

ARISE

Database Interface for Work Package 4.

Basic:

The current set-up can **identify a person**, having signed up and completed the mandatory fields. This will be an element that the interface can transfer this data from one set of data to another by filtering information across the platform. This will be a fundamental basic across all parts of the platform, as it is the identifier, to which all other information will be connected.

The second piece of data that is of fundamental importance is which **modules** have been taken. There is a requirement of which modules have been registered, started and/or completed. A report can now be formed connecting these two parts of the database. At its simplest these are the two pieces of data that the platform needs most.

Need to know/ Nice to know; Push/Pull

The next level of interest is in **data mining**; who a user is and, which modules have been taken. There are two areas of interest here, the first is the profile of the user, where the platform builds a **qualified profile** of the user and compares it to all the other cohorts. This is essentially passive in nature and looks at the *de-facto* data. Tendencies can be extrapolated and similarities with the user and others established.

As a **Backoffice** function, this allows us to see which modules are most popular and/or relevant. Internally, we can see which are good, bad or in need of a minor/major overhaul. Secondly, we can begin to make a plan for the user, directing him or her to other relevant modules, built on their history or who else took this path. This is proactive, aiding and abetting the user, with qualified menace. Now, we are painting a **learning path** for the user, which is both pertinent and relevant to his or her needs.

Reports can be generated on a weekly, monthly, quarterly or annual basis, building a body of competent data, to bolster and reinforce the **significance** of the modules offered. In artificial intelligence terms the platform, through blockchain could identify successes and failures, and in a smart context, offer or generate new areas of interest. This is a powerful feature to offer (based on search criteria or mapping patterns of choice against Google searches for example) and extend the dynamic nature of the platform, staying **relevant** and becoming a **first port** of enquiry.

In terms of the **leaderboard**, the platform (and the gamification aspect), can rank, promote and encourage the user and his/her journey, to engage and maintain contact. While the current platform offers these aspects, there is no follow-up or dynamic interaction to encourage **loyalty** and multiple repeat visits.

Profile

The process of identifying the modules taken, is a simple listing. But by identifying the types of modules, **patterns** can be mapped, both personally and across platform. This allows the data to be **ranked**. This requires a ranking internally by the consortium. Each weighting can be fixed or fluid, and blockchain and AI aid this process.

The platform can also analyse the **person type**. Whether they are blue collar, white collar, student or CEO, and by this prepare routes of preferred relevant courses. This means tendencies can be mapped, allowing for **preplanning** and preparing of new developments or areas of interest.

The latent data of comparing profiles with other persons' profiles, marking similarities and identifying differences means that there is a management capability to drive the platform, allowing improvements and beneficial enhancements. This comparison with similar and dissimilar builds a **backbone**, making the platform stronger.

In building profiles of persons; (their likes; their tendencies; their possible future choices), makes the platform robust. It reinforces the modules offered, identifies new interests and reports on redundant or antiquated work.

Having a search engine, allows for requests to be noted and assessed towards what offerings can be made, while probing the range of modules offered. A report of their wishes informs us of their needs; This means we can build a **relevant** plan for them.

By mining the modules usage, we can see what is **popular**; what needs to be reworked, is there oversupply, are there any voids which need attention.

Tecnico Lisboa (IFS)

Notes from Antonio about updating the design of the platform to include ARISE reference.

- improving the existing BIMCert reward system (based on XP points).
- integrate the BIMCert platform with other tools through API.
- support learning content management throughout the lifetime of the project.

TASK 4.# ARISE Learning Management Platform

This task will develop the ARISE learning platform, which will support trainers and course administrators to organise and structure BIM and Digital Construction modules and courses and respective contents and assisting trainees throughout the learning process.

The platform will answer to several challenges that are the result of a very dynamic and competitive economic environment that requires companies to readily and continuously adapt to stay abreast of competition and so, the workforce needs to acquire an increasing amount and variety of skills, in a shorter period.

Gamification appears in this context as a valuable instrument to motivate and engage trainees, getting them into a “learning” mission that can result in a “rewarded” progression, recognised by an online community. Gamification reveals something already known, that people respond to specific triggers: reward, competition and the satisfaction of task completion.

The gamification engine enables trainees to earn “points” every time they complete each one of the predefined sub-goals and goals successfully. As more trainees are involved, keeping score will become more important (it has been demonstrated that benchmarking progress is a vital gamification driver) and they will only be able to keep score if they are succeeding. The system also provides “badges”, visual stamps that are unlocked when the user achieves designated targets. The “levels” are implemented in conjunction with the badges and might be used to define a learning status. The “leader-boards” will then promote a more competitive environment and motivate participation and engagement. Various metrics can be used to determine how trainees can advance in the learning game, how often courses are completed successfully, number of badges earned, points gained etc.

All the points, badges and levels achieved by the trainees can then be sent to the blockchain network, using APIs, which will allow creating a large European repository for certification. Also, the integration with the APP is crucial and will allow delivering a full online environment supported by all devices (PCs, tablets, smartphones, etc.).

This task includes the following activities:

- platform design development, based on BIMcert platform, to emphasize the added value of ARISE within the European context.
- implement BIMCert reward system (based on XP points, levels and badges) and adapt it to the ARISE functional model.
- integrate ARISE platform with other tools (blockchain and APP) through APIs.
- support learning content management throughout the lifetime of the project.

Deliverables

D 4.# : ARISE platform (M9)

D 4.#: ARISE management and integration report (M24)

Milestones

M 4.#: Platform design update report (M4)

M 4.#: ARISE Platform available online (M9)

ARISE Overview of foreseen functionality

ARISE LEDGER and CERTcoin

- Ledger for (micro)certificates
- CERTcoin functionality
- Maybe a mobile site to check your individual learning account Functioning as entry-point for your ledger info and your CERTcoin-wallet

BUILD UP Skills advisor app

- ARISE task-based recognition with for each task a set of one or more connected learning outcomes.
- Repository of to the recognition linked training supply
- Some micro-learning activities that can be used to earn CERTcoin(s)
- Can generate X-API statements for recording progress and learning analytics in the Learner Record Store (for the x-API statements always correct referencing will be done to the ARISE task-based recognition.) For example: 'person 1 followed micro-learning x on task y with 90% score'
- Can open ARISE e-learning at the Moodle platform by using LTI (Learning Tools Interoperability)
- Can provide a mobile site to check individual learning account

Note: Moodle (Module Object-Oriented Dynamic Learning Environment)

§ Earned recognitions & certificates

§ Earned CERTcoin

§ Followed learning 'chunks'

Learner Record Store

- Stores all the LRS statements coupled to a unique personal-identifier
- Can be queried in order to check progress and/or issue CERTcoins
- ARISE MOODLE platform
- ARISE e-learning chunks/modules
- Repository of content from BIM Alliance partners
- Can generate X-API statements for recording progress and learning analytics in the Learner Record Store (for the x-API statements always correct referencing will be done to the ARISE task-based recognition.) For example: 'person 2 followed ARISE module x on task y with 80% score'

Ingredients of the ARISE IT infrastructure