

One Step Ahead in the Future of Labs: Widgets, Ubiquity and Mobility

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One Step Ahead in the Future of Labs: Widgets, Ubiquity and Mobility

Education is changing...



CONTENT

INTERACTION

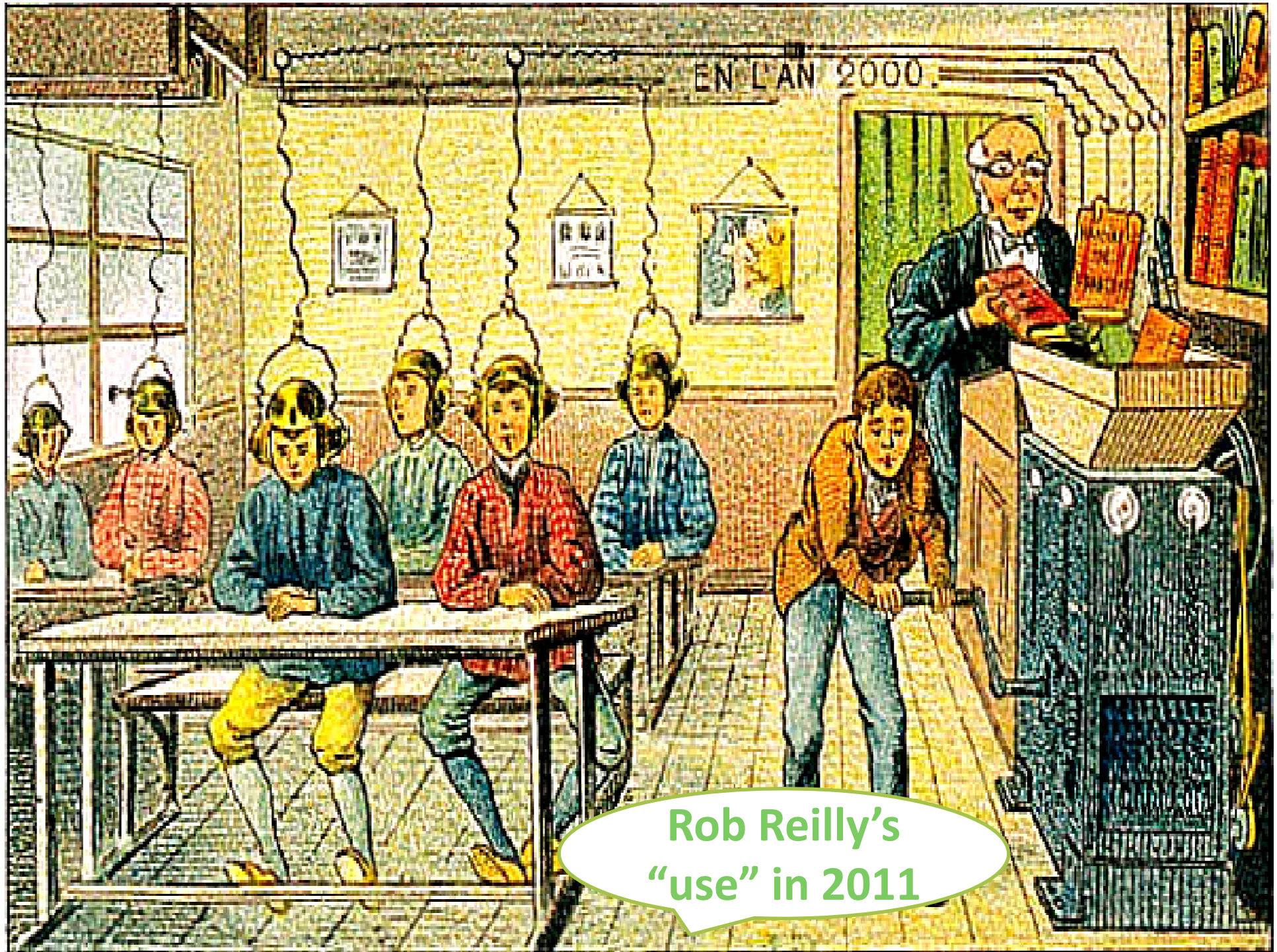
ASSESSMENT

CERTIFICATION



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Rob Reilly's
"use" in 2011

Games-like

Engaging

Social

AI-ADAPTIVE

augmented

Education is becoming ...

Mobile

analytics

OPEN

Federated

addictive

Disruptive



One Step Ahead in the Future of Labs: Widgets, Ubiquity and Mobility

Open education new initiatives



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OCW was Education Web 1.0

The screenshot shows the MIT OpenCourseWare website homepage. At the top, it features the MIT logo and the text "MIT OPEN COURSEWARE MASSACHUSETTS INSTITUTE OF TECHNOLOGY". Navigation links include Home, Courses, Donate, About OCW, Help, and Contact Us. A search bar is present with the text "Enter search keyword" and a "go" button. Social media links for Twitter and Facebook are also visible. A "SIGN UP FOR OCW NEWS" button is in the top right corner.

The main content area features a large banner titled "Unlocking Knowledge, Empowering Minds." with a photo of a young man, Juan Lara, in front of a red robotic arm. Text on the banner reads: "Free lecture notes, exams, and videos from MIT. No registration required." and "It's a great opportunity for students to become extraordinary engineers." Below the banner is a "NEWS FEATURE" section titled "edX ANNOUNCED" with a photo of Sal Khan speaking at a podium. The text says: "MIT and Harvard announce edX, a new online learning collaboration." Below this is a "2012 MIT Commencement" section with a photo of Sal Khan and text: "Open education innovator Sal Khan, MIT alumnus and founder of Khan Academy, delivers commencement address at MIT." A "SUPPORT OCW" section is also visible, with text: "Help sustain educational resources you need. Please support MIT OpenCourseWare" and a yellow arrow pointing down with the text "SUPPORT FREE & OPEN".

On the left side, there is a sidebar with navigation links: "Get Started with OCW", "VIEW ALL 2100 COURSES", "Most Visited Courses", "OCW Scholar", "Editor's Picks", "Audio/Video Courses", "Translated Courses", "New Courses", "Find Courses", and a list of departments: Architecture and Planning, Engineering, Health Sciences and Technology, Humanities, Arts, and Social Sciences, Management, Science, Other Programs, Cross-Disciplinary Courses, and Special Collections. There are also links for "Supplemental Resources" and "View All Departments".

- 🔒 CONTENT
- 🔒 ¿INTERACTION?
- 🔒 ASSESSMENT ¿SELF?
- 🔒 ¿CERTIFICATION?



New Web 2.0 Education

P2PU Learn Contribute Blog Help Login

LEARN ANYTHING WITH YOUR PEERS.

IT'S **ONLINE** AND **TOTALLY FREE.**

At **P2PU**, people work together to learn a particular topic by completing tasks, assessing individual and group work, and providing constructive feedback.

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Simple and free. Study Today.

159,449,695 lessons delivered
KHANACADEMY Search for a video or topic

Futures Introduction

1 million lbs. Forward Contract. Oil. Year. 2 3 4 5 6 7. PIES. 200k. Oil agrees to buy.

- CONTENT
- INTERACTION
- ASSESSMENT
- ¿CERTIFICATION?



An Adaptive open learning

Carnegie Mellon University



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The Open Learning Initiative offers online courses to anyone who wants to learn or teach.

Our aim is to combine open, high-quality courses, continuous feedback, and research to improve learning and transform higher education. [Learn More](#)



Active Learning

Throughout our courses, students encounter activities, simulations, and virtual labs to help them apply and test their learning.

[Learn More](#)

Codecademy

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```
Hey! Let's get to know each other. What's your name?  
Type it with quotes around it like this "Ryan" and then press enter.
```

