EU HORIZON 2020 Project

newton

Networked labs for training in sciences and technologies

Deliverable D5.2 Summary

This document presents a comprehensive architectural overview of the NEWTON Platform, in compliance with the functional, technical, operational and transitional requirements described in the D5.1. The document uses a number of different architectural views to depict and define the technologies, products, and techniques necessary to develop and support the platform, and to ensure that the components are compatible.

This document also:

- Identifies and describes the risks inherent in this Technical Architecture;
- Define baseline sizing, archiving and performance;
- Identify the hardware and software specifications for the Development, Testing, QA and Production environments;
- Define procedures for both data and code migration among the environments.

In addition, the present deliverable includes an overview of all efforts conducted to understand the existing technical environment and its strategic direction and to determine how the system's proposed technical architecture fits into them.

The NEWTON platform integration, part of WP5, will be led by SIVECO and performed by SIVECO and other partners involved in the development of NEWTON platform components, according to NEWTON DoA.

- Input from WP2: Labs and Content Production and Management:
  - Contents and virtual experiments.
  - The virtual labs will provide the following features:
    - A visual software simulation and learning environment that students can use across different programs/courses;
    - An expandable set of virtual experiments, learning resources, and assessment activities;
    - An inclusive interface to ease the access to all users, including those with disabilities.
  - The fab-labs will provide the following features:
    - A learning environment where the student can practice theoretical concepts into a realistic setting;
    - A set of remotely accessible labs deployed and distributed over different locations;
    - Automated-assessment where the student receives feedback on experiments performed.
  - Integration of the fab-lab and virtual labs;
  - Integrate in NEWTON the already available fab-lab;

- Implement the connection between fab-labs and NEWTON's business logic;
- Setup the reservation system for fab-lab and inter-fab-lab communication;
- Implement the connection between virtual labs and NEWTON's business logic;
- Integrate the virtual experiments with the NEWTON ICT platform;
- Integrate the inclusive lab interface to address the different types of disabilities. All details about the inclusive lab interface will be further described in WP2 deliverables.

- Input from WP3: Supporting Technologies
  - Supporting technologies used by the NEWTON platform to deliver effective-based, multi-sensorial, media-rich, tailored content to its end users:
    - Propose mulsemedia content for enhancing e-learning;
    - Propose appropriate commercial off the shelf devices for generation of mulsemedia content.
  - Define a set of scenarios for using mulsemedia content to support innovative teaching and learning.
  - Integration of multi-sensorial content with modal access that will be detailed in Task 3.1.4.
  - Development of new algorithms for various modalities for identification and system navigation appropriate for distance learning that will be detailed in Task 3.1.5.
  - Development of the appropriate infrastructure needed to store and manage the relevant multi-sensorial media (mulsemedia) data:
    - Propose an annotation mechanism for mulsemedia data;
    - Define mulsemedia data access mechanisms;
    - Develop API for mulsemedia storage and management.
  - Realistic model of the learner profile (adds user's affective and sensorial state to the NEWTON Learner Model).
  - Methodologies for adaptive rich multi-sensorial content delivery.
  - Multi-sensorial Content and Its Multi-modal Access.
  - Input from WP4: Innovative Pedagogical Methods.
  - Online courses developed for at least three subjects in the STEM domain (e.g. augmented reality, gamification and self-directed learning).
  - Innovative technologies and approaches that enhance online teaching practices in the STEM domain.
  - Innovative pedagogical approaches for people with disabilities.
  - Pedagogical based Learner Model that supports learner-oriented technology enabled teaching and learning.