European Remote Radio Laboratory (ERRL) Project

http://errl.evtek.fi

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Enhancing Engineering Education

- Increase attractiveness of engineering studies
- Make flexible arrangements
- Life-long-learning
- From theory to practice -> understanding
- CDIO: (http://www.cdio.org)
  Conceive – Design – Implement – Operate

ERRL Project Contributors

- Atılım University, TR, promoter
- Groupe ESIEE Paris, FR
- EVTEK University of Applied Sciences, FI
- Institute of Communication and Computer Systems, National Technical University of Athens, EL
- Institute of Vocational Education, Work and Technology at University of Flensburg, DE
- Balikesir University, TR
- The Norwegian University of Science and Technology, NO
- Transilvania University of Brasov, RO

EVTEK + Stadia -> Metropolia 1.8.2008

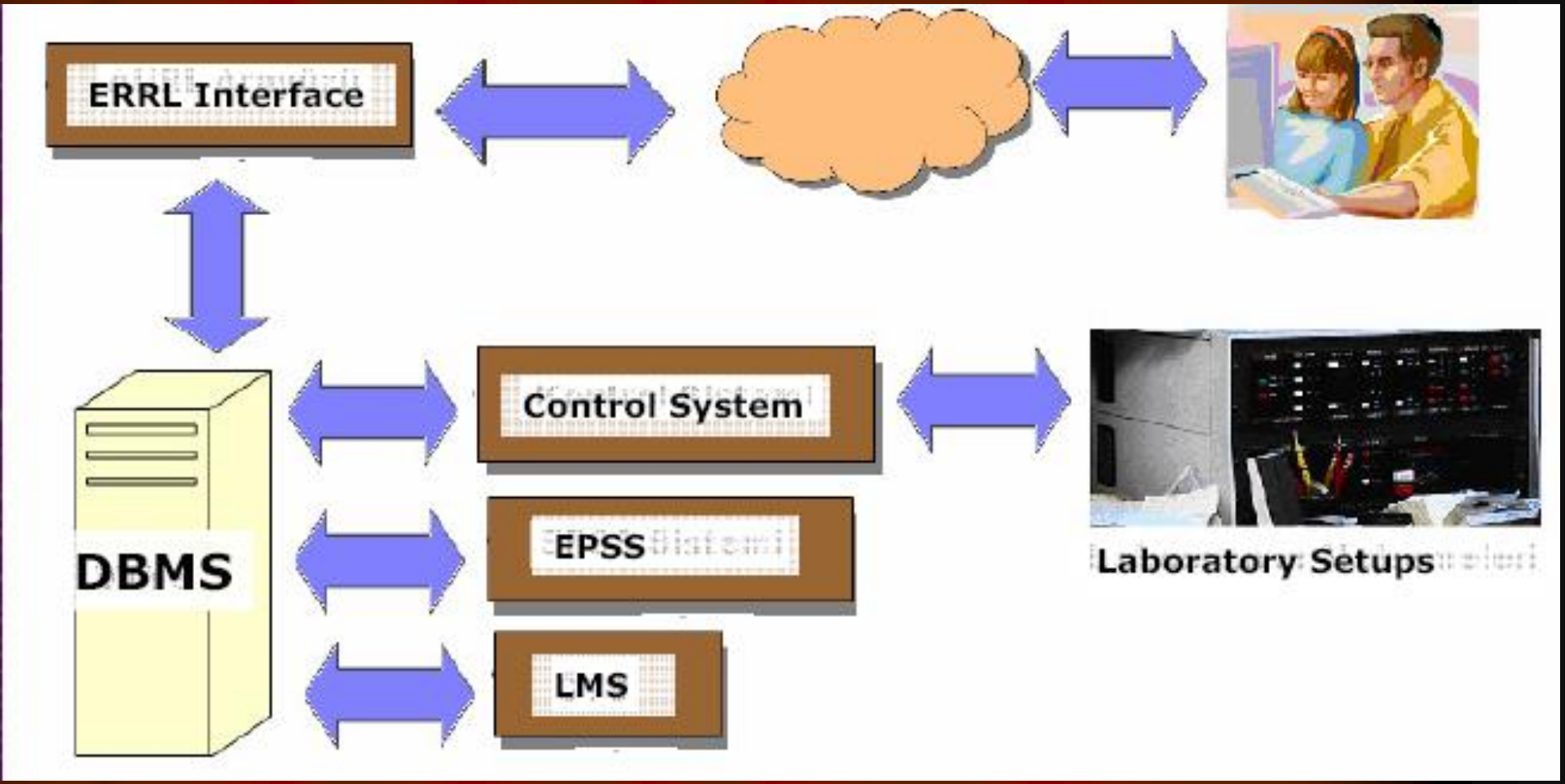
ERRL Project Scope

- Develop a distance access RF laboratory platform
- Provide access to
  - theoretical and particularly practical training
  - high-cost & high-tech equipment in radio communications field via Internet
- Duration: 2 years
