Library of Labs

LiLa – Library of Labs

Dissemination
of Remote and Virtual Laboratories
for Natural Sciences and Engineering

May 2009 – November 2011

Co-funded by the community
programme *e***Content***plus*

LiLa is an acronym for ‘Library of Labs’, an initiative of eight universities and three companies, which aims at developing an integrated platform for remote experiments and virtual laboratories.

LiLa is committed to enhancing the learning experience of science and engineering students all over Europe.

LiLa is co-funded by the *e***Content***plus* programme of the European Commission.

Who is LiLa?

Eight European universities and three enterprises have united to work on LiLa. Each participant offers specialised expertise in one or more of the following fields:

- content (virtual laboratories & remote experiments)
- access control and booking systems
- 3D modelling
- meta data development
- e-learning pedagogics

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Who is LiLa?

Universität Stuttgart (Coordinator)	*Germany*
Technische Universität Berlin	*Germany*
Oracle Germany (formerly Sun)	*Germany*
Technische Universiteit Delft	*Netherlands*
Linköpings Universitet	*Sweden*
Universität Basel	*Switzerland*
Universidad Politécnica de Madrid	*Spain*
Aristotle University of Thessaloniki	*Greece*
University of Cambridge	*UK*
Computational Modelling Cambridge Ltd	*UK*
MathCore Engineering AB	*Sweden*

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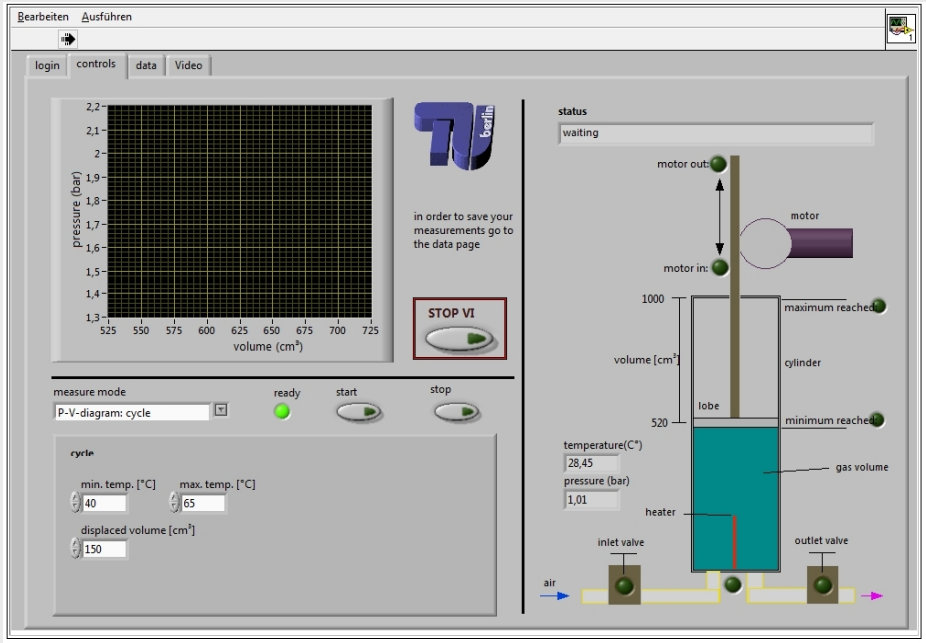
What are the main objectives of LiLa?

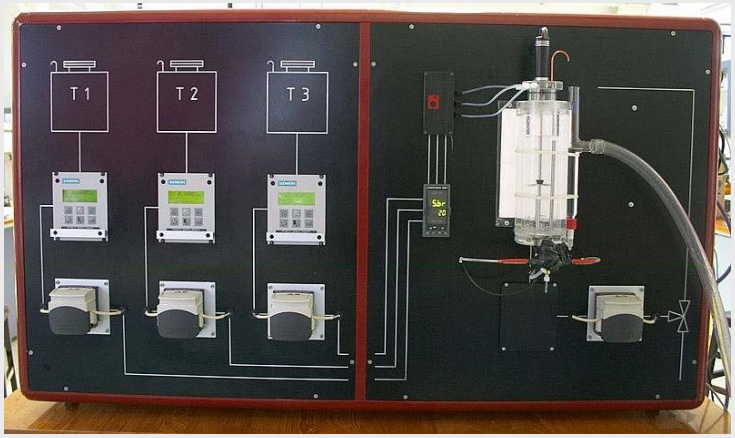
- Create a technical and organizational framework for the mutual exchange of experiments across Europe (and beyond)
- Build a repository of experiments on a central server where experiments can be retrieved
- Offer the experiments as reusable modules which can be run on local Learning Management Systems as well as on the LiLa portal
- Equip the experiments with describing data (metadata) and integrate them into library catalogs, thus making them retrievable in library systems
- Make the experiments accessible via an access control and a booking system that allows reservation of experiments by lecturers and booking of experiments by students
- Facilitate the creation of courses and allow users to supplement and change courses
- Integrate the LiLa experiments into a framework that fosters collaboration between students and discussion on experiments
- Disseminate the LiLa network across Europe (and beyond)

What are Remote Laboratories?

In a remote lab students control real (physical) equipment via the internet and investigate real objects.



