

# DigiCulture

## O2.1 - Mapping the VLH Concept

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## Executive Summary

This document proposes the design of the Virtual Learning Hub from the technical point of view. This Output is dedicated to designing, implementing and usability testing of an integrated Virtual Learning Hub for developing DSC using Online, Open & Flexible Higher Education Approaches and Practices.

The DSC Learning Hub Concept incorporates several components, services and technologies.

The design of the DSC VLH starts with the desired functionalities previously discussed in partner meetings and conferences, as well as with the existing IT and e-learning infrastructures of the partners, and their desired connections with the Hub.

Several solutions were investigated, most of them in the area of open-source Personal Learning Environments (PLE). Based on the adopted concept, we propose to use the open-source learning management system Moodle as the basis for the DSC Learning component, as well as, to some degree, for most of the other components.

The DSC LH Structure comprises the 13 courses developed as part of the curricula and syllabus.

The final concept development involved the integration of registration, privacy policies and adaptation of badges.

The concept was constantly evaluated against the DSC Guidelines with experts, evaluation from the project partners and with real users (students and teachers from higher education).

## Objectives of this document

- to propose the design of the DSC Learning Hub from the technical point of view.
- outlining a possible implementation at the level of different technical components of the hub.
- To finalise and evaluate the concept against the DSC Guidelines

## Who is this document for?

- Pedagogues and didacticians interested in the design and technical infrastructure behind the DSC Learning Hub.
- Researchers interested in discussion and presentation of currently existing challenges in the field of VLEs and user case scenarios.

## What topics are addressed in this document

VLEs, OERs, MOOCs, XAPI, Open badges standards, Open Badges Bestr, Bestr XAPI, Learning Record Store (LRS), Enterprise Learning Ecosystem, Learning Management System – Moodle 3.4., H5P, Mahara.

## 1 Aims and Scope

The aim of this document is to propose the design of the DSC Learning Hub from the technical point of view. Starting from the desired functions, this document outlines a possible implementation at the level of different technical components of the hub, in order to achieve those functions.

Despite numerous projects on DSC there is no single European Learning Environment acting as a central hub for learning about DSC and developing DSC Skills in HE. This Output is dedicated to designing, implementing and usability testing of an integrated DSC Learning Hub for developing DSC Skills using Online, Open & Flexible Higher Education Approaches and Practices.

## 2 State of the art

The DSC Learning Hub Concept incorporates several components, services and technologies.

The design of the DSC LH starts with the desired functionalities previously discussed in partner meetings and conferences, as well as with the existing IT and e-learning infrastructures of the partners, and their desired connections with the Hub.

Existing open-source entities were analyzed to see if and how they could be used to achieve the project's stated objectives.

We performed an independent analyze of several tools: XAPI, Open badges standards, Open Badges Bestr, Bestr XAPI, Learning Record Store (LRS), Enterprise Learning Ecosystem, Learning Management System – Moodle 3.4., H5P, Mahara.

### **Different analyzed tools**

XAPI is an enabling tool through which you can collect within a registry, Learning Record Store, learning experiences in the form of a statement that are readable by both humans and machines. This approach goes to change radically the way organizations collect and manage the tracking data generated by e-learning platforms.

E-learning platforms xAPI terminology are called "activity provider" as they are to be understood in the broadest sense of the term and are not limited to traditional LMS, but embrace any platform capable of emitting xAPI statement.

The LRS is a decoupled system e-learning platform and can pick up statements from a plurality of systems. The data collected may be shared amongst other LRS and lend themselves to being analyzed, for example, for the award of the badge.

An experience, wherever it takes place, can be traced through a statement xAPI and collection in the Learning Record Store provided by Bestr. Bestr in turn uses statements collected to evaluate badge assignment policies.

The statement has the form of xAPI subject, verb, object, and contains the information required to identify the learner, action and activity.

The particular component as "actor" defined in the subject contains the email of the learner, the word identifies the action that you want to track (i.e. "completion") and the object contains the task description and a user name.