- Budget: 500 000 €, 388 000 € from Leonardo da Vinci
- Start: October 2006
- URL: http://errl.evtek.fi

Project Content

- Six work packages
  - Management and Coordination
  - Specification and Needs Analysis
  - Course Material
  - Software Tools
  - Pilots and Test of Remote Experiments Modules
  - Valorisation

Platform Structure



EPSS – Electronic Performance Support System
LMS – Learning Management System

Features

- Introducing to the basic test and measurement devices
  - Use of EPSS
- Theorical background via course material
  - Use of LMS
  - Grouped in levels to support EQF (European Qualification Framework)
  - Assessment system
- Experimental Setups
  - Grouped in levels according to EQF
  - Conduct experiments remotely
  - Receive/display output data in several formats

Remote Experiment Modules

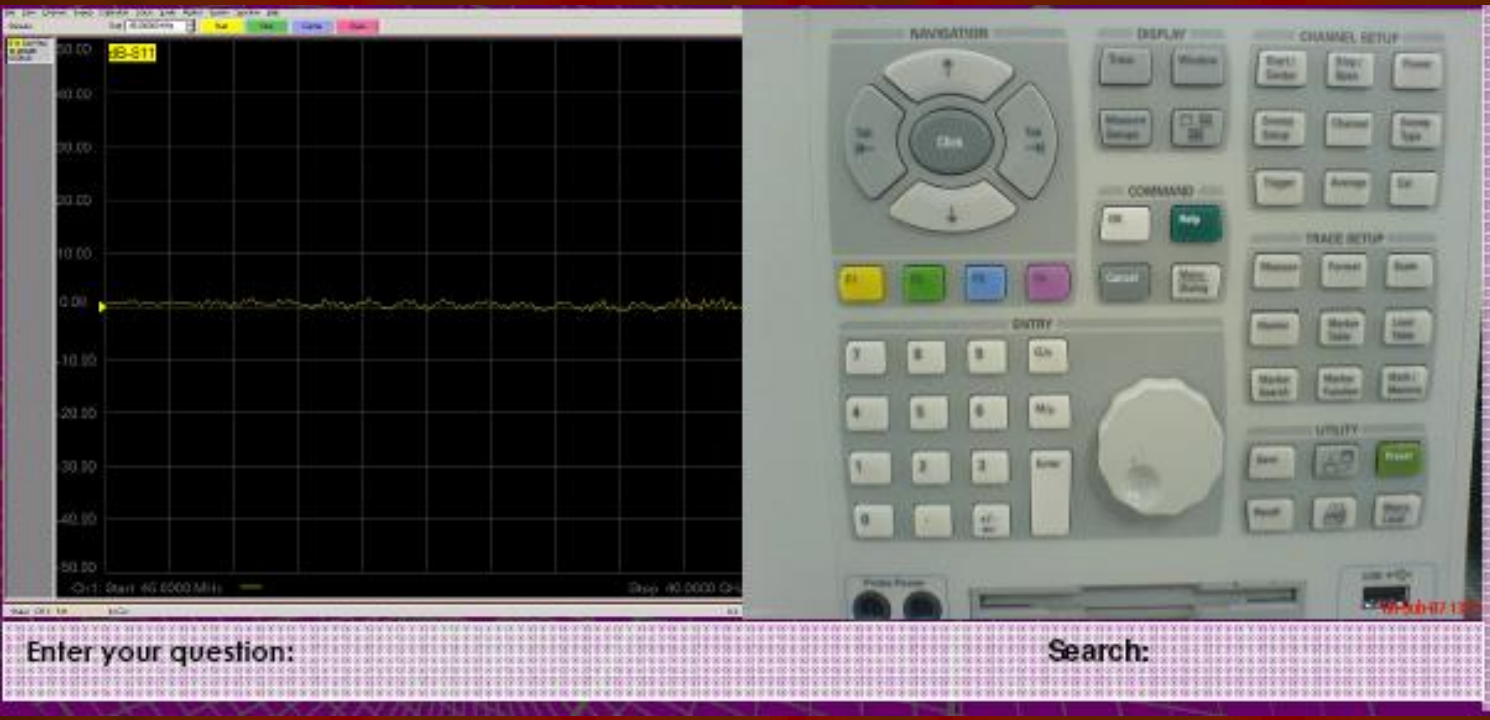
- 14 experimental setups are planned
- Setups will allow exploitation of high frequency equipments remotely
  1. Spectrum analyzer
  2. EMC analyzer
  3. Vector Network analyzer
- Experiments will be grouped in levels to support EQF (European Qualification Framework)