```
> █
```

Learn to code

Codecademy is the easiest way to learn how to code. It's interactive, fun, and you can do it with your friends.

[Get Started](#) (it's free)



Massive On-line Open Courses

UDACITY

MITx MIT's new online learning initiative

INTRODUCTION TO
Artificial Intelligence

In partnership with
STANFORD ENGINEERING

Course Discussion Progress Information Profile

Coursera



STANFORD
UNIVERSITY



MIT
Massachusetts
Institute of
Technology



How about Certification on those open environments?






Self-accreditation & identity ?

A collection of six colorful icons representing different skills and achievements: a red gear with "<JS> +", a purple circle with a lightbulb, a blue shield with a rocket, a yellow circle with two hands, a blue gear with a document, and a green square with a classical building facade.

badges = visual representations of a skill or achievement

Open Badge Backpack

		
ISSUER I want to issue badges	EARNER I want to earn and collect badges	DISPLAYER I want to display badges



Mobile and augmented learning...



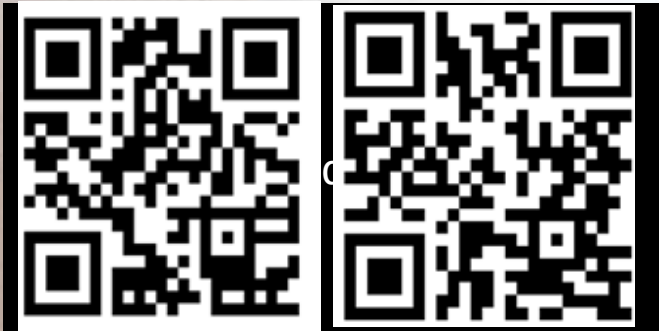
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F My Life

Today I woke up to find that my car had been broken into. I was upset about not hearing my car alarm go off, until I realized that it *had* gone off in the middle of the night. I had woken up, cursed the idiot who had set off the alarm, put a pillow over my head, and fallen back to sleep. FML

Today my friends and I were drinking boba, a type of East Asian tea. On the side of the cup it said, "Please drink carefully to avoid choking on the boba." I started to laugh at the ridiculousness of the label and proceeded to choke on the boba in a coughing fit. FML



Today I went for a jog in my neighborhood. While I was running, I passed my girlfriend's parents, who were out for a walk. Trying to make a good impression, I stopped to talk. When I got home, I realized I was wearing a shirt that friends had given me as a joke. It said: "Blow me, bitch. It's my b-day." FML

You Shouldn't Have Even Bothered . . .

Today I babysat three-year-old twins. They have a huge dry-erase board hanging between their beds. After they fell asleep, I was bored and drew a very large, detailed penis on the board. When I went to erase it, I realized I had used a permanent marker. FML

Today my child said to me, "Mommy goes up like a stick." I said, "Well, that's okay." Then I asked when it does that, and he said, "Times when I'm watching Scooby-Doo and he comes out dressed in lady clothes." FML

Today I met a really nice couple at a party. Our conversation eventually drifted to hooking up. The guy commented that hooking up was pathetic. They had met on My

Today I was giving my boyfriend a blowjob. He had something squirt into my mouth. I had to spit it out. FML



Enriched ebooks



iBooksU



Location-based AR

- ✓ Location of institution facilities: CSEV AR
- ✓ In-situ collaborative Learning: leARnengineering



Gamification



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Education should not be fun,
it should be addictive!



The importance of...

Learning analytics

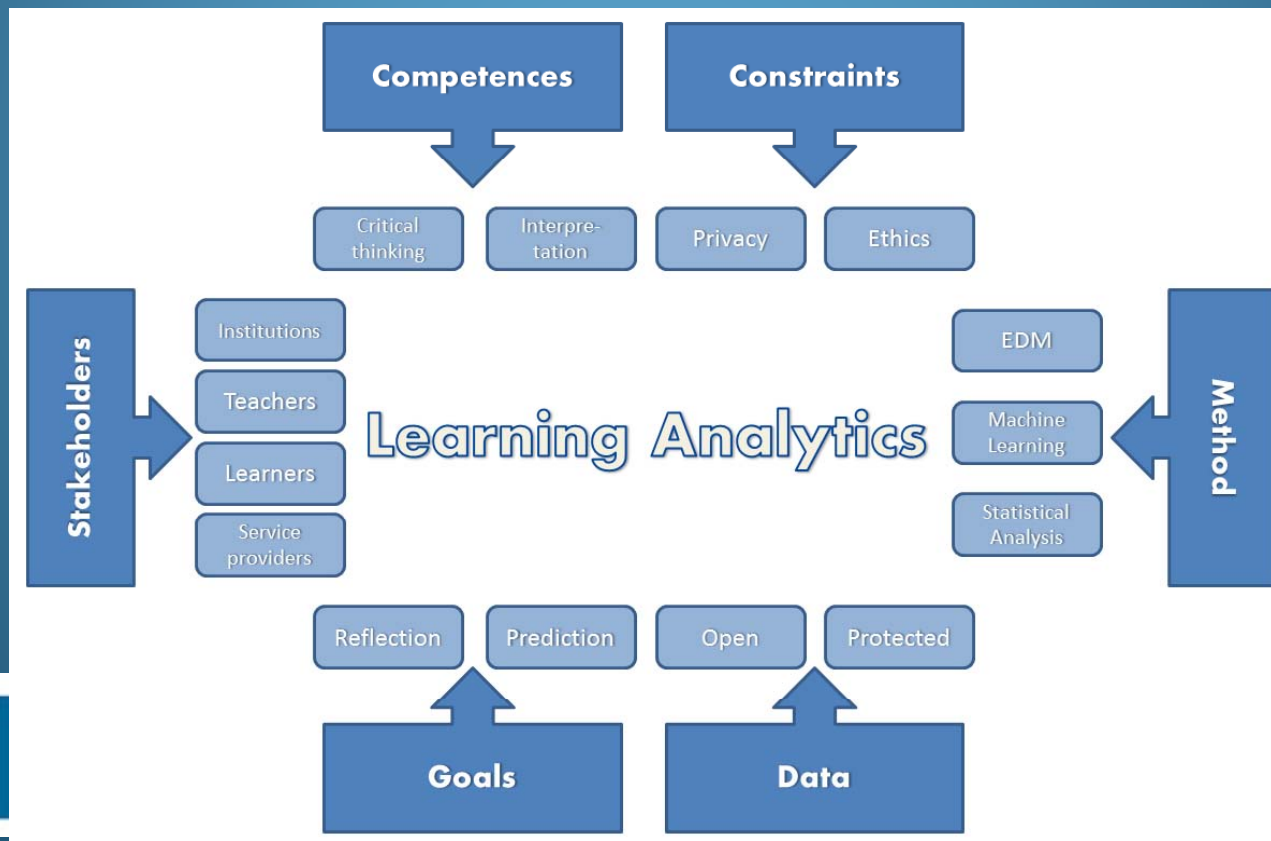


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Learning analytics

- Data mining students learning performance to adapt and personalized contents and services



How these new initiatives impact
on engineering education?

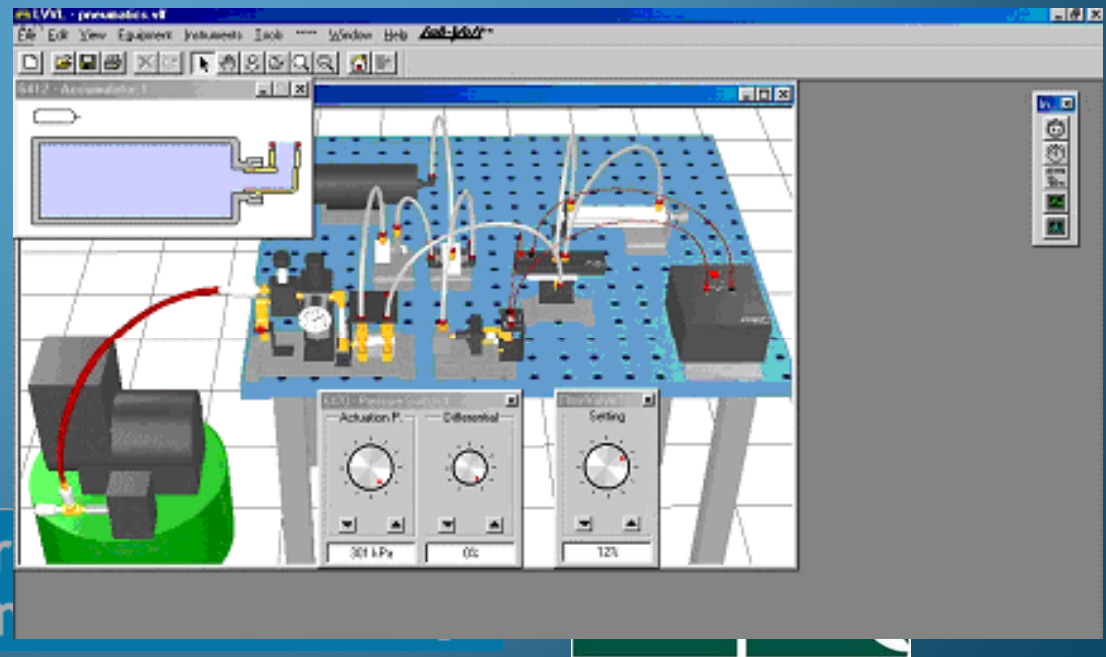


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What happen with our resources?

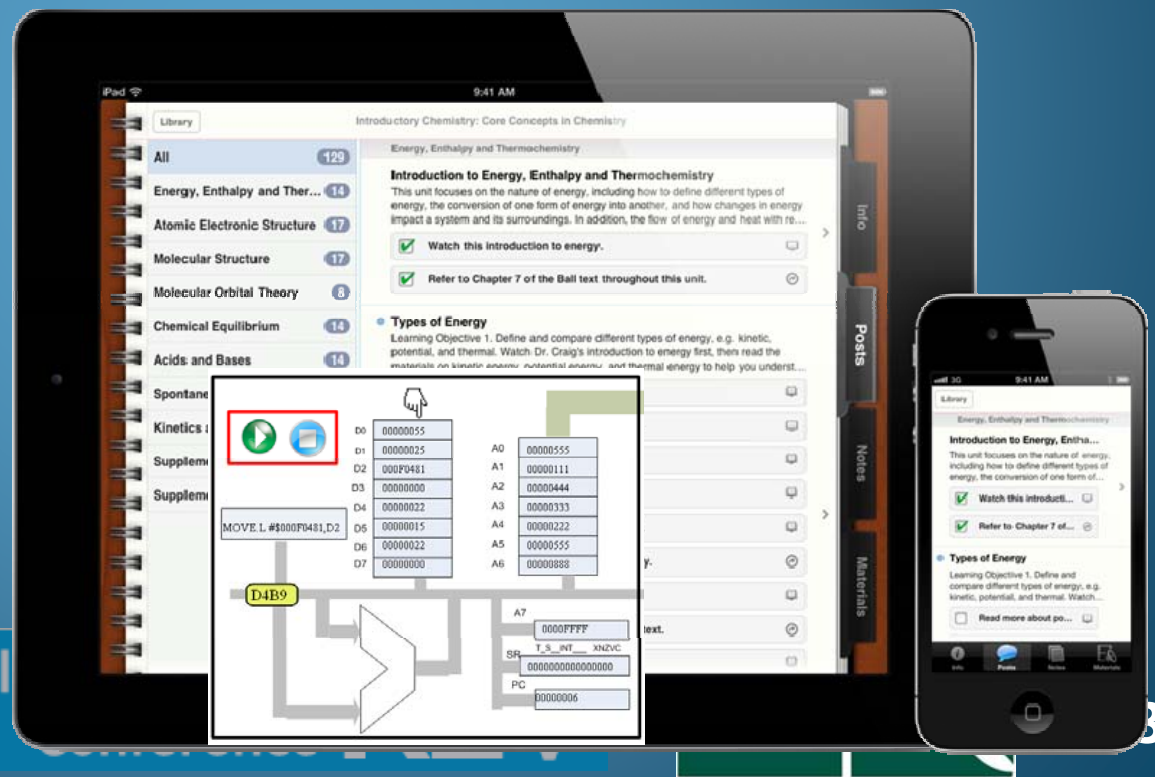
- Existing resources:
 - Virtual & Remote Labs
 - Simulations
 - Video-lectures
 - Assessment



Inter
Con

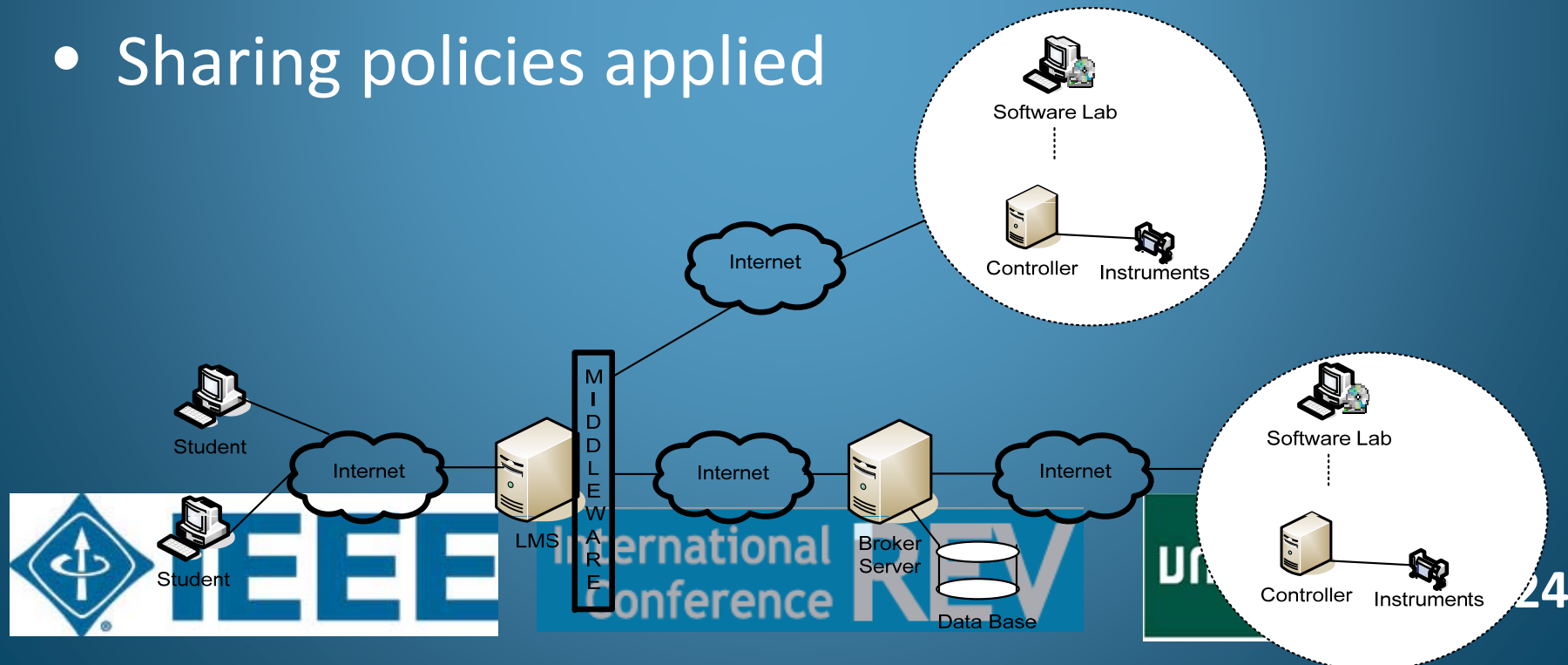
1) Should be easily reused into the new initiatives

- iBook
- Enriched eBook
- iTunesU
- Massive on-line courses
- P2P learning environments



2) Should be shared by other institutions

- A federation of resources is needed to orchestrate the resources sharing
- APIs offered to share learning analytics
- Sharing policies applied



3) Should work on any device

- Resources built or adapted using cross-platforms technologies such as HTML5
- Reduce reprogramming efforts



4) Should be more engaging

- Apply some game-like elements to our experiments
 - Karma
 - Levels
 - Badges
 - Points
 - Story-telling
 - Realistic cases
 - ...
 - Confrontation
 - Collaboration & Fighting



5) Should be more secured

- With identification technologies
 - or along with traditional username & Password (identification)
- Such as,
 - Biometrics
 - Multi-biometrics
 - RFID
 - Combination
- Multiple identities ?
- Digital identities ?



But we have a long way to walk...

- Challenges -



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Online Labs as Open E-learning Resources

- Traditional laboratories were the only possibility that allowed students to carry out experiments and get the needed skills for their future jobs
- The improvement in communication networks and programming languages were key factors in the evolution from traditional Laboratories to online Labs



Online Labs as Open E-learning Resources

- Currently, there are a great number of Virtual and Remote Labs on Web
 - **Virtual Web Labs** → Virtual web labs are applications installed in a web server and accessed over Internet
 - **Remote Web Labs** → are applications which allow student to manipulate hardware through a Web browser over Internet



Online Labs as Open E-learning Resources

Virtual and Remote Labs are not mutually exclusive. They can be combined in the learning process. For instance:

- A Virtual Web Lab can be used to teach students how to hand the instruments and carry out tasks that can damage these
