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Sharing Educational Experiences from In-Person Classroom to Collaborative Lab Environments

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What / Why / How

- *Is it possible to provide satisfactory experimental experiences in a remote learning environment?*
- *How can a remote lab handle a massive environment ?*
- *Is VISIR a tool suitable for teaching or complementing electronics learning process ? Remotely ? Face-to-face ?*
- *Can become remote labs a stand-alone learning tool or do they need to be a part of a more complex system to achieve the learning goals they are able to provide ? Need some collaborative tools ?*
- *Is possible to replicate the VISIR network in emerging countries ? And federate them ?*

VISIR / VISIR+



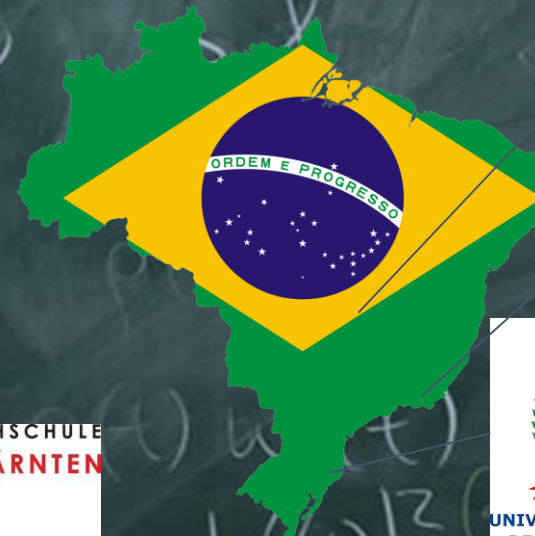
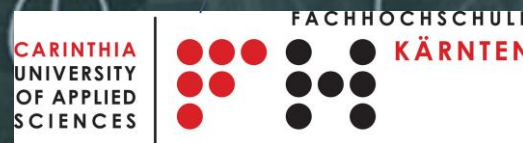
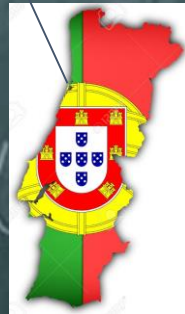
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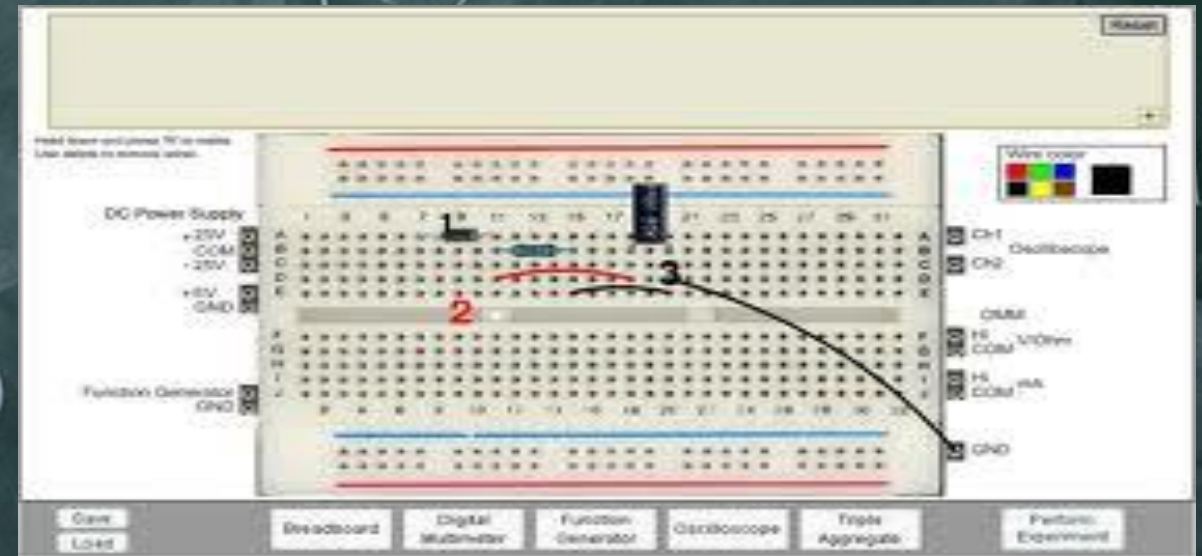
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VISIR+ network