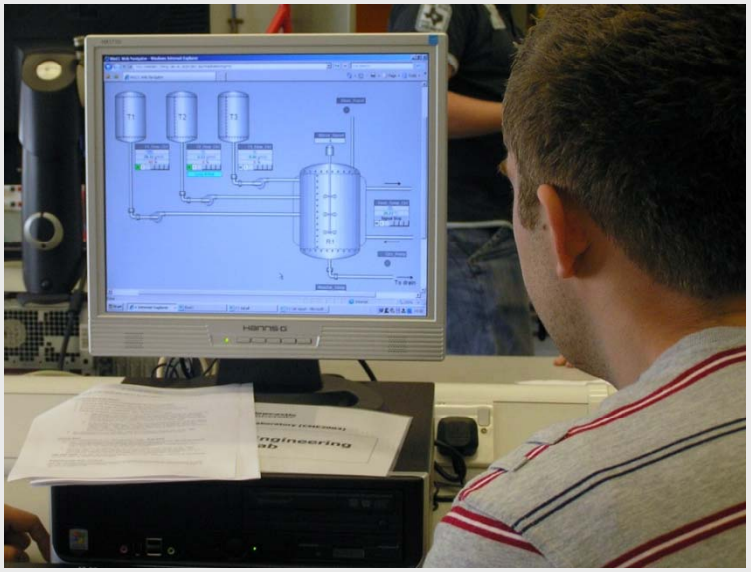
More Examples of Remote Laboratories...



... for instance, at the University of Newcastle.

The Cambridge Reactor Weblab

The reactor – a key unit in many chemical plants – can be fed with three liquids. The reaction is monitored and controlled remotely...



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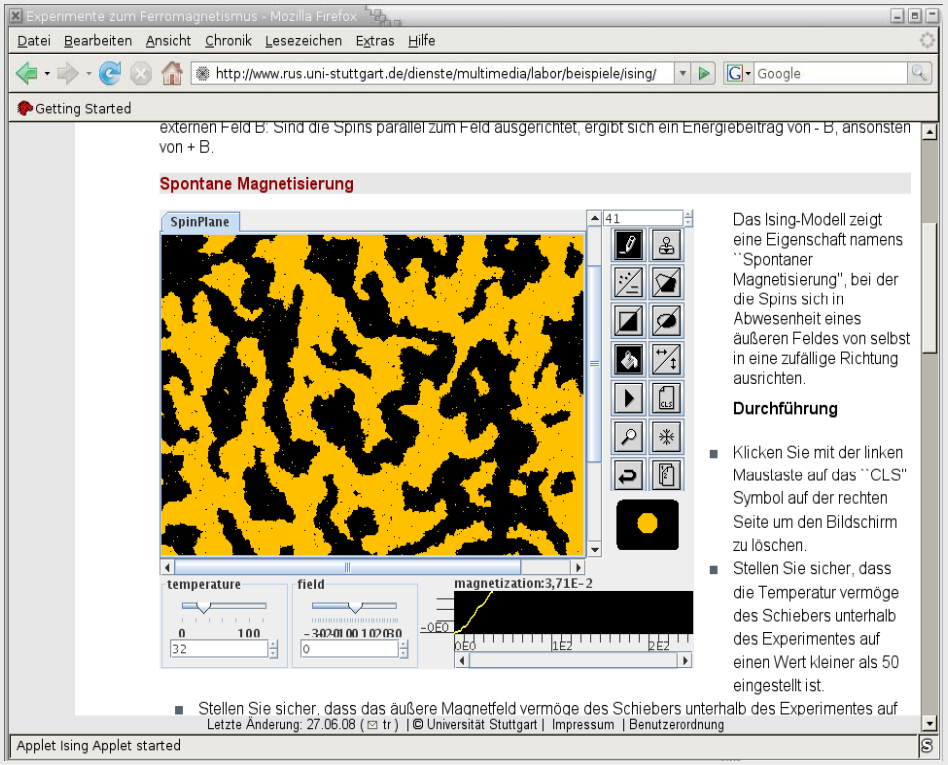
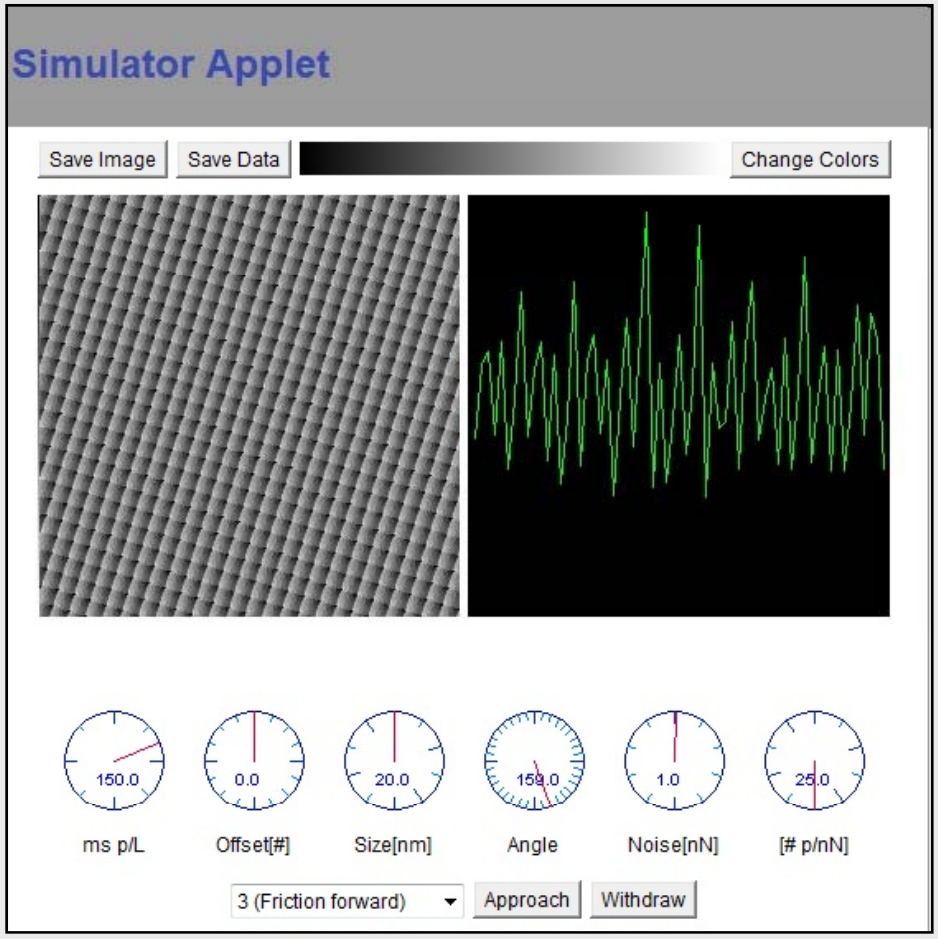
What are Virtual Laboratories?