 - A Remote Web Lab can be used when students have learnt of management of instruments
- A new resource to consider inside **Blended Learning !!!!**



Online Labs as Open E-learning Resources

- Virtual and Remote Labs can be used in many educational fields, such as:
 - Electronic and Control
 - Electrical Engineering
 - Chemistry
 - Physics
 - Anatomy
 - Biology
 - Education
 - ...



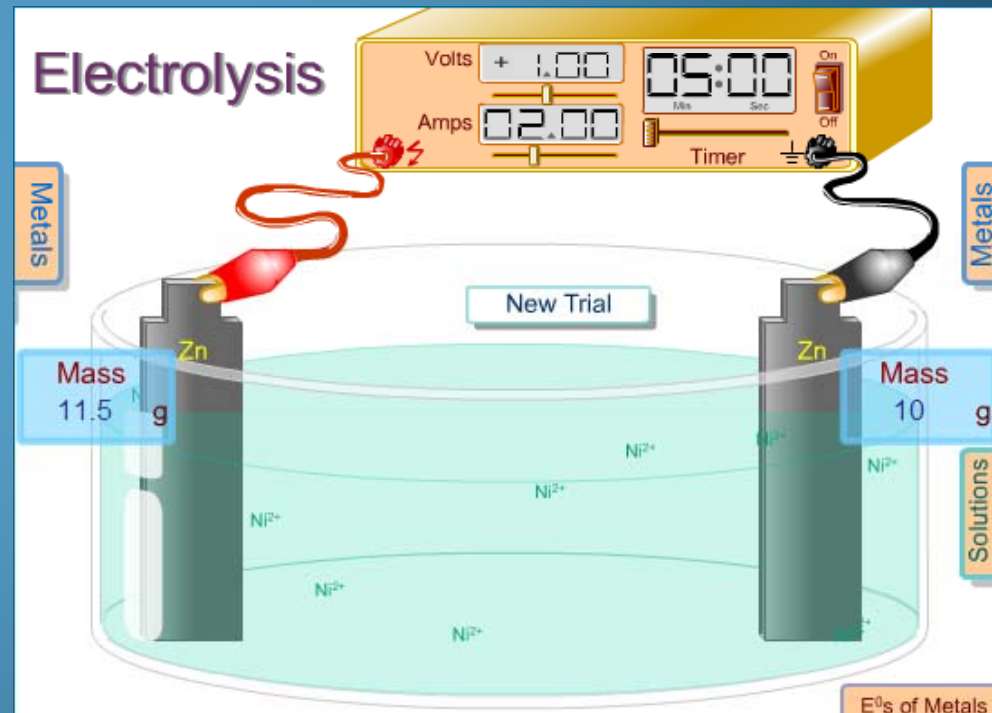
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Examples of Virtual and Remote Web Labs

- **Chemistry**

The Iowa State University provides a set of Virtual web Labs in Flash where students can carry out experiments about electrochemistry, gas laws, stoichiometry, and acid-base equilibria



Examples of Virtual and Remote Web Labs

- **Anatomy**

The Stanford University provides a set of online interactive media to teach human biology

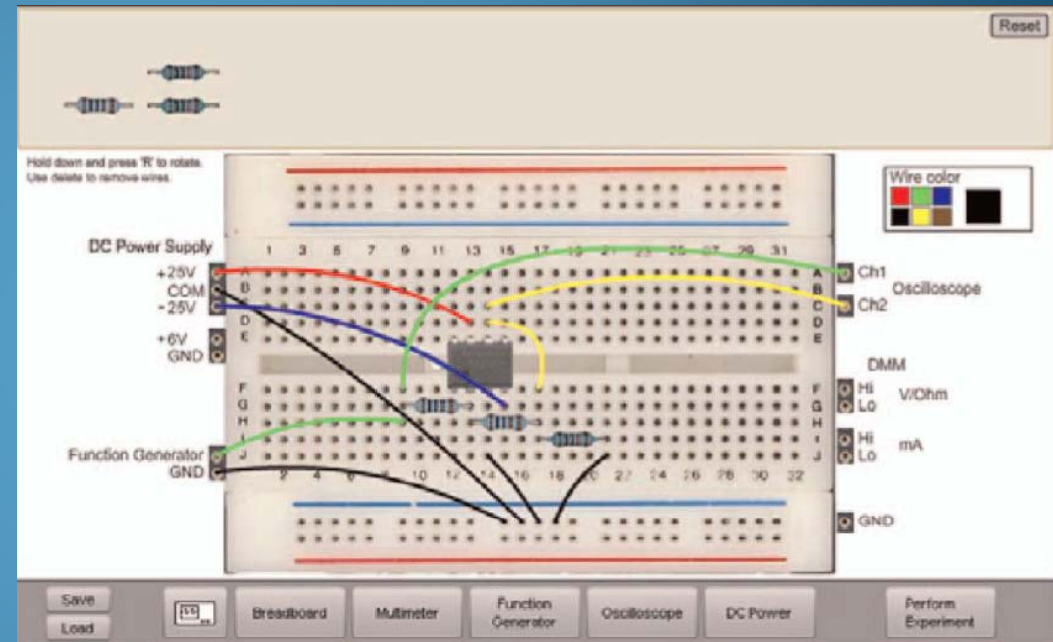
<http://virtuallabs.stanford.edu/>

The screenshot shows a web-based virtual lab interface. On the left is a navigation menu with a search bar and a list of topics including 'The Heart', 'Cardiac Cycle', 'Cardiac output', 'Fick's principle', 'Blood Vessels', 'Blood Pressure Meds', and 'Muscle Cells'. The main content area is titled 'Muscle Types: Smooth Muscle' and contains the following text: 'There are 3 different types of muscles in your body that differ in structure and functional mechanisms. You will examine samples from rat thigh, heart, and intestinal muscle tissue under the microscope and oscilloscope to see how their anatomical and physiological properties vary.' Below the text are three interactive elements: a microscope icon labeled 'Choose muscle', a circular inset showing pink striated muscle fibers with a red needle and a blue 'amp' label, and an oscilloscope icon labeled 'oscilloscope' showing a green waveform. A text box on the oscilloscope reads: 'Smooth muscle cells have very rapid depolarization, followed by a long plateau, and a terminal repolarization.' Below these elements, the text says: 'You have just picked **smooth muscle!** Smooth muscle does not have the same crossed striations as skeletal and cardiac muscles. Smooth muscle is found in the digestive tract, blood vessels, bronchioles, and in the ducts of urinary and reproductive systems.' A small image of the digestive tract is shown to the right. At the bottom of the interface, it says 'Muscle Cells > Smooth-low'.

Examples of Virtual and Remote Web Labs

- **Circuit analysis and electronics**

Visir project developed by Blekinge Institute of Technology (BTH) in Sweden that has created a lab workbench equipped with a unique remote control interface, enabling students to perform physical experiments at home or elsewhere



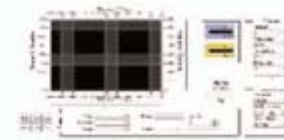
breadboard



multimeter



functiongenerator



oscilloscope

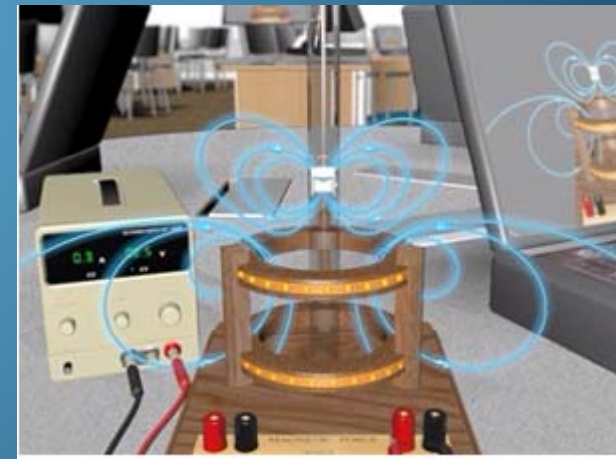
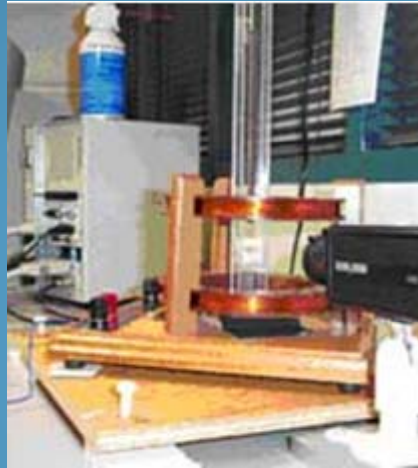


dcpower

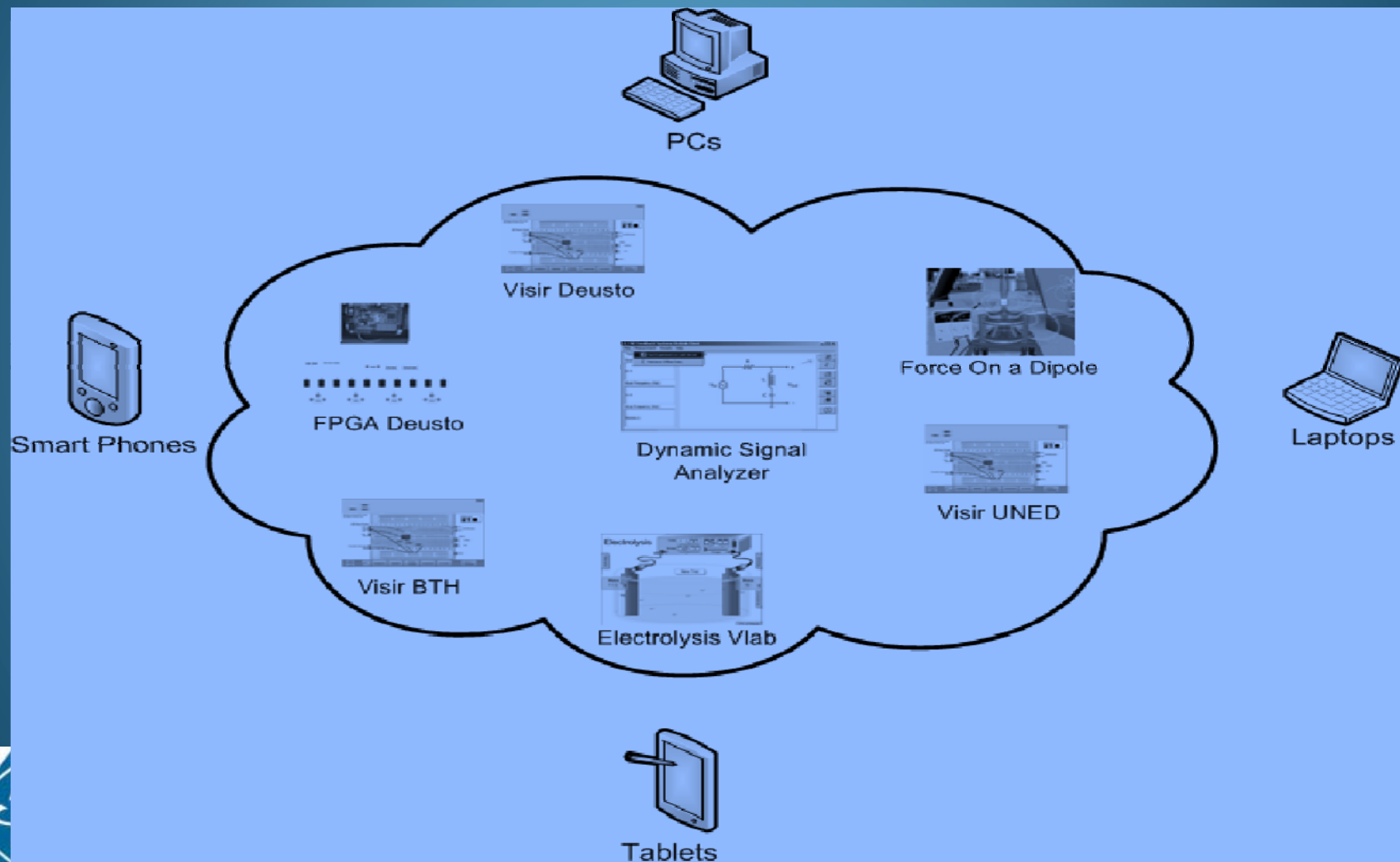
Examples of Virtual and Remote Web Labs

- **Physics**

Force On a Dipole Experiment from MIT. This Remote Lab consists of a small magnet suspended vertically by a spring in the center of two horizontally mounted coils



Virtual and Remote Web Labs In INTERNET



Sharing Virtual and Remote Web Labs

Currently, there are two main solutions:

- Shared architectures
 - iLab Shared Architecture (ISA)
 - WebLab-Deusto Architecture
 - SAHARA
- E-learning standards
 - W3C's Resource Description Framework (RDF) & Dublin Core (Lab2go)
 - SCORM (LILA)

IEEE Education Society
Working Group on
"Standard for Networked
Smart Learning for
Online Laboratories"
(PAR No. P.1876)



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Sharing Virtual and Remote Web Labs

Shared architectures provide a unifying software framework that can support access to a wide variety of online laboratories. Users and the online laboratories can be globally distributed across an arbitrary number of locations linked only by the Internet

- iLab Shared Architecture (ISA)
- WebLab-Deusto Architecture
- SAHARA



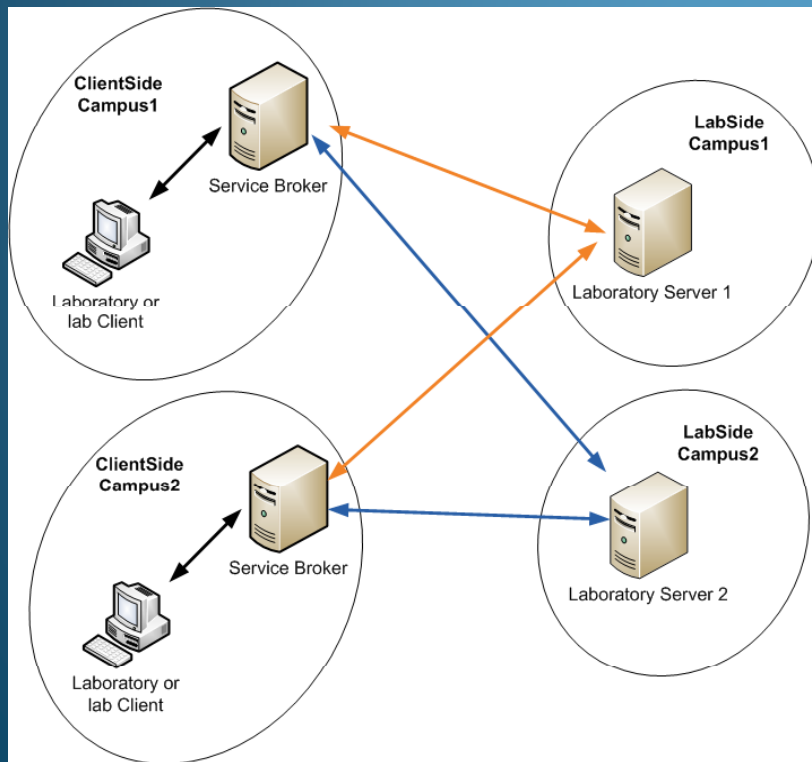
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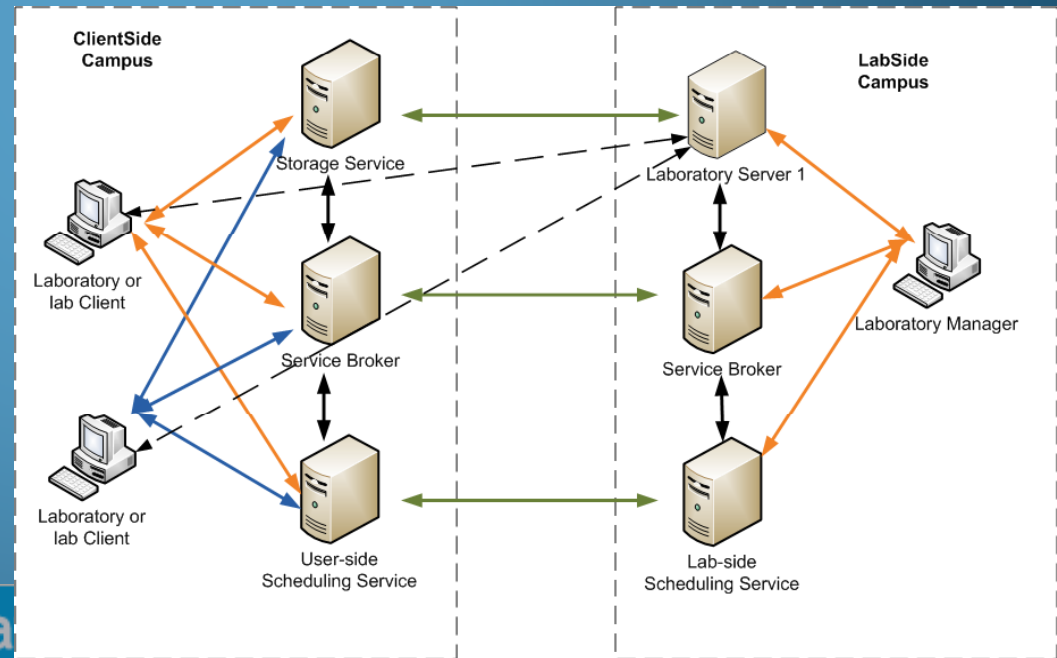
Examples of Shared Architectures

iLab Shared Architecture (ISA)

Batch Experiments



Interactive Experiments



Examples of Shared Architectures

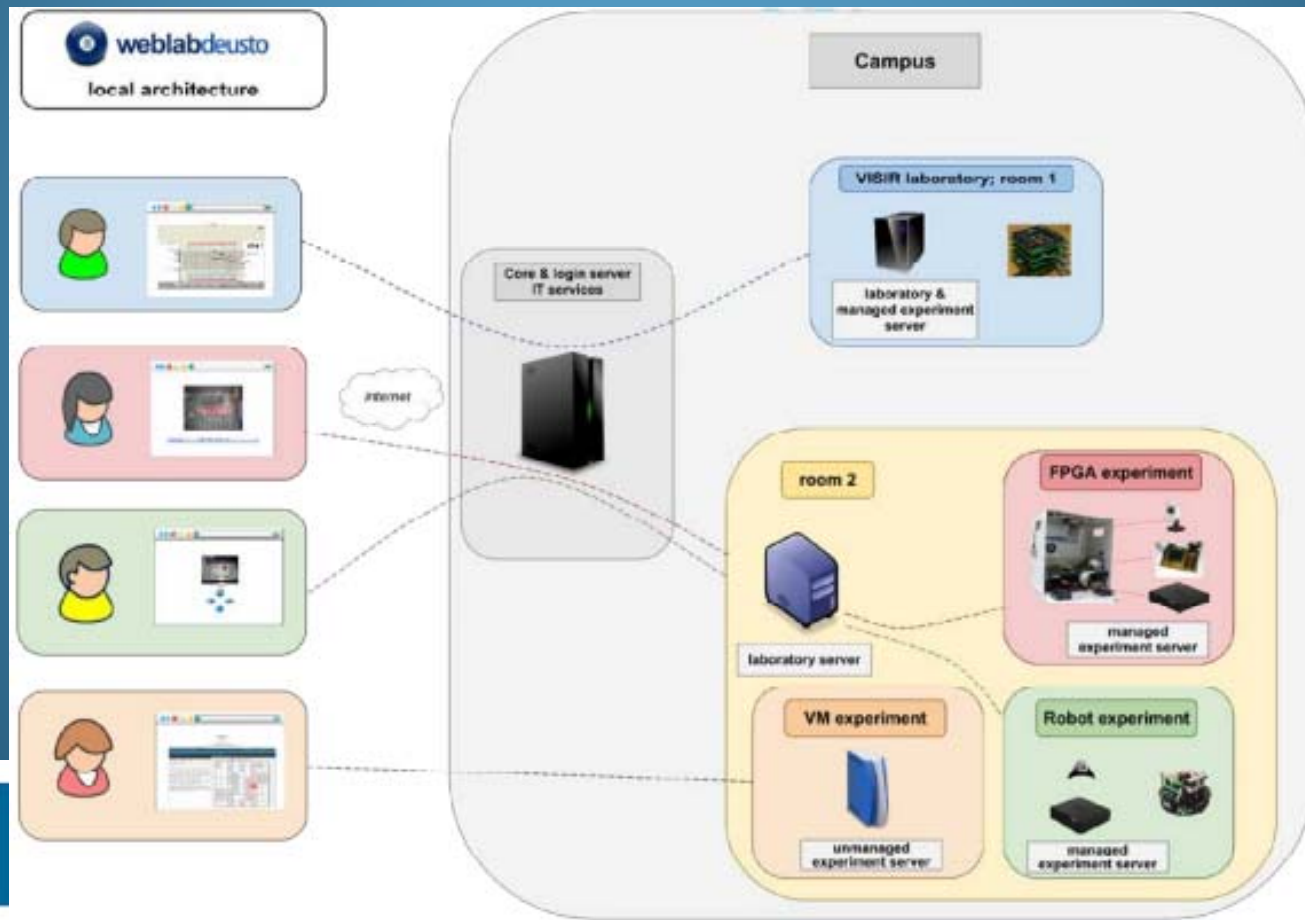
iLab Shared Architecture (ISA). At this moment is implemented in:

- Africa (Uganda, Nigeria, Tanzania)
- Asia (China)
- Europe (Austria, Stuttgart, Brasov, ...)
- Australia (Queensland, Melbourne)
- USA (Massachusetts)



Examples of Shared Architectures

WebLab-Deusto Architecture



Examples of Shared Architectures

WebLab-Deusto Architecture is implemented in:

- Deusto
- DIEEC (UNED)

Some of the laboratories are:

- FPGA
- Visir
- Managing a Robot

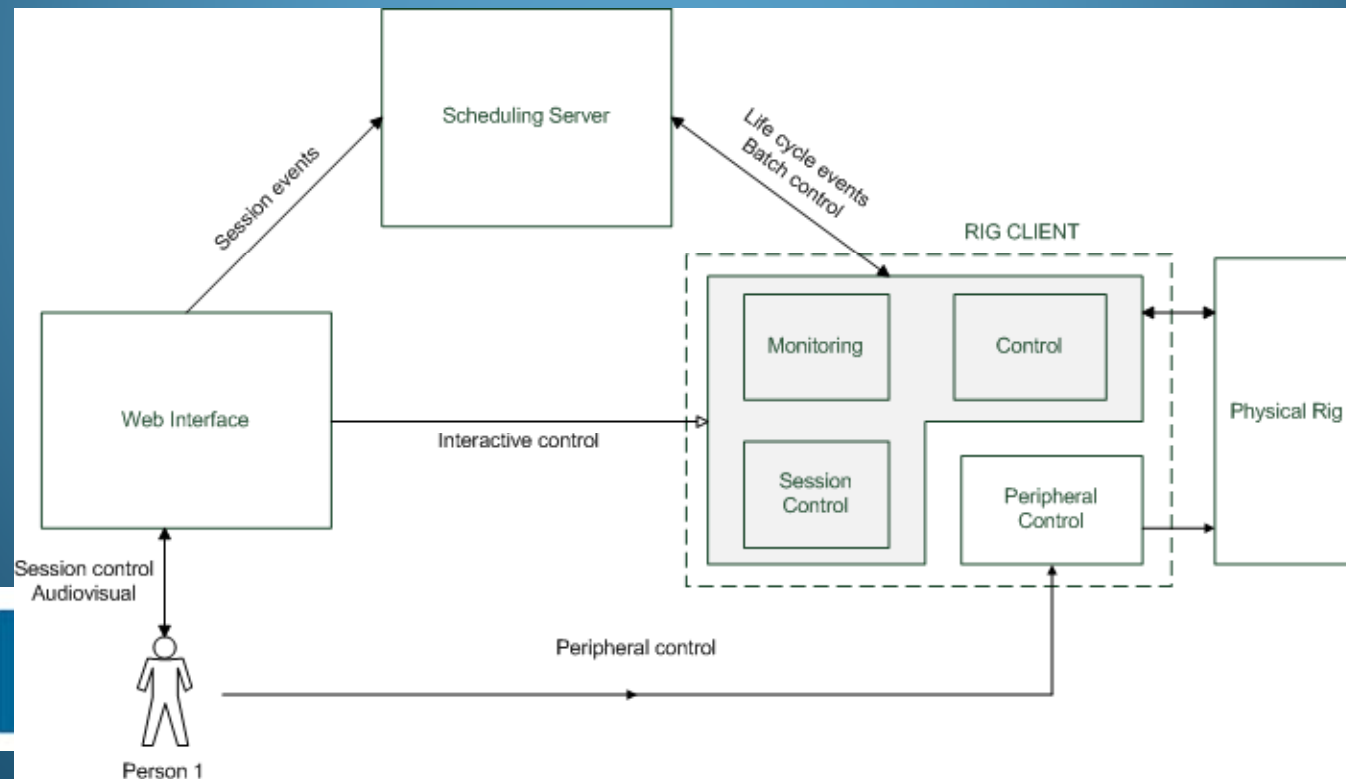


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Examples of Shared Architectures

SAHARA provides a network of remote laboratory that could be used by all Australian Universities



Examples of Shared Architectures

SAHARA is being used by:

- Curtin University of Technology
- Queensland University of Technology
- RMIT University, University of South Australia
- The University of Technology, Sydney



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Virtual, Remote Web Labs and Shared Architectures in INTERNET

Therefore:

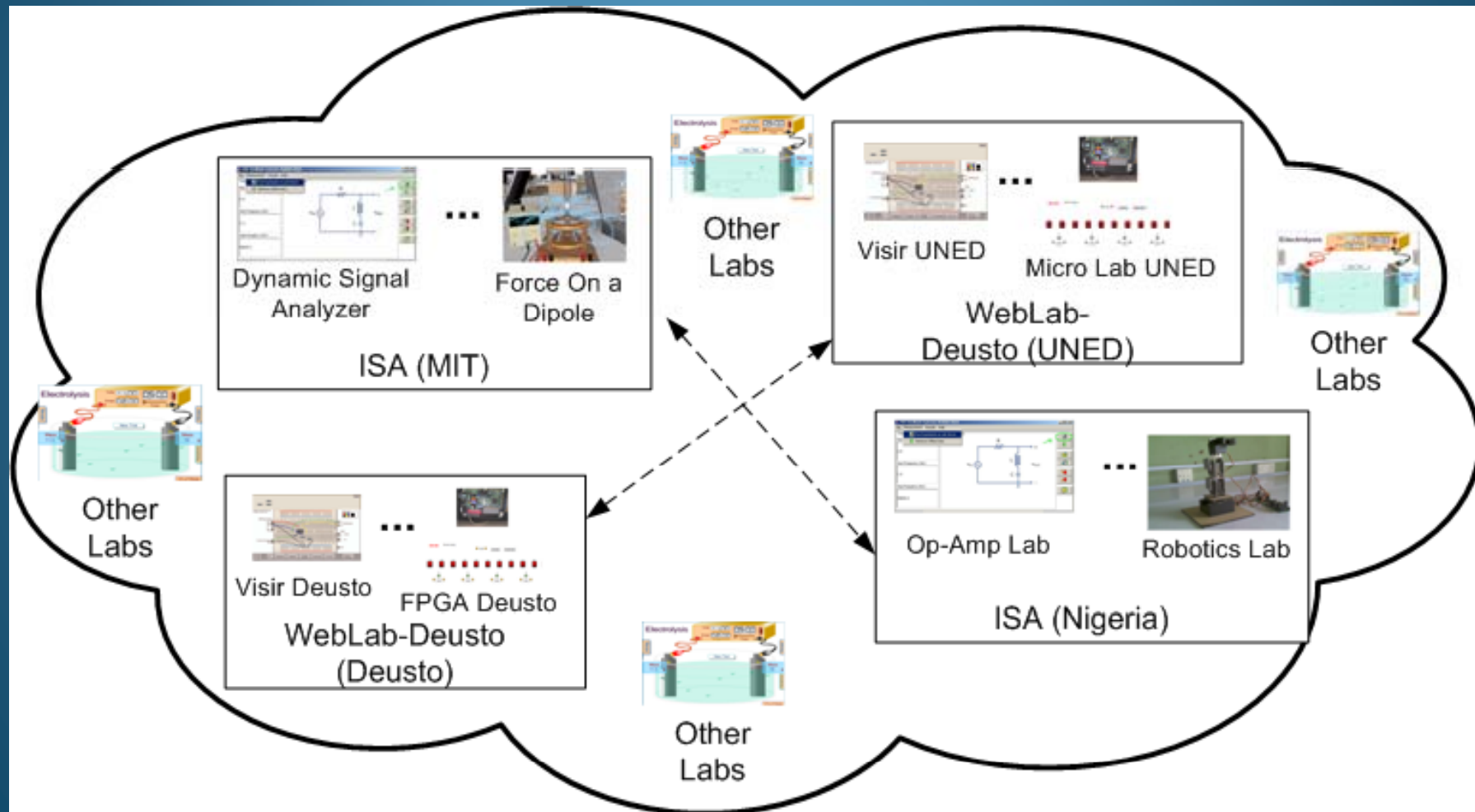
- Students of universities that have implemented some of the shared architecture are able to reuse Virtual and Remote Labs of other universities



