

# Open Virtual Mobility

## 02-A2 VIRTUAL MOBILITY LEARNING HUB TECHNICAL IMPLEMENTATION

### - Final Draft -

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## Imprint

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This paper is O2-A2 document produced as part of Outcome 02 – A2 Virtual Mobility Learning Hub Technical Implementation and aims at explaining the technical implementation of the Virtual Mobility Learning Hub.

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Partial content of this report was submitted for the IEEE ICALT Conference (under review).

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## Executive summary

The aim of this draft is to provide details regarding the technical implementation of the Virtual Mobility Learning Hub - VMLH. The Open VM Learning Hub Concept incorporates several components, services and technologies. This document details the current configuration of the VMLH development environment, which will subsequently become the production environment. This document is based on the State of the Art analysis, part of the **O2A1 LH Concept**.

## What are the objectives of this paper?

- To provide details regarding the technical implementation of the Virtual Mobility Learning Hub - VMLH.

## Who is this paper for?

- Pedagogues and didacticians interested in the technical infrastructure behind the Virtual Mobility Learning Hub.
- Researchers interested in discussion and presentation of currently existing infrastructures of VLEs.

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## What topics are addressed in this paper?

The main topics are based on a research of different VLEs, Open Badges, and their use in Moodle, Mahara.

## Contributors

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## Acknowledgements

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## 1. Aims of this draft

The aim of this draft is to provide details regarding the technical implementation of the Virtual Mobility Learning Hub - VMLH.

## 2. State of the Art

The Open VM Learning Hub Concept incorporates several components, services and technologies. This document details the current configuration of the VMLH development environment, which will subsequently become the production environment.

This document is based on the State of the Art analysis, part of the **O2A1 LH Concept**.

## 3. Methodology

The Virtual Mobility Learning Hub is planned to be an innovative multilingual ICT-based environment. The applied methodology for the concept and implementation of the Virtual Mobility Learning Hub (VMLH) follows the principles of agile development (Beck, 2001), and socio-cognitive engineering method (Sharples, 2002; Andone, 2009), with focus on frequent technical and user cases iterations and then, user tests to improve user experience.

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## 4. Expected results

The present document provides a detailed look at the different components of the VMLH from the technical point of view and the way they interact in order to provide the desired functionality. They are valid at the editing moment 14-May-18.

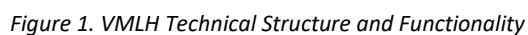


Figure 1 represents the current configuration of the VMLH dedicated virtual machine, the different components currently installed, and the way they all interact. A more detailed look will be provided as follows.

#### 4.1 The environment

Currently, the VMLH resides on a dedicated virtual machine in the Data Structure of the Center for eLearning (CeL) of the Politehnica University of Timisoara (UPT). The operating system of this machine is CentOS version 6 (latest release: CentOS release 6.9 Final). There are 4 GB of dedicated RAM, and 50 GB of storage (expandable through the use of LVM). As middleware, the environment has installed the latest stable versions of nginx (as webserver), MariaDB (database management system), and PHP7. Various other utilities are installed (git, the necessary PHP extensions, etc.).

Because the CeL Data Center is part of the larger IT infrastructure of the University, current external access is limited to the web server (ports 80 and 443). The web server uses SSL technology through signed security certificates, and redirects all traffic through the secured interface (port 443).

#### 4.2 Moodle

Even though different solutions were investigated (edX, Academy by Moodle, etc.), Moodle was chosen as the basis for the VMLH due to its reputation as the leading open-source learning management system (LMS), the fact that it covers most of the VMLH requirements, the possibility of networking different university platforms through the MNET procedures (if so desired), and previous successful experiences.

Currently, version 3.5 of Moodle is installed on the VMLH virtual machine. This version is still in development, but due to be released officially during the Summer of 2018.

Additional plugins and themes were installed and tested:

- Theme: Snap ([https://moodle.org/plugins/theme\\_snap](https://moodle.org/plugins/theme_snap)), version 3.3.1 (deactivated)
- Log Store: Logstore xAPI ([https://moodle.org/plugins/mod\\_hvp](https://moodle.org/plugins/mod_hvp)), version 2.2.4
- Activity Module: H5P ([https://moodle.org/plugins/mod\\_hvp](https://moodle.org/plugins/mod_hvp)), version 1.7
- Activity Module: Group Formation ([https://moodle.org/plugins/mod\\_groupformation](https://moodle.org/plugins/mod_groupformation)), version 1.6.2
- Course Format: Onetopic format ([https://moodle.org/plugins/format\\_onetopic](https://moodle.org/plugins/format_onetopic)), version "san juan"
- Assignment / Submission plugins: Mahara portfolio ([https://moodle.org/plugins/assignsubmission\\_mahara](https://moodle.org/plugins/assignsubmission_mahara)), version 1.2.2-mdl2.7+

Other plugins will be installed and/or developed, as the specifications of the VMLH are refined, reviewed and finalized.