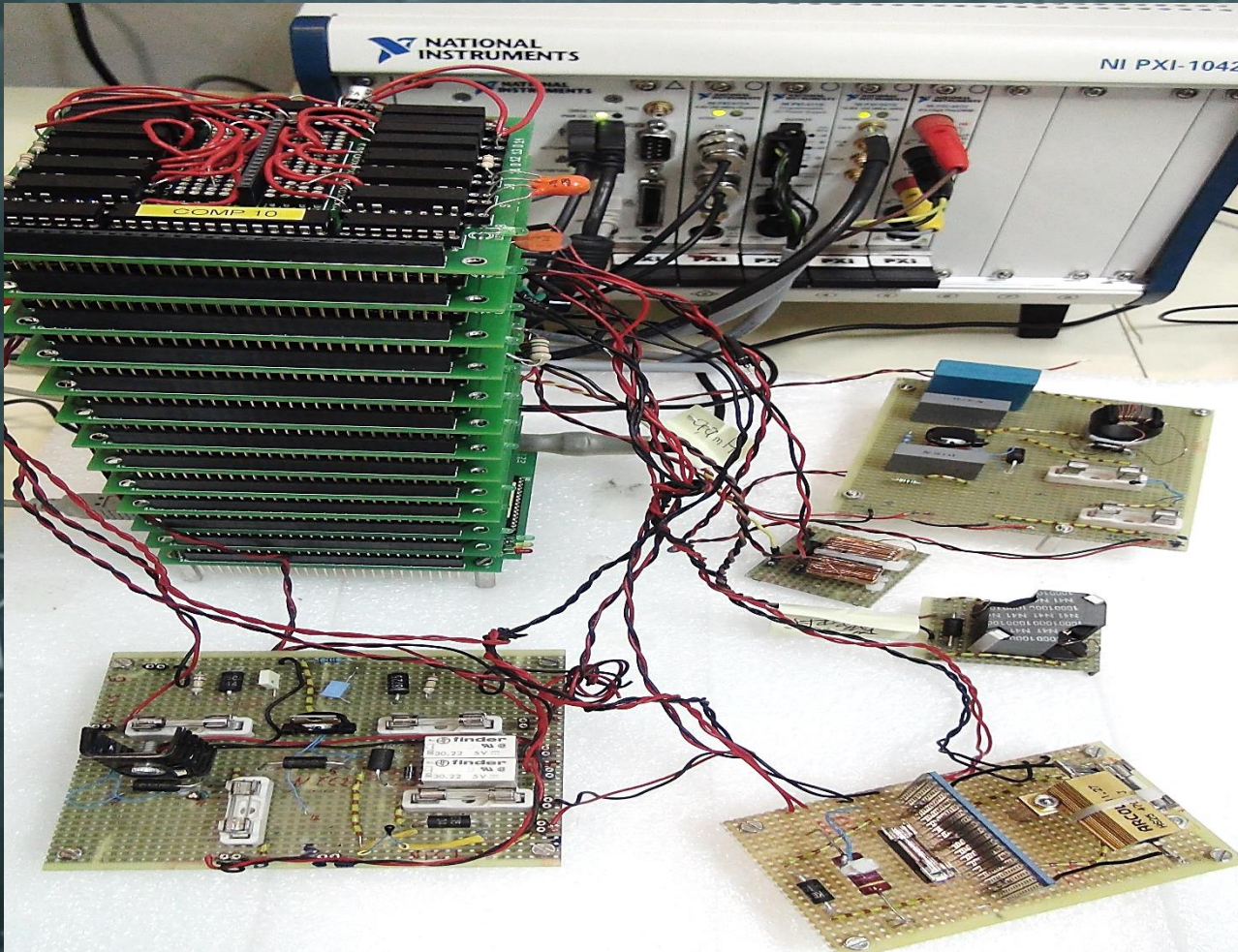
VISIR system

- VISIR System (HW + SW)
 - Virtual Instrument Systems in Reality

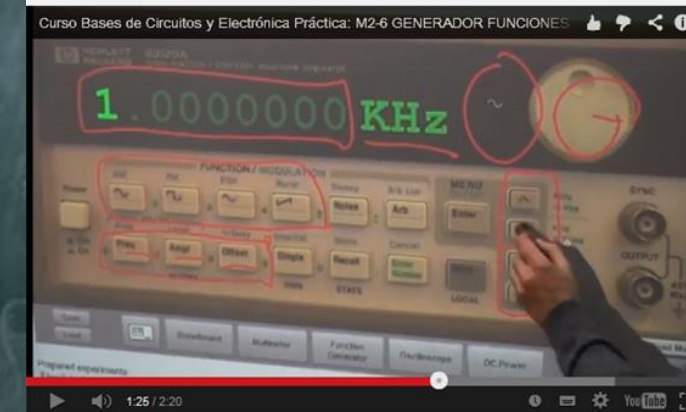


VISIR system

- Complex boards + Instrumentation



VI. Generador de funciones



- E - 0 - Datos
 - N - I - Simulación
 - N - II - Instrumentos VISIR
1. I. Presentación y...
 2. II. VISIR
 3. III. Breadboard
 4. IV. Polímetro
 5. V. Fuente de alimentación
 6. VI. Generador de...
 7. VII. Osciloscopio
 8. Autoevaluación I P / R
 9. Autoevaluación II P / R
 10. Autoevaluación III P / R
 11. Autoevaluación IV P / R
 12. Autoevaluación V P / R
 13. Autoevaluación VI P / R

A remote lab?

- A remote laboratory is a tool which combines software and hardware to allow students to access to real equipment, instruments and components remotely through the Internet
- The main advantage of remote labs, when compared with traditional laboratories, lies in its availability that has neither temporal nor geographical restrictions
- Main disadvantage are maintenance and 100% availability

What is VISIR ?