Virtual laboratories are simulation environments that model physical processes on the computer. They are often combined with real experiments.



More Examples for Virtual Laboratories…

The friction simulator at Nano-World (University of Basel) enables students to simulate friction phenomena on an atomic scale.



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What can be found on LiLa?

Currently, the LiLa portal at www.library-of-labs.org contains

- 41 remote experiments and
- 218 virtual laboratories

in the following fields:

Physics	150
Chemistry	6
Engineering	7
Mathematics	75
Computer Sciences	21

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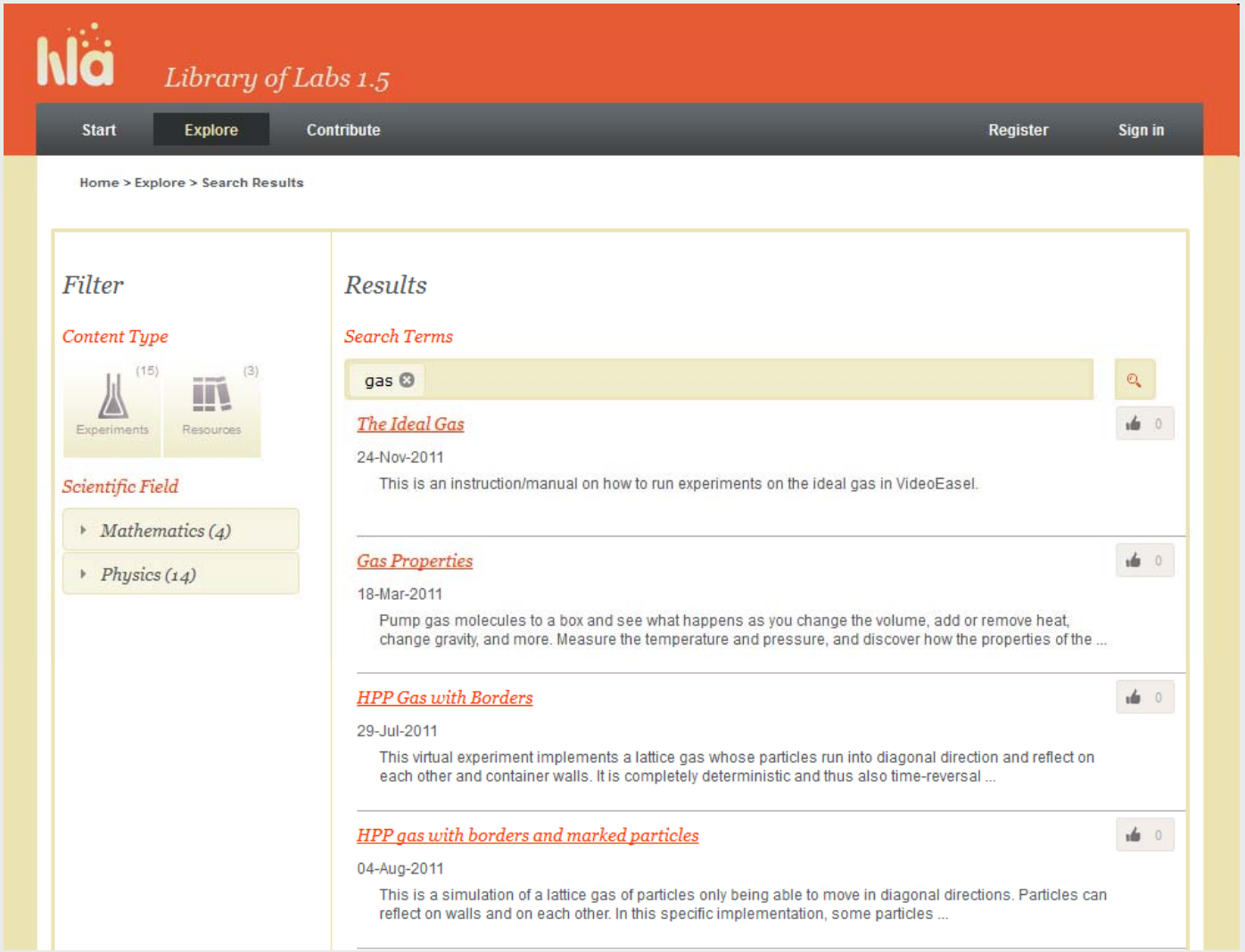
How does LiLa work?