Badge assignment policies are described in the form of verbs and activities defined within the environment of learning or assessment.

Based on this analyze, several tools were included in the technical structure and implementation and some others were initially included and then excluded.

### 3 Methodology, tools and research

The DSC Learning Hub is planned to be an innovative multilingual ICT-based environment unique in Europe (as a directory of virtual mobility attributes) with the main plan to promote collaborative learning, connectivist social networking as an instructional method, OERs as the main content, open digital credentials as recognition and validation of DSC skills which can be applied to all ages and levels of digital education.

The DSC needs to be built on a user-friendly interface, as well as the mobile interface, to encourage everyone to access it, engage in different open learning activities, connect with others and develop their DSC competencies.

The applied methodology for the concept and implementation of the DSC Learning Hub (DSCLH) 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.

The methodology and tools will be applied in O2.1 in relation to O2.2:

- UPT Internal consultations on technical structure, user cases and functionalities, including the proposed technologies: LMS, xAPIs, Bestr and LRS.
- DigiCulture Internal consultation with the technical team: Consultations about different technologies and infrastructures needed.
- External consultation on DSC LH – within the partnership with experienced former teachers and students involved in DSC.
- external consultation on DSC LH with experts in open education, open badges and DSC during the DSC workshop in the EDEN Annual Conference in June 2020, Timisoara, Romania (online).
- Continuous adaptation and improvements of the DSC LH user cases, functionalities and technical development – based on usability evaluations.

The development of the DSC Learning Hub as a Personal Learning Environment (PLE) furthermore focuses on (a) the development of a responsive interoperable interface, (b) implementation of social software, (c) integration of tools for mobile learning, (d) development of a common working/collaboration space, (e) inclusion of features and learning analytics, (f) integrated self-assessment, and (g) validation of open digital credentials.

The development of the DSC Learning Hub (DSCLH) will imply an interdisciplinary approach from web technologies, mobile technologies, Web 2.0, interactive media and audio-video technologies, open access and tools for semantic technology. It will exist also in all partner languages (EN, IT, DK, AT, LT, RO) with a

possible extension to other languages which will allow communication at European, national and regional levels.

## 4 Expected results / Intermediate results

The aim of the present document is to propose a technical solution to the required functions of the DSC Learning Hub.

### 4.1 DSC LH Functional Diagram

The functional diagram for the DSC Learning Hub is displayed in **O2.A1 – Annex 1 DSCLH Structure** and in Figure 1. It contains most of the functionalities of the VMLH as they are envisioned at this moment.