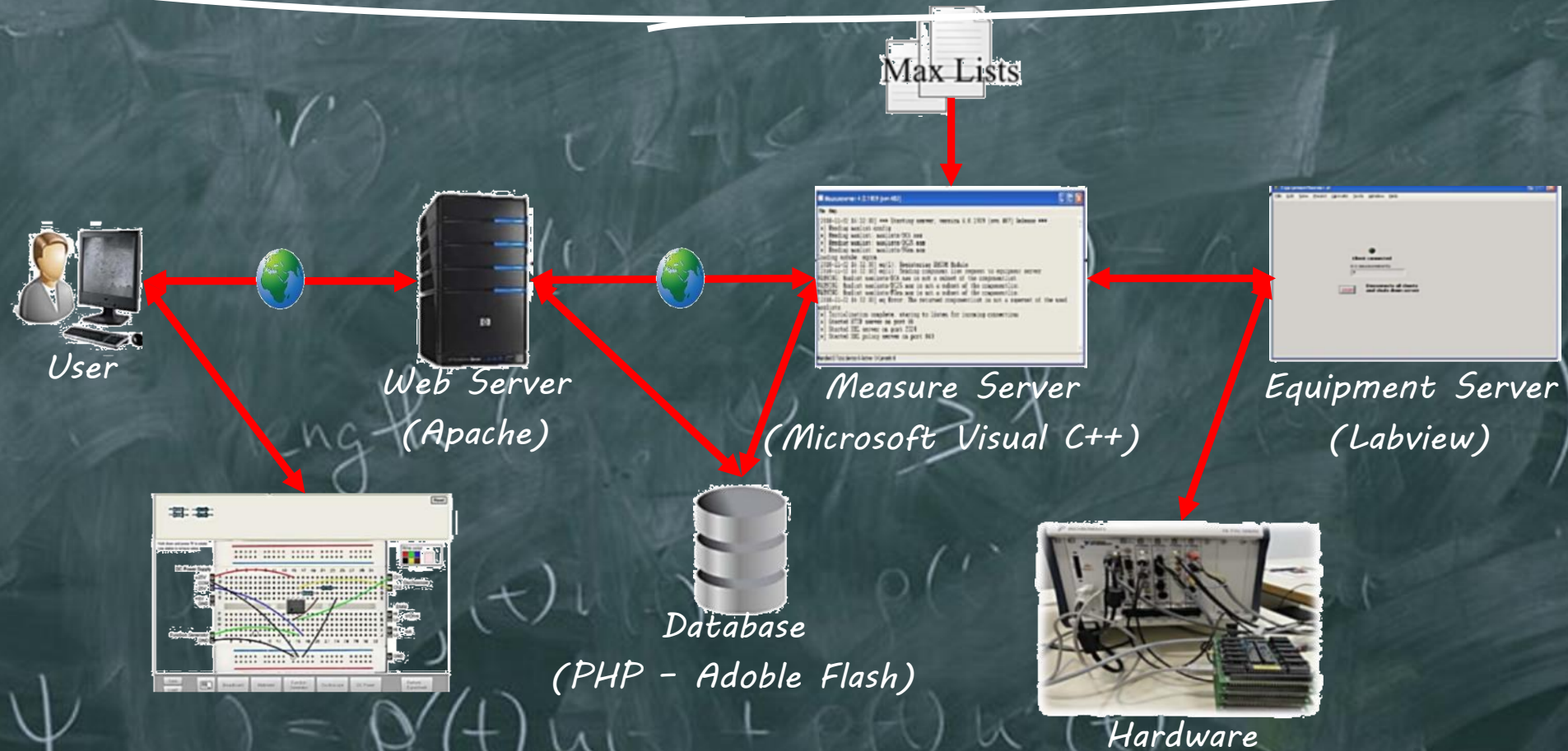
Virtual Instrument System In Reality

- VISIR is a remote laboratory for wiring and measuring electronics circuits on a breadboard remotely
- VISIR allows realizing real measurements on physical equipment
- The entire equipment is controlled by LabVIEW server software
- The wiring mechanism is developed by means of a relay switching matrix connected to a PCI extensions for Instrumentation (PXI)