The LiLa portal:

- Explore, search and run experiments.
- Rate and comment them.
- Download experiments to your computer, upload them to your local Learning Management System
- Upload new experiments.

http://www.library-of-labs.com

Click on „Explore LiLa“ to browse experiments by scientific field or content type, or to find experiments by searching for terms like name, author, keyword, etc.



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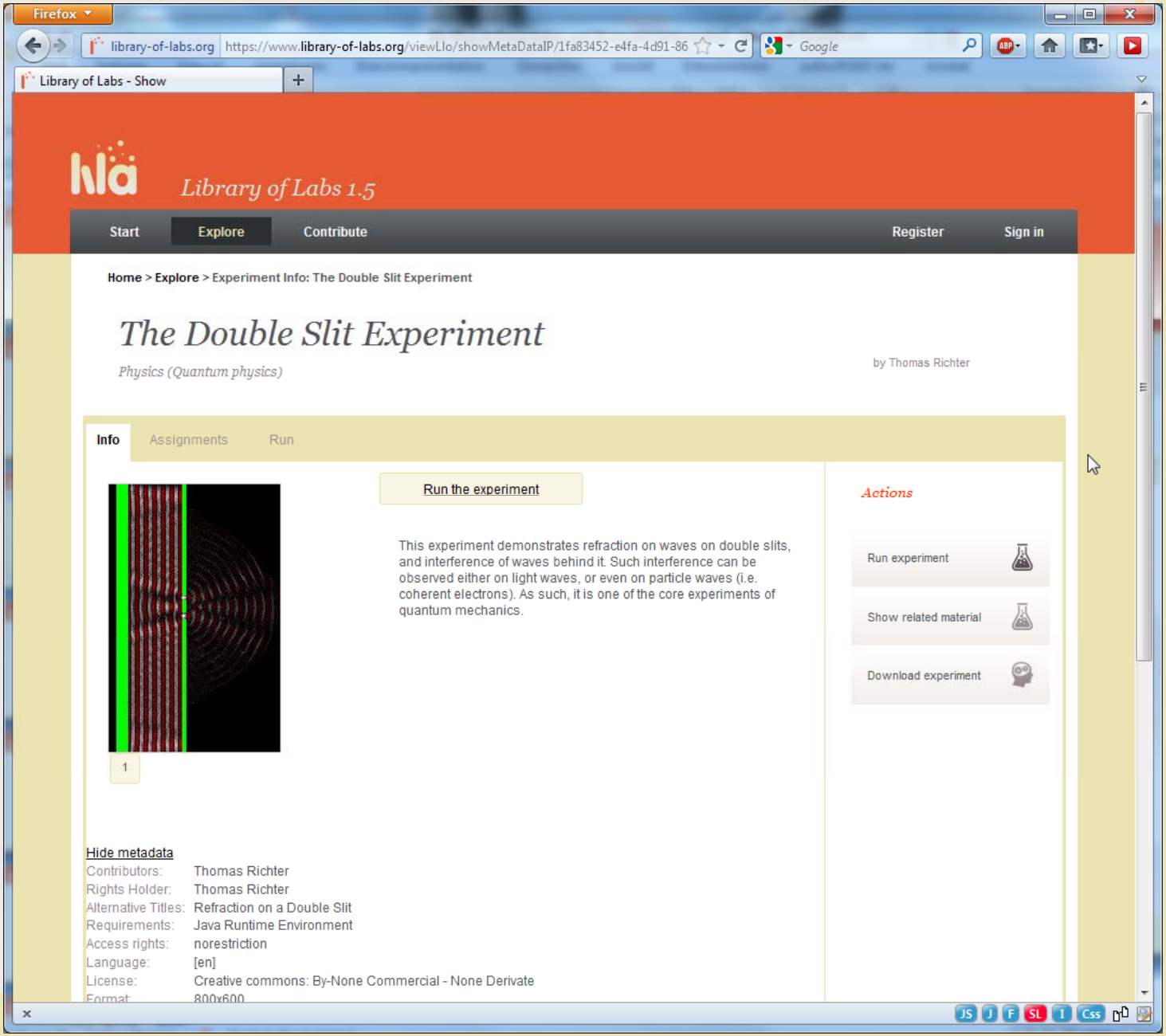
Viewing Information