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Virtual, Remote Web Labs and Shared Architectures in INTERNET



Challenges of Shared Architectures

- Currently these architectures are not able to speak (too much) each other. It is necessary to:
 - sponsor the design of an efficient mechanism for sharing, exchanging and trading access to online labs by creation of a global network of shareable experiments
 - lead the evolution of an architecture that enables the sharing of online labs by unified standards



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Challenges of Shared Architectures

- These challenges are being undertaken by



Challenges of Shared Architectures

- The Global Online Laboratory Consortium is composed by a great number of members, such as:

- University of Technology, Sydney
- Massachusetts Institute of Technology
- University of Deusto
- University of Stuttgart
- Carinthia University of Applied Sciences
- UNED
- Makerere University
- Technische Universität Graz
- The University of Queensland
- TU Dortmund University
- School of Engineering - Polytechnic of Porto
- Universidad EAFIT
- College of the North Atlantic Qatar
- Obafemi Awolowo University
- Nanyang Technological University
- RMIT
- Bleckinge Institut of Technology



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Using E-Learning Standards

The use of E-learning Standards make easier:

- Interoperability → offer e-learning resources on different platforms
- Migration among different versions of e-learning platforms
- Search and Reuse of E-learning Resources



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Using E-Learning Standards

Some of well-known e-learning standards are:

- Dublin Core & LOM IEEE. Both define a set of metadata which allow describing e-learning resources
- IMS Content packaging & SCORM. Both define how to pack e-learning resources to create more complex e-learning objects



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Using E-Learning Standards

- IMS Learning Design supports the use of a wide range of pedagogies in online learning
- IMS Question and Test Interoperability describes a data model for the representation of question (assessmentItem) and test (assessmentTest) data and their corresponding results reports



E-Learning Standards & Online Labs

Virtual and Remote Web Labs are enriched e-learning resources and therefore can be used with e-learning standards



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E-Learning Standards & Online Labs

- Some example of the use of e-learning standards and Online Labs are:
 - Lab2go Project
 - LILA Project



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E-Learning Standards & Online Labs

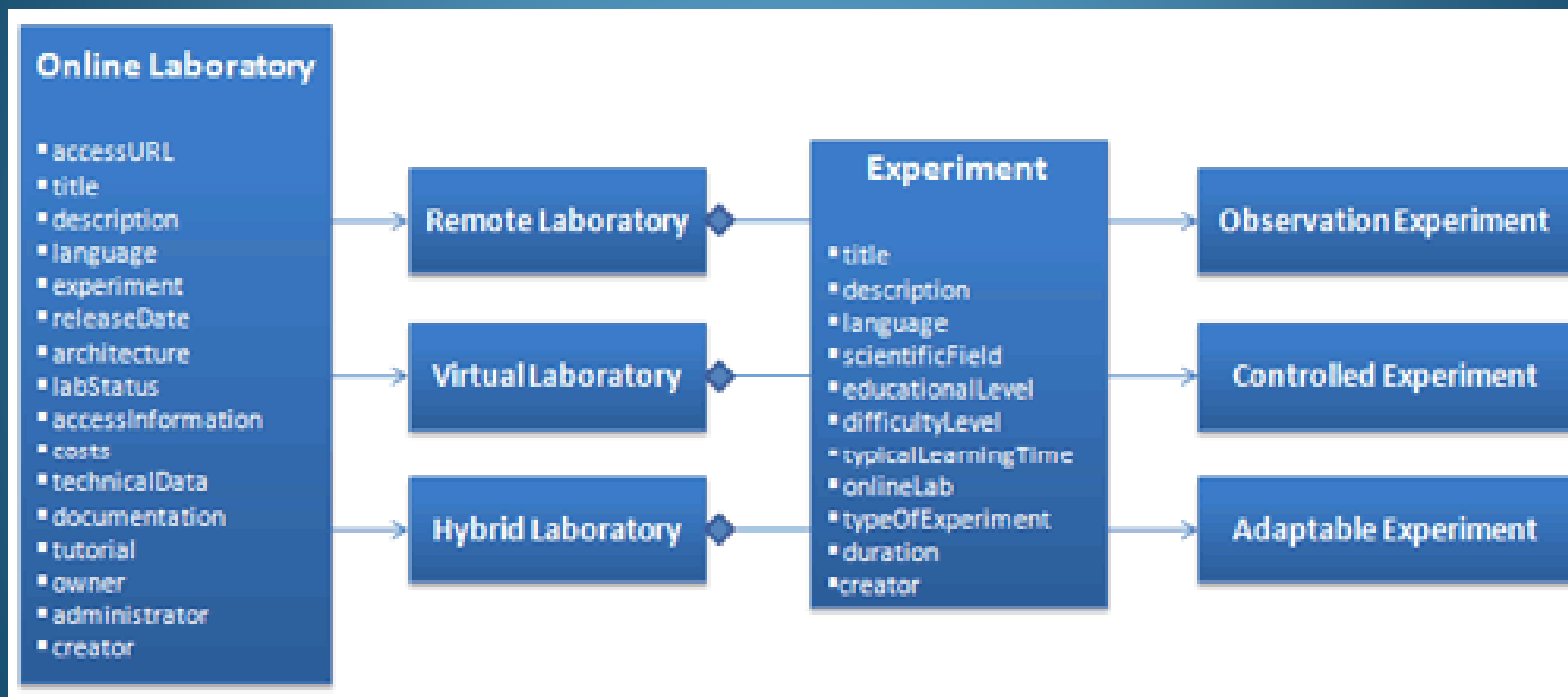
- Lab2go project has created a generic model ontology consisting of various properties to add laboratories such as remote laboratories, virtual laboratories, experiments, access URL, status, cost, release date, languages, description, administrator, etc.
 - This project adopts basic terminology and data types from **Dublin Core**



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E-Learning Standards & Online Labs



E-Learning Standards & Online Labs

The screenshot displays the Lab2Go web application interface. On the left, there is a navigation sidebar with a 'Menu' section containing 'Lab2Go', 'User', 'MetaData', and 'Help'. Below this is a search bar labeled 'Search for Resources' and the Lab2Go logo. The 'Navigation' section includes links for 'Online Laboratory', 'Experiment', 'Subject', 'Agent', 'Client Requirements', 'Scientific Field', 'Architecture', and 'Document'. A 'Login' section offers 'Local' and 'OpenID' options, with fields for 'Username' and 'Password', a 'Remember me' checkbox, and 'Login' and 'Register' buttons.

The main content area is titled 'Resource List' and features a list of 10 online laboratories. The list is as follows:

1. Virtual Laboratories in Probability and Statistics - Finite Sampling Models
Online Laboratory
2. Virtual Laboratories in Probability and Statistics - Bernoulli Trials
Online Laboratory
3. Virtual Laboratories in Probability and Statistics - The Poisson Process
Online Laboratory
4. Virtual Laboratories in Probability and Statistics - Random Samples
Online Laboratory
5. Network
Online Laboratory
6. Virtual Laboratories in Probability and Statistics - Hypothesis Testing
Online Laboratory
7. Virtual Laboratories in Probability and Statistics - Set Estimation
Online Laboratory
8. Virtual Laboratories in Probability and Statistics - Games of Chance
Online Laboratory
9. Virtual Laboratories in Probability and Statistics - Distributions
Online Laboratory
10. PhET
Online Laboratory

On the right side of the interface, there are two utility panels. The 'Explore Tags' panel shows a list of tags including 'distribution', 'Cisco', 'control', 'Security', 'IPS', 'random variable', 'Plant', 'CISCO', 'BGP', 'statistics', 'probability', 'statistic', 'probability distribution', 'gene', 'Game', 'PC WORX', 'temperature', 'Network', 'probabilities', and 'standard deviation'. The 'Show Properties' panel lists various attributes such as 'type', 'Description', 'Access Requirement', 'Architecture', 'Lab Status', 'Has Part', 'Language', 'Requires', 'Rights Holder', 'Access URL', 'Cost', and 'Date Created'.

E-Learning Standards & Online Labs

- LILA project. Consists of a web server running the LiLa portal and a database for keeping the experiments, and a second database for the booking and reservation time slots and the corresponding booking and reservation codes. Experiments are, as already described earlier, represented by **SCORM packages**



