

7th International Technology, Education and Development Conference

Enhancing K-12 science education through a multi-device web tool to facilitate content integration and e-Infrastructure access



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- Main purpose
 - Achieve a joyful exploration of e-Science through expert knowledge guidance and e-Infrastructures
- Aim
 - Enable access to resources of selected e-Infrastructures
 - Improve science curricula by enriching school's existing teaching and learning materials
- Target users
 - Students, Teachers and Researchers in Europe

Scenario

Virtual Science Hub



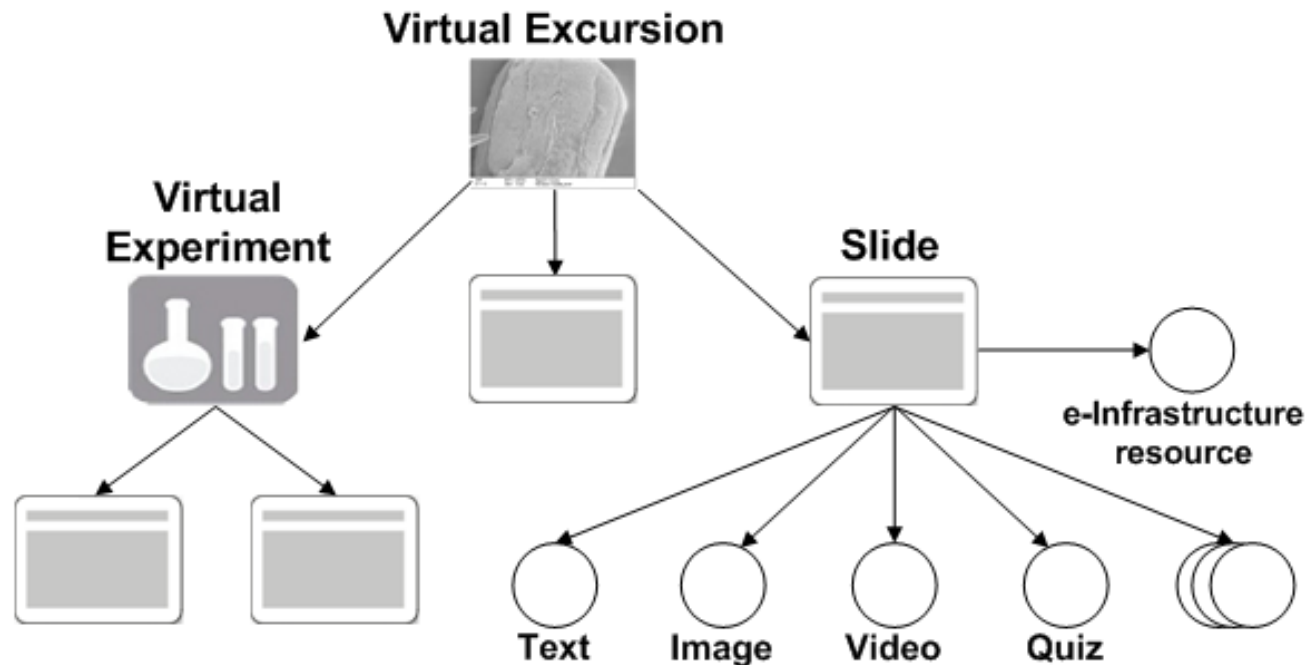
- Social collaborative e-Learning platform
- Aim
 - Foster collaboration among teachers, researchers and scientists
 - Share and create enhanced learning materials
 - **e-Infrastructure pedagogical resources**
 - **Virtual Excursions**
 - Provide students access to e-Infrastructures and expert knowledge of e-Science
- Main tool
 - Virtual Excursion Viewer (**ViSH Viewer**)

Virtual Excursion

- A Virtual Excursion is a tour through some digital context by teachers and pupils on a given topic that is attractive and has an educational purpose
- Take advantage of e-Infrastructures benefits for education
- Is generated as a reusable, granular and interoperable **Learning Object**
- Defined in **JSON**
 - Can be exported to **SCORM**
- Metadata based on **LOM**

Virtual Excursion (II)

- Is composed by an arrangement of resources of any type: text, images, videos, websites, flash objects, quizzes, e-Infrastructure resources, etc.
- Granularity: **four aggregation levels**



ViSH Viewer

- Innovative web tool to consume educational content which aims to facilitate e-Science infrastructures access through the **Virtual Excursions**
 - Allows users to view and interact with Virtual Excursions **from any device**
 - No installation needed
- Technology and implementation
 - Web application based on **HTML5**
 - **JavaScript** library + HTML + CSS
 - Client-server architecture

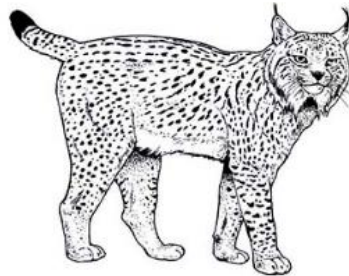
ViSH Viewer Features

- Multi-device
- e-Infrastructure resources management
- Synchronization
- Integration with videoconference services
- Quizzes
- Content filtering and adaptation
- Offline access