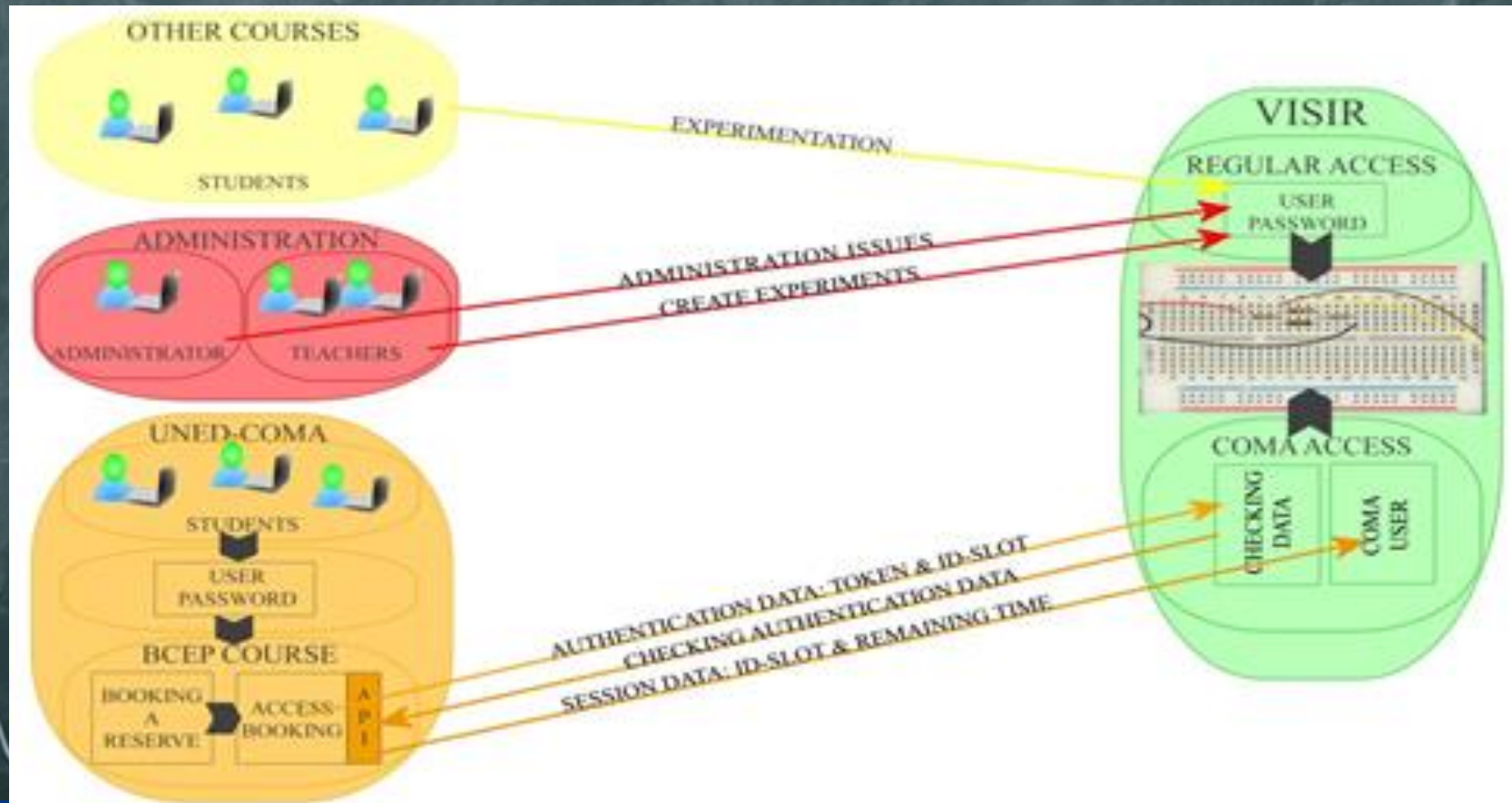
What is not VISIR?

- VISIR is not a simulation software or a virtual lab; there is a physical limitation since it does not allow an indeterminate number of concurrent users
- VISIR is not a lab to carry out any type of experiment; for example, destructive experiments are not allowed because all experiments must be reusable
- VISIR is not an instructor; The measurement server acts as an instructor to avoid hazard circuits but it lacks of assessment and evaluation for teachers or guidance for students