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E-Learning Standards & Online Labs





Home | About | **LiLa Content** | Resources | Contact

You are here: Home » LiLa Content

LiLa Content

The following list represents the initial content to be integrated into the LiLa environment. The project is open for additional content providers.



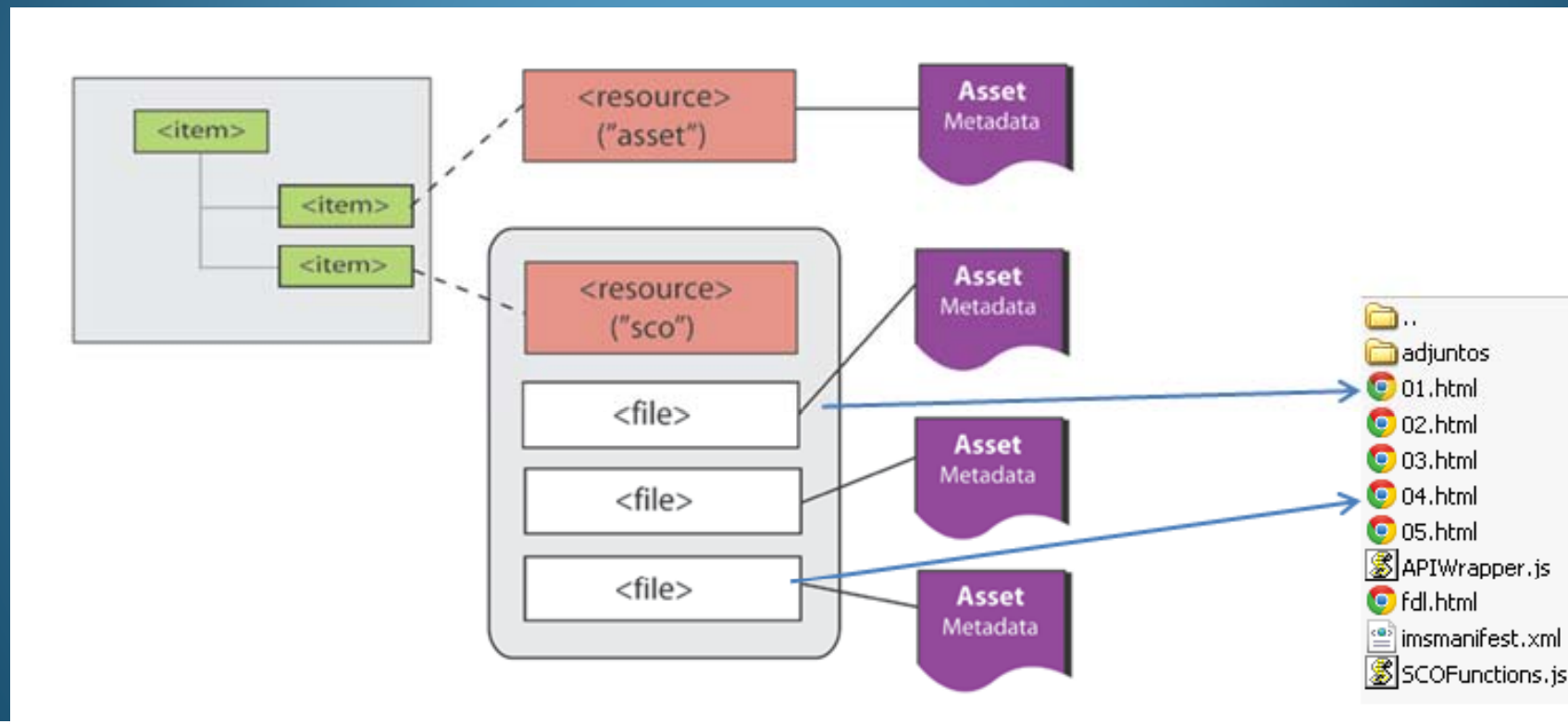
co-funded by the
Community Programme
eContentplus

Content	Description	Type	Content Provider
VideoEasel	Laboratory for statistical mechanics, about 90 experiments (magnetism, lattice gas, population dynamics, oscillating reactions...)	Virtual Lab	Rechenzentrum Universität Stuttgart
Remote Farm	16 experiments (magnetism, electrical oscillator, Raman-Spectroscopy...)	Remote Experiments	Technische Universität Berlin
Cambridge Weblabs	Two setups: combustion flame experiment & reactor web-lab	Remote Experiments	University of Cambridge
SRM web-suite	Combustion engine simulations	Simulations	Computational Modelling Cambridge Ltd.
LTFN	Optical properties of thin films, Nanomechanical properties of thin films, Nanotopography	Remote Experiments	Aristotle University Thessaloniki
NanoWorld	Six setups: Virtual pharmacy experiments, electro chemistry, fluorescent dipoles, atomic flat silicon surfaces...	Virtual Experiments	Universität Basel
NanoWorld	Nine setups: Remote atomic force microscope, data acquisition of sensors, harmonic oscillator,...	Remote Experiments	Universität Basel
OMNotebook	An electronic notebook based on the programming language Modelica, suitable for Multi-domain acausal simulations, e.g any type of system that can be described by coupled differential equations (flight simulation, racing car, robots, automatic gearbox and many more)	Simulations	Linköpings Universitet



Challenges of E-Learning Standards & Online Labs

Structure of SCORM Package



IEEE

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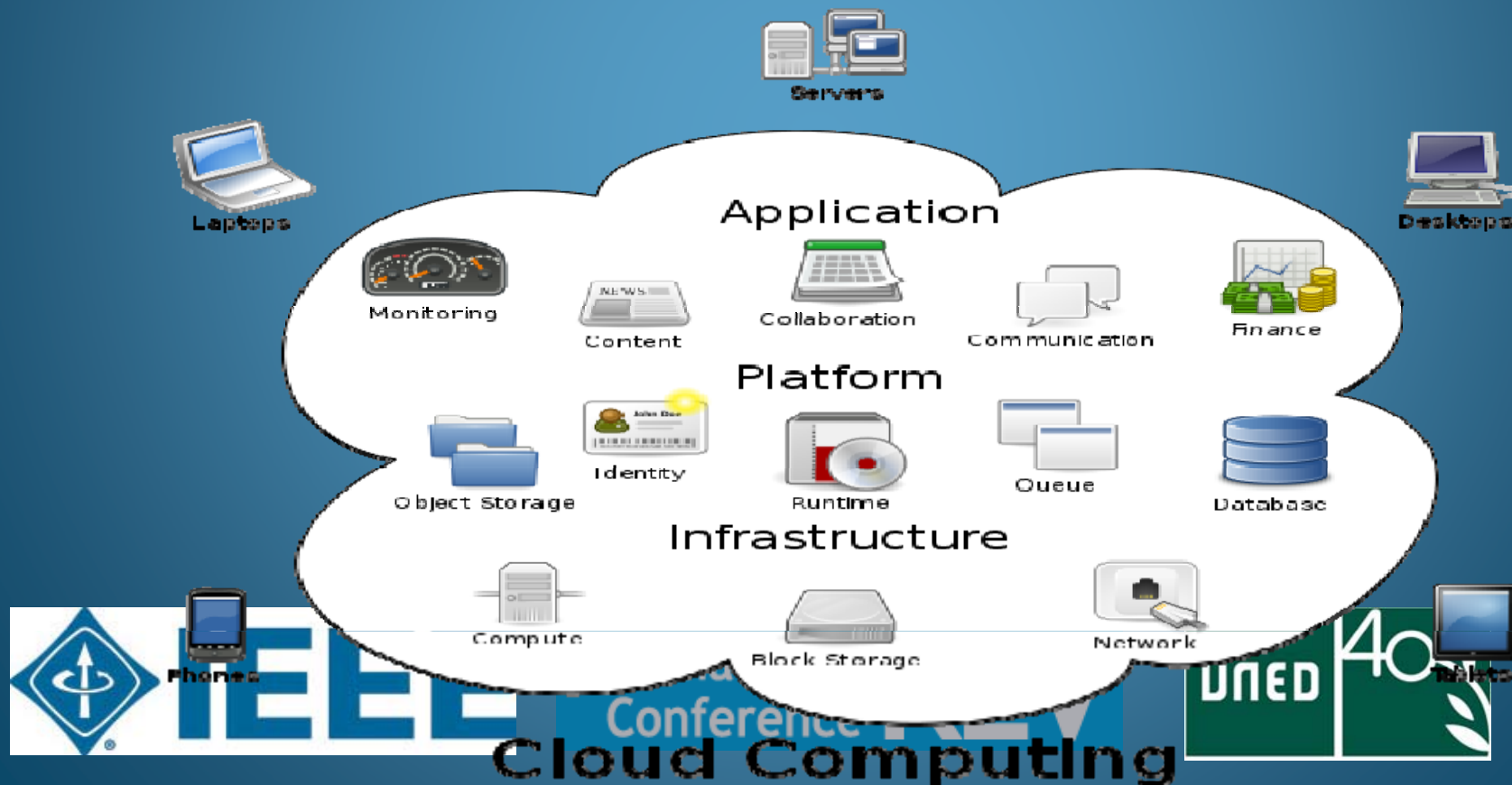
Challenges of E-Learning Standards & Online Labs

- Although SCORM is used to pack e-learning resources. Several issues must be considered:
 - The packaging of rich multimedia and interactive e-learning content is restricted by current online learning environment that uses SCORM
 - SCORM should have an authentication mechanism, particularly to Protect Assessment Data
 - SCORM should use current programming standards. It is recommended that SCORM use a RESTful API to decentralize the architecture



Challenges of E-Learning Standards & Online Labs

- To mash-up, nowadays Internet is a set of services, applications and infrastructures



E-Learning Standards & Online Labs

- Therefore new e-learning standards are being developed such as **Next Generation SCORM** focus on:
 - Tracking of detailed learner interactions and learner performance characteristics that are richer in scope and depth than assessments involving score thresholds
 - Tracking of out-of-browser content to include games, simulations, virtual worlds and mobile apps



E-Learning Standards & Online Labs

- Launching and tracking of multi-modal content that renders intelligently based on device (ex. **tablet, smart phone, laptop**) **not only in LMS**
- Accessing to learner data during or after the learner experiences the content
- Hosted content via a content as a **service (CaaS) model**

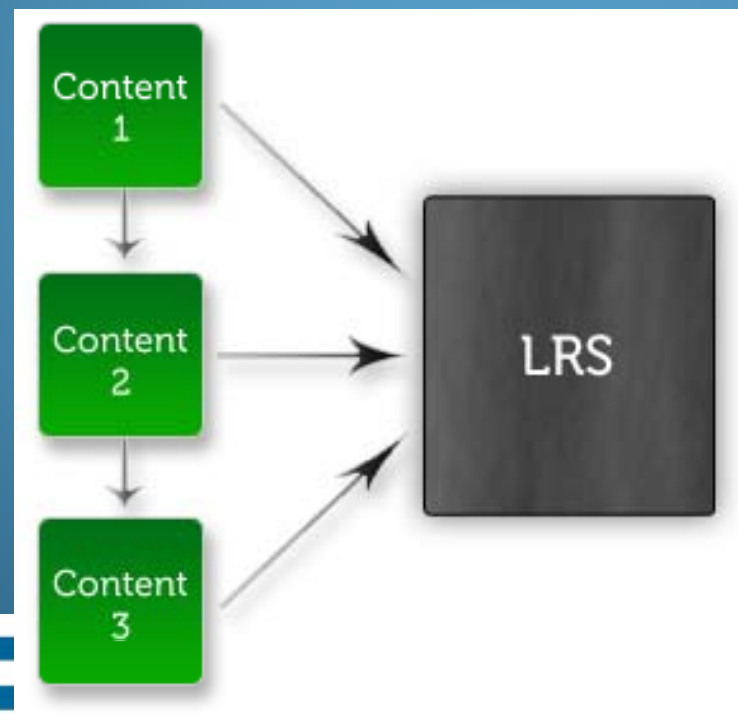


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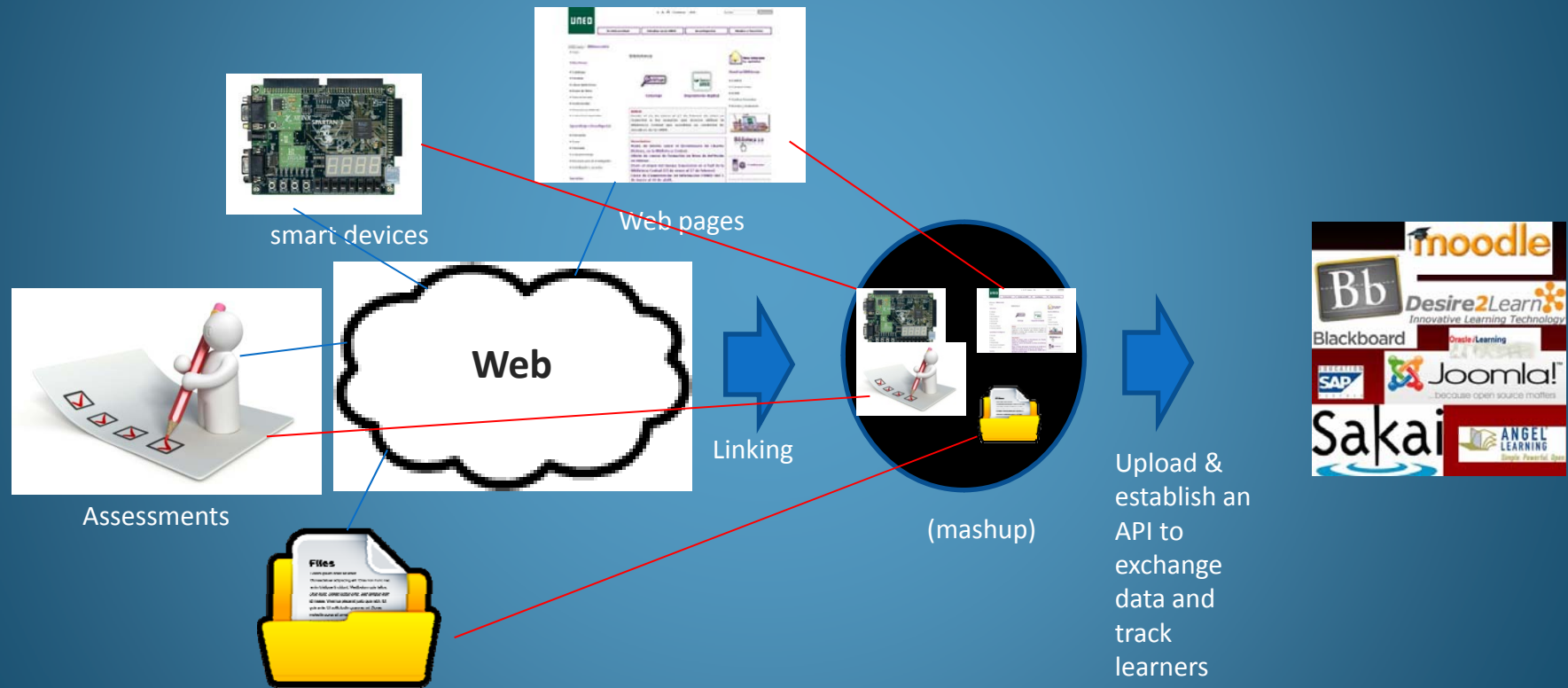


E-Learning Standards & Online Labs

The e-learning resources such as assessments, files, applications are in Learning repositories



E-Learning Standards & Online Labs



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Online Labs & Education

Virtual and Remote Web Labs are e-learning resources, and they must be used along with other e-learning resources & services, such as:

- Assessments
- Forums
- User tracking
- Tutorials (Web, PDF, etc.)



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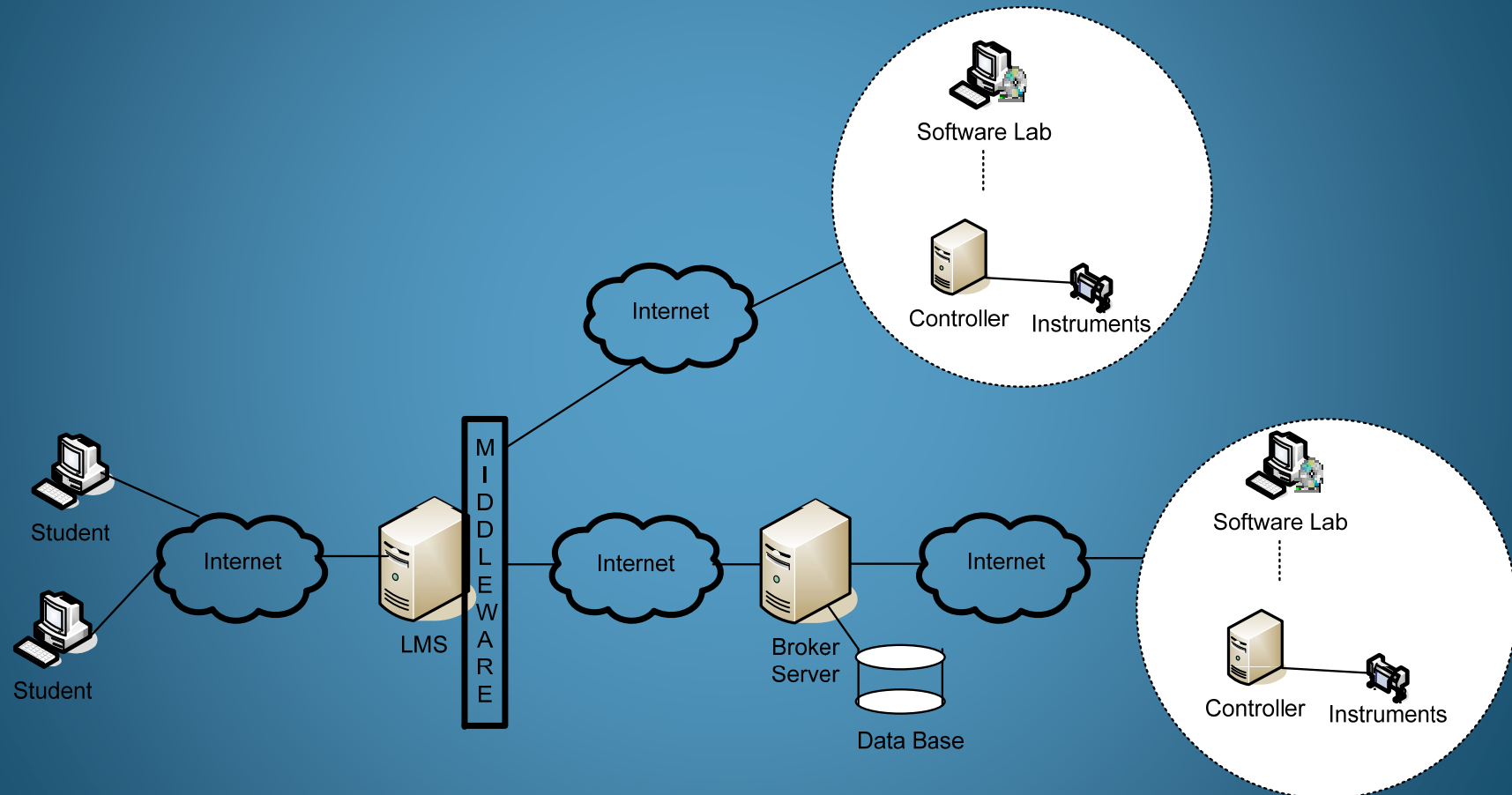


Online Labs & Education

- As it has been SCORM can be used In LMS
SCORM Complaint
- Other possibility is that Virtual, Remote Web Labs and Shared architecture provide a set of APIs and these can be used by e-learning systems



Online Labs & Education

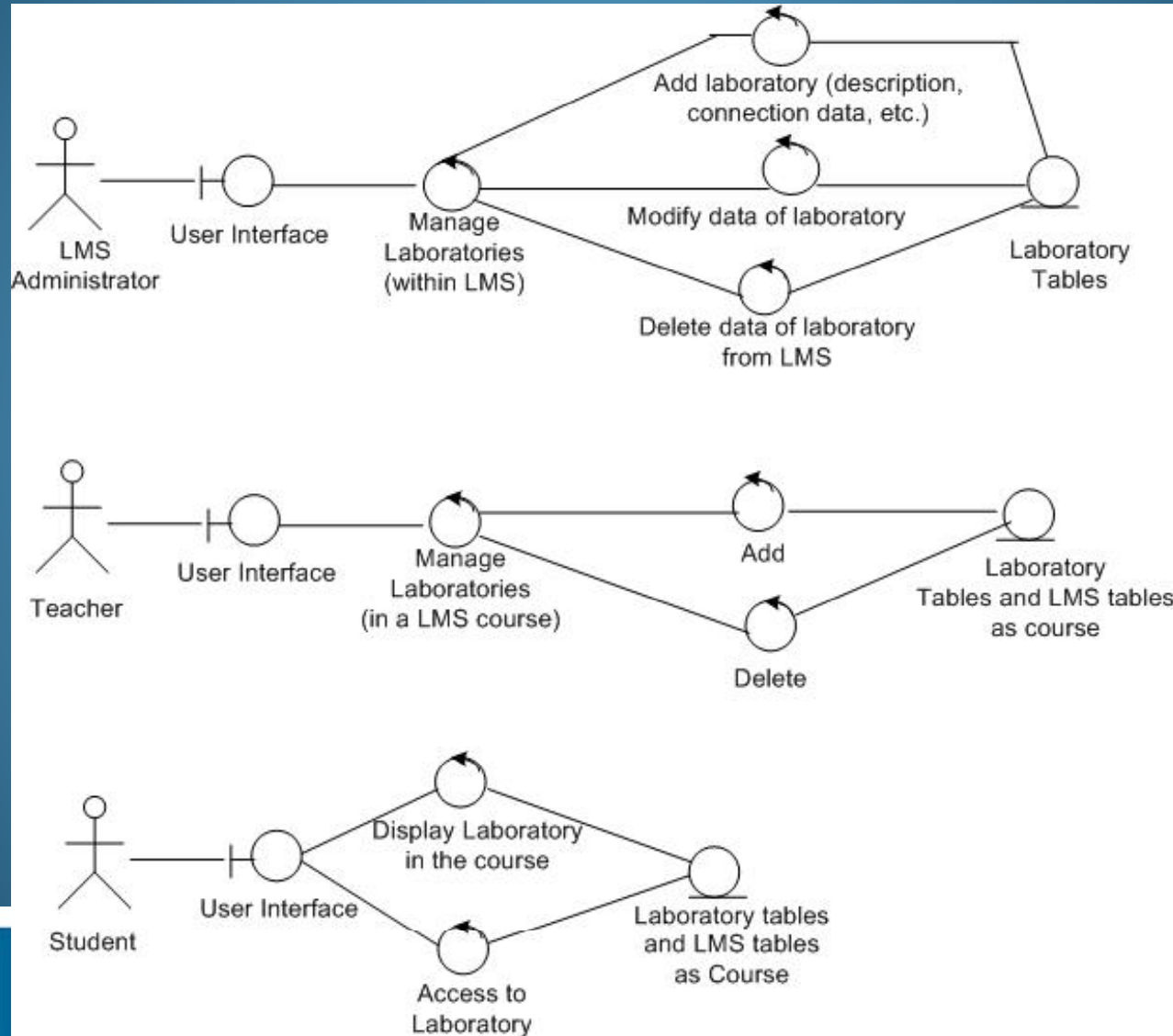


Online Labs & Education

- To do this, the main idea is to create an activity or module in a LMS (the less code possible to allow being translate a some LMS)
- And the main goal is to split the creation of learning scenarios in different roles



Online Labs & Education



Online Labs & Education

- This idea has been developed for DIEEC from UNED
- This idea is evolving a new concepts and issue such as:
 - Use of new e-learning standards
 - There are institutions which use other e-learning system and **free courses and communities**



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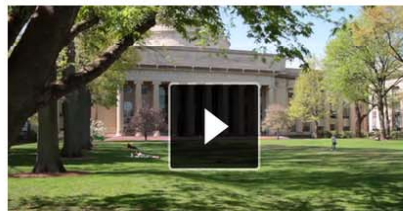
Online Labs & Education

- **Massive open online course (MOOC) and free learning communities**
 - MITx will offer a portfolio of MIT courses for free to a virtual community of learners around the world



MITx will offer a portfolio of MIT courses for free to a virtual community of learners around the world. It will also enhance the educational experience of its on-campus students, offering them online tools that supplement and enrich their classroom and laboratory experiences.

The first MITx course, 6.002x (Circuits and Electronics), was launched in an experimental prototype form. Watch this space for further upcoming courses, which will become



ANNOUNCEMENT



On May 2, it was announced that Harvard University will

Online Labs & Education