View all available information about the selected experiment and…



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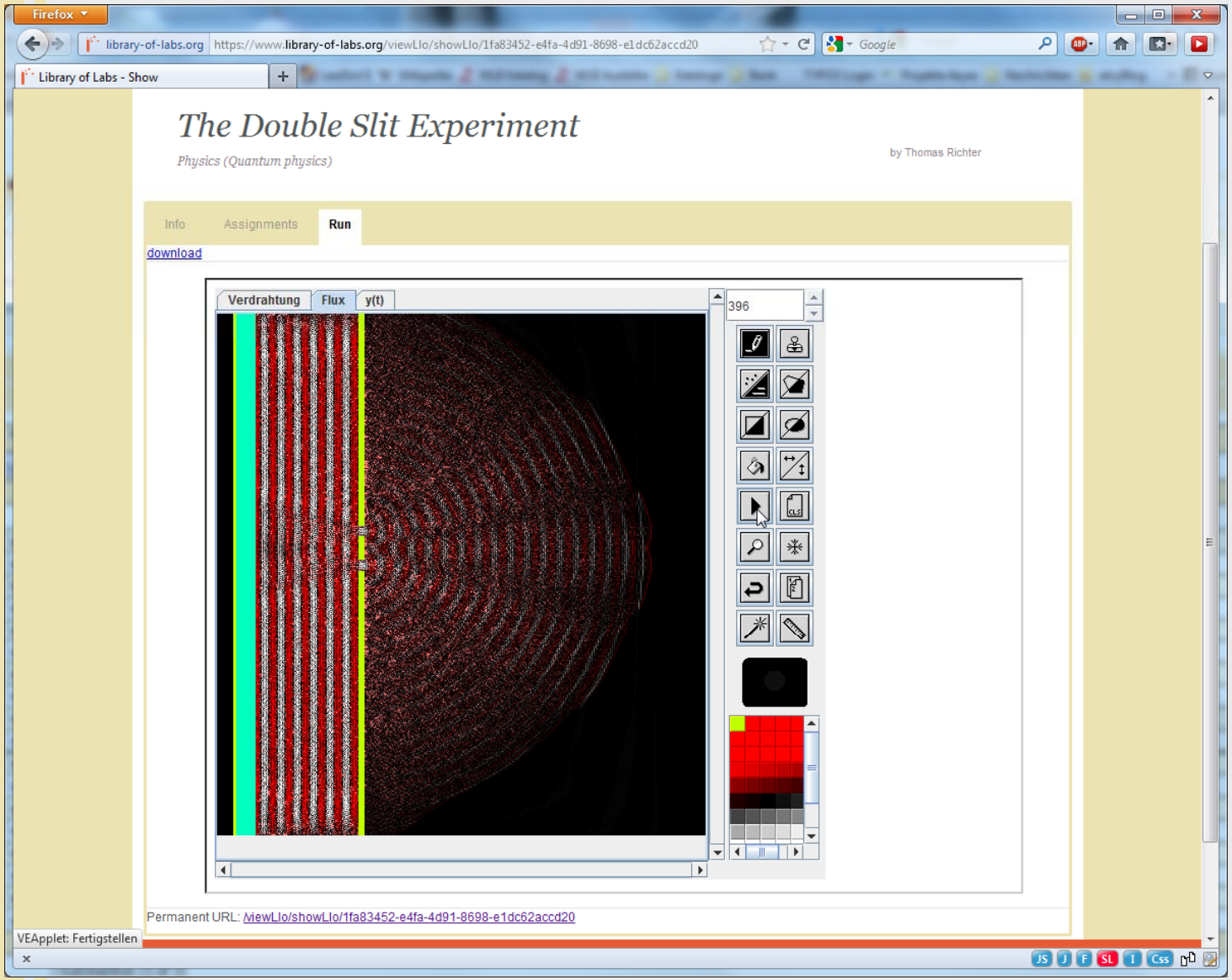
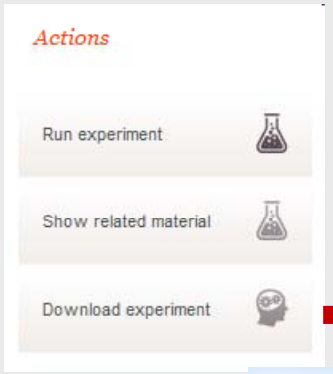
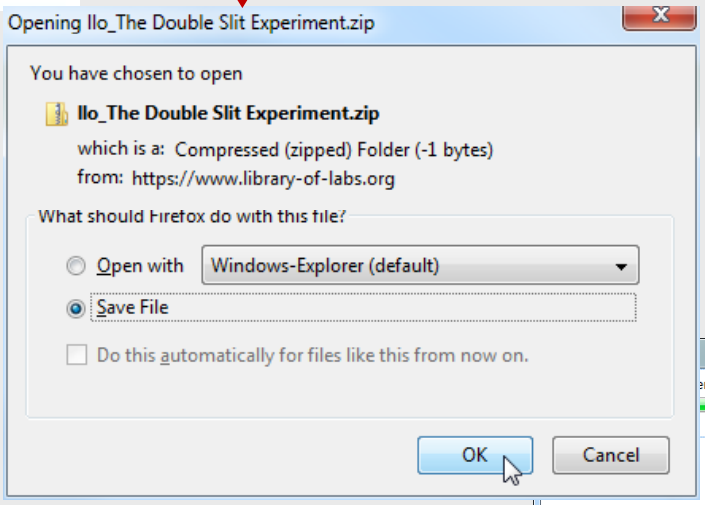
Running Experiments