Language packs for all the official languages of the partners have been installed. Also, a dedicated email account was created on the CeL email server, in order to allow the platform to send email notifications to its users.

#### 4.3 Mahara

As a part of preliminary requirements suggested by the partners, we investigated the possibility of integrating Mahara, the electronic portfolio management system. We succeeded in installing version 18.04.0 of Mahara on the same virtual machine, using the same database, as a different platform.

Due to the compatibility between Moodle and Mahara, we were able to implement a one-way Single Sign-On mechanism, allowing users authenticated in Moodle (who have this privilege activated) to access Mahara without the need for another account or a second login procedure.

Furthermore, the accounts are linked, and students from Moodle could use their Mahara portfolios as submissions in specially configured assignments in Moodle (through the use of the dedicated plugin).

#### 4.4 Open Badges

The xAPI logstore plugin has been successfully tested, and test Badges were issued by Bestr to users who managed to complete all the activities in a given course on the OpenVM Learning Hub.

In order to send "completed" events to Bestr Learning Record Store (LRS) and enable automatic badge issuing, the XAPI logstore Plugin was installed and configured.

The complete automatic issuing of a open badge was tested: users "completed" a Moodle course, the VLMH sent "completed" events (xAPI statements) to the Bestr LRS and Bestr automatically sent badges to the users via e-mail. Finally, the users claimed their open badges.

Bestr currently has two environments: pre-production(.pp) and production(.prod). The switch from .pp to .prod needs to happen when all the components of the customer system (the OpenVMLH) are tested and stable.

In order to complete the testing phase in pre-production, the following operations need to be completed:

- 1) The inclusion in the platform of the e-assessment tool and the self-assessment tool; if the e-assessment tool will need to generate automatic badge issuing, it will be necessary to develop/integrate in the e-assessment tool the feature to send events to Bestr LRS
- 2) A complete test with a real course containing all of the components.

Further tests need to be conducted with other badge-awarding scenarios, however they need to be directly related to skills defined in other activities of the project. Also, the integration of further sources (other badges, or the Mahara ePortfolio) could be investigated. Currently, only Moodle courses can send events to Bestr LRS and allow automatic badge issuing. Other components, e-portfolio, evidences, e-assessment tool need development in order to generates the right xapi statements and allow automatic badge issuing or inclusion of additional information in OpenBadge (evidences).

#### 4.5 Blockcerts

Following discussions from the latest project meeting in Timisoara, a decision has been made regarding the feasibility of integrating the Ethereum-based Blockchain technology already under scrutiny by the UPT partner.

Since Bestr platform in 2019 is going to provide notarization on Ethereum public Blockchain using the Blockcert standard, the project will have the possibility to experiment with this other kind of digital credentials. Details about this have yet to be defined.

#### 4.6 VM Skills

The e-assessment tool has been integrated into the VMLH and awaits testing.



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## 5. Next steps

From a technical point of view, the following operations need to be completed:

- Testing the e-assessment tool with final users
- Finalizing the graphical interface of the platform
- Implementing additional functionalities according to the partners' needs and suggestions
- Develop the missing functionalities.

## References

Bestr – Digital platform for Open Badges

<https://bestr.it/>

Group Formation – Moodle plugin

[https://moodle.org/plugins/mod\\_groupformation](https://moodle.org/plugins/mod_groupformation)

H5P – Moodle plugin / Interactive Content

[https://moodle.org/plugins/mod\\_hvp](https://moodle.org/plugins/mod_hvp)

<https://h5p.org>

Logstore xAPI – Moodle plugin (Cineca custom version)

[https://github.com/CinecaElearning/moodle-logstore\\_xapi-cineca](https://github.com/CinecaElearning/moodle-logstore_xapi-cineca)

Mahara – ePortfolio open-source platform

<https://mahara.org>

Moodle – the leading open-source Learning Management System

<https://moodle.org/>

## Attachments

Add any further documents, information etc. as attachments (which may be links to other documents).

OpenVM LH Technical Structure

<https://www.lucidchart.com/invitations/accept/1648c383-98a9-4f47-83e7-db69728901ad>