VISIR software



External Booking System

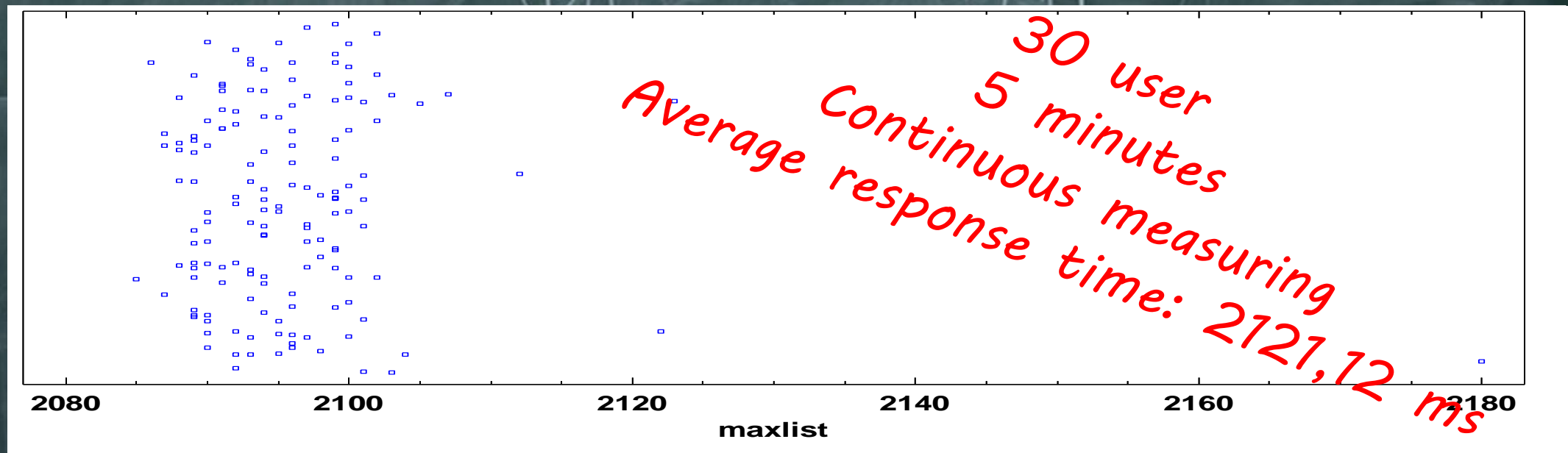


Scalability!!

- VISIR has some features that collide with a massive use or a MOOC: The intrinsic limitations of a real laboratory such as VISIR collide with one of the most relevant features that any MOOC should achieve: scalability
- An undetermined number of users can access VISIR's simulated workbench (it's a server limitation as in other systems), but ...
- A maximum of 60 users can simultaneously perform measurements; more accesses to the measurement instruments collapses VISIR

Physical constraints

Furthermore, for an optimal immersion, the number of concurrent users should not exceed 25 to obtain an adequate response time in continuous measuring (for occasional measures this factor is not critical)



Bookings system settings

Initial settings:

- 2 simultaneous turns booked (variable)
- 16 turns per course (variable)
- 60 minutes per turn (fixed)
- 16 concurrent users (variable); up to 384 turns every day

Going to the limits (60 concurrent users): up to 1440 turns every day avoiding the risk of collapsing VISIR

New replications (I)

Hardware, software and educational uses support (VISIR+):

- Share publications and tutorials regarding the use of VISIR
- Share the use of VISIR remotely to allow access
- Start a first time face-to-face experience with decision making teachers and academic administrators regarding feasibility and best practice
- Start several synchronous sessions (using some collaborative environment, like Moodle, videoconference facilities, etc.) with the new teachers and personnel involved in the new deployment to allow a fast starting access of the system

New replications (II)

Hardware, software and educational uses support (VISIR+):

- Develop face-to-face delivery with people involved in the on-site implementation as well as with new target institution members in the area of the local University*
- Have a local experience inside the classroom on the use and development of the educational implementation*
- Develop and extend the teaching experience from the local institution to all the core new institutions in the local area*
- Realize a formal evaluation and quality assurance of the process*

Participant Institutions	UNED & UNSE
Local coordinator	Rubén Fernández
Members from EU HEI	Manuel Castro & Félix García Loro
Members from LA Institution/s	Rubén Fernández, Héctor Paz, Mario Gómez, Fernando Soria
City	Santiago del Estero
Dates (2016)	September 12th, 13th, 14th, 15th and 16th
Total number of turns ^a	8
Number of attendants	31
Attendees' institutions	Universidad Nacional de Santiago del Estero, Universidad Católica de Santiago del Estero, Universidad Nacional de Salta, Universidad Nacional de Tucumán, Universidad Tecnológica Nacional, Facultad Regional de: Buenos Aires, Delta, Paraná, Escuela de Educación Técnica Nº 8
IRICE member in person	María Isabel Pozzo
News on the web	Link Faculty in UNSE: http://www.unse.edu.ar/index.php/editar/2963-se-dictara-taller-internacional Link home UNSE: Taller de capacitación
Own VISIR?	No
Technical Training Action	No

New replications (III)

UNED-Santiago del Estero collaboration:

- Distance and on-line training
- Face-to-face training



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Outcomes (I)

- *The integration of remote laboratories in online learning environments, together with good practices in designing practical experiences, reduce the disadvantages of remote laboratories compared to in-person laboratories, without leaving behind their inherent advantages*
- *Strategy of using diverse and complementary options in the same course (as in-person laboratories, remote laboratories and/or simulators) provides a broad range of capabilities and an easier assimilation of the experimental advantages*

