and knowledge management integrated?

In order to become more integrated, both learning and knowledge management will need to broaden their focus and gain more systemic perspectives on learning and knowledge management in an organization.

Training departments will need to expand their focus from one of managing learning content to one of managing the creation and flow of 'intellectual capital' to maximize the value. Knowledge management people on the other hand, will need to acknowledge that training contributes to the knowledge management efforts.

A good part of the reason why knowledge management workers and learning/training workers haven't interacted very much is due to their different clienteles.

Other barriers to merging the two are the following:

- Both practises are often far removed from each other in organizations.

- The concepts used by knowledge management are often misunderstood. Therefore, there is often only partial agreement on the terminology used in an organization.

- The communities of practice are rather divergent.

- The technologies both practices use are also divergent. Both have spawned different software sub-industries.

Nevertheless, common applications are becoming more frequent. For the future, predictions announce the coming of 'intellectual capital management', which has been defined as "the sum and synergy of a company's knowledge, experience, relationships, processes, discoveries, innovations, market presence and community influence".

Content management and learning management

Both content management and learning management systems are designed to store knowledge or learning/course components, often at an object level. Because of this, not only knowledge management may fuse with learning management. In the vendor market, there is an increasing demand to CMS to grow closer to LMS.

The APQC defines content management as follows: "a system to provide meaningful and timely information to end users by creating processes that identify, collect, categorize and refresh content using a common taxonomy across the organization. A content management system includes people, processes, technology and the content itself."

The increasing demand to compress the time to develop content for e-learning initiatives and for more targeted or personalized learning through the use and repurposing of standard based learning objects leads to a quicker unification of concepts and systems. Key issues are:

- Setting priorities for the investments in knowledge management, learning management and content management, resulting in a holistic approach of intellectual capital management.

- Developing and managing individuals, competencies and communities.

- Describing, classifying and managing unstructured content.

- Creating and managing activities aimed at transferring knowledge to individuals (communities within an organization and putting knowledge to work for customers).

When learning management systems are designed to store course components on the object level, in a central repository, the LMS grow closer to CM systems available. This opens the doors to single sourcing solutions, managing content throughout an organization.

Why use e-learning

Advantages of e-learning

- Flexibility, accessibility, convenience: Users are able to proceed through a program at their own pace and at their own pace. Users can access an e-learning course anytime, anywhere, and learn only as much as they need.

- Cross-platform: E-learning can be accessed by Web browsing software on any platform. A training program can be delivered to any machine over the internet or intranet without having to author a program for each platform.

- Browser software and internet are widely available: Most computers have access to a browser, are connected to the organization's intranet or the internet.

- Inexpensive worldwide distribution: There is no need for a separate distribution mechanism.

- Ease of updating information: if changes need to be made to a program or courseware after the first implementation, these changes are made on the servers storing the program or courseware. Everyone worldwide can instantly access the update of information.

- Travel costs and time savings: there are no travel costs for bringing remote employees to a centralized workshop.

- Training efficiency is increasing significantly. Not only from a qualitative standpoint (i.e. pedagogical by the use of a new method, personalization, learner autonomy, memorization and follow-up, operational by learning by opportunity and the speed of the learning updates, and organizational by creation of knowledge sharing community) but also from a quantitative standpoint (i.e. learning elapse decreases, learning cost may be reduced and learning effectiveness is increasing).

In the paper *Six Steps to implementing E-learning*; some other key benefits are summed up:

No need for travel

- Alternative training mode from offsite personnel.

- Instructors are not held by geographic boundaries.

- More students can view a presentation at once.

Shorter Development Cycles

- Faster delivery of appropriate training to applicable staff members.

- Higher rates of student completion than found in self-paced training.

- A more efficient mode of offering penetrating data.

- Flexibility to modify or change content and to make it accessible on demand.

Cost Savings for the Corporation

- Reduction of internal training costs.

- Reduced time away from work for participants.

- Students retain knowledge better.

- LMS provides a tool for optimum intercommunication and data compilation.

- Dramatically reduce travel costs.

- Flat fee pricing structures give organizations unlimited access to training for one year.

Disadvantages of e-learning

- Bandwidth limitations. Limited bandwidth means slower performance for sound, video and intensive graphics, causing long waits for download that can affect the ease of the learning process. Future technologies will solve the problem however.

- Loss of human contact. There is a general concern that as we move towards more computer usage, a terminal will replace a friendly face. Gradual introduction of e-learning or the use of blended learning may be the answer to this concern.

- E-learning programs are too static. The level of interactivity is often too limited.

- E-learning systems take more time and more money to develop then expected. This is indeed the case, as it is with any new technology that is implemented. It is easier by starting with an easy program and building on success.

- Not all courses are delivered well by computer. Some training topics are not best served by computer based training and require a more personal touch. Team building issues and dealing with emotional issues are two examples.

- Quality of learning. Progress in the field of e-learning has been relatively slow when compared to other 'fields'. A lot of web-based systems are not better than systems that were developed 15 years ago. Still, focus is often on how to develop a lot of courses and not on how to improve the quality of learning.

- Resistance to change. Introducing e-learning initiative in an organization is not an easy-to-do task. Resistance may be hard to overcome, lack of communication and commitment from champions within the organization may jeopardize the chances of a succeeding e-learning initiative.

- Confusion about technology.

E-learning concepts and tools

In our rapid changing worlds, organizations are confronted with many organizational, learning challenges, as for example:

- Knowledge and training become obsolete very rapidly.

- Training budgets are often not controllable.

- Training is often necessary here and now (not next week, miles away from the work place).

- In the globalising market economy, the most cost-effective way is sought to meet the global learning needs.

- Because of the growing skills gap and demographic changes, organizations need new learning models.

- The number of training providers is increasing.

- As lifelong learning becomes the …, the demand for flexible access grows.

In the future, organizations need to ensure that they recruit and keep the talented employees. By fulfilling learning needs, they ideally want to create additional returns and profitability. By offering new learning mechanisms, they want to create strong partnerships with their customers and suppliers.

Organizations are on the look out for new means to ensure the success of re-organizations, mergers and acquisitions, organizations. They need catalysts to enhance innovative capacities, to improve productivity and performance. To improve their strategic position in an ever more competitive market, organizations seek out for new avenues to align the organizational objectives, new means to beat the competition and to create shareholder value.

Concepts

Between the challenges an organization faces today and the possible achievements of the organization tomorrow, lays a great gap. There are however a number of learning concepts that may be used to bride over this gap. These concepts are the following:

- Participant activities: the actions performed by and characteristics of individuals in the organizations, i.e. courses people take, the learning path, the individual learning style…

- Skills and Learning repository: the course and job content related issues, i.e. job roles, competencies …

- Management activities: the actions performed by training managers, i.e. providing training courses (group training, individual training), find new ways to enhance the learning process, set up web-based courses, PC-based training …

By updating a skills and competencies database, an organization will have a clear overview of the learning needs and requirements. The organizational competencies are mapped, and serve as the starting point to begin the transfer of know-how throughout the organization. But, how will an organization do this? By using these learning concepts, and by choosing a learning management

solution (LMS). The concepts as described above will serve as the LMS' functionalities. Although it is not necessary to implement all the functionalities at once, it should be possible to add functionalities over time, as necessary.

Tools

An LMS is a solution that provides design, deployment and management of educational and training services through different context and media. Internet, Intranet or extranets, CD-ROMs, diskettes, instructor led courses or other media can be used to offer a service to the employees. The solution will however not be a replacement for traditional training, but a supporting tool, which will help organizations to develop and structure their know-how, competencies and knowledge communities and networks.

Learning Management System

Learning Management System is used as a generic term to refer to a suite of functionalities designed to deliver, track, report on and manage learning content, learner's progress and learner's interactions. The term LMS may refer to very simple course management systems or to a highly complex enterprise-wide distributed environment.
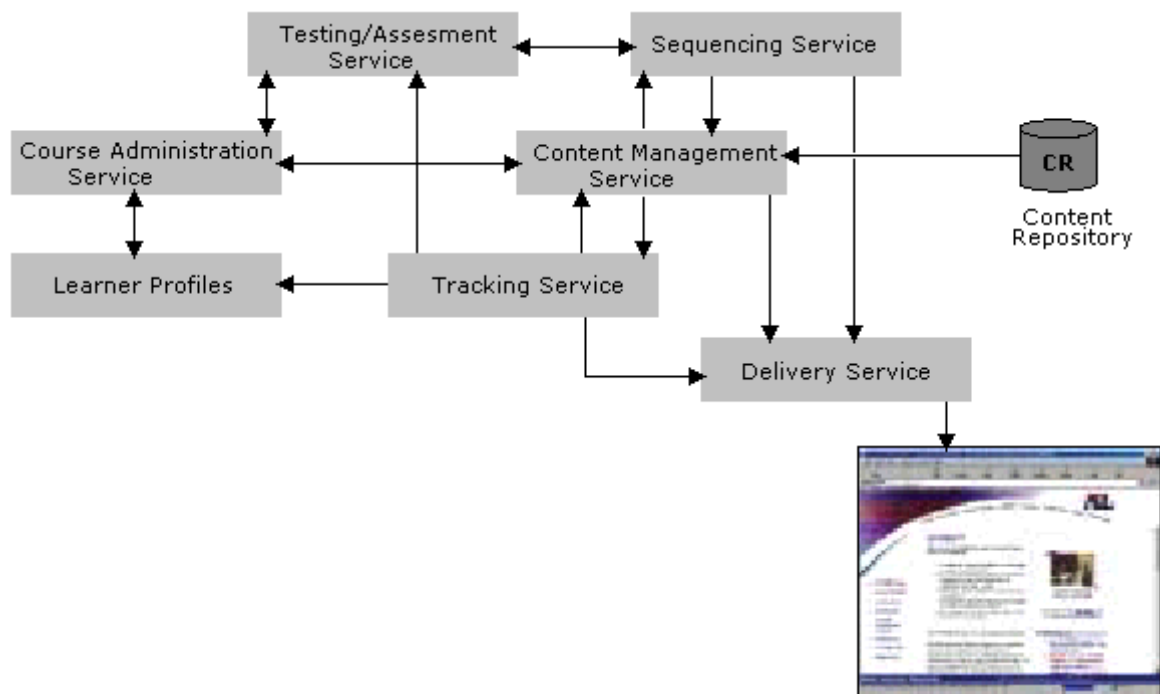
LMS versus LCMS

In some research notes, a difference is made between a learning management system and a learning content management system. The differences between those systems are rooted in the origins of what they were originally designed for:

- An LMS has its roots in training management and scheduling applications, whereas a LCMS has its roots in learning content authoring tools.

- An LMS revolves around the user (learner, instructor, and administrator) and the resources. An LCMS revolves around the construction and management of content and learning experience.

- The purpose of an LMS is to help users manage, unify and optimise the training resources. The purpose of an LCMS is to assist in the creation, organization, and personalisation of learning content in different delivery modes.

- LMS software also becomes the clearing house of learning resources from classroom to online courses. LCMS tools go now far beyond content lay out and content composition only. These systems also allow collaborative access, tagging, re-use and multi-mode expression of learning content and experience.

Organisations may find both useful in their own rights and as standards for the content objects evolve, these two systems might be developed to be fully integrated.

Learning Objects

When creating content on an object level, creating learning objects, a learning content management systems may be described as the combination of a learning management system, providing the training related functionality and a content management system, providing the authoring functionality with objects which may be used by both system.

The standards that are currently being developed (such as the SCORM or sharable content object reference model) focus on the opportunity to create learning content, which may be reused, accessible on multiple levels, interoperable (usable across various platforms) and durable (resistant to version updates of system software). By adding the necessary meta data (as is foreseen in the standards under development), the neutral objects may be used in more than one system, in more than one context, for one individual as necessary. In these standardization efforts, XML is often the source for these content objects.

Not only standardization initiatives as SCORM or IMS focus on the concept of learning objects. Alcatel for example defines a learning object as follows:

- An element that is part of or contributes to the didactic process. A piece of knowledge or a channel of knowledge.

When developing their learning strategies and initiatives, Alcatel provides the following (non-exhaustive) list of learning objects, in the following categories

- Course meta information – a course title, introduction of the coach, prerequisites for the course, a training plan, objectives of the course, agenda.

- Document oriented media – a document, a FAQ, procedures, white papers, customer documentation, and manuals.

- Other media – video, animation, audio, search engine, internet links collection, games.

- Tests and questions – exercises, evaluation tests.

- Coaching and community channels – a coach, classmates, chat box, newsgroup, mailing list.

Example: A company's intranet for e-learning

An intranet may offer the following items for e-learning:

- Work instructions, reference information, check lists, templates

- Best practises and notes from other users or learners

- Search possibilities to match learning with the real environment and the problems learners account in their daily work

- Courses, including exercises and test for individual, self-paced learning

- Platforms for practising in a non-production environment

- A curriculum for showing a learning path

- Interaction with coaches, instructors and learners

- Virtual classrooms

Towards Intellectual Capital Systems?

In the paper *Learning Management and Knowledge Management* a description is given of the ICS, a system integrating knowledge management, content management and learning management systems. The following key capabilities will characterise this integration or an Intellectual Capital System as it is often referred to.

User Platform

- Portal based access to a variety of content, activities, communities and tools, based on the user's profile.

- Powerful search capabilities.

- Dynamic delivery and access to specific content, based on user profiles, user assessment or other data.

- User-configurable agents monitoring sources and repositories to automatically alert users to relevant new information.

- Access via other devices than a portal (browser) alone.

Content creation

- Object-oriented content and activity creation, allowing integration with leading XML and other authoring tools.

- Easy importing of external or existing content.

- Templating for content creation by general contributors.

- Powerful search capabilities across structure, content and metadata.

- Easy content reuse.

- Publishing to any number of devices.

Content management

- An object-oriented repository, allowing granular storage of XML content and other formats, with descriptive and category metadata to facilitate retrieval.

- Integration of external content, portals …

- Workflow, lifecycle, process automation and security functions applied to the validation and publication of content.

- Automatic indexing of unstructured content, automatic categorization of taxonomy and creation of taxonomies to provide content in context.

- Link management capabilities.

Management of individuals and communities

- Integration of tools for virtual meetings, workplaces, classrooms, discussions, group scheduling …

- Peer-to-peer information sharing

- Features to allow users to rate content, provide alternatives and comments.

Manager and administrator platform

- Monitoring and reporting for "people managers".

- Management of resources and facilities for trainings, meetings …

Connectivity and Integration

- Integration with other ERPs and other corporate applications.

Developing Standards

There are many organizations working on specifications related to e-learning, but five in particular are key players:

- Alliance of Remote Instructional Authoring and Distribution Networks for Europe (ARIADNE)

- Aviation Industry CBT (AICC)

- IEEE Learning Technology Standard Committee (LTSC)

- IMS Global Learning Consortium (IMS Consortium)

- Advanced Distributed Learning Initiative (ADL)

ARIADNE

The ARIADNE Foundation was created to continue the development of tools and methodologies for producing, managing and reusing computer-based pedagogical elements and telematics supported training curricula. This foundation wants to increase the awareness of 'Europe's (and beyond) learning citizen' of existing ICT-based training channels. Their aim is to convince and

guide new potential users from the academic community (public sector institutions) and to assist new users from the corporate world.

Technologies and methodologies are offered by the ARIADE foundation:

- Multilingual indexation of learning objects.

- Capitalization, sharing and reusing learning objects.

- Authoring of learning objects.

- Capturing socio-geographical learners' data.

- Designing socio -geographically targeted curricula.

- Selecting and assembling learning objects in targeted curricula.

- Designing web distributed distance courses.

- Using interactive communication technologies: best practises.

- Managing of small, medium and large ODL courses: besting practises.

AICC

The Aviation Industry CBT (Computer-Based Training) Committee (AICC) is an international association of technology-based training professionals. Since 1988, the AICC develops guidelines for aviation industry in the development, delivery, and evaluation of CBT and related training technologies. The objectives of the AICC are as follows:

- Assist airplane operators in development of guidelines which promote the economic and effective implementation of computer-based training (CBT).

- Develop guidelines to enable interoperability.

- Provide an open forum for the discussion of CBT (and other) training technologies.

The AICC develops technical guidelines, also known as AICC Guidelines and Recommendations (AGRs). Currently there are nine guidelines available. Products and training that are "AICC Compliant" comply with one or more of the nine AGRs. There is however a difference between claiming compliance and certification. Certification can be verified by checking the AICC's list of certified products. For e-learning initiatives, AGR-006 (file-based computer managed instruction) and AGR-0010 (web-based computer managed instruction) are of special interest.

IEEE

The IEEE/LTSC (Learning Technology Standards Committee) consists of several working groups, including groups focusing on learner-related issues, content-related issues, data and meta data and management systems and applications.

Their goal is to develop technical standards, recommended practises and guidelines for software components, tools, technologies and design methodologies. By doing this, the working groups aim at facilitating the development, deployment, maintenance and interoperations of computer implementations of education and training components and systems. The development of these standards, recommendations and guidelines is aimed at enabling tools, courseware, information and services to be developed, acquired and utilized on a component basis.

With their LTSA (Learning Technology Standard Architecture), the LTSC wants to specify a high level architecture for information technology-supported learning, education, and training systems. This architecture aims at describing a high-level system design and the components of this learning technology. The standard aims at being neutral in several aspects: pedagogically neutral, content-neutral, culturally neutral, and platform-neutral.

IMS

IMS Global Learning Consortium, Inc. (IMS) is a global association of more than two hundred educational institutions, commercial companies, government organizations and others collaborating to describe open specifications for facilitating online distributed learning activities. Several workgroups (Competency, Questions & Tests, Content Management, Profiles/Enterprise, Meta-Data, Learning Design, Accessibility, Simple Sequencing and Digital Repositories) collaborate in developing an promoting these specification for online distributed learning activities, such as locating and using educational content, tracking learner progress, reporting learner performance and exchanging student records between administrative systems.

IMS has two key goals:

- Defining the technical specifications for interoperability of applications and services in distributed learning.

- Supporting the incorporation of the IMS specifications into products and services worldwide. IMS endeavours to promote the widespread adoption of specifications that will allow distributed learning environments and content from multiple authors to work together (in technical parlance, "interoperate").

The IMS coordinates its efforts with those of AICC and ADL.

ADL: SCORM (Shareable Content Object Reference Model)

The Advanced distributed learning initiative (ADL) is an initiative started by the US Department of Defence and the White House Office of Science and Technology policy in 1997. ADL's goals are to accelerate standardisation within the online learning industry by developing guidelines for large-scale distributed learning systems in order to promote more cost-effective training for the government, military and the national work force.

The purpose of the ADL initiative is to ensure access to high-quality education and training materials that can be tailored to individual learner needs and can be made available whenever, wherever they are required.

In 1997, ADL began working with key industry leaders to identify critical technical interface point around which standards for web-based learning technologies might be developed. Several standard organisations (LTS/IEEE, IMS and AICC) meet to investigate what exactly needed to be standardized. Over time, these meetings culminated into the ADL Sharable Content Object Reference Model (SCORM). The SCROM was developed to incorporate several, disparate efforts to develop standards for learning technology initiatives.

The SCORM intends to liberate learning content objects from local implementations. It is intended to provide the technical means to easily share content object across multiple learning delivery environments by using object technology and XML.

The market

According to IDC, the online learning industry has three major market segments:

- Content organizations – firms that furnish course structure, multimedia, simulations, testing and assessment; both off-the-shelf solutions as customized applications.

- Learning services firms – firms that provide needs assessments, program-building components, content design, development and programming, technical and systems integration, site management and hosting, maintenance and online mentoring.

- Delivery solutions companies – firms selling technologies associated with e-learning, including training, authoring tools, course management systems, collaborative software and virtual classrooms and add-on tools.

Types of tools and vendors

When looking around at the various vendors of e-learning, it shows that a lot of companies offer courses, including or not including video, audio, assessments, testing etc. Other vendors offer learning management systems, which allow the client to define and develop customized training, including a system to monitor and manage the learning efforts.

The course ware offered by vendors may be categorized according to the degree of interaction with a coach:

- Learners take the initiative; there is no or little interaction with a training department: free learning.

- Learning is self-paced, but a coach is available to help with, refine and follow up the learning process: free learning with mentor.

- A virtual classroom in which learners form a community and are guided by an e-instructor: interactive courses with a group.

Learning environments offered by the vendors are shifting from closed system, focusing on courses for obtaining core competences in the technology segment, to open platforms that favour learning communities, on which learning materials are partially or even completely provided by the participants.

Gartner on the other hand distinguishes six types of e-learning vendors:

- Assessment tools: vendors selling tool which focus mainly on the evaluation and assessment of the learners, giving guidance to identify the learning needs.

- Custom Content: these vendors offer their clients customized content, answering to the identified learning needs of the client. These tools focus mainly on the productions of the courses, and to a lesser degree on the assessment and strategic aspects of implementing e-learning in an organization.

- Off the shelf packages: vendors selling tools which present themselves as all in one solutions, assessing the learner and creating content in an easy way, often using templates.

- LMS and portals: these vendors will set up the management tools, focusing exactly on that aspect. Management and aggregation of content play the key role in this tool. Often, templates are offered to the client to publish the content on these portals.

- Virtual classrooms: this is a more interactive tool, as is already described above. However, vendors of these tools enabling or setting up the virtual classroom, often pay less attention to course production or assessment and strategic matters, but the do pay attention to the management and authoring environment.

- Other vendors offer authoring tools technical platforms, focusing on authoring and not necessarily as much on assessment and strategies.

Gartner's six types makes clear that the e-learning market is a broad and complex market, with as many different types of vendors as there are vendors themselves. [add an estimate of the number of vendors]

However, as is described earlier, the differences between those systems will slowly fade. More and more vendors will try to offer as well a tool for assessment and strategic implementation of e-learning initiatives, as a tool for easy authoring and management of the learning objects. Indeed, more and more vendors are said to work with chunking of content, or are said to work to adhere to the rules or guidelines of one of the standardization initiatives.

The value proposition

Before we give a short note on the return on investment of e-learning initiatives, we give a brief overview of the market statistics for the next years. It is said that training services, such as system integration, needs assessment, hosting, maintenance and online mentoring will grow by 111 % by 2003. Furthermore, the services are expected to double their current market share reaching 36% by 2003. The delivery technologies such as LMS, authoring tools etc are expected to grow by 80%. In Europe, e-learning profits are expected to exceed €350 million by 2004.

Cost/benefits of e-learning

Because the figure of the return on investment is based on a purely, quantitative approach of an initiative, the figure may often be disappointing, because the most impressive results of an e-learning project are often to be found in more 'softer' criteria.

Often, organisations are recommended to make a cost/benefits analysis, using four categories:

- Hard cost savings, which include travel and lodging costs, on facilities, instructor fees, printing, distribution and storage costs which may be reduced.

- Hard revenue impacts, including the opportunity costs of not having adequately trained personnel, the increased productive time on the job, a shorter time to deployment of a new product or service, the increasing sales effectiveness of selling partners and an increased revenue by introducing training 'for fees'.

- Soft competitive benefits: knowledge transfer is more accessible, training delivery is more consistent, knowledge may be certified on a large scale, expert can now perform the job, and they do not need to teach classes, morale increases through equal training capabilities.

- Soft benefits to individuals: which include just-in time activities are available, employees know 'where they stand', which motivates them; learning priorities are clearly prioritised; progress is being watched an evaluated positively.

Often these 'wins' are quicker and more noticeable on the 'soft' scales – for clear indicators that there is indeed a positive, quantitative result, a long term vision is needed when planning and starting an e-learning initiative.

ADL suggests that technology based instruction (of which e-learning may be considered a sub-part) may reduces costs of achieving a wide range of instructional objectives by 30 to 60 percent. The time to achieve instructional objectives would be reduced by 30 percent and student skills and knowledge would increase by 30 percent.

Furthermore, ADL claims that when using sharable content objects, investment costs may be reduced by 50 to 80 per cent. Therefore, however, the sharable content objects must meet the following requirements:

- Durable: the objects do not require modification as versions of system software change.

- Interoperable: the objects operate across a wide variety of hardware, operating systems and web browsers.

- Accessible: the objects can be indexed and found as needed.

- Reusable: the objects can be modified and used by many different development tools.

As not many tools adhere to these standards yet, it is however difficult to say if these estimates indeed are correct.

It becomes clear that e-learning does provide opportunities to either save money (rather in the long term) and to create a learning environment throughout the organisation, in which knowledge is shared among all employees. It is indeed correct to state that delivering the right knowledge at the right time to the right people impacts the whole of an organisation:

- Executive management: the data to optimise the organisational effectiveness, to simulate and react to business opportunities is available.

- Finance: the ROI of the training/education investment may be calculated by correlating learning with the business outcomes.

- Legal: the organisation is in compliance.

- Human resources: the tools are there to manage training, employee development and retention.

- Sales: the product/industry/customer knowledge that correlates to sales successes and failures is accessible.

- Marketing: brand building is possible based on the quality of the people and the product

- Engineering: the knowledge transfer tools to facilitate innovation and collaboration are available.

- Training: it is possible to change from a cost to a profit centre.

- Services/support: it is possible to ensure customer satisfaction by having the right knowledge available.

- Channel management: the time to market may be accelerated by providing instantaneous global product launches.

- Production: skill gaps and competencies are assessed and closed, making it able to achieve certification.

Implementation Approach

When introducing e-learning into an organization, management support is necessary. In many studies, it is described as the key player for making an e-learning project successful. Here, we give a brief description of an implementation approach only. In Appendix C, a summarized version of Brandon Hall's *Six Steps Guide to Implementing E-learning* is presented.

After developing a clear vision of what and how e-learning and the organisation's business concepts are related, a preparation phase may start. During this preparation phase, it is important to discover e-learning. This pilot project reveals probably the do's and don't for the organisation. Next a full implementation phase may take place, during which e-learning will be deployed throughout the organisation. Finally, the initiative must be supported throughout the organisation, by delivering and updating content and giving support to the users.

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Appendix

Appendix A: The distance learner's Bill of Rights

- Do not make me click and click and click to get to the courses I want to take.
  I realized that most e-learning sites spend a lot of time selling, describing and enrolling to the point where it takes a lot of time and clicks to get to the learning part of the experience. If designers keep click counts down, they'll keep attendance up. As a rule of thumb, ask yourself: can the learner get some substance in three clicks?

- Respect that not all e-learning users have equal access speeds. Please label your site with what browsers are compatible and the recommended access speed. Do not claim that your site works with a 28.8 when you really need a T1 line.
  I found that user system requirements were not often clearly stated for the learners. Its important to remember that when users access your websites from the www, many factors can impact access speed. To be safe, design the site and indicate your minimum requirements assuming a latent mediocre line.

- Warn me if I need plug-ins, if my system must be restarted and how I get back into the training after I am kicked off due to a reboot.
  In one case I was running IE 5.0 and had already installed Flash and Shockwave plug-ins. I was delighted until I got to the exercises, then I realized that I had an older version of each plug-in and spent the next 30 minutes downloading, installing and restarting my computer. I didn't know how to log back into the training.

- Provide me with a phone number for a real 'live' person of whom I can ask questions.
  When I was kicked off the system with the plug-in install I wanted to get help relaunching the course, but there wasn't a number available.

- Provide an engaging learning experience. Please don't expect me to read long text passages and page after page with little or no interaction.
  Most of the courses failed in that they provided little reinforcement of learning. In many courses feedback was often pushed back to the end of a lesson with little or no exercises during the page after page of information. Users need relevant and interesting activities every 2-3 screens.

- Please do not make me scroll every screen. My wrist hurts after a while.
  A growing number of designers are creating training with extensive scrolling. I have seen courses with as much as six or seven pages of vertical scrolling. Limit your scrolling as much as possible.

- Give me a site map so I can jump to the content that I need most.
  A detailed site map that allows users to jump to any content they wish will have a super impact on end-users. It helps transform the training course into a performance support tool.

- I want substance…not sizzle!

Appendix B: Ten principles on Instructional Design

- Conditions during training should increasingly approximate conditions on the job.

- Use multimedia to enhance, not distract from, the learning process.

- Learning is better when you distribute practice over time.

- Select a test item that gives learners the best opportunity to demonstrate the sill or action specified in the objective.

- Have learners practice as much as possible under conditions that reflect their real-word performance situation.

- The Law of Retency is that things learned last are remembered best.

- People learn most when you present information in their preferred learning styles.

- People relate learning to previous knowledge, skills and attitudes.

- The law of primacy states that things learned first are usually learned best..

- Apply instructional strategies that enhance the transfer of new material

Appendix C: Six steps guide to implementing E-learning(Brandon Hall)

Step 1: Prepare for e-learning

No matter how good the benefits of e-learning might look for the organization, careful analysis and planning are a solid foundation for your e-learning initiative.

A strategic assessment will determine the major barriers your organization might need to overcome to successfully implement an e-learning initiative. Secondly, a readiness assessment may be conducted, following this approach:

- Select the relevant dimensions to consider (business drivers, stakeholders, content, technology, learners, tracking)

- Identify the organization's major assets and barriers for each dimension.

- Consider implementation strategies: how to build the business case for e-learning in the organization? How to develop a strategy aligning the learning vision to key business goals and drivers? How to support upper-level support and funding?

Step 2: Develop a strategy

For this second step, the guide gives three approaches to developing a strategy, correlating to the level of an organization's experience with e-learning.

- Level 1: If an organization has little or no experience with e-learning, a business case should be built either around an off-the-shelf generic approach or a narrow and tall, problem focused approach.

- Level 2: If an organization has successfully two or more successful e-learning projects, a business case may be built around a problem-focused approach with customized content and simulations.

- Level 3: If an organization has successfully implemented two or more successful e-learning projects, with customized contents and simulations, a business case may be built around an enterprise wide solution.

When presenting a business case to the management, it is important to align the e-learning initiative with business goals of the organization. As training plays an integral role in an overall organisation strategy, e-learning as part of training may be presented as to enable an e-culture within an organization, creating synergy among the knowledge of an organisation.

When selling the advantages of an e-learning initiative to the Cs of the organization, speaking their language might be crucial to build the business case. Primary emphasis should be put on making improvements in the training delivery. To ensure continual investment and reinvestment, it is suggested to draw the parallel with investment in R&D.

Step 3: Select technology and content

There are two major parts to an e-learning program: an LMS and content.

Several questions and tactics to be considered are summed up in the Guidebook. It should be noted however, with the merging of KM, CM and LMS systems, attention should be given to those tools working with standards, making it possible to reuse content, to easily expand the system …

When comes to the choice of content, you can either buy content or create customized content. You will need to find a happy medium between building or buying courses.

Step 4: Sell e-learning to everyone in the organisation

With this step, focus on communicating the initiative throughout the organization in order to gain acceptance. In some organisation, a single champion may be primarily responsible for kick-starting the implementation. However, as the impact of e-learning is heavy, forcing changes on various departments, it might be necessary to install a steering committee (consisting of business managers and training representatives) to monitor and improve the implementation.

Several strategies are proposed for providing a smooth transition to e-learning:

- Involve instructors early on and throughout the implementation.

- Start small to build confidence.

- Evaluate and select external skills sets that compliment the organisations.

- Make training and trial projects available to those who wish to advance their skills.

- Use an internal competitive bid process to find the required skills.

Step 5: Implement Enterprise-wide

Enterprise-wide e-learning is typically aimed at one or more of the following benefits:

- Access: make training available to learners

- Costs: reduce training costs.

- Content: increase the scope of offerings.

- Reinvention: Reengineering how training happens.

- Relevance: Making training more meaningful to people's work.

- Speed: Responding to content change and rapid product innovations.

- Efficiency: Avoiding the lock-stepped scheduling of classroom training.

- Empowerment: Putting the responsibility for learning in the hands of the learners.

- Business: using fast, effective learning as a competitive weapon.

- Globalisation: making training both consistent and available across the world.

- Convenience: letting time-pressured students learn at the best time and place.

- Connection: connecting learning data to other systems.

Step 6: Measure the Business Benefit

When measuring the benefits for the business, make sure to focus on measurement parameters on growth in performance, competencies and intellectual capital.