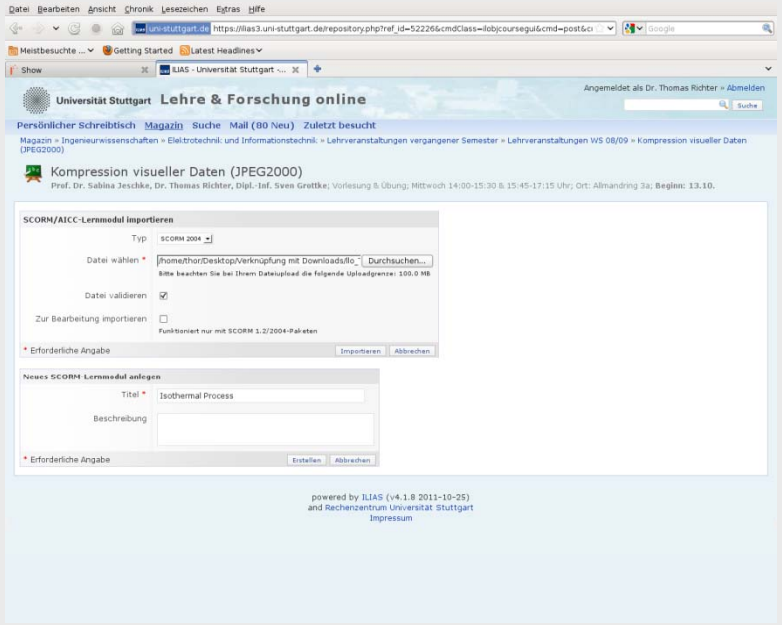


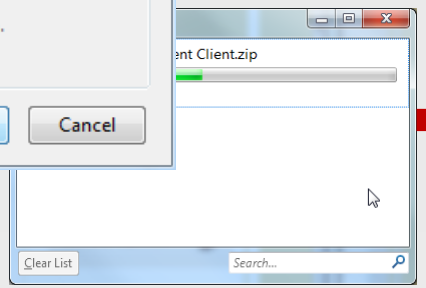
...run it directly in your web browser

Since the LiLa Learning Objects are SCORM compliant, experiment packages can be integrated into online