Virtual Excursion Examples

Doñana Biological Reserve

Iberian
Lynx



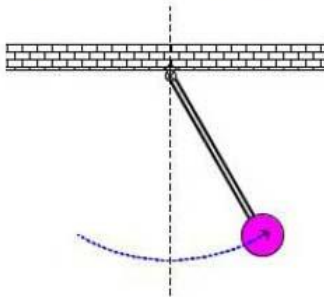
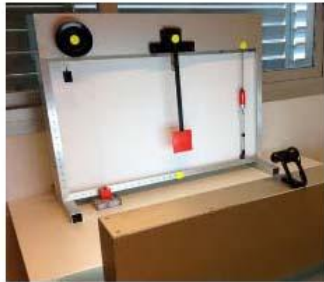
Iberian Lynx

Live Webcam in Doñana

Estación
Biológica
Doñana
CSIC



Remote Physics Laboratory

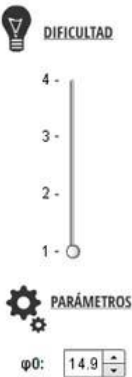
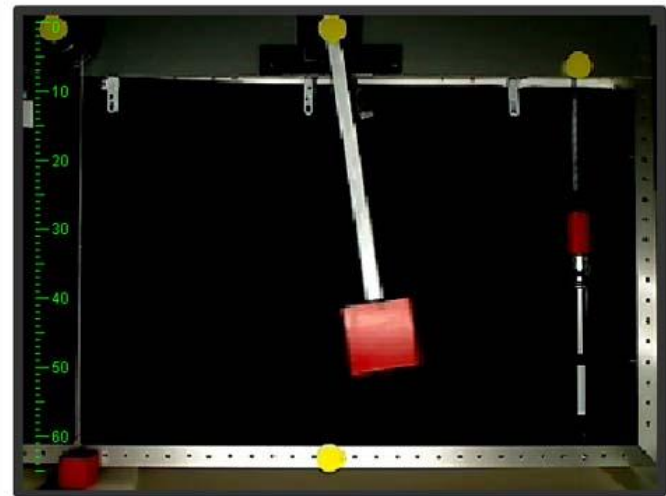


RRLAB PENDULUM

Level 1

1. Let's suppose a simple pendulum. Using the 65cm length virtual ruler, measure its length x . Units in the international system.
2. Set the initial angle φ_0 , place the pendulum on its position (**Place** button) and then launch the experiment (**Launch** button).
3. Observing the image, calculate the period T_0 with the help of a stopwatch. Measure during several periods to reduce the error.
4. Calculate the theoretical period T_1 from the length x and the gravity g .
5. Compare and discuss the T_0 and T_1 values.
6. Expansion: Does T depend on φ_0 ?

RRLAB PENDULUM

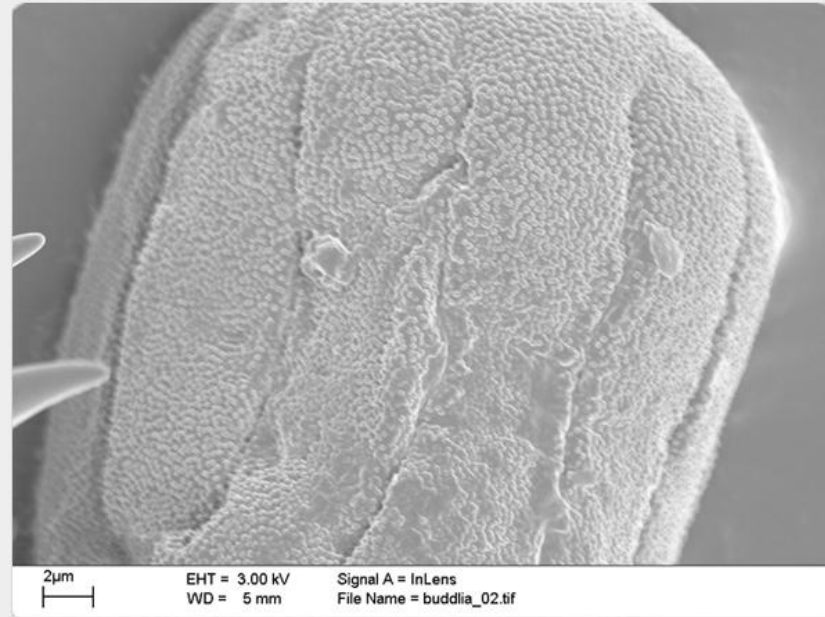


Real Time Microscope

Nanoscience Centre



The Nanoscience Centre is an 1800m² research facility completed in January 2003 and located at the north east corner of the University's West Cambridge Site. The Centre provides open access to over 300 researchers from a variety of University Departments to the nanofabrication and characterisation facilities housed in a combination of Clean Rooms and low noise laboratories.



Conclusions and Future Work

- **Virtual Excursions:** creation of a reusable, granular and interoperable learning object
- Real examples of how to enrich learning using e-Infrastructures resources with a web tool
- Future Work
 - **Virtual Excursions Editor**
 - **Learning Object as a Service** for non-educational contexts

Thank you for your attention!

Any Questions?



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