Outcomes (II)

- Students have been able to complete the different activities and tasks from different courses and educative platforms, to interact with the remote lab. So, for students, the different systems used have accomplished its function: to provide the remote laboratory along with theoretical contents.
- Previous experience for the UNED system implementation, communities and platform, aLF and INTECA videoconference system, allow the implementation of the remote laboratories as well as the support systems inside MOOCs

Outcomes (III)

	Advantages	Disadvantages
Simulator	Flexible, generic, accessible More relaxed attitude It prepares for the real lab	Everything works Complexity
Virtual lab	It simulates something real	It's specific It depends on the internet
Online lab	It simulates something real through Internet No specific setup or configuration	Internet bandwidth use
Remote lab	It's real Access to expensive equipment I can see what others do. Safe design It needs less physical space Users' inversion is smaller.	It may not work or it may not be maintained. It relays on internet connection. They do not seem real They are usually unique users They may get burned Software messages

Next steps: PILAR

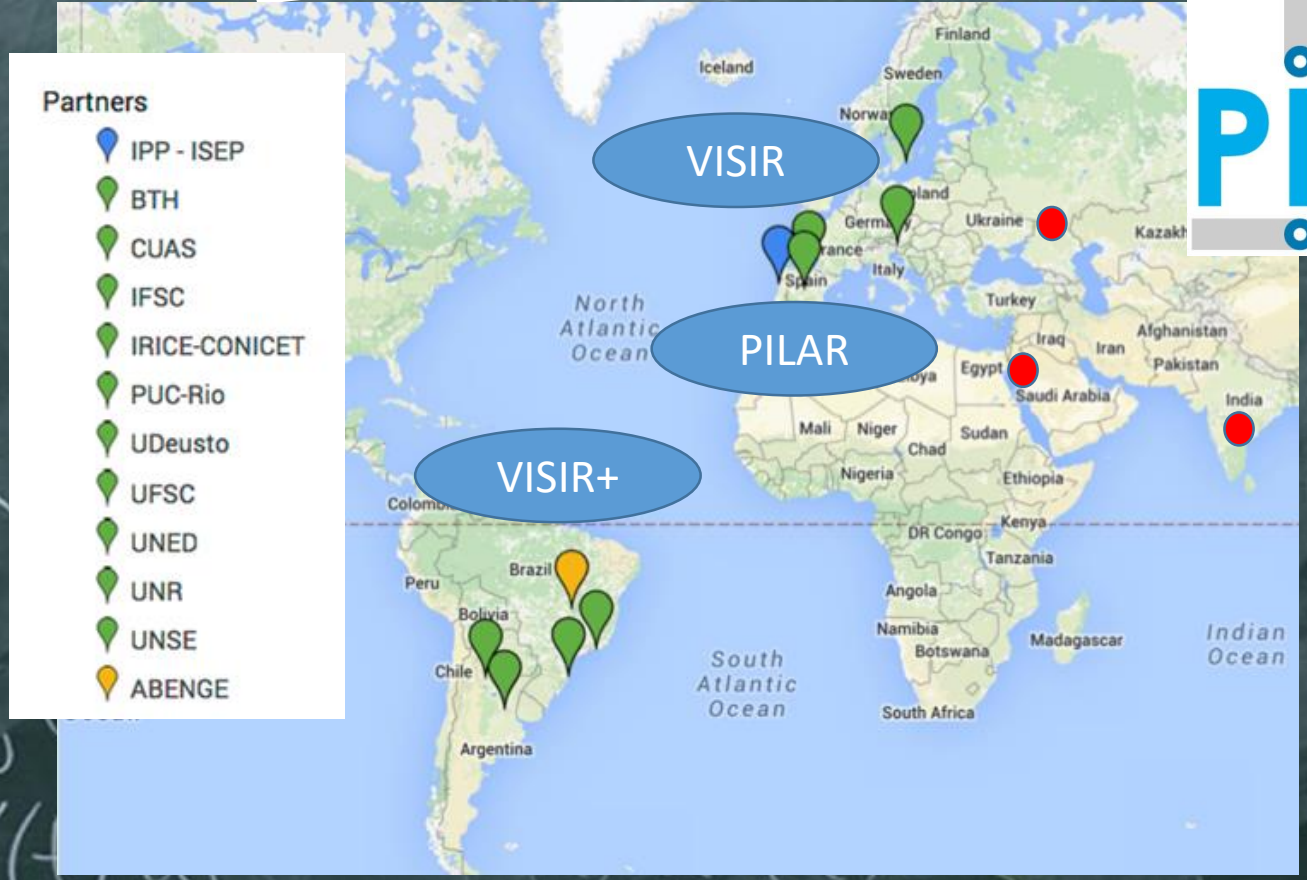


- Building a reliable, highly available, unique international VISIR platform federation, that integrates all the different resources used by VISIR in each of the partners