DigiCulture in UniCampus Technical Structure and Functionality

By UPT team

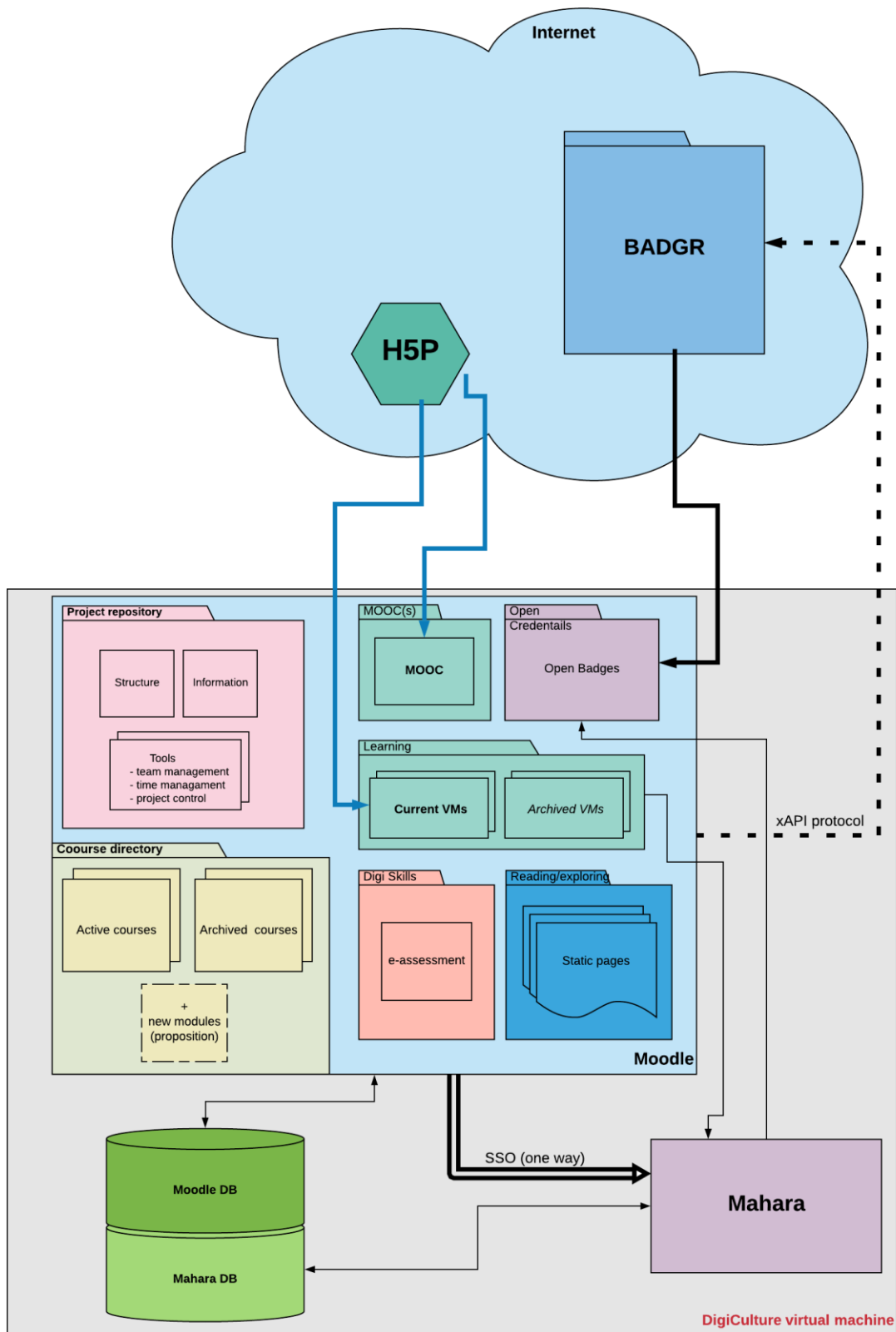


Figure 1. DSC Learning Hub Diagram



Several solutions were investigated, most of them in the area of open-source Personal Learning Environments (PLE). Included here are edX and Academy (Moodle's official MOOC-oriented version).

However, based on the adopted concept, we propose to use the open-source learning management system Moodle as the basis for the **DSC Learning** component, as well as, to some degree, for most of the other components. Moodle has all the features necessary to run online courses (MOOCs or otherwise), and its' open-source licensing allows the development of all the necessary extensions and improvements, as well as the use of existing third-party plugins.

Also, Moodle allows easy integration between different Moodle instances (as well as other types of platforms, such as Mahara), facilitating the connection between other LMSs (such as the e-learning platforms from the partner universities), if desired.

In order to prevent fragmentation, the proposed solution will revolve around this Moodle installation, and all the requirements will be integrated into this platform.

The main advantage is that even out-of-the-box, Moodle will cover many of the requirements for the other sections. A unified user management system and access control mechanisms are already in place.

One major disadvantage is that any development in areas not adjacent to Moodle's scope will need extra effort in order to integrate the resulting functionalities into the Moodle framework.

The **DSC skills** will be certified using OpenBadges. The badges will be awarded by Badgr through integration with the VM Learning, as a recognition of accomplishments during the MOOC's or the VMs' activities. Badgr receives information from Moodle via the xAPI plugin, and awards the badges according to predefined scenarios.

We propose that the **Repository** should be a dedicated category of Moodle courses (or a single course). The Moodle "Single Activity" format allows the use of a single activity as the main course content (instead of topics or weeks), and the Wiki format might be a good solution to bring dynamic content to any interested users.