- COURSERA provides courses from universities such as, Princeton or Stanford , for free

Coursera Courses Jobs Contact Us Sign In

Education for Everyone.
We offer courses from the top universities, for free. Learn from world-class professors, watch high quality lectures, achieve mastery via interactive exercises, and collaborate with a global community of students.

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PRINCETON UNIVERSITY STANFORD UNIVERSITY M UNIVERSITY OF MICHIGAN Penn UNIVERSITY OF PENNSYLVANIA

Recently Announced

Algorithms: Design and Analysis, Part I
Stanford University
by Tim Roughgarden, Associate Professor

In this course you will learn several fundamental principles of algorithm design: divide-and-conquer methods, graph algorithms, practical data structures, randomized algorithms, and more.



Online Labs & Education

- Udacity → provides courses where students learn solving challenging problems and pursuing projects with world-renowned university instructors

Meet Udacity!

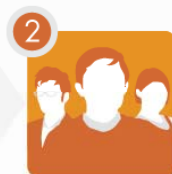
Udacity is a totally new kind of learning experience. You learn by solving challenging problems and pursuing udacious projects with world-renowned university instructors (not by watching long, boring lectures). At Udacity, we put you, the student, at the center of the universe. [Keep Reading](#)

The Four Elements of Udacity



1
Take any of our 11 classes. 100% free!

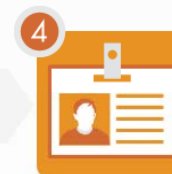
[Course Catalog](#)



2
Join a community of 112,091 active students and instructors. 100% free!



3
Optionally certify your skills online or in one of our 4,500 testing centers, for a fee.



4
Optionally let us hand your resume to one of our 20 partner companies. 100% free for students!



Online Labs & Education

- Harvard University and the Massachusetts Institute of Technology (MIT) have developed edX. The two institutions will collaborate to enhance campus-based teaching and learning and build a global community of online learners



Online Labs & Education

- UNED, Massachusetts Institute of Technology, CSEV, Telefonica and Banco Santander are collaborating on a project of higher education on line for Spanish- and Portuguese-speaking countries to simplify and have easy Industry-related activities and collaborative environment in economics activities



Online Labs & Education

- Virtual and Remote labs must be able to be elements of these courses and communities
 - Challenges, such as:
 - Open access
 - Security
 - Ubiquity
 - E-learning Services
- Must be reconsidered with new ideas, Standards and architectures



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New Ideas to Create Online Labs

According to IEEE Technology Time Machine several ideas and concepts must be considered

2011 IEEE Technology Time Machine (TTM)

Sponsored by

Assessment of Future Technologies

◆ Conference Details

Dates 01 Jun - 03 Jun 2011

Location Sheraton Hong Kong Hotel
Hong Kong, China

Web site > www.techbeyond2020.ust.hk/

Contact William Tonti
445 Hoes Lane
USA Piscataway NJ 08854
[+1 732 562 6060](tel:+17325626060)
w.r.tonti@ieee.org

Conference # 18585

Attendance 250

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Conference Focus

- Application
- Science

> [Back to search results](#)

- IoT
- Cloud (Service) Computing
- Mobile and ubiquitous systems
- Security
- Smart Grids
- Health & Biosystems



New Ideas to Create Online Labs

“Internet of Things (IoT) refers to the vision that in the next 20 years, a revolution in device-to-device communication will take place that will be comparable to the revolution in person-to-person communication that erupted in the last two decades with the Internet and World Wide Web”



New Ideas to Create Online Labs

We will be able to browse I or “things” just as today we search for information. We will be able to create environments out of things, just as today we can mash up services and information

This “things” have embedded intelligence, an embodiment of the IoT can function quite autonomously, making decisions and taking actions that would normally require human activity



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New Ideas to Create Online Labs



Security in e-learning systems

Biometric & Fingerprint



Biometric Technology

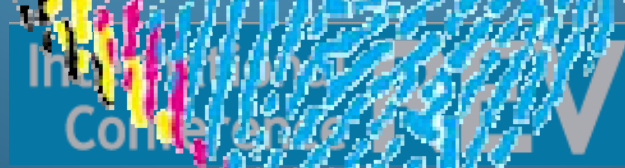
- According to “Biometric Market Forecast to 2014”, biometric technologies:
 - Widely accepted
 - Adopted in POS, ATM, border security and so on



Biometric Technology

Fingerprint recognition dominates

the world market of biometric technology



Biometric Technology

- Companies search for application with a fast integration
- The biometric authentication security architecture multilayer would be the future of network security



Biometric at Labs

- Combination of Labs and technology emergent
- Exams by Internet – NEED an automatically control module



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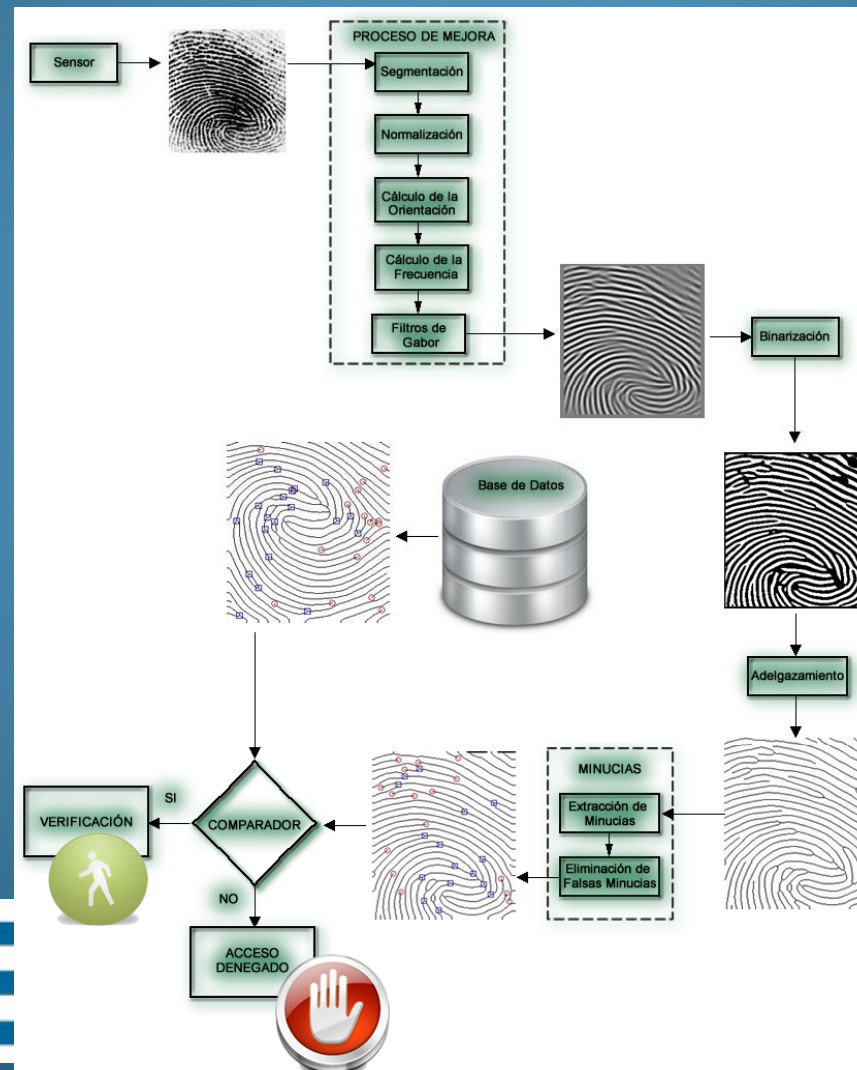
Biometric at Labs

- BUT, practical activities with real instrumentation by Internet – NEED a biometric system

- For his own benefit
- For the institutions'



Generic Diagram of Biometric for example uses of Fingerprint



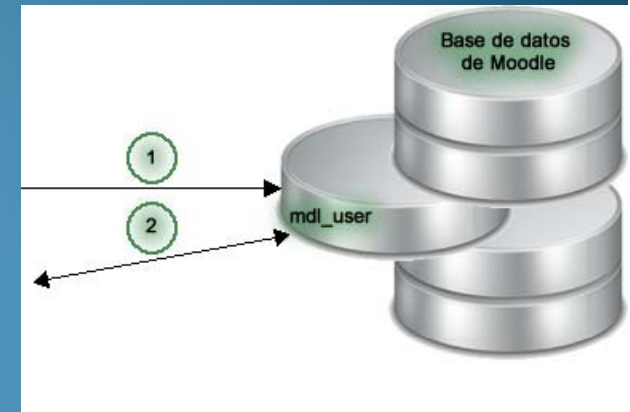
Biometric at Labs

- Traditional authentication (IDN, password, ...) + Biometric
- LMS to connect us with Labs – such as Moodle
- Case of study
 - Moodle (user name + password) & Biometric



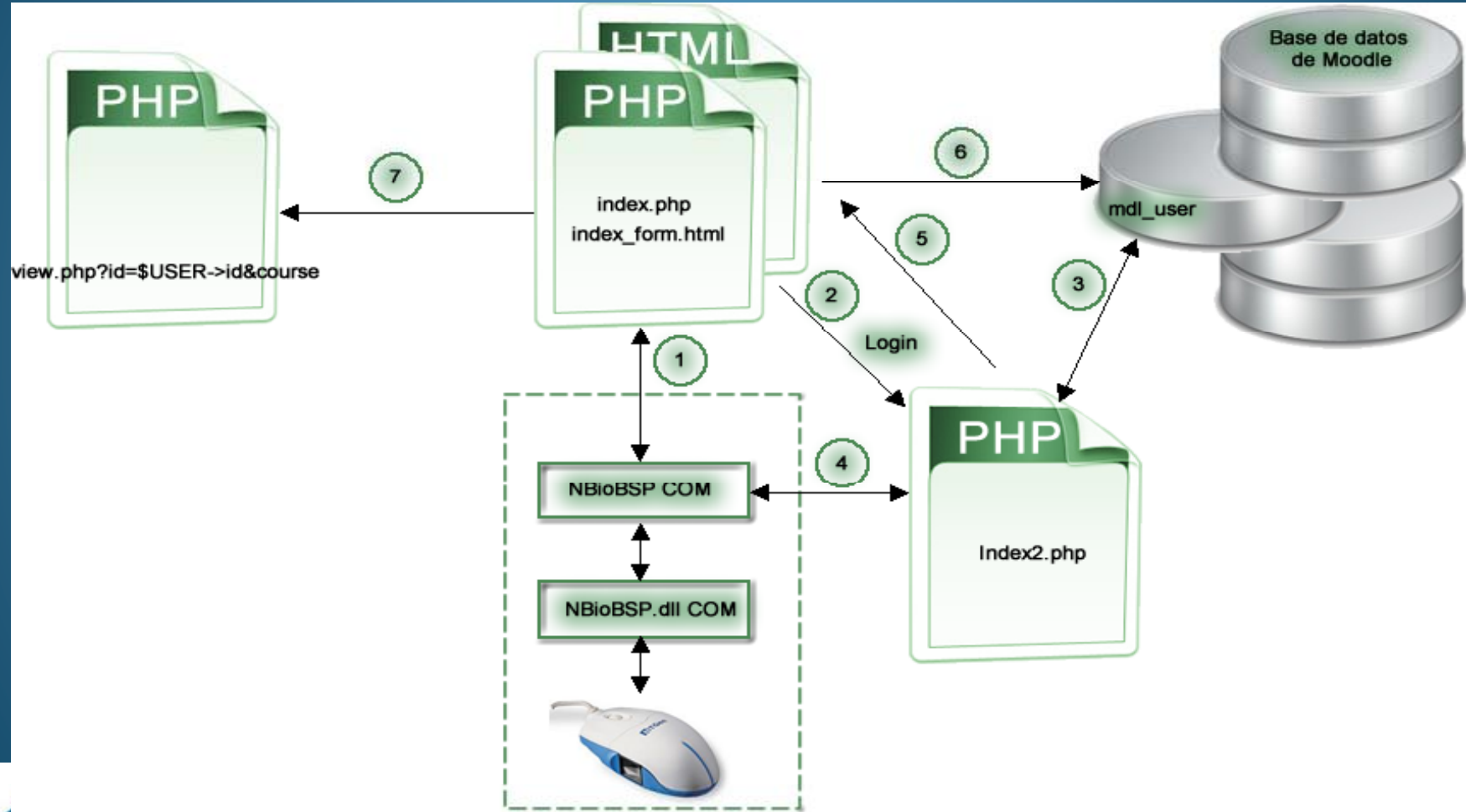
Biometric at Labs

- New login
 - Biometric sample stored in Moodle DB
 - At enrolment – it is stored
 - Login – match it in every access



- New files and changes in *login/* folder
- A new field (Biometric sample) in *mdl_user* table of DB Moodle