courses on compatible Learning Management Systems like ILIAS or Moodle.









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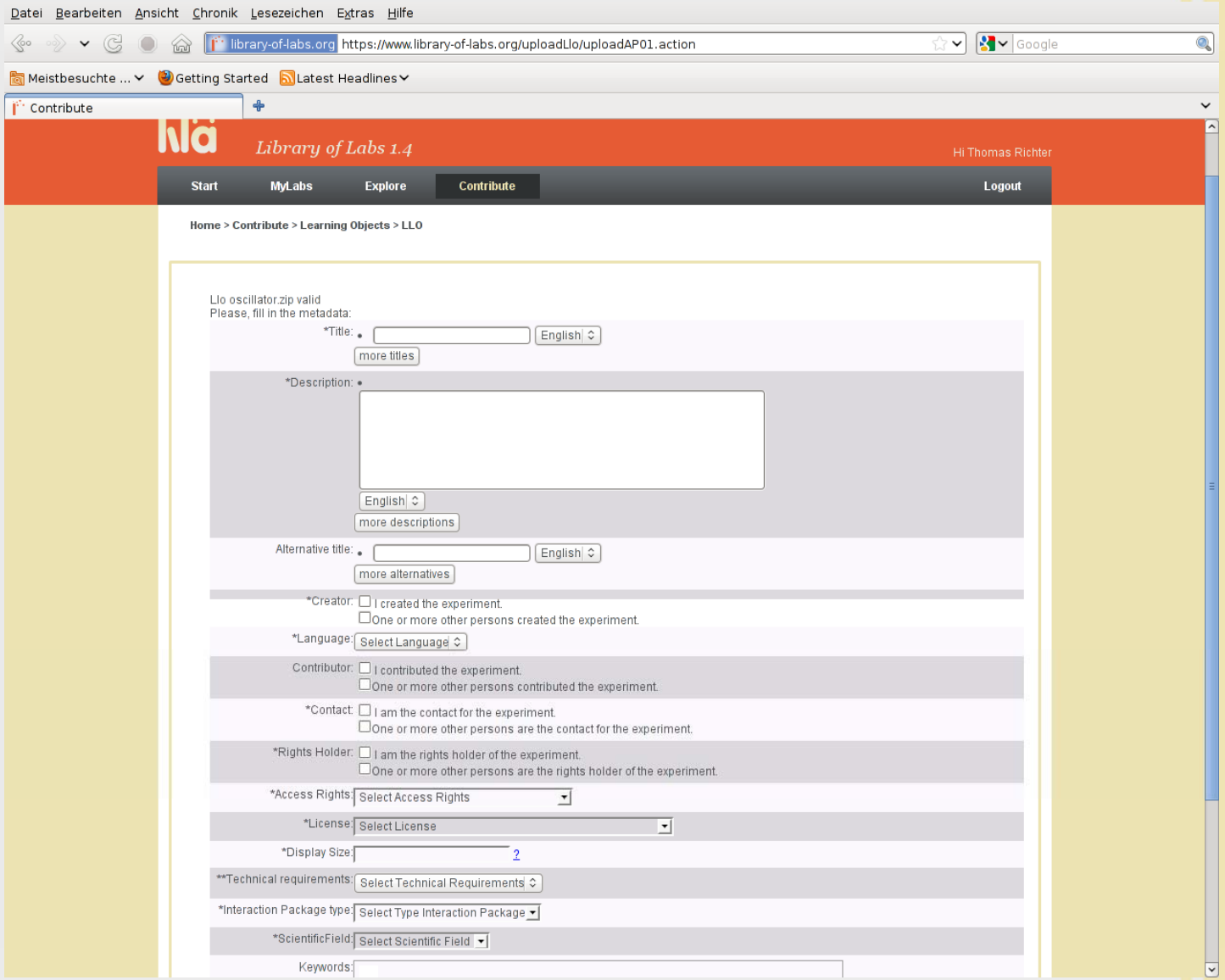
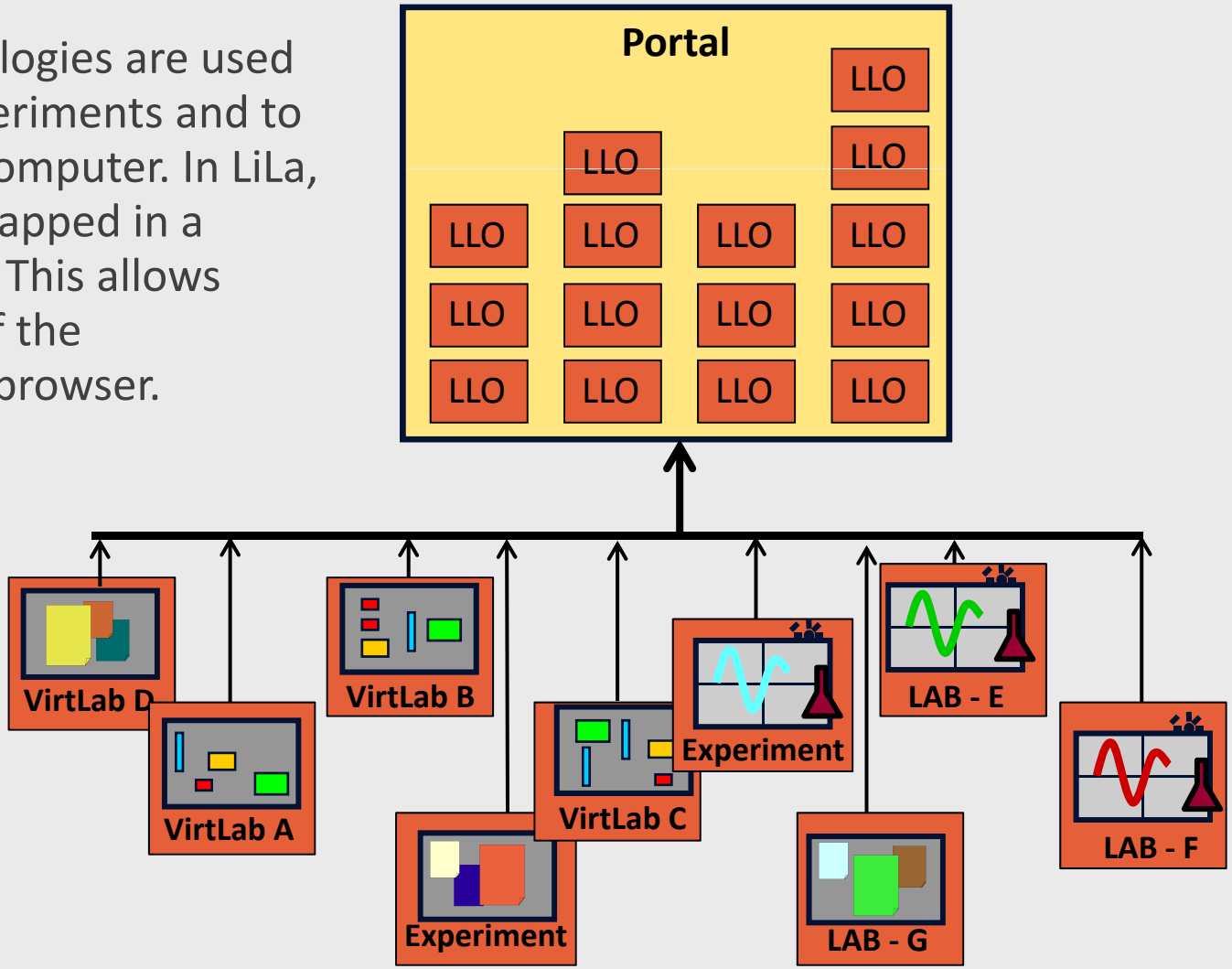
LLO Upload