Basic Modules via EPSS

(Electronic Performance Support System)

- Different interfaces for each of the devices
- Each interface will contain the front panel of the device
- A simulation over the pre-defined data – no real experiments
- Support
  - Question and Answer
  - Keyword search

An Example – VNA (Vector Network Analyser)



INSTRUCTIONS

Text

sound

video

animation

applet

Enter your question:

Search:

- Show pictures

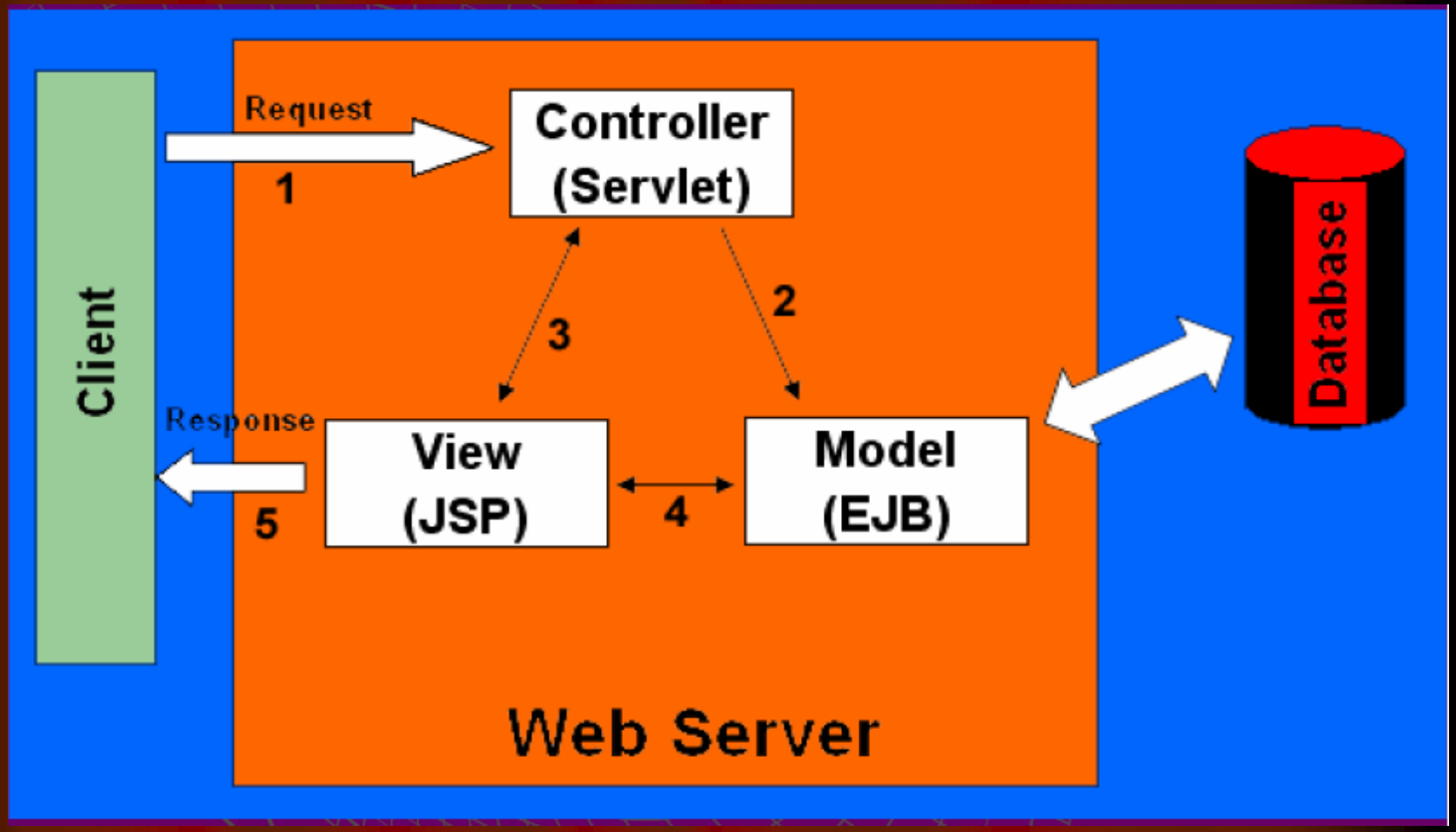
ERRL MOODLE

- http://errlmoodle.atilim.edu.tr/

Course Material

- Theoretical and reference course materials
- • Content for Learning Management System
- • A modular system to address different skill levels
- • Related to European Qualification Framework Assessment system
- In English and in some partner languages (Finnish included)

Web Server Architecture



Experiments 1/2

- Measurement of scattering parameters of short, open load, matched load (Device: VNA)
  - concepts of reflection and transmission (return loss, Standing Wave Ratio, reflection coefficient)
- Spectrum Analysis and Fourier Series (Device: Spectrum analyzer, signal generator)
  - frequency-domain representation of sine, triangle and square waves
- FSK, ASK and PSK modulation (Device: Spectrum analyzer, Modulation generator, oscilloscope)
  - Digital modulation techniques

Experiments 2/2

- Measurement of scattering parameters of wave guide, bandpass/lowpass filter, amplifier, phase shifter, directional coupler (Device: VNA)
  - transmission, phase shift, attenuation, directivity, filtering and amplification Equipment: Vector Network Analyzer
- Impulse Response and Multipath (Device: VNA)
  - relation between time and frequency domain response of a radio channel
- Frequency Modulation (Device: Spectrum analyzer, modulation generator, oscilloscope)

Expected Outcomes 1/2

- EPSS (Electronic Performance Support System) content on the use of test and measurement equipments.
- Radio-lab training modules with up-to-date course contents
- Test system which will evaluate the user's degree of success in completing ERRL courses

Expected Outcomes 2/2

- A project web site facilitating collaboration and discussion on radio systems education, among partners and in European level.
- Data for comparison of in-lab and remote training from didactical point of view
- An operational remote laboratory environment for full access

Lessons learned

- Enhancing engineering education through EU funded projects
- Forming of a productive consortium is many times difficult
  - randomly
  - commercial companies ?
- Procedures and working methods are different (administrational practices and procedures)
- Commitment and engagement ?
- Exchange of ideas, the transfer of technology and practices, and pedagogical approaches between partners
- Identify and deploy good learning management tools to facilitate learning and management of course materials developed
- If the courses and contents are not in the syllabus of degree programme, it makes difficult to persuade the students and teachers to seriously go through them
- Will education be next killer application of the Internet ?

THANK YOU !