- Federation will be completely opened to other partners, allowing to extend the capabilities of PILAR to much more interested educational institutions
- Building a set of remote practices, based in this new platform
- Those new remote Practices must allow, in a transparent way, the use of the best set of remote learning services available

VISIR / VISIR+ / PILAR



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Conclusions

- Remote laboratory VISIR has shown the ability to perform its activity inside classrooms as in massive environments remotely
- Experimentation and VISIR remote lab have been an attraction for teacher's and students' enrollment
- The replication of new VISIR nodes are on-going
- VISIR+ are expanding the VISIR network in South-America
- PILAR is federating and increasing collaborative functionalities

Support - Projects



PILAR. Platform Integration of Laboratories based on the Architecture of VISIR

Co-funded by the
Erasmus+ Programme
of the European Union



PILAR >>> 2016-1-ES01-KA203-025327

Erasmus+ Strategic Partnership in Higher Education 2016



VISIR+ - Educational Modules for Electric and Electronic Circuits Theory and Practice following an Enquiry-based Teaching and Learning Methodology supported by VISIR - Erasmus+ Capacity Building in Higher Education 2015 nº 561735-EPP-1-2015-1-PT-EPPKA2-CBHE-JP

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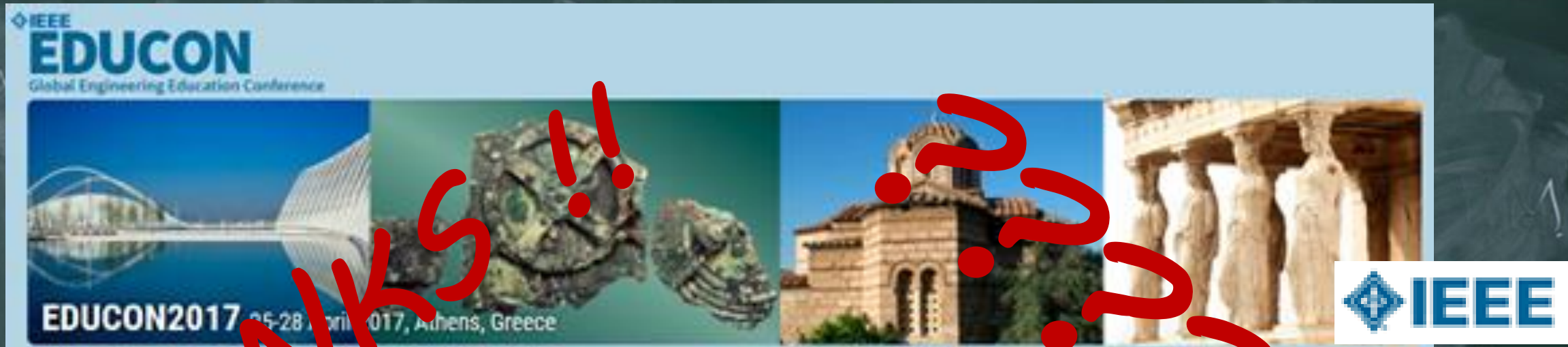


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