You can even upload new experiments to the LiLa repository, if you are a content provider.



Central Design Goals of the LiLa Software

Many different technologies are used to control remote experiments and to run simulations on a computer. In LiLa, all experiments are wrapped in a standardized package. This allows plug-and-play usage of the experiments in a web browser.



Central Design Goals of LiLa Software

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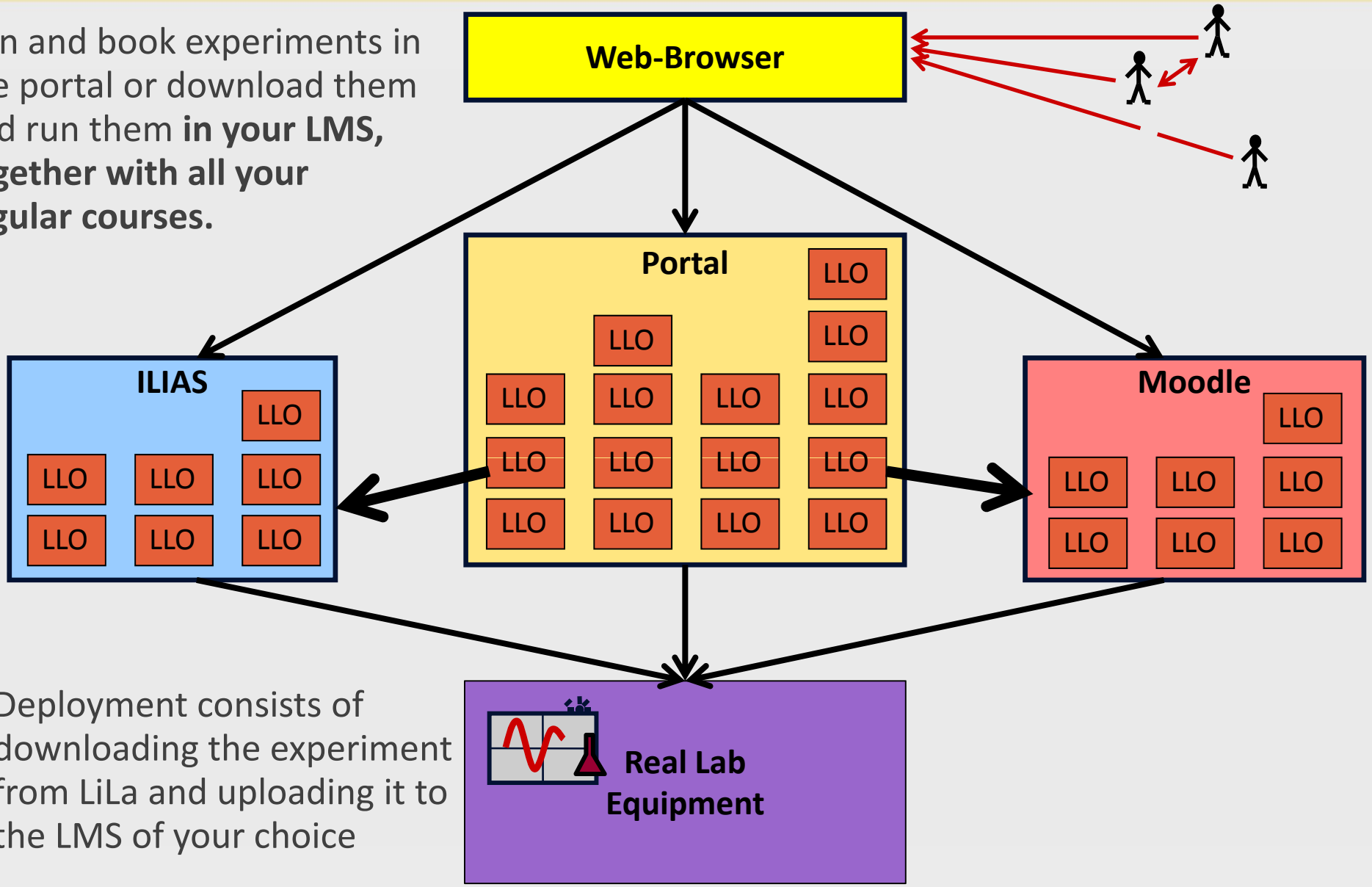
Deployment of LiLa Content

Run and book experiments in the portal or download them and run them **in your LMS, together with all your regular courses.**



Deployment consists of downloading the experiment from LiLa and uploading it to the LMS of your choice

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How do students benefit from LiLa?

- LiLa enables students to find experiments and related material by indexing and cataloguing widespread resources.
- LiLa integrates experiments and labs from all over Europe, thus offering a wide and attractive choice of experiments.
- By providing access to remote and virtual experiments alike, LiLa allows students to easily compare results of simulations and real experiments side by side.
- LiLa enables the collaborate use of remote and virtual experiments, thus enhancing the student ‘s learning experience.

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How will lecturers benefit from LiLa?

LiLa will assist lecturers in developing courses by providing:

- a central starting point for finding remote experiments & virtual labs.
- supplementing material.
- didactical assistance.
- a tutoring system.
- use cases.

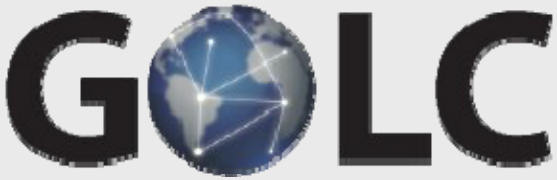
Lecturers can:

- offer a practical and realistic experience to more students.
- share setups and materials.

LiLa is engaged in European and international consortia to promote the development and application of remote laboratories:

GOLC Global Online Laboratory Consortium

SEFI European Society for Engineering Education
Europäische Gesellschaft für Ingenieur-Ausbildung
Société Européenne pour la Formation des Ingénieurs



The Global Online Laboratory Consortium (GOLC) is focused on promoting the development and sharing of, and research into remotely accessible laboratories for educational use.

LiLa identified interoperability of Remote Laboratories and Virtual Laboratories as important goal. This goal needs steps towards standardization and can only be reached on a global level.

LiLa contributions to work in GOLC sub committees:

- Technical Metadata for cross-system retrieval (Technical Committee)
- Regulations for cross-system booking (Technical Committee)
- Structured descriptions of pedagogical settings (Pedagogical Committee)
- Pedagogical Metadata (Pedagogical Committee)
- Standard Questionnaire for Evaluation (Pedagogical Committee)

European Society for Engineering Education
Europäische Gesellschaft für Ingenieur-Ausbilding
Société Européenne pour la Formation des Ingénieurs

SEFI, the European Society for Engineering Education, has more than 150 university members from 27 countries across Europe.

LiLa partners will continue to collaborate as Working Group within SEFI.

Topics will be

- Promotion of re-usage of existing content
- Exchange of usage experiences
- Work on pedagogical scenarios
- Maintenance of the portal
- Inclusion of additional content

Everybody is invited to join!

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How can I get involved in LiLa?

LiLa is designed for participation.

Students and teachers can visit the LiLa Portal at any time, search for experiments and run them on the portal or download them to their local Learning Management Systems. Some remote experiments need a booking: LiLa will provide contact information to the owner of the content and a booking system.

Moreover, LiLa is designed for integrating additional content – virtual laboratories and remote experiments. In fact, more than 100 experiments on the LiLa portal were provided by partners from outside the original consortium.

Interested parties are welcome to contact LiLa at any time.

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How can I contact LiLa?

LiLa Portal:	http://library-of-labs.org
Project Website:	http://www.lila-project.org
Project Coordinator	Dr. David Boehringer boehringer@rus.uni-stuttgart.de
Technical Coordinator	Dr. Thomas Richter richter@rus.uni-stuttgart.de