The **Reading/Exploring** section of the HUB could consist of static content pages, easily added/managed with the appropriate third-party plugin available in the Moodle official plugins repository.

The **Open Credentials** represent the section where each user can view and manage their backpack of badges, which would be awarded, stored and then retrieved from Badgr. A possible extension of this functionality could be a personal eportfolio management system, such as Mahara.

Alternatively, if the requirements for this section surpass Moodle's possibilities (or is otherwise established), a whole different section can be developed, either as a Moodle extension (see disadvantages stated prior), or as a whole different platform/website, with access to Moodle's database for extracting relevant information (user access, course details, etc.).

## 4.2 DSC LH User Case Scenarios

For the integration of the DSC LH user case scenarios are designed and evaluated:

*Teacher from a partner institution scenario* - Figure 3.

*Teacher scenario* – similar with the Teacher from a partner institution scenario with the only exception that the teacher credentials will need to be verified offline by a person previously involved in DigiCulture.

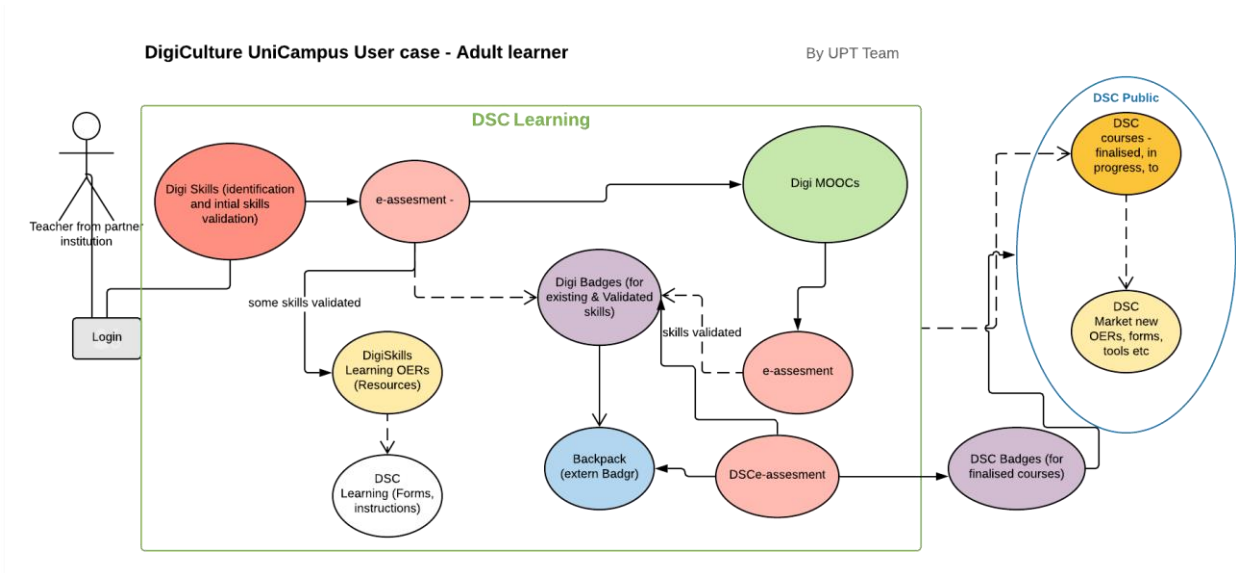


Figure 3. DSCLH Teacher from a partner institution scenario

### 4.3 DSC Policies and Guides

In the further development phase of the project, several discussions emerged related to various necessities and implementations required on the DSC Learning Hub.

One main talking point were the policies which need to respect the EU’s GDPR policies and also take into account the various policies of the project partners. A Privacy policy related to GDPR needs to be created, including a cookies section as well. The users will need to be redirected to the policies of each partner in order to be fully informed. Without agreeing the privacy policy of the hub, a user will not be able to create an account and access the hub. When creating the policies, several aspects related to sustainability need to be taken into account. We need to take into account the technical sustainability related to Moodle possibilities and limitations and also related to the same thing for the server hosting the hub. This resulted in creating and integrating the DSC LH policies which took into account internal policies of project partners.