Biometric at Labs – How?



Biometric at Labs – Real case

- Date – June, 2010
- Seek – receptivity of the users
 - The use of biometric control as a method of verification
- Sample size – 23 students
- In the segment from 26 to 35 years old
- With a college degree



Biometric at Labs – Real case

Most important Q/R in the Survey about E-learning activities

Questions	Rate
How do you consider the register via fingerprint to access to the courses in Moodle?	47,8% students consider it is convenient or very convenient
If you had to choose one biometric technology to access Moodle courses, which one you would choose?	52,2% Fingerprint
Do you consider that it was easy to access the course in Moodle using fingerprint verification?	78,3% easy or very easy
How would you consider your knowledge of biometrics?	60,9% without knowledge level
Have you ever used the biometric access control?	73,9 % Never

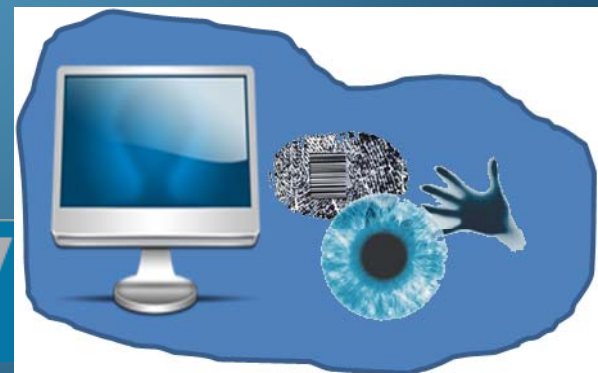
Biometric at Labs – Real case



- Results – a positive trend of the use of biometric control as a way of access to e-learning activities
- Safer, easier and faster
- Some biometric technologies are integrated in our laptops – best-known



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Biometric in High Education – Future project

- Challenge:

Convert the distance into an advantage



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Biometric in High Education – Future project

- Future project – Face recognition
 - Key – Biometric systems, more than a control system
 - Intelligent control of emotions (angry, worried, happy, etc.)



IEEE

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Biometric in High Education – Future project



- DIEEC website as a tool for students
- Interactive display at information point at Industrial Engineering School



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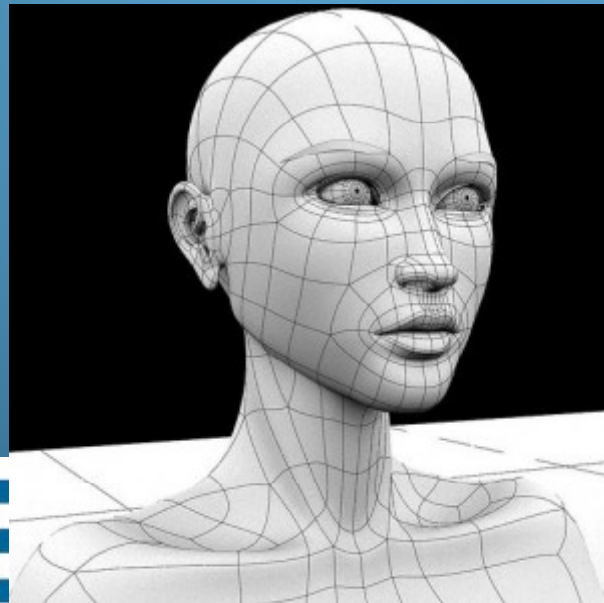
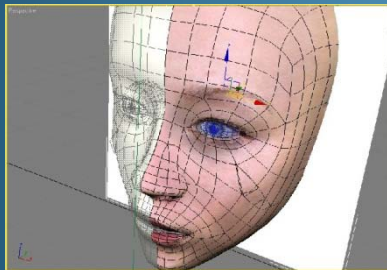
Biometric in High Education – Future project

- Robots to interact with children with disabilities



Biometric in High Education – Future project

- Serious Games
- 3D Animation for educational purposes



Ubiquity in e-learning systems

Future Technologies for Engineering Education

Mobile devices

The screenshot shows the website for the IEEC Research Lab. At the top, it reads "Research on Technologies for Engineering Education" and "Electrical & Computer Engineering Department (DIEEC) | Spanish University for Distance Education (UNED)". Below this is a blue circuit board graphic. On the left is a "Menu" with items: Presentation, Labs, Labs Infrastructure, Integration of Labs in LMS, Virtual and Remote Labs, FPGA Remote Lab, Microprocessor Remote Lab, PICs Remote Lab, VISIR - Electronics Remote Lab, Fluids Remote Lab, and Karnaugh's Map Virtual Lab. The main content area is titled "Presentation" and states: "The IEEC Research Lab is devoted to the advancement of knowledge and improvement of distance engineering education, especially. The main research areas are the following:". Below this, a diagram shows "Virtual/Remote Labs" at the top, with "Learning Objects" and "Learning Management Systems" on either side. At the bottom of the diagram are "Biometrics" and "Mobile Learning", with a purple flower logo in the center.

<http://ohm.ieec.uned.es/portal/>



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Mobile devices

- Some experiments are made with technologies not supported by mobile devices:
 - Flash on iOS devices
 - Microsoft Silverlight



Mobile devices

- Some experiments do not make sense to use them in a mobile device:
 - Because you have to program or compile something (a file) previously with a computer-based tool
 - e.g., microprocessor remote lab
 - Because screen is too small
 - Tablets could help



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Mobile devices

- Ways of using experiments on mobile devices:
 - Native app (iOS or Android) for the experiment
 - Provides more control over the device capabilities
 - Expensive to create and maintain
 - Specific development for each platform



Mobile devices

- Ways of using experiments on mobile devices:
 - Integrated on an enriched ebook
 - It allows its use together with the theory and assessment
 - Web-based experiment adapted to mobile device
 - Reduces development efforts



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Mobile Web adaptations

- Provide a proper layout. Developers should think what is actually going to be used from a mobile device, and how may the user see it in a small screen
- Provide the required contents. Developers should think what contents are going to be migrated to the mobile version
- Avoid plug-ins. Some plug-ins are not available in all devices, such as Flash or Microsoft Silverlight



What will the future bring?

According to IEEE Technology Time Machine several ideas and concepts must be considered



IEEE Technology Time Machine
Symposium on Technologies Beyond 2020
May 23-25, 2012, Dresden, Germany

IEEE

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Overview
Committees
Venue
Important dates
<< Back to Home

**Thanks to everyone who took part at the
2nd IEEE Technology Time Machine in Dresden 2012.**

Following the second IEEE Technology Time Machine in Dresden, the feedback of speakers, attendees and exhibitors encouraged us to announce that the TTM 2012 was a true and full success.

The event brought together internationally renowned industry leaders and scientists from over 30 countries who discussed and looked at technologies beyond 2020. Locating the TTM in the beautiful city of Dresden proved very popular with our guests who enjoyed the vibrant feel of the city as well as the stunning scenery.

Highlights included keynotes from James Truchard, President & CEO of National Instruments, Peter Bauer, CEO of Infineon Technologies AG as well as Wolfgang Lehner, professor and head of the database technology group at the Dresden University of Technology. In addition, participants welcomed the opportunity to visit leading local industry and research institutions after the event.

We would like to express our sincere thanks to all involved and to everybody who helped shape this symposium

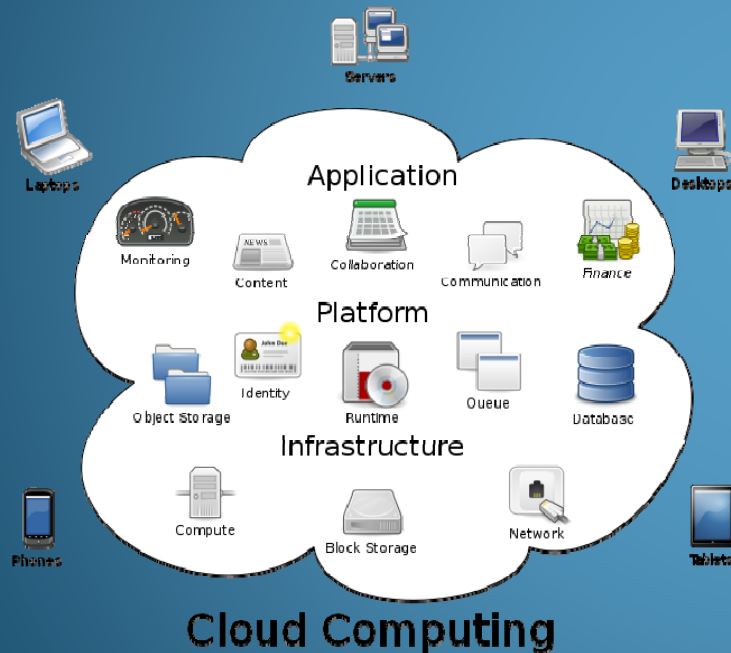
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- Network (Service) & Cloud Computing
- Collective Intelligence
- Media & Immersive
- Smart Power
- Transportations
- Health & Biosystems



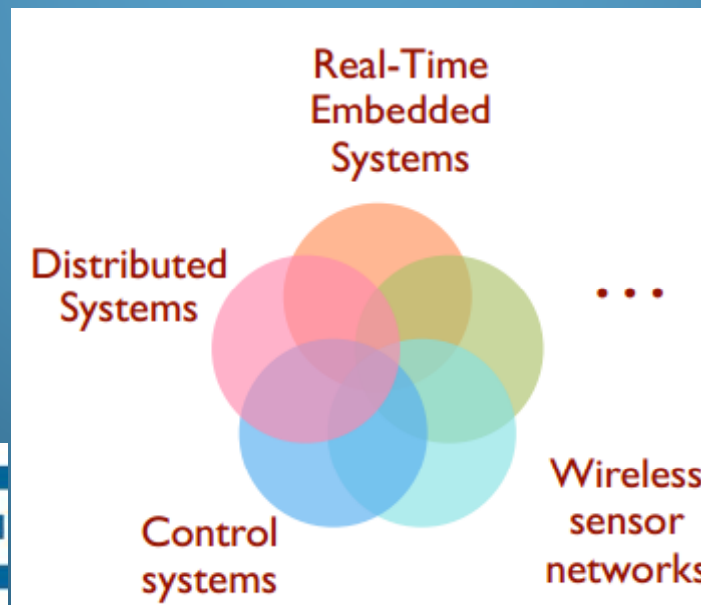
What will the future bring?

- Cloud computing & Internet of Things



What will the future bring?

Cyber Physical Systems. Complex systems can be characterized as composed of heterogeneous components and in particular electromechanical, thermal, computing, and communication elements



What will the future bring?

- **Collective Intelligence** emerges from collaboration and competition of multiple individuals

“In a changing and dynamic world, high-resolution and timely geospatial information with global access and coverage becomes increasingly important”



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What will the future bring?

Future Connectivity and networks →

- we will have faster connectivity, both wireless and wireline, we will be using cell phones and other devices, we will be living in a world
- seamless ubiquitous access to information and services



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What will the future bring?

- Future of Media →

- How will information be acquired, paid, and distributed in the future
- What is the impact of ubiquitous connectivity and connected users on future developments



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IEEE EDUCATION SOCIETY

- IEEE Education society is interested in:
 - Educational methods
 - Educational technology
 - Instructional materials
 - Accreditation
 - History of science and technology
 - And educational and professional development programs within Electrical Engineering, Computer Engineering, and allied disciplines

IEEE Education Society



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IEEE EDUCATION SOCIETY

- To do this, IEEE education society organize and support several conferences:



FIE 2012
3 - 6 October
Seattle,
Washington USA



IEEE Education Society



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IEEE EDUCATION SOCIETY



TAEF 2012 13-15 June
Vigo,
SPAIN

IEEE Education Society



ITHET 2012
21-23 June 2012, Istanbul, TURKEY

ITHET 2012 21-23 June
Istanbul,
TURKEY

International Conference **ICL**

ICL 2012
21-23 September Villach, AUSTRIA

International Conference **REV**

9th International Conference on Remote Engineering and Virtual Instrumentation
University of Deusto, Bilbao, Spain
July 4 - July 6, 2012



ICELIE 2012 25-28
October
ÉTS,
Montréal,
CANADA



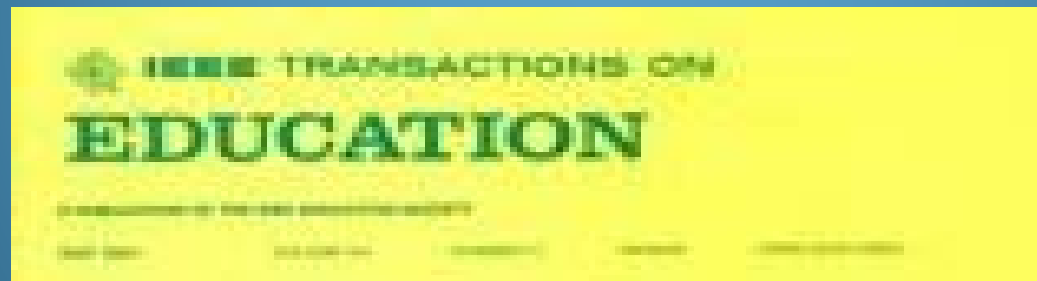
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IEEE EDUCATION SOCIETY

- IEEE education society provides a set of publications, such as:
 - IEEE Transactions on Education

IEEE Education Society



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- IEEE Learning Technologies



- IEEE-RITA Revista Iberoamericana de Tecnologías del Aprendizaje

IEEE-RITA

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- The Interface—joint publication with ASEE



- IEEE Technology and Engineering Education (ITEE)

IEEE Education Society



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IEEE EDUCATION SOCIETY

– BUT IEEE as Conferences and Publications and Services provider must be changing as the time is changing:

- Virtual worlds and virtual conferences
- Immersive conferences
- Open content publication
- Enriched and immersive publications

IEEE Education Society

allowing INTERACTIVITY and OPEN ACCESSIBILITY



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Conclusions

Mashup of acronyms, letters, technologies ...

Some initiatives has been developed to SHARE laboratories and be used in learning management system

- iLab, Labshare, WebLab-Deusto
- LILA, UNED (DIEEC) Project

our PhDs will be the future with our help



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Conclusions

But new issues must be considered to:

- Should work on any device, such as (e-books, smart phones, tablets, PCs, etc.)
- Should be used along with other e-learning services and different platforms (LMS, Massive online Courses, etc)
- Should be shared by other institutions. Ideas such as Cloud computing, new e-learning and Internet of things must be considered
- Should be more secured (biometric methods) and certified



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ACKNOWLEDGMENT

- European Funded projects RIPLECS “Remote-labs access in Internet-based Performance-centred Learning Environment for Curriculum Support” 517836-LLP-1-2011-1-ES-ERASMUS-ESMO
- PAC PAC - Performance-centered Adaptive Curriculum for Employment Needs - 517742-LLP-1-2011-1-BG-ERASMUS-ECUE
- e-Madrid Project, S2009/TIC-1650, “Investigación y Desarrollo de tecnologías para el e-Learning en la Comunidad de Madrid”
- DIEEC/UNED team: **Elio / Mohamed / Alberto / Gabi / Sergio / Maria Jose / Clara / Charo**



One Step Ahead in the Future of Labs: Widgets, Ubiquity and Mobility

**Thank for your attention
Comments ? Questions ?**

Manuel Castro

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