

CSEDU 2009

International Conference on Computer Supported Education

Information Technologies Supporting Learning



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CSEDU 2009

International Conference on Computer Supported Education

Thanks for the invitation to the CSEDU Organizers !

Information Technologies Supporting Learning
supersedes Computer Supported Education



(Institute for Systems and Technologies of
Information, Control and Communication)



European Union > TEL >
Technology Enhanced Learning

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POLITÉCNICA

CSEDU 2009

International Conference on Computer Supported Education



Thanks to the IEEE and the IEEE Education Society !

and to Portuguese and Spanish IEEE



IEEE EdSoc Distinguished Lecture Program

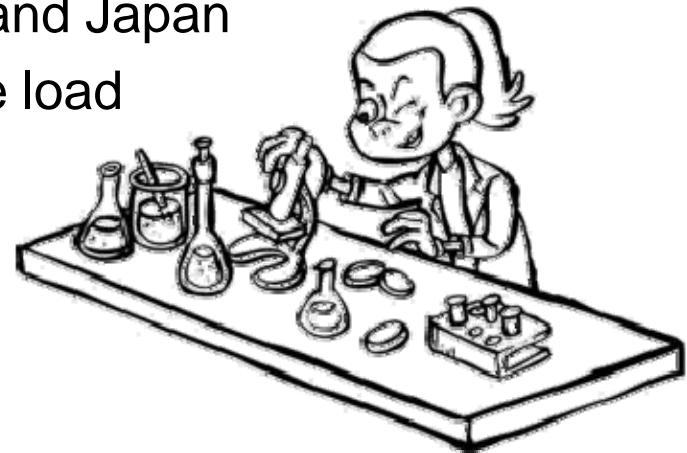
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- Introduction
- E-Learning Evolution
- Blended Learning
- SOA
- Services in Learning
- Reuse of Services
- Reuse of Learning Objects
- Conclusions
- Acknowledgements

Introduction

- A new Higher Education
 - Declaration of Bologna (1999)
 - Implementation by 2010
 - New Technologies ↔ New Methodologies

- The New European Area
 - A model closer to North America and Japan
 - Greater importance to the practice load



Introduction

- A new orientation → more experimental tasks
- A clear direction → professional world

- EHEA boosts mobility
 - In &
 - Outside of Members Countries

- Members Countries could move to any others
 - Continue studies in anywhere
- No-Members attract to study in this new education plan



Introduction

- Mobility of people ↔ Immediate translation
 - Increase economy
 - Generate jobs
- Of course...



Introduction

- Negative Aspects
 - Depend on each country

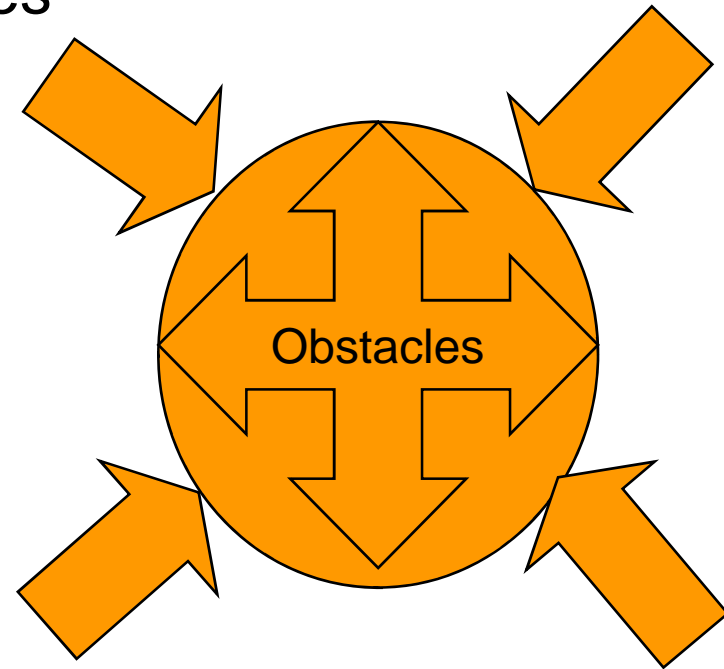
- Could it bring more benefits?
- Disadvantages in common:
 - Economics &
 - Academic aspects

- New vocational studies
- What happens to the ancient engineering?





A case of study

□ Also, there are some obstacles own of each country



□ How far is each educational system to the new European model?

A case of study

- In Spain,
- Current model, 2 types of degrees:
 - “Diplomaturas”/Technical engineering (3-year)
 - “Licenciaturas”/Engineering degree (5 or 6-year)
- What **would** they be???
 - Degree of 3-year  BS/BSc
 - Degree of 5-year  MA/MSc
- Problem: These degrees are not exact **equivalent**

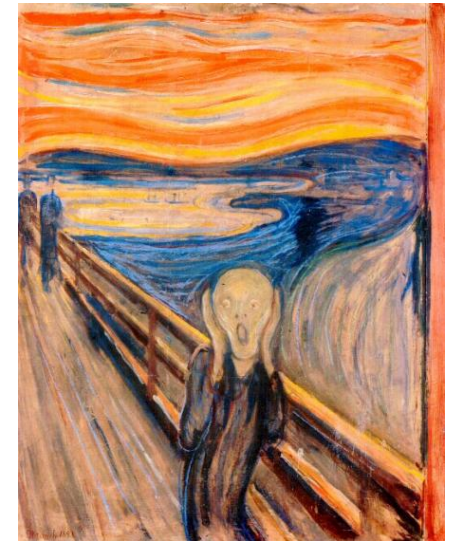
A case of study, Spain

□ Problem

- 3-year degrees → vocational and experimentation tasks
- 5-year degrees → theoretical knowledge

□ But in the own country

- Similarity between universities in the curriculum of a particular degree are scarce
- Different importance for the same subjects
- Subjects exist only in a few universities



To adopt the new model

- To get the New European model
 - A common consensus in the country itself

- However,
 - The process goes on
 - All the universities and countries try to adopt it by the deadline



Bologna Process

- Sets the framework of IT-based approaches
 - must operate
 - must support

- 2 major interrelated sets of changes
 - Set 1 – US-like unified cycles & ECTS
 - Set 2 – At shifting the focus on “active learning”



Bologna Process – Set 1

- An unified cycle structure involving
 - Graduate
 - Master
 - Doctoral cycles

- A single unit of measurement, the ECTS
 - 25-30 hours of total effort
 - Before, it was hours of face-to-face

- Consequences:
 - Re-design
 - Re-accreditation of all the degrees



Bologna Process – Set 1

- This massive simultaneous redesign presents
 - Daunting challenges
 - Unprecedented opportunities

- Synergies among the redesign can be exploited

- The re-utilization oriented approaches
 - LCMS
 - Dublin Core
 - QTI
 - IMS
 - SCORM, etc.



Bologna Process – Set 1

- ECTS facilitates the seamless combination of
 - Face-to-face
 - Distance
 - Blended learning

integrating evaluation in the process




Bologna Process – Set 2

- At shifting the focus
 - From instructor-centered “teaching”
 - To student-centered “active learning”

- Methodological changes such as:
 - Continuous evaluation
 - No more emphasizing theoretical lectures
 - Focus more on assignments and projects
 - Higher practical focus
 - Higher flexibility for students



Bologna Process – Set 2

- With this methodological shift 
The introduction of effective IT based approaches
 - Alleviate the burden on the instructor's resources
 - These should facilitate the trend towards “mass-customization”
 - Allow individually tailored learning
 - Level of resources similar to the standardized education



Bologna Process

- Opportunity to introduce far-reaching modifications in the educational systems

- In Spain, so far
 - All the official degree were listed in a catalogue by the Education Ministry

 - On the catalogue, name & curriculum degree of each degree

 - The new system breaks away from that closed catalogue



Bologna Process

- Now in Spain,
 - There are generic guidelines to which new degrees should conform
 - Universities are free to propose new degrees and their curriculum
 - Always the proposal must be cleared from a quality criteria point of view
 - Faculty CVs
 - Cohesiveness
 - Appropriateness of IT infrastructure



Bologna Process

- A last bad aspect is
 - That emphasis on promoting mobility and
 - The international dimension in education

- To get this objective,
 - The adoption of standards-based
 - Location independent IT-based educational solutions



Bologna Process

- These should support both
 - Distributed need of learning services
 - Their consumption by distributed students groups

- In conclusion, it will provide
 - Interaction between students & instructors
 - Interaction among participants in distributed teams

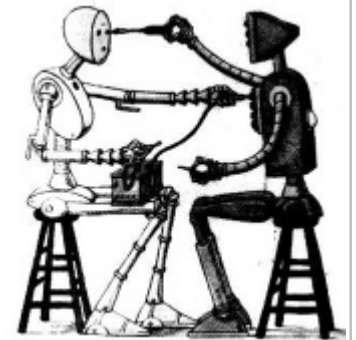


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E-Learning Evolution

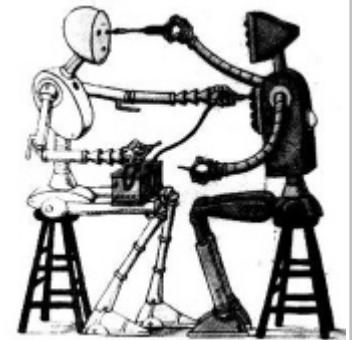
- A clear desire for a common area of Higher Education
- Seeking solutions and models
- Technology gives a noticeable change in the methodology
 - On the side of teachers
 - On the side of students



E-Learning Evolution

- Nowadays Education offers
 - Synchronously communicate, teacher-students
 - Collaborative tools
 - Documentation
 - Opinion board, etc.
 - To be renewed every day

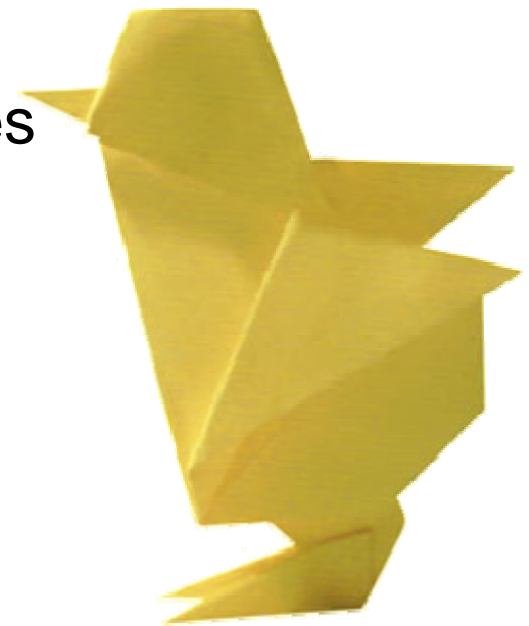
- E-learning has changed continuously during the last 15 years



E-Learning Evolution

- At first, only digital content
 - Text files
 - Hypermedia documents

- Nowadays, e-learning concept involves a wider range of technologies

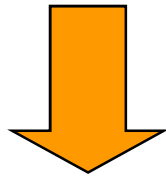


Different Technologies in nowadays


Technologies			
Wiki & Blogs	Discussion boards & Chats	Educational animation	e-mail
ePortfolios	Games	Hypermedia	LMS
MP3 Players	Multimedia CD-ROMs	Screencasts	Simulation
Virtual & knowledge based classrooms	Websites & Web 2.0	Podcast & videocast	Remote & vlabs, etc.

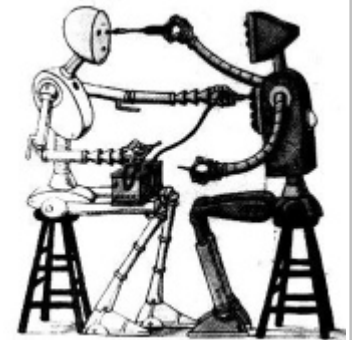
E-Learning Evolution

- The backbone of this evolution



The Technological Revolution

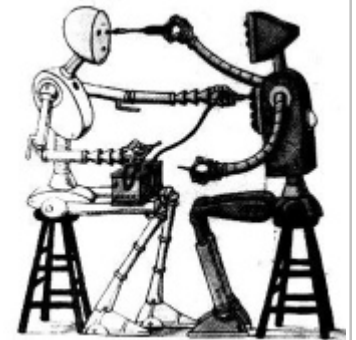
- The fact  There is not a new pedagogical methodology
- The real change is based on
 - New services
 - New possibilities



E-Learning Evolution

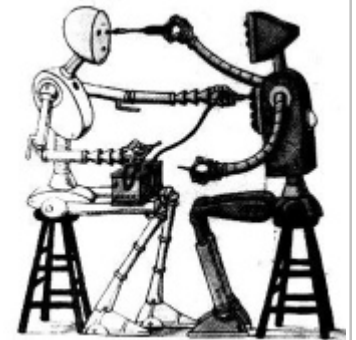
- E-learning was used to define on-line environments
- The offer of distance learning course has increased

- E-learning,
 - To distance learning
 - To flexible learning
 - But also, in conjunction with face-to-face teaching**Blended learning**



E-Learning Evolution

- The tendency is to create a VLE
 - Sometimes with MIS to create a Managed Learning Environment
- All the aspects of a course are handled through a consistent user interface standard
- E-Learning lessons are designed
 - To guide students through information
 - To help students perform in specific tasks



E-Learning Evolution

- Common standard format for e-learning content
 - SCORM

 - The way to implement the new technological resources
 - Depend on programmer or
 - Teacher of the course

 - The level of involvement between student and teacher &
 - The level of content of the course
- } Change depending on the preferences given

E-Learning Evolution

- Examples:

- A course of international politics will need
 - Tools that give synchronous communication
 - Appear natural and fluid

- A course of self-study will need
 - Asynchronous communication
 - Documentation
 - Assessments



Communication & Technology associated

□ Communication:

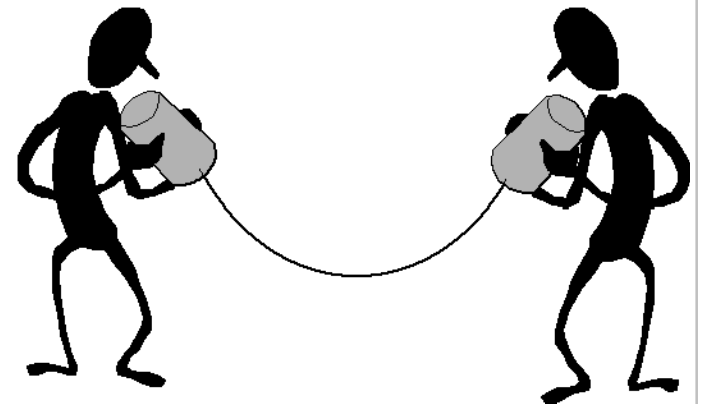
- Asynchronous
- Synchronous

□ Asynchronous:

- Blogs, wikis & discussion boards
- Email
- No real-time interaction with other users

□ Synchronous

- Chat sessions
- Virtual classes

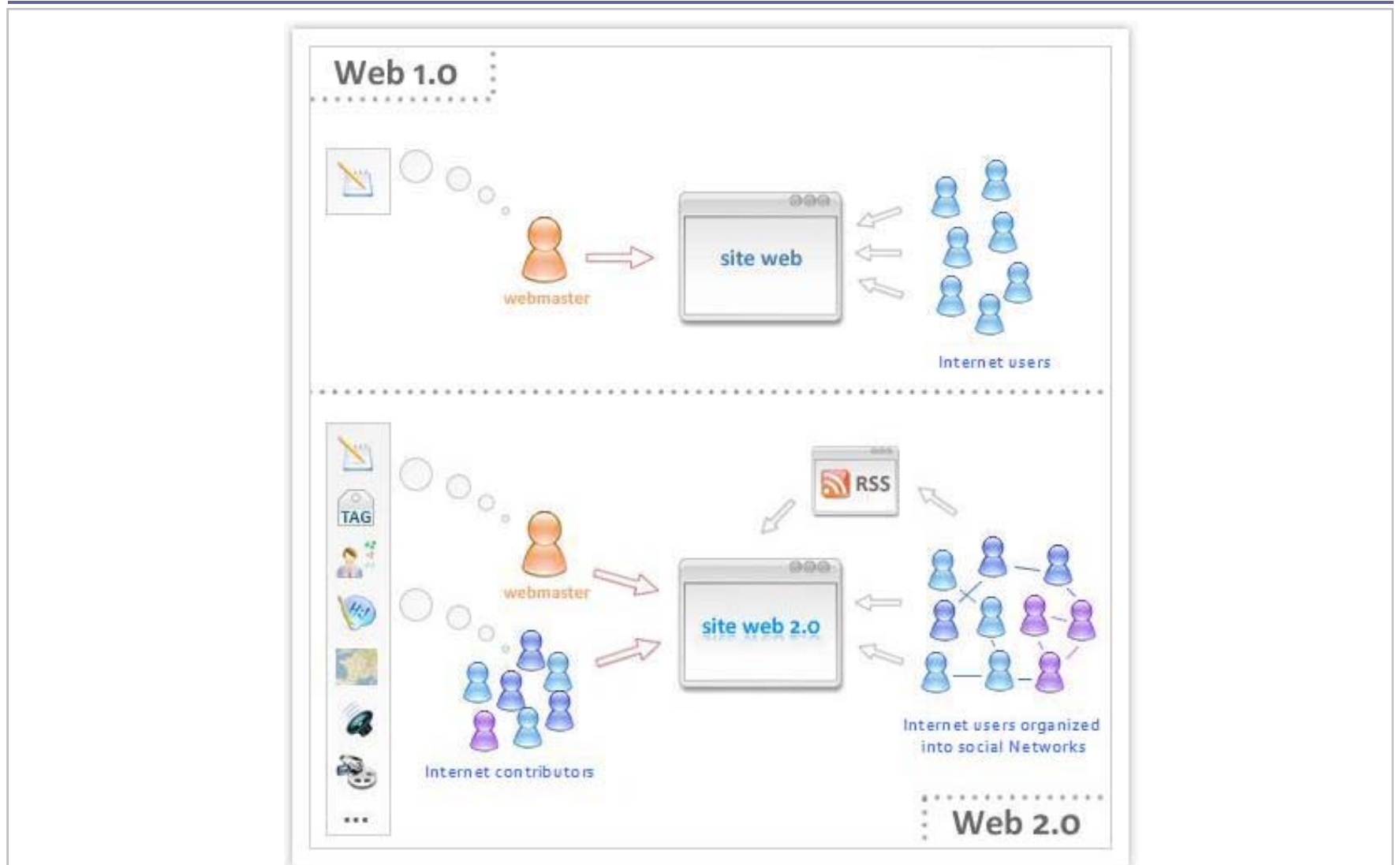


E-learning 2.0

- Web 2.0
- Impetus to
 - All collaborative tools
 - A social aspect
- Virtual communities
 - Able to get documentation
 - Live communication with others
 - Example: Second Life



E-learning 2.0



E-learning 2.0

- In this second generation, e-learning in itself has not changed
- Take the influence of current interest
- Use all the technology possible
- Apply all to education learning

- **Problem**, the way to raise learning takes another way



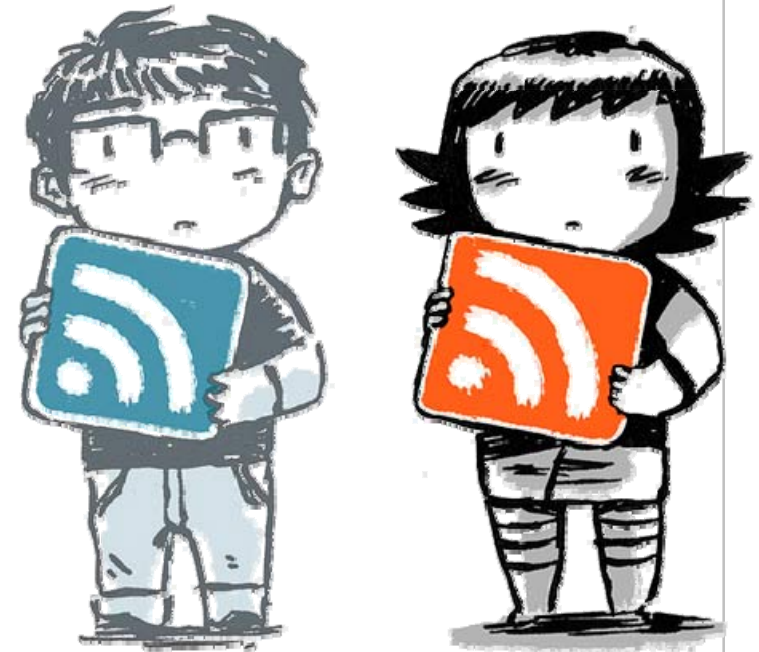
E-learning 1.0 & 2.0

□ E-learning 1.0

- Students took the contents of a course
- With some practical exercises
- Those practices were evaluated by teachers


□ E-learning 2.0 emphasizes

- Communication
- Exchange ideas
- Synchronous or Asynchronous



E-learning 1.0 & 2.0

- E-learning 1.0 focused on
 - Using Internet to replicate the instructor-led experience
 - Content was designed to lead a learner
 - Providing a set of interactions, experiences, assessments and simulations

- E-learning 2.0  Collaboration
 - The knowledge is socially constructed
 - Claim the best way to learn something is to teach it to others



E-learning benefits

- Virtual environment → Reduction of paper usage
- Reduce costs of Higher education
- Time to update content & correction is very low
- Perception is a livelier interaction with huge contents



Web evolution

- It started from the idea of sharing knowledge
- Developing nets where
 - Share ideas
 - Situations
 - Images
 - Any educational resources &
 - Knowledge on an open way
- UNESCO, some definitions
 - Open knowledge
 - Knowledge-based society



Web evolution

- UNESCO adopted in 2002 the concept OER
 - Open Educational Resources
 - Materials and other learning subjects offered openly through the use of IT
 - For consulting, use and adjustment to a user's community
 - No commercial purposes



The Open Course Ware (OCW) project

- It started at MIT in 2001

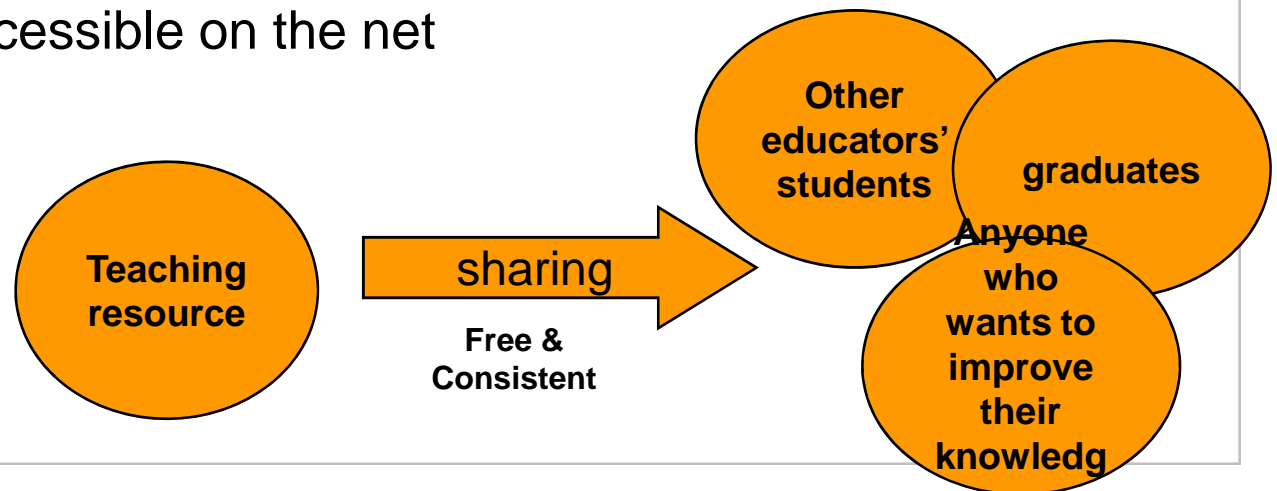


- The aim of offering pedagogical materials in an open and free of charge basis to society

- At present, MIT provides about 1800 courses

- Freely and
- Universally accessible on the net

- Main objective



The Open Course Ware (OCW) project

□ This philosophy spread to the world



□ Main universities have created the OCW Consortium

- More than 200 universities & institutions

□ Conditions to be included into the project:

- Technical demands a globally
- Approachable site via Internet with the right quality
- (No requirement) most of participants use the technology of content management based on eduCommons



The Open Course Ware (OCW) project

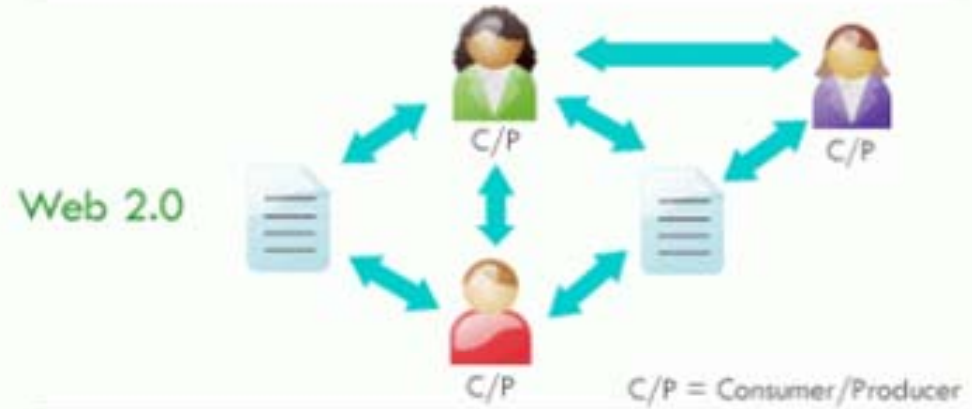
□ eduCommons

- Open Source project built on Pone
- Developed by “The Center for Open and Sustainable Learning”
- By Utah State University

OPENCOURSEWARE
CONSORTIUM

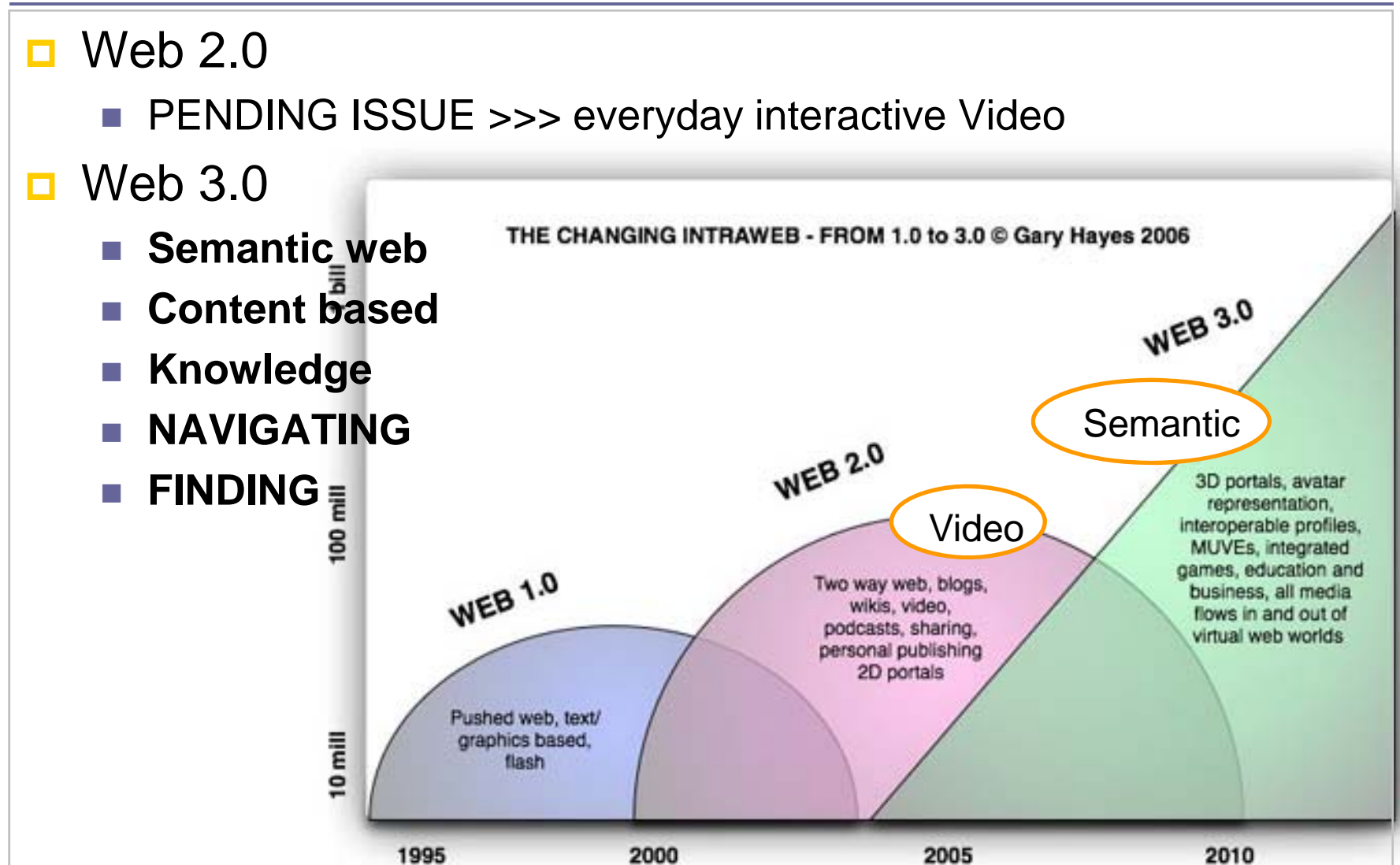
Web evolution

Web 2.0 to 3.0



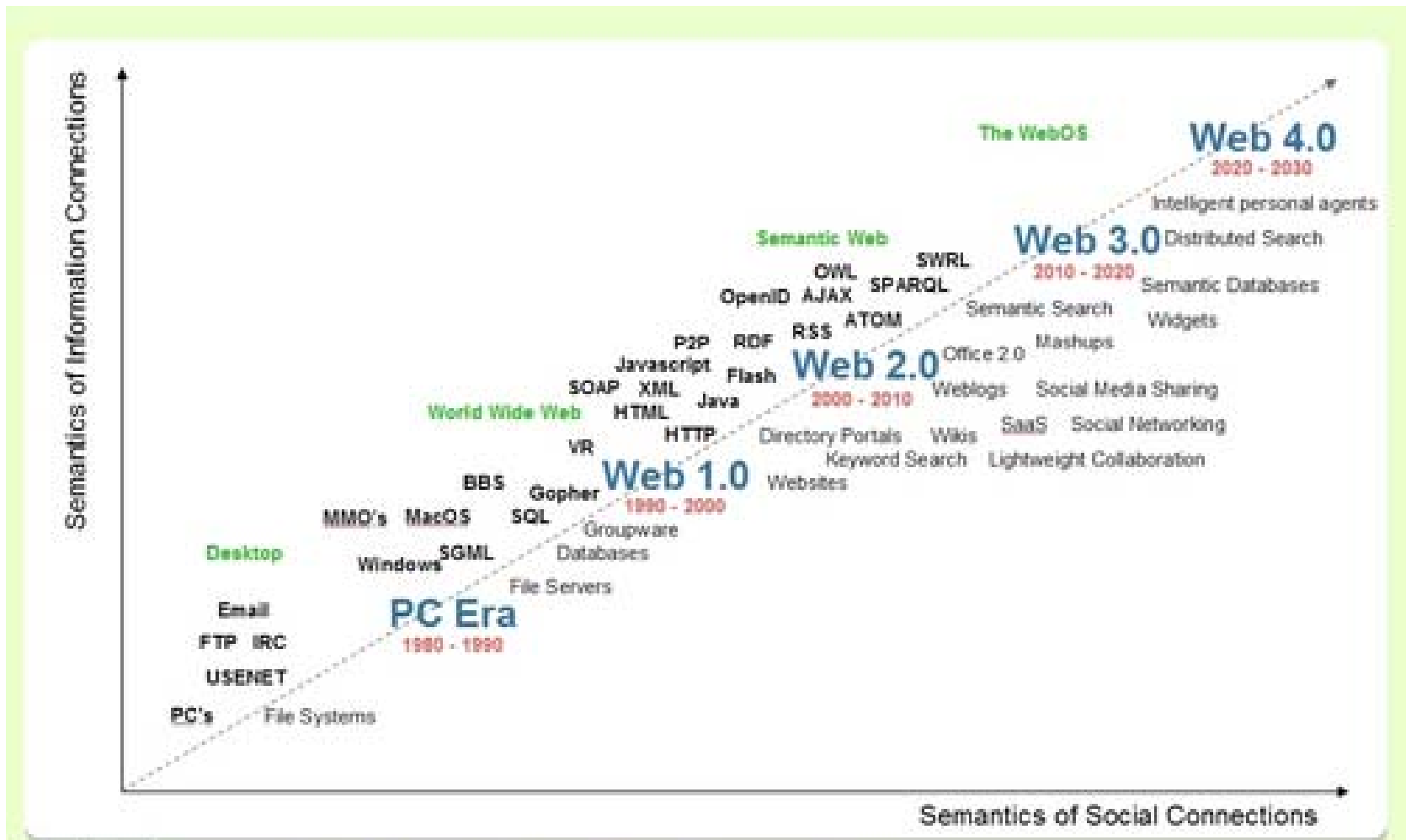
Web evolution

- Web 2.0
 - PENDING ISSUE >>> everyday interactive Video
- Web 3.0
 - Semantic web
 - Content based
 - Knowledge
 - NAVIGATING
 - FINDING



Web evolution

□ Web 4.0 ???????



Source: Radar Networks & Nova Spivack, 2007 - www.radarnetworks.com

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Blended Learning

- By b-learning, a new way of convergence between
 - Distance
 - On-line
 - Traditional education

- Through a mixed model of education with different percentage of each methodology
 - Depending on students or learner approach

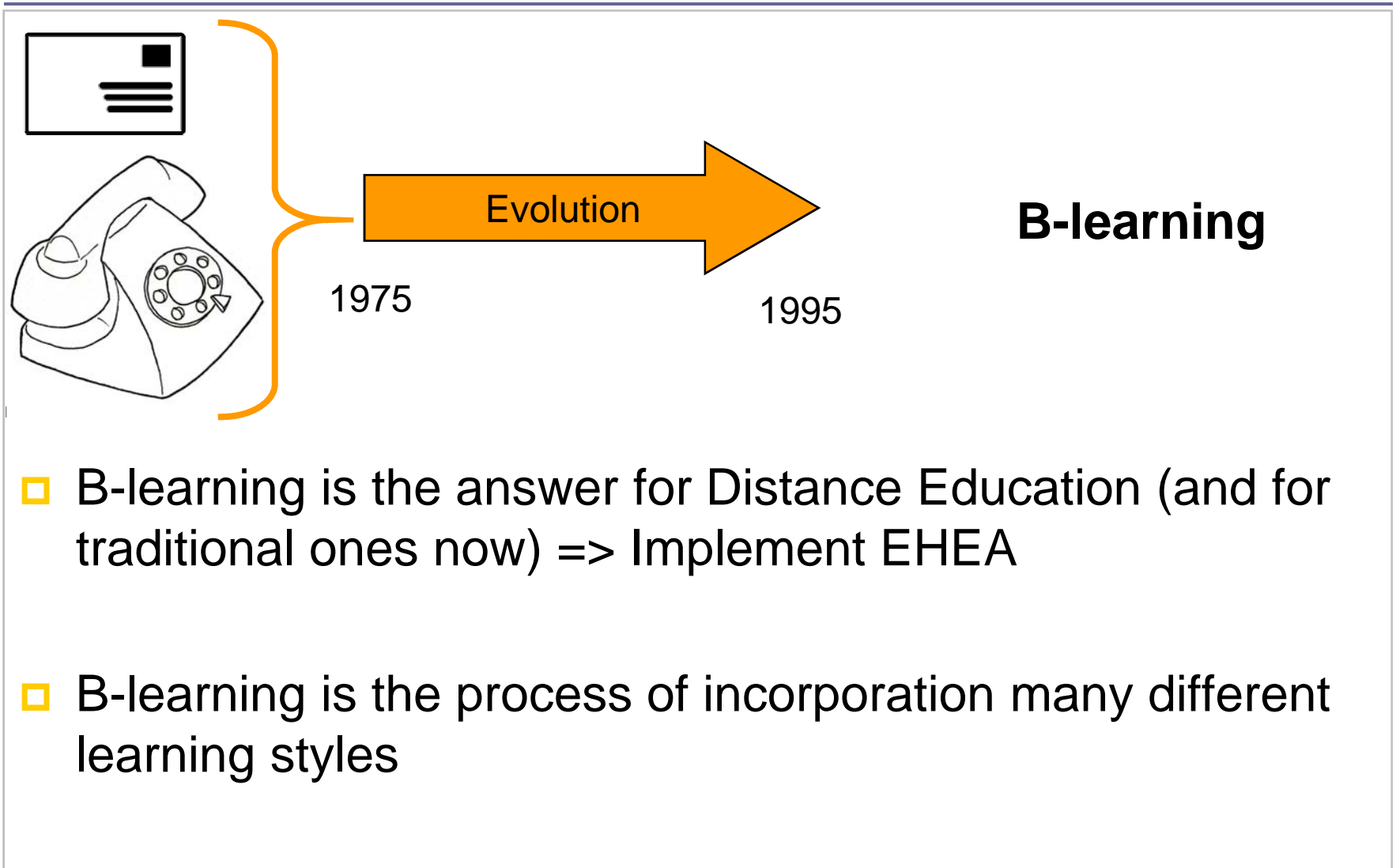
- The new approach is learner-centered

Blended Learning

- Learners depending on their availability
 - Will adopt a mix-approach
 - Including elements of
 - On-line
 - On-class
 - Collaborative tools through classic distance education

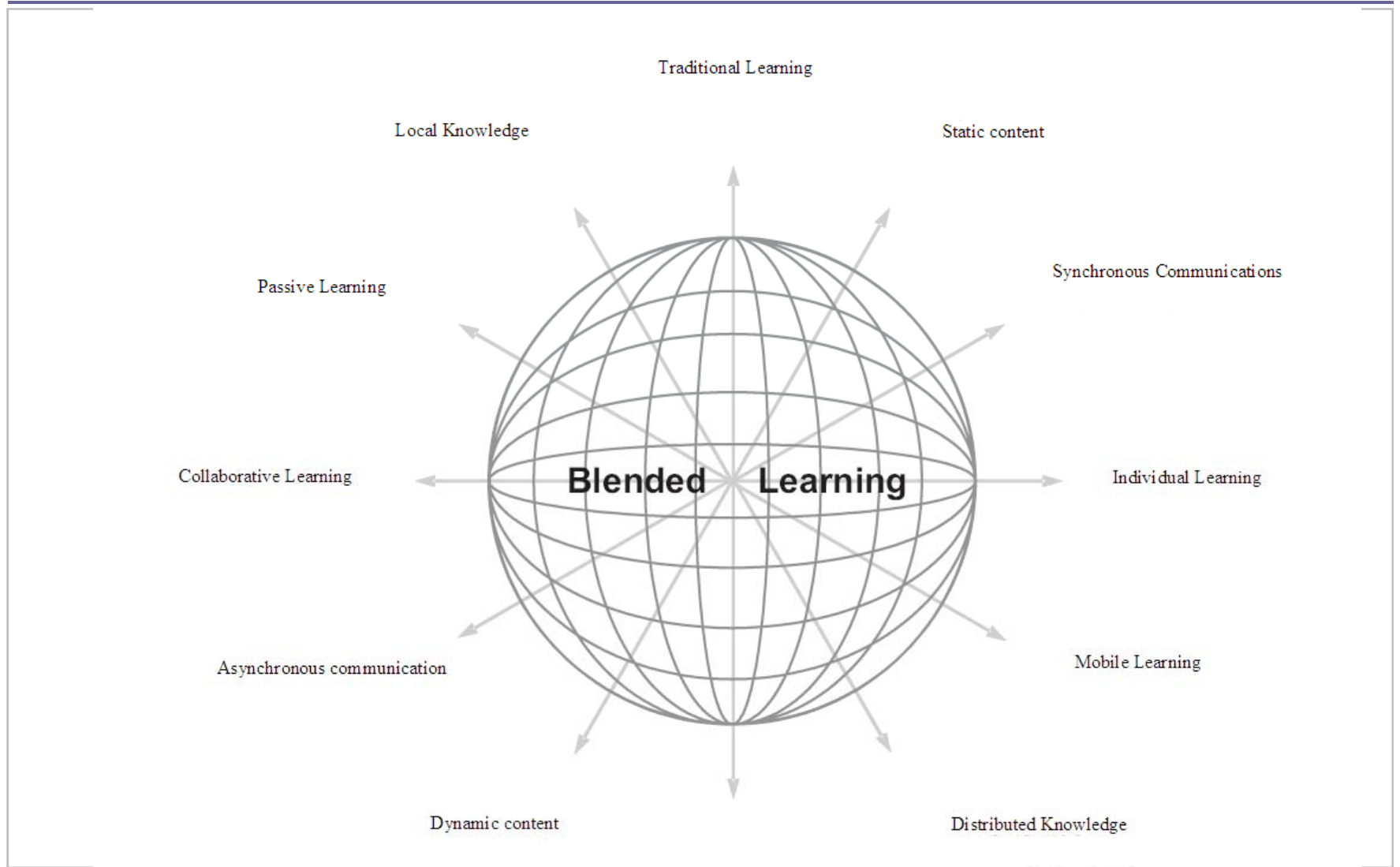


Blended Learning



- ❑ B-learning is the answer for Distance Education (and for traditional ones now) => Implement EHEA
- ❑ B-learning is the process of incorporation many different learning styles

Blended Learning



Blended Learning

- Typical example – combination of
 - Technology-based materials
 - Face-to-face sessions

 - An instructor starts a course with an introductory lesson in the class
 - Follow-up materials online
 - Also, it can be integrated in LMS

- At first, b-learning is
 - The combination of e-learning & m-learning with other resources
 - The key is human intervention

Blended Learning advantages & disadvantages

□ Advantages:

- Costs
- Ease of access for people with degree or professional career
- Flexibility of schedules & workload

□ Disadvantages:

- Limited access to a PC or Internet
- A lack of knowledge of the use of technology

□ Such disadvantages are in all kinds of learning

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Service Orientation Paradigm - SOA

- Information Systems (IS) are built to support business processes
- SOA (Service Oriented Architecture) proposes building these systems
 - As an hoc collection of smaller modules
 - Called “services”
- These “services” can be shared by more than one IS
- Implementation are hidden from IS



Service Orientation Paradigm - SOA

- SOA implementations are based on Web Services (WS)
- Use of the Web Service frameworks
 - Based on implementation platforms such as .Net or J2E
- A Web Service is
 - A software system
 - Support interoperable machine-to-machine interaction
 - Over a network
- It has an interface described in a machine-process (WSDL) (Web Service Description Language)



Service Orientation Paradigm - SOA

- Other systems interact with WS in a manner prescribed
 - Using SOAP-messages (Simple Object Access Protocol)
 - Use HTTP with an XML serialization
 - & other Web-related standards

- SOA is a much broader concept than WS
 - Provides a general framework
 - Capable of accommodating the peculiarities and specificities of e-learning

- Problem, that broadness



Service Orientation Paradigm - SOA

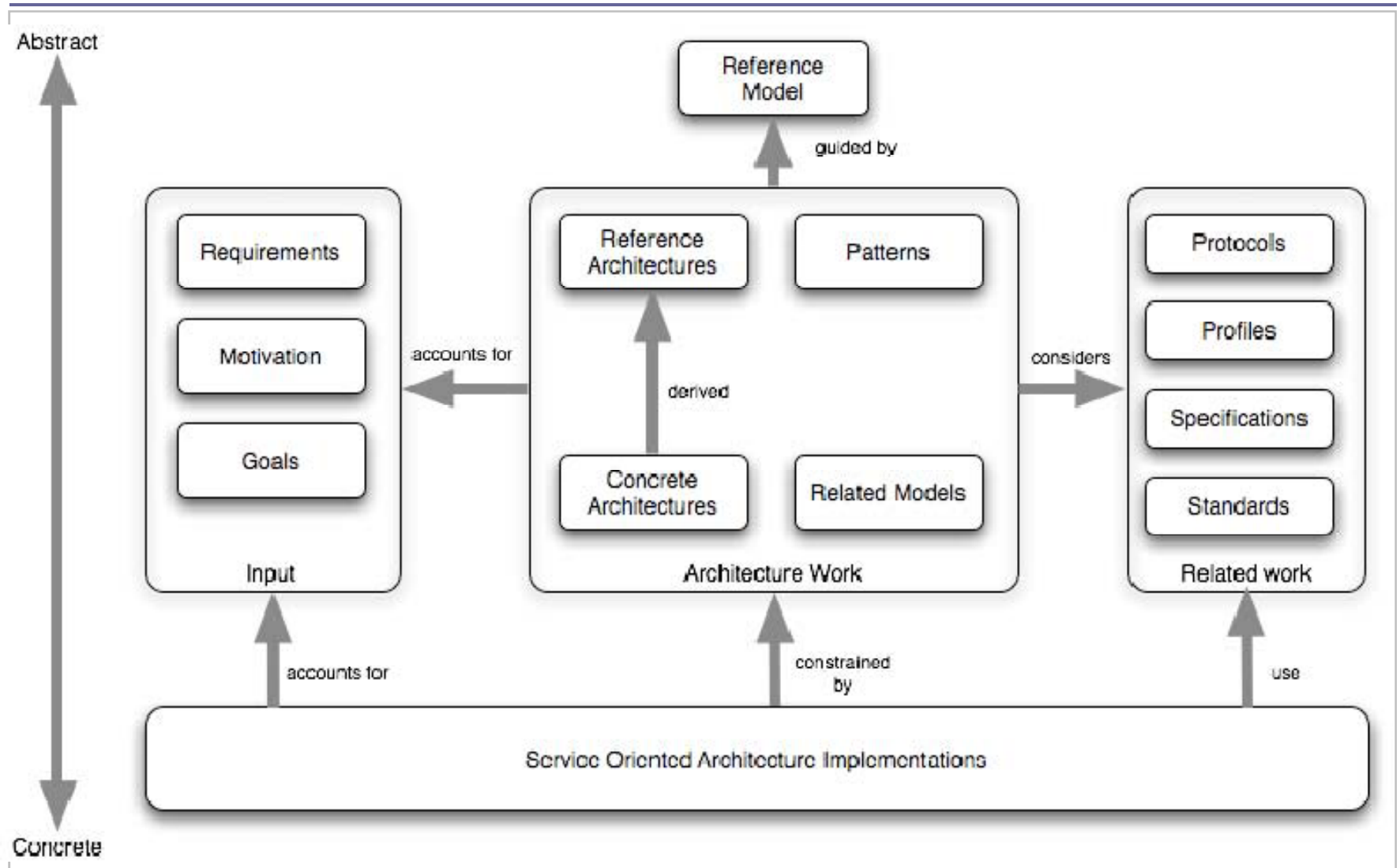
- OASIS – Organization for the Advancement of Structured Information Standards)
 - Not-for-profit consortium, 1993
 - Created the Service Oriented Architecture Reference Model Technical Committee → SOA-RM TC

- In 2006 Official Standard OASIS RM for SOA 1.0
- In 2008 “Reference Architecture for SOA”

- The aim of RM
 - Avoid the conflicting definitions
 - Define an abstract model with irrespective of technology



How a RM relates to other work




Service Orientation Paradigm - SOA

- SOA is defined as a paradigm for organizing and utilizing distributed capabilities
- Organizations create capabilities to support a solution for their problems on their business
- However, person's needs might be met by capabilities offered by someone else
- SOA provides a powerful framework
 - To match needs & capabilities
 - To combine capabilities



SOA paradigm. Key concepts

- Visibility – Those with needs & those with capabilities – to be able to see each other
- Interaction is the activity of using a capability – It's mediated by the exchange of messages
- Use a capability  real world effects. The result of an interaction is an effect



Service Orientation Paradigm - SOA

- Concept of “service”:
 - The performance of work by one for another
 - The capability to perform work for another
 - The specification of the work offered
 - The offer to perform work for another

- Distinction, capability ↔ ability

- In SOA, services are the mechanism by which needs and capabilities are brought together



Service Orientation Paradigm - SOA

- SOA means,
 - Organized solutions
 - Reuse
 - Growth
 - Interoperability

- Under SOA, it offers capabilities and act as service providers

- SOA is commonly implemented using WS, though it can be used other implementation strategies



Service Orientation Paradigm - SOA

- SOA shares many traits with Object Oriented Programming (OOP)
- Although, in SOA the central focus is the task or business function
- SOA-based systems can be visualized as an ecosystem comprising people, machines and services
 - Number of ownership
 - Management
 - Governance issues
- There is not a simple hierarchy of control and management



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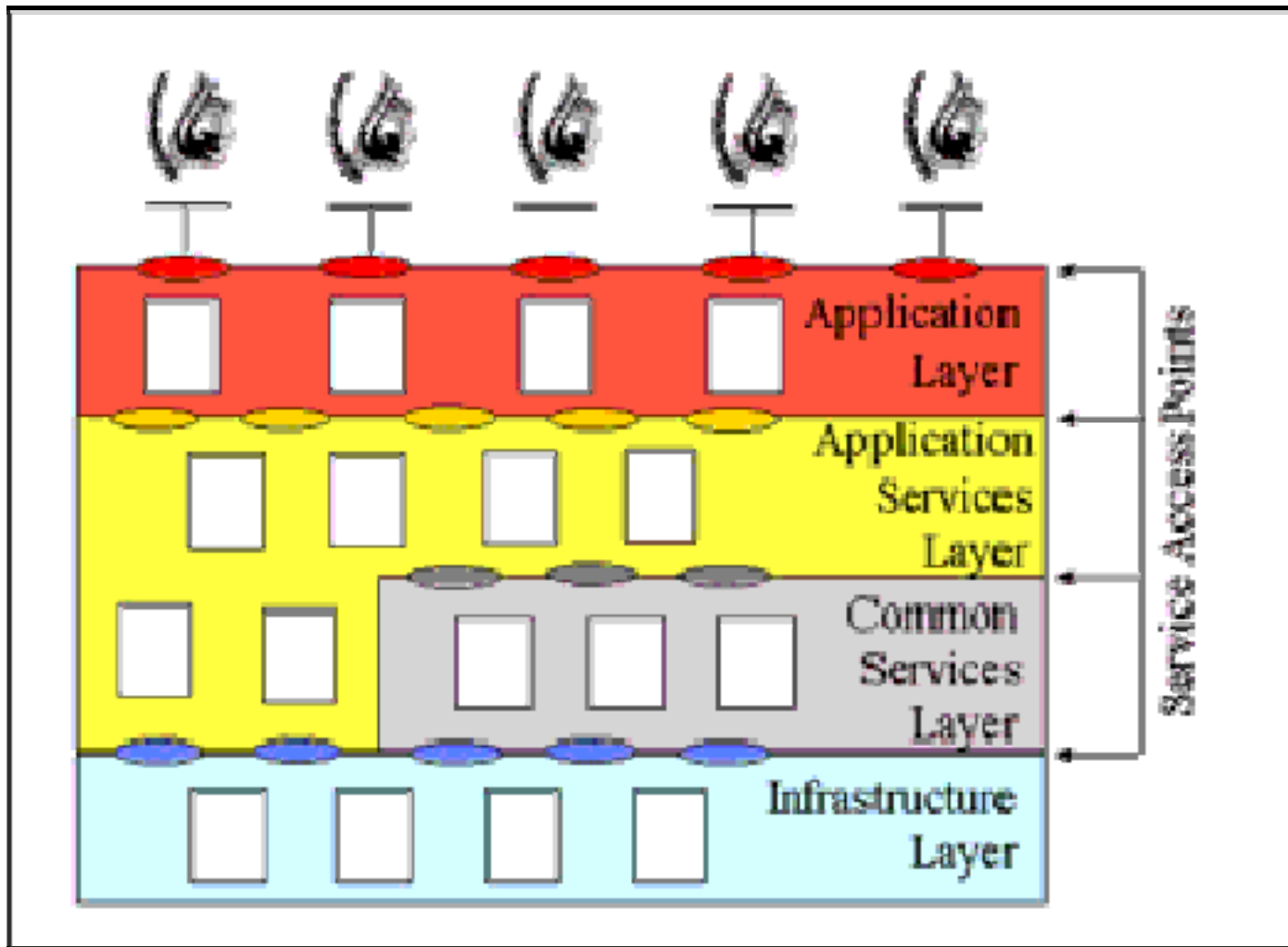
Services in Learning

- LMSs provide a suite of tools which support
 - The creation, the maintenance and the delivery of on-line courses
 - Enroll and management, students
 - Administration, education
 - Reporting of student performance

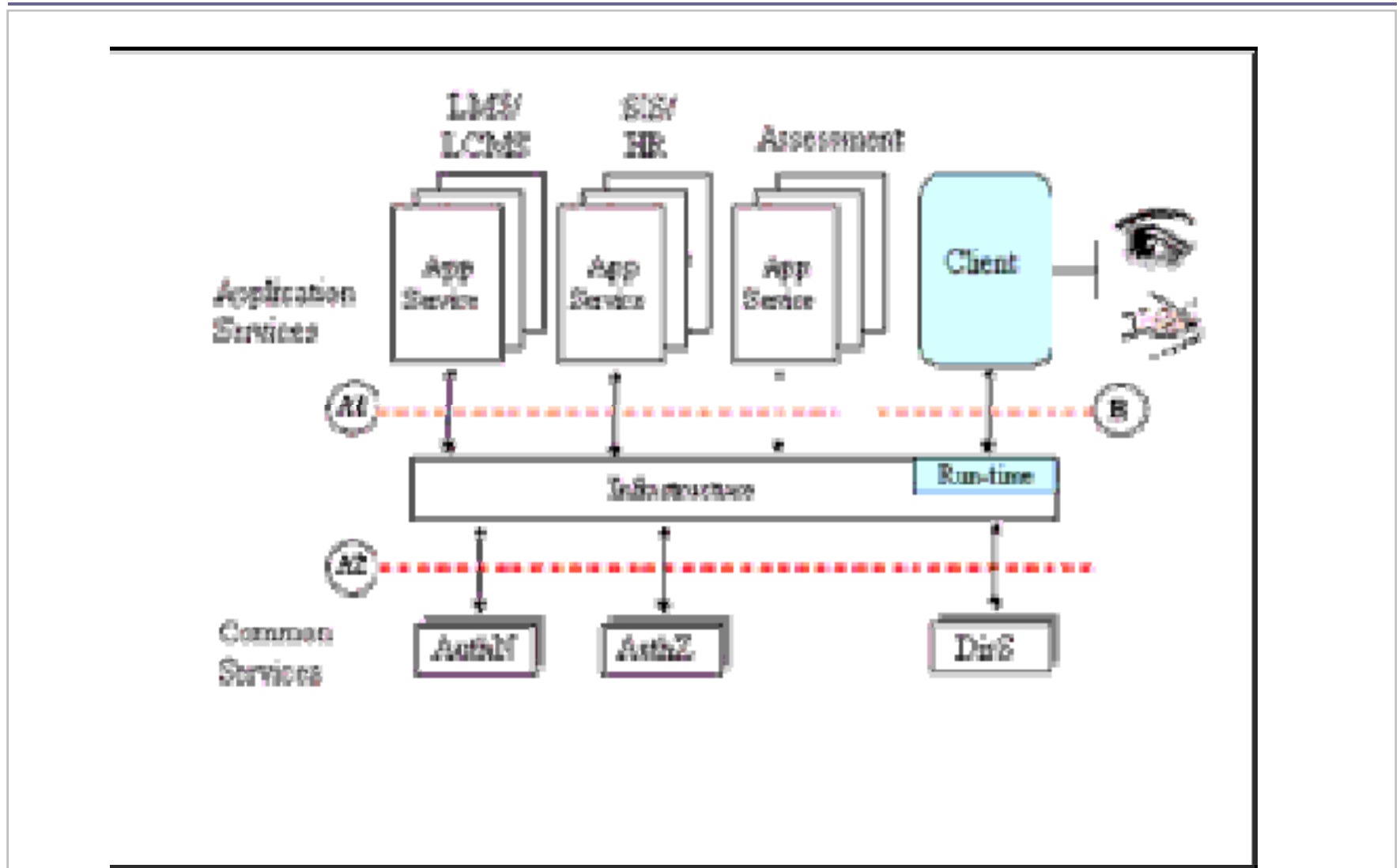
- E-learning frameworks provide specification for LMS development with SOA oriented.



IMS Abstract Framework



IMS Abstract Framework



Open Knowledge Initiative (OKI)

□ It is a MIT project that sponsors a SOA-based set of Open Service Interface Definitions (OSIDs)

□ OSIDs integrate

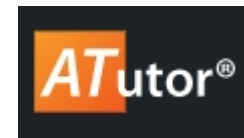
- Many educational applications
- With a variety of content publishers
- A widely accepted strategy for repository integration



LMSs categories

□ Open source

- dotLRN
- Moodle
- Sakai
- ATutor
- Whiteboard

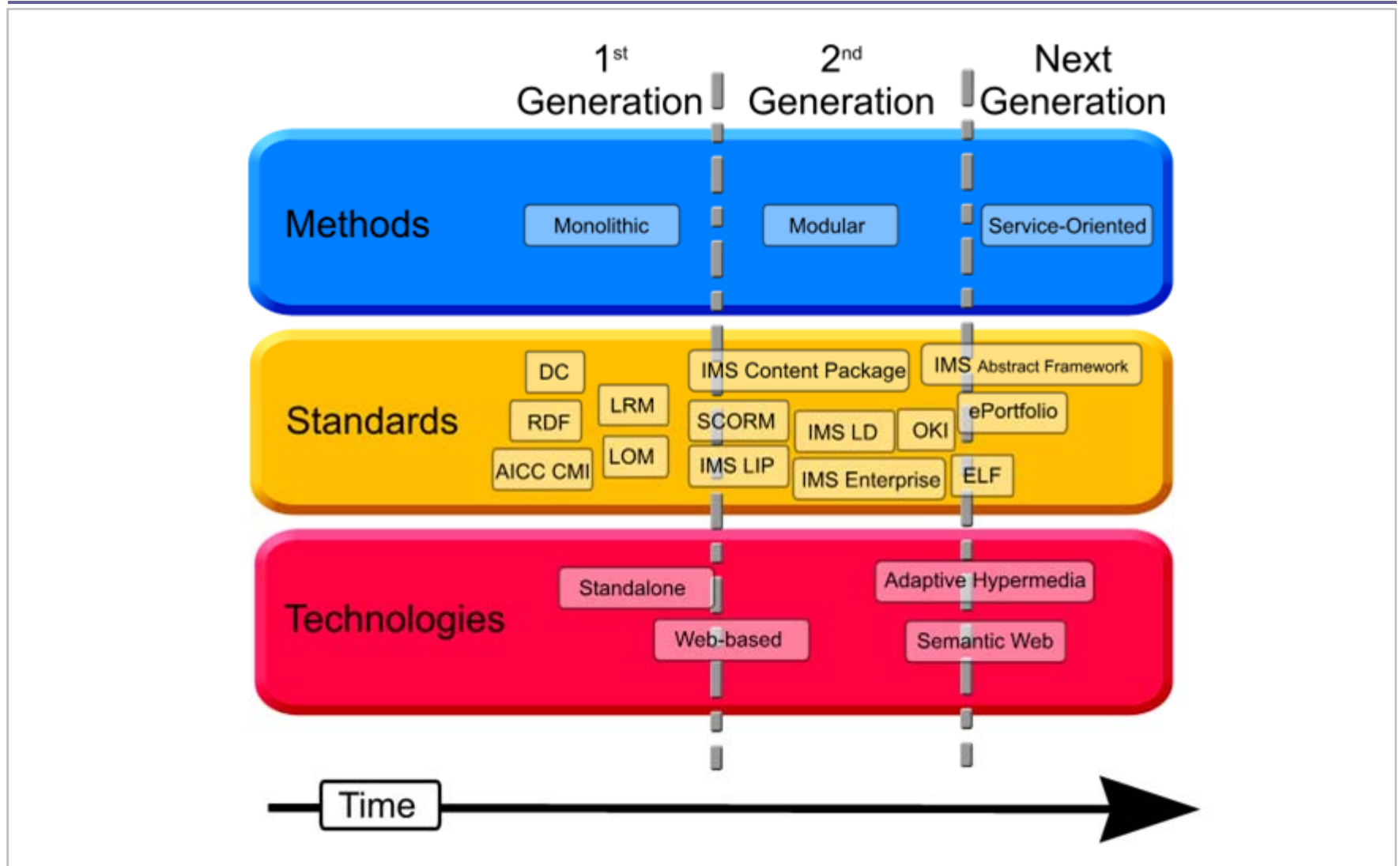


□ Proprietary solution

- WebCT/Blackboard
- Gradepoint
- Desire2Learn
- Learn.com



LMSs in successive generations



SOA approaches in Higher Education

- Smart (2008) presented at the IMS Global Learning Consortium Summit on Interoperability
- *“SOA has a great deal to offer to these institutions, but of all the challenges that remain, the cultural and governance issues seem to me to be the most difficult to tackle”*



Innovation
Adoption
Learning

Learning with letters

- B-learning, E-learning, M-learning
- U-learning (ubiquitous)
- P-learning (pervasive)
- A-learning (ambience)
- C-learning (capacity)
- T-learning (digital TV)
- V-learning (video or visual)

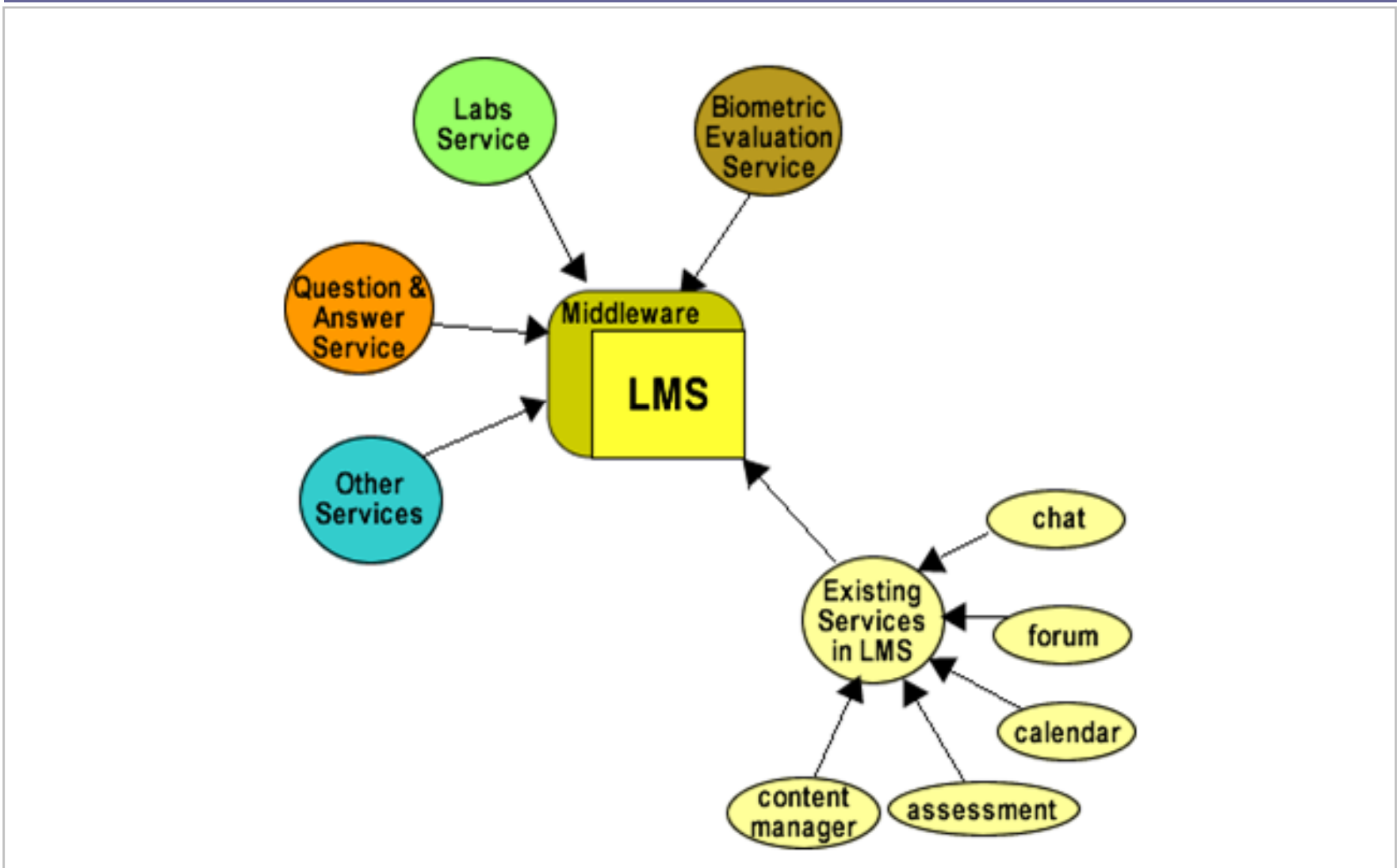


S-Learning

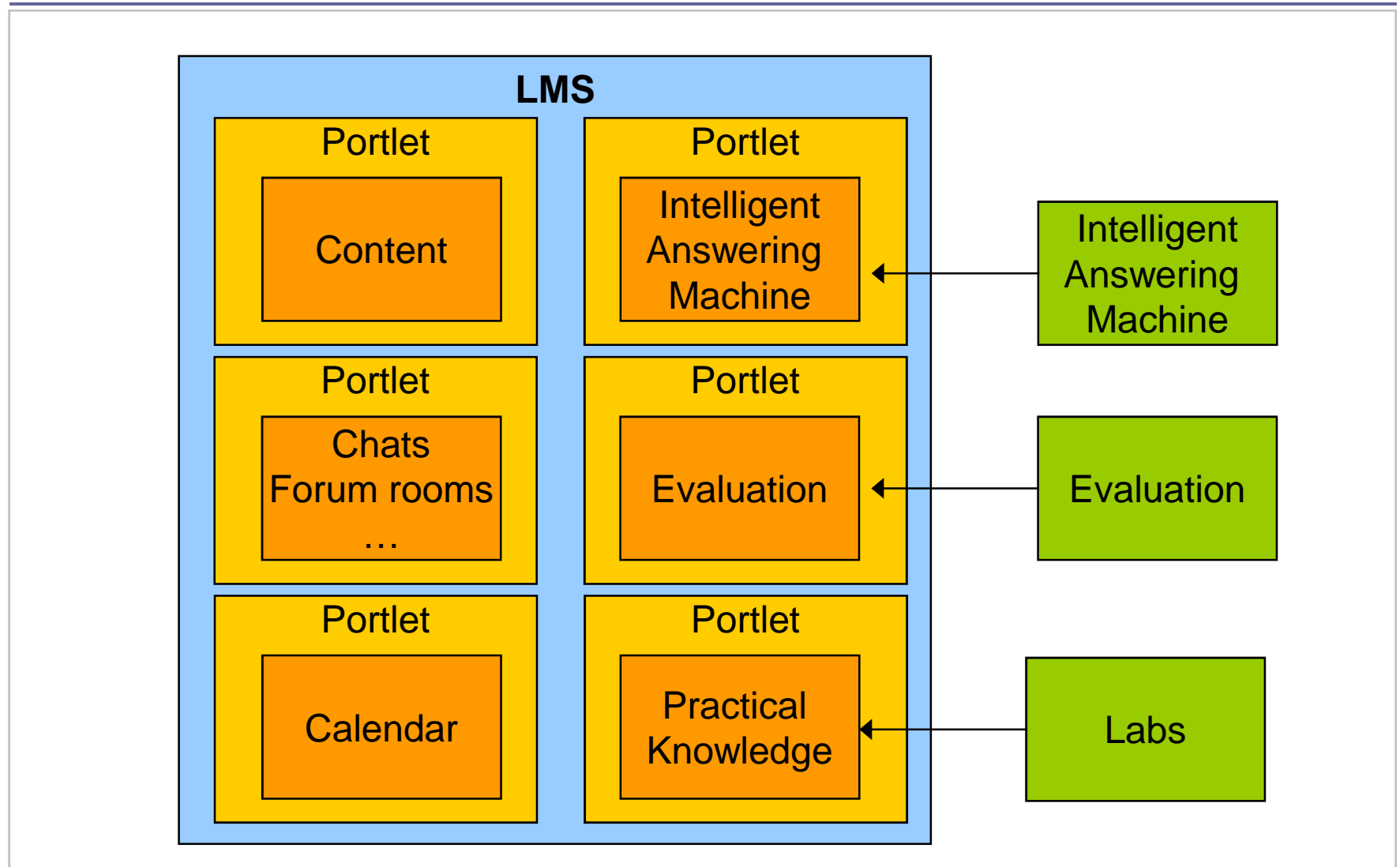
- ❑ Services oriented to e-learning
- ❑ A new methodology based on the creation e-learning tools encapsulated in a service-shape
- ❑ It can easily integrate into different e-learning platforms
- ❑ Reuse services of LMS
- ❑ It must only focus on the creation services to be integrated in a very rich environment of services

Information Technologies Supporting Learning

Example of integration of new services in a LMS



Example of integration of new services in a LMS



Services in e-learning

- UNED, developing e-learning projects
 - Different services, improving in some way the learning experience

- Virtual learning environment (VLE) used by universities
 - Instructors manage their courses
 - Exchange information with students
 - Long-term courses

- VLE used by corporate setting
 - Courses shorter
 - Only one instructor-led or online session



Characteristics shared by universities & institutions


- ❑ Manage users, roles, courses, instructors, facilities & reports
- ❑ Course calendar
- ❑ Student messaging & notifications
- ❑ Assessment/testing
- ❑ Display scores & transcripts
- ❑ Grading of coursework and roster processing, including wait listing
- ❑ Web-based or blended course delivery



Learning Content Management System (LCMS)

- Systems that focus on
 - the development,
 - Management and
 - Finally published content in a LMS

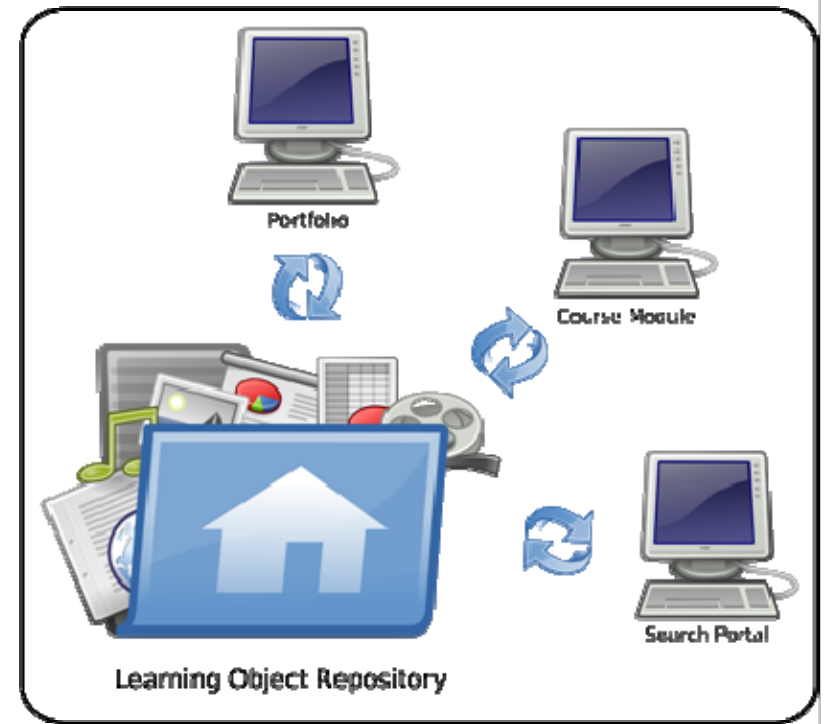
- Multi-user system
 - Users work with learning content from a central object repository

- Today, LMS is used as a term to encompass the functionality of the LCMS  It is not entirely correct

Learning Content Management System (LCMS)

- LMS is not oriented to
 - Create or manipulate courses
 - Reuse an existing course to create another

- LCMS allow
 - Create courses
 - Import
 - Manage
 - Find and reuse units of learning content (learning objects)



LMS / LCMS

- LCMS provides
 - tools for authoring and re-using or replace content, MLO (mutated learning objects)
 - Virtual spaces

- LMS is often used to refer to both LMS & LCMS

- LMS is software for
 - Planning
 - Delivering
 - Managing learning events



LMS / LCMS

- The focus of an LMS is
 - Manage students
 - Keep track of students' progress
- It performs administrative tasks, not to create course content
- LCMS is a software for managing learning content
 - Reduce duplicated development
 - A course can be modified and republished for various audiences
 - Allow rapid assembly of customized content



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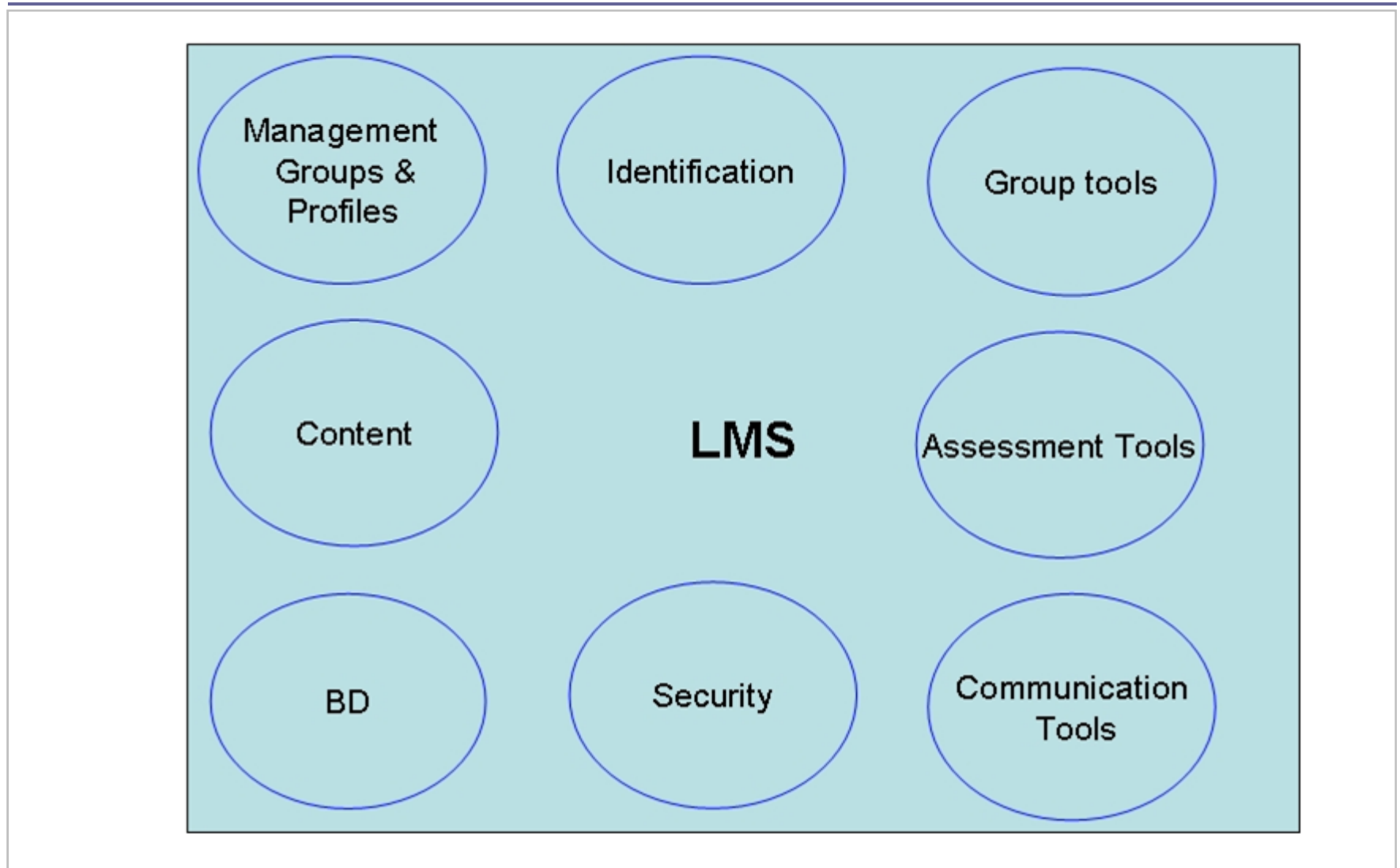
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Reuse of Services

- Internally by LCMS, learning objects
 - Externally adding additional services
- } **LMS**
- New services provide greater robustness
 - All the services or packages are almost common to all of the LMSs



Diagram of Services in LMS



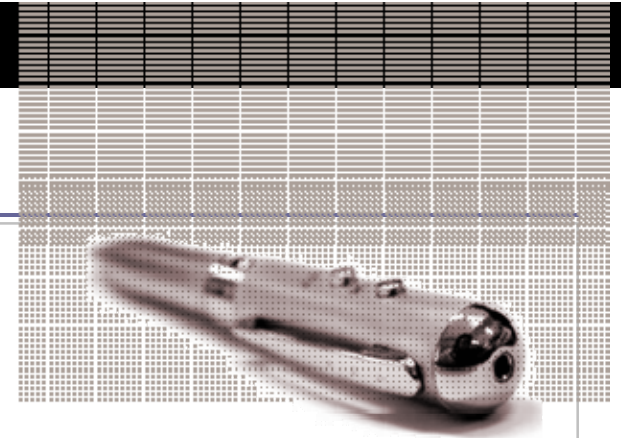
Reuse of Services

- An LMS can generate
 - Different courses
 - Each one with different content

- A content of a course can be used at university or institution

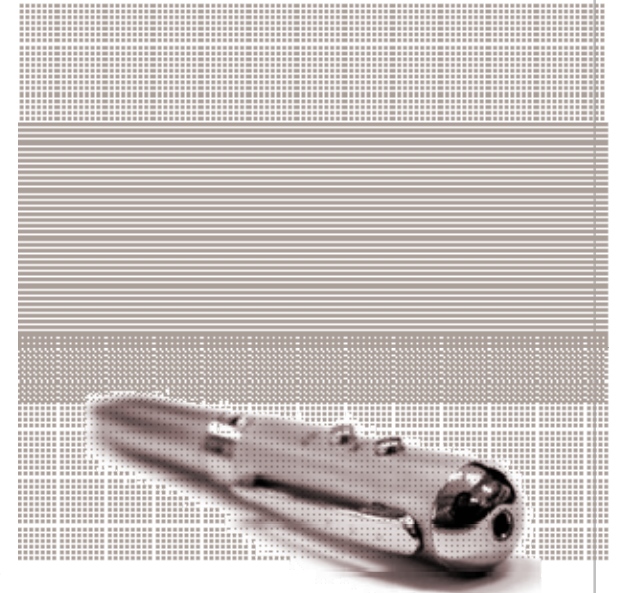
- Possibility to extrapolate it to other places

- A lot of LMSs
 - Commercial & free
 - All use standards → but these are not common among them



Reuse of Services

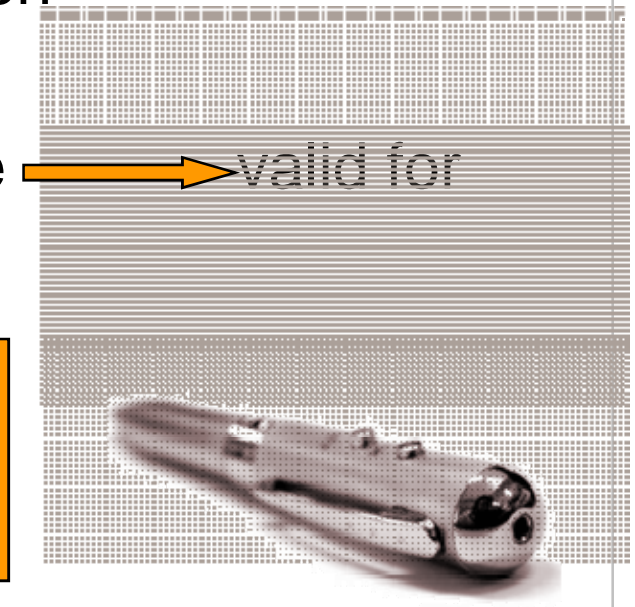
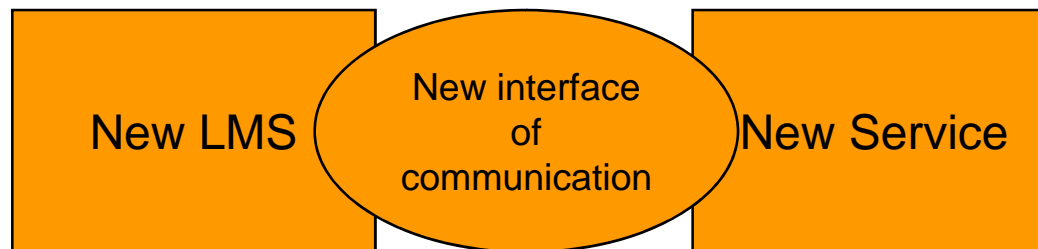
- A course in a specific LMS → adjust to the new LMS
- Situation
 - LMS is equipped with
 - Basic packages
 - Standards and
 - database
 - Handles the content of the courses
- For specific situation would be necessary a new services



Reuse of Services

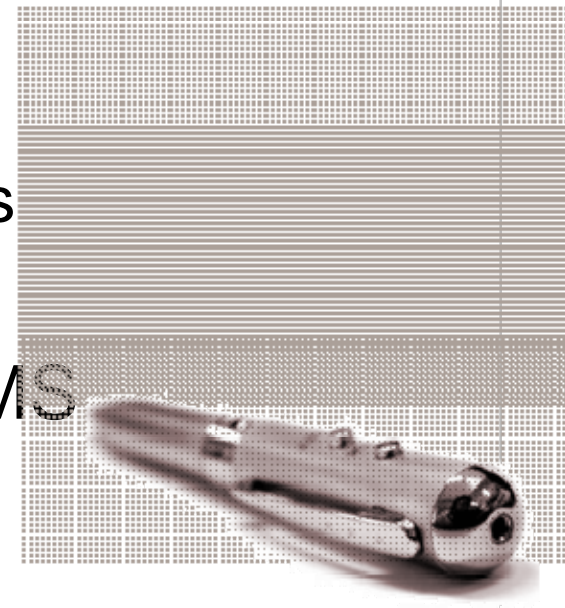
- A new service could be integrated in some way in the LMS

- Let the new service to
 - Adapt to the growth of the institution
 - Changes of the environment
 - The work done in the first instance next situations



Reuse of Services

- Independent capsules of LMSs
- Just depending on the environment
- Create generic services
 - For a particular environment
 - Reuse them in the same environments
- Changing the interfaces with the LMS



Reuse of Services

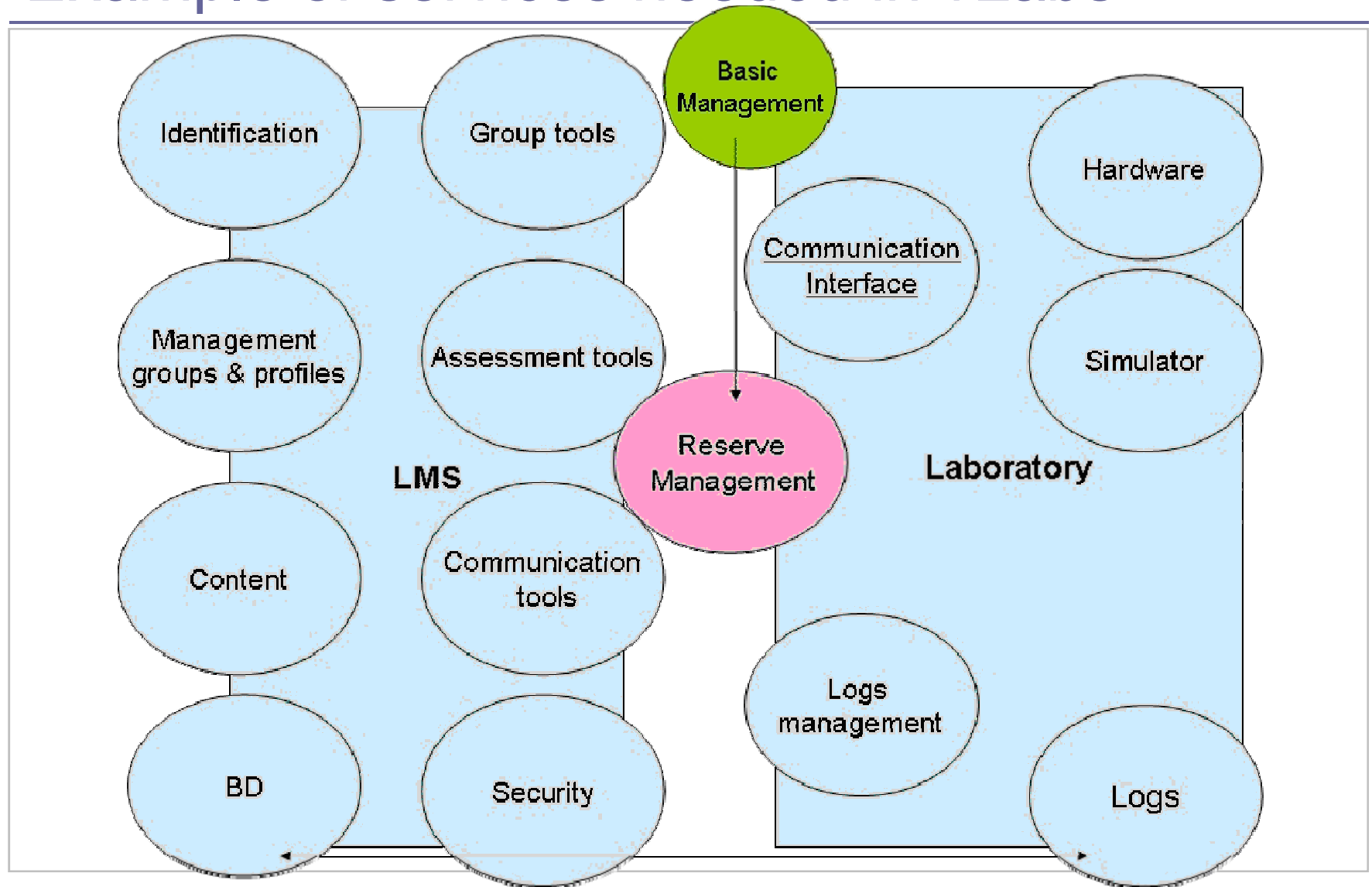
- Then, LMS has a poor design??
 - The vast majority of current situations can cover all the points

- Important situation → New Virtual environments

- Example, virtual Labs
 - Introduce a system of reserve management
 - Monitor slots of time
 - Labs with real and limited instrumentation



Example of services needed in vLabs



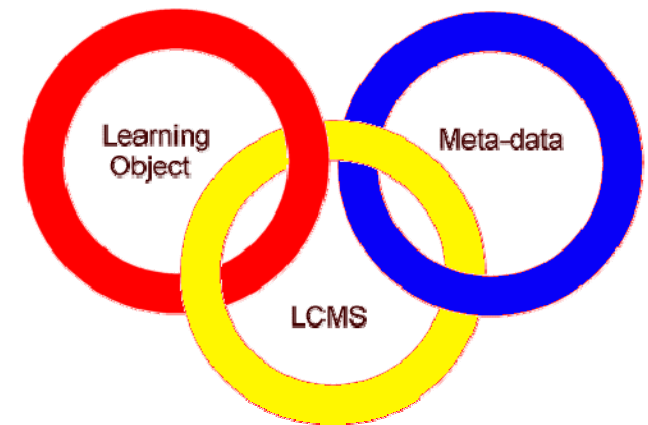
Index

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- **Reuse of Learning Objects**
- Conclusions
- Acknowledgements

Reuse of Learning Object

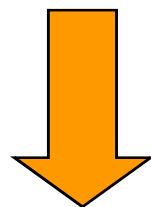
- Learning object repositories are an effective way of sharing knowledge

- Learning objects are the best attempt to solve
 - The interoperability
 - Reuse
 - Automated updating and
 - Personalization issues

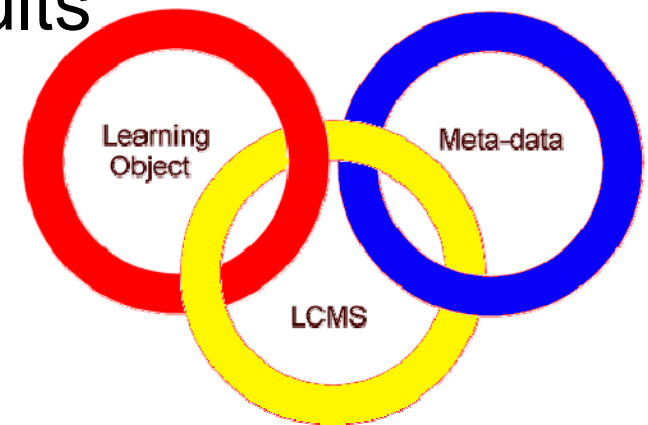


Reuse of Learning Object (LO)

- ❑ Search engines are not suitable to find digital resources
- ❑ Metadata can obtain additional information that users need
 - Describe the nature and purpose of a LO
- ❑ No search through lists of results

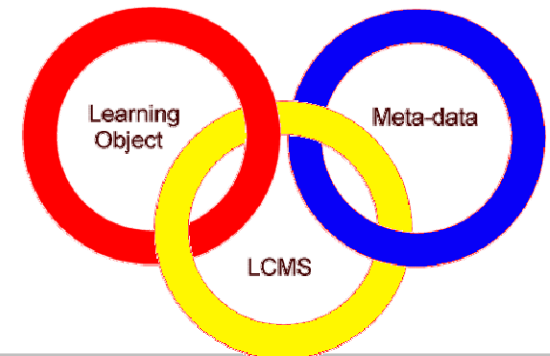


Explore collections of LOs



Reuse of Learning Object (LO)

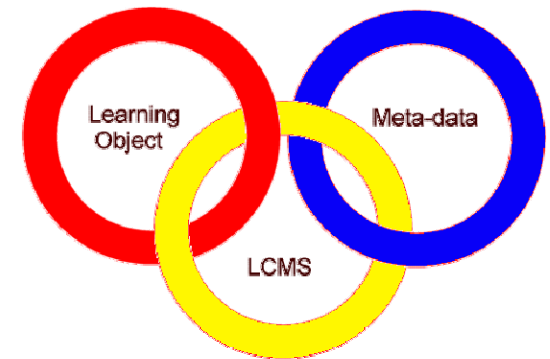
- Resources organized by pedagogical value
- Learning standards:
 - Dublin Core
 - IEEE LOM
- For interoperability across implementations XML
- Inside communities
 - Adapted to the requirements of their own education system
 - Through application profiles
 - CanCORE
 - LOM-es, etc



Reuse of Learning Object (LO)

□ Courses use in

- Multiple environments
- Multiple tools
- And systems



□ SCORM

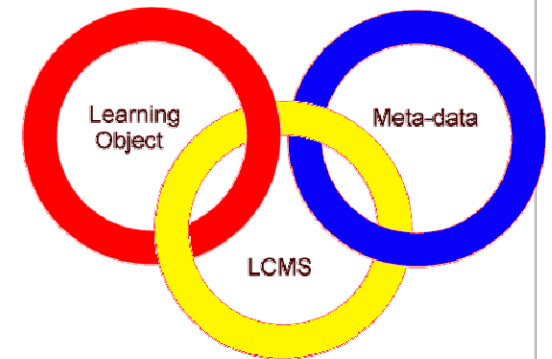
- Standardizes how LMS launch & track directed learning experiences

□ SCORM package contains a manifest file that

- Declares its contents
- Is set up to describe the order in which the sharable content objects (SCOs) are to be delivered

Reuse of Learning Object (LO)

- Impossible to find single LOs
- LOs are stored in large collections with
 - Tools to view, edit & share their descriptions
 - Tools to retrieve them
- Learning object repositories are accessed by Web Services
- Repositories as web applications. Benefits:
 - Expanded searching capabilities
 - Accurate access
 - Usage statistics

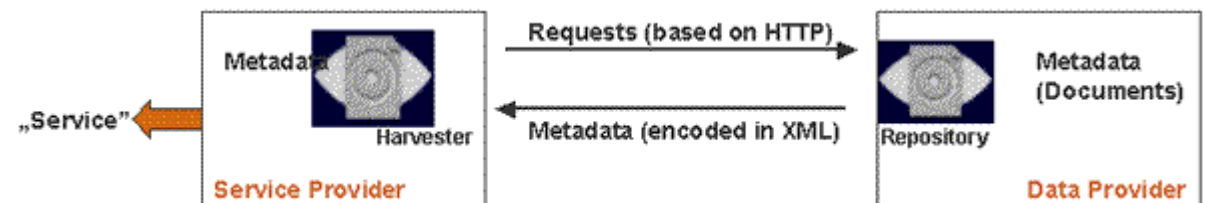


Transfer content of metadata between multiple repositories

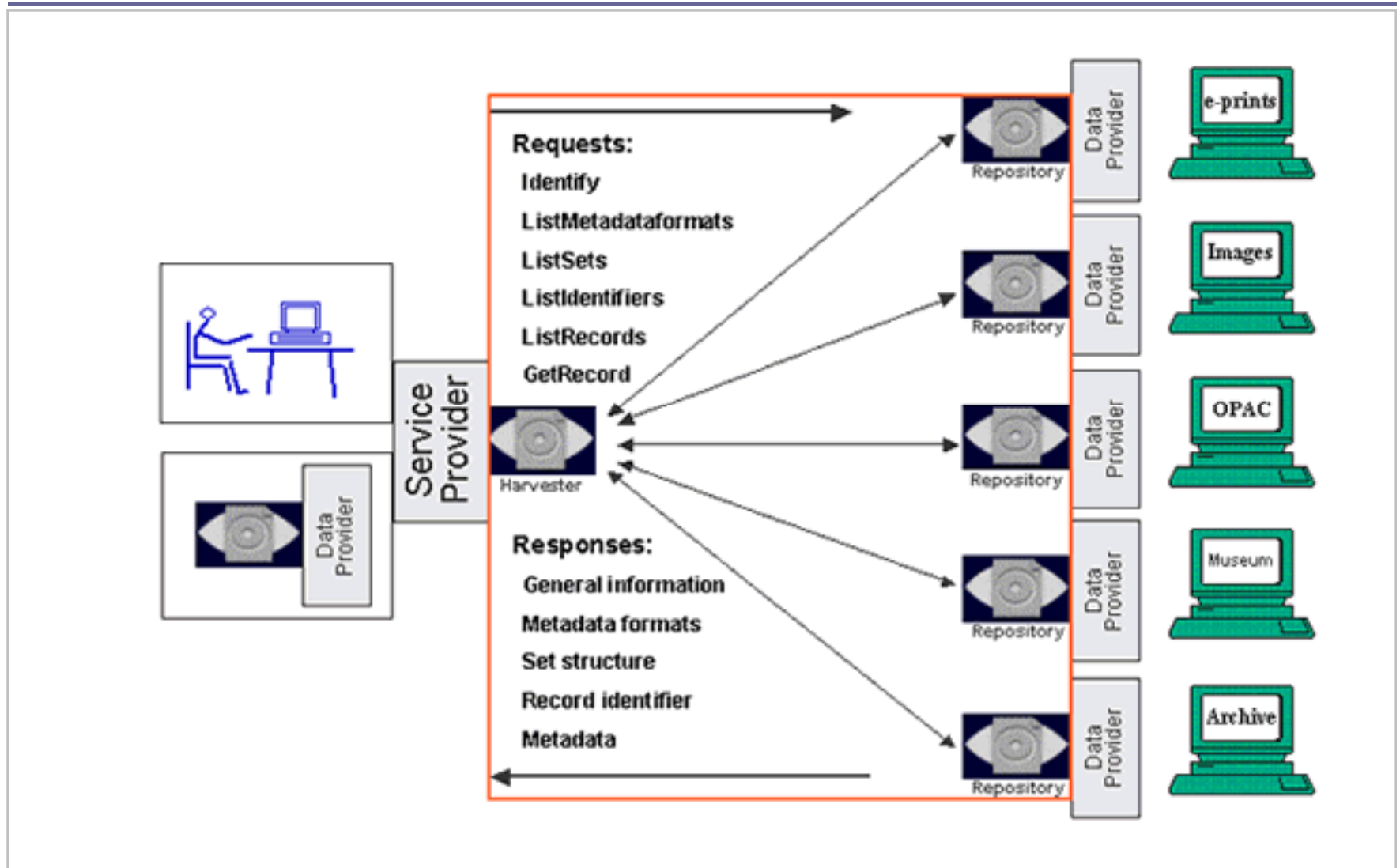
- Federated search (FS) layer, middle layer
- Don't have to modify anything
- In a federated search systems,
 - Queries from users are sent to different Learning object repositories (LORs)
 - FR engine merges the results received by these LORs
- Protocols to reuse repository metadata from external applications

- OKI

- OAI-PMH →



OAI-PMH: Structure Model



Transfer content of metadata between multiple repositories

- Consequences,
- Individual institutions can build their own individual registries
- The global network GLOBE
 - Shares the index of learning resources
 - Available from the five main individual services around the world
 - Users gain access to all the content of all the repositories



From learning objects to DIGITAL UNIVERSAL OBJECTS

□ Universal view of digital objects

The screenshot shows the UNED e-spacio website. At the top, there are logos for UNED and Spacio UNED, followed by the text "El e-espacio de los contenidos digitales de la UNED". Below this, there are navigation links: "e-spacio (Login)", "Navegar por Comunidades", "¿Quiere participar?", and "Derechos de autor". The main content area is divided into several sections:

- Búsqueda General**: A search bar with a "Buscar" button.
- Búsqueda de autores**: A search bar with a "Buscar" button.
- Recorrer**: A list of options: "por Nombre de Autor", "por año", and "por últimas incorporaciones".
- Estadísticas**: A list of options: "Los top50 títulos", "Los más vistos - últimas 4 semanas | Este año | Todos los años", and "Todas las estadísticas- por fecha | por país".
- Revistas Digitales UNED**: A section with a globe icon and the text "Revistas Digitales UNED".
- Noticias**: A section with a globe icon and a list of news items:
 - › La futura Ley de Ciencia, los repositorios y el acceso abierto
 - › Más de 5.000 descargas diarias el mes de noviembre
 - › Actualización semanal de accesos
 - › Incorpore los registros de e-spacio a Zotero, el gestor bibliográfico open source
 - › Renovación de passwords
 - › RSS | Más...
- Añadidos últimamente**: A section with a yellow arrow icon and a list of recent additions:
 - › RESEÑA de : Romero López, Dolores (ed.). Soledades, de Antonio Machado. Exeter: Exeter University Press, 2006.
 - › RESEÑA de : Sanfilippo, Marina. El renacimiento de la narración oral en Italia y España (1985-2005). Madrid: Fundación Universitaria Española, 2007.
 - › RESEÑA de : Trecca, Simona. Ha parole il...

At the bottom of the page, there are logos for "CSEDO 2009", "Manuel Castro Gil", "UNED", "(Software Libre en Teleformación) CYTED", and "OBER".

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Conclusions

- EHEA, framework within which are the IT-based approaches



- This massive and simultaneous redesign
 - Daunting challenges
 - Unprecedented opportunities

- Synergies among the redesigned

- Approaches
 - LCMS
 - Standards: LOM, Dublin Core, QTI, IMS, SCORM

Conclusions

- ECTS facilitates the combination of
 - Face-to-face
 - Distance
 - B-learning

- E-learning  Distance learning
- B-learning  Distance & face-to-face

- E-learning 2.0
 - Influence of current interest
 - Use all the technology available
 - Social and collaborative

Conclusions

- The next generation of e-learning platforms
 - Based on service-oriented visions
 - Framework that encourages
 - Reuse &
 - Sharing of learning contents

- Focus more on
 - Pedagogical & didactical issues of e-learning
 - Knowledge management

Conclusions

- A framework built on the aforementioned protocols and metadata
 - Interoperability between institutional repositories
 - Improve the resources
 - But, It is not enough to
 - Develop more intelligent, reliable & precise services
 - Connect institutional repository resources with other resources

- Future versions of SCORM & LOM should become
 - Easy to understand

Conclusions

- Legal questions in the field of digital content creation

- Interoperability
 - By standardizing
 - Data management across LMSs
 - A matter of utmost importance



Acknowledgements



GOBIERNO
DE ESPAÑA

MINISTERIO
DE CIENCIA
E INNOVACIÓN



PROGRAMA
IBEROAMERICANO



CSEDU 2009

International Conference on Computer Supported Education

Where to find and publish on Technology / Computers on Education ?



IEEE Frontiers on Education (October)



FIE

USA based conference

IEEE (Education and Computer Society) and ASEE collaboration



Improvement of the Electrical and Computer Engineering Learning

CSEDU 2009

International Conference on Computer Supported Education

Where to find and publish on Technology / Computers on Education ?

IEEE Education Engineering – EDUCON (April)



Region 8 (Europe, Middle West and Africa) based conference

IEEE Education Society

Academic, research and industrial collaboration on global engineering education

CSEDU 2009

International Conference on Computer Supported Education

Thank you ! Questions for debate ?



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