Another important aspect which we concluded needs to be prepared and implemented are DSCLH guides of use of the learning hub for students and tutors.

### 4.4 DSC LH Registration structure

Regarding the registration, a form needs to be created and implemented. This form will contain several fields, some mandatory, some optional. These fields are: username, password, email address, full name, city (optional), country (optional), gender, target group selection and organization.

A second form, one available after sign-up will collect data about the previous background of the users. These data refer to the level of education, level of internet access, experience with digital tools, use of online education and belonging to disadvantaged categories.

A future to implement option will be the possibility of the hub being open to partner universities, and the integration of these accounts in the Learning Hub.

For assessing and validating the hub we propose several activities. First, each course should have a pre-assessment form evaluating the current knowledge status of the learner and also the expectancies related to the course. Next, the e-assessment tool developed in output O4 needs to be implemented and functional on the hub. We propose three types of validation indicators. One validating the prior knowledge under the form of a short test, one validating the learning activities in the courses and the last validating various other types of activities implemented in each course. Based on completing the pre-assessment form, the DSCLH could offer suggested courses to the user based on their previous knowledge and current skills.

The DSCLH Registration and user access structure on which the Diagram is based contains:

DSC LH Registration:

all users are learners, if it is a tutor needs special request and form to be completed, the form is translated in project languages

open to universities, universities to be selected from a list, no LDAP, group enrolment is also possible, but the registration form to be completed compulsory

Registration form: Name, Email, Sex (male, female, other), Country, City - not compulsory, language, Status (student, Academic, IR officer, non-academic staff, other), organisation - select from partners - other to introduce text

Form with previous background: Level of education, Level of online access, Digital tools, Online education, Do you come from one of these situations (economic, migrants, ethnic, ) Yes, No - no compulsory - he has to choose from the 8 categories from the OpenVM application

levels of access: learner, student from university, Teacher from university officer / staff from university, open – other, tutor (need to complete a separate form)

pre-assessment at the beginning of any course and assessment after completion of MOOC,

validation: validation of prior knowledge -test – questionnaire, Validation of activities in courses

Validation of other activities, feedback, of their level of competencies suggestions for course

Course selection - teams and groups, free selection, from the available MOOCs, no level required

based on feedback from pre-assessment, submoocs available as they are ready

Assessment: each assessment from the Moodle quiz, assessment tool to result in a badge

Badges, eportfolio integration in Mahara with Export of badges

Guides -Instructions on following EN, registration guide in all languages, LH use, Student, Tutor,

Policies: GDPR - own policy, DSC Policy, Institution policies - links to other institution policies integrated in the policy, link based on the registration form selection, Privacy, information on what we do with data, where is exported,

Technical sustainability – tutor Sustainability, synergies with other projects



The registration model, course navigation with assessment and resulted badges, policies and guides were validated with project experts and real user (students and teachers). They are developed and integrated in the DSCLH as part of the O2.2 activity.

## 5 Next steps

The next steps include the continuous integration in the DSC LH of this concept, user cases and functionalities.

## 7 References

Academy by Moodle

<https://academy.moodle.net/>

Logstore xAPI – Moodle plugin

[https://moodle.org/plugins/logstore\\_xapi](https://moodle.org/plugins/logstore_xapi)

Mahara – ePortfolio open-source platform

<https://mahara.org>

Moodle – the leading open-source Learning Management System

<https://moodle.org/>

Open edX – free and open-source Course Management System

<https://open.edx.org/>

Static pages – Moodle plugin

[https://moodle.org/plugins/local\\_staticpage](https://moodle.org/plugins/local_staticpage)

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M. Sharples, N. Jeffery, J. Du Boulay, D. Teather, B. Teather, and G. Du Boulay, 'Socio-cognitive engineering: a methodology for the design of human-centred technology', European Journal of Operational Research, vol. 136, no. 2, pp. 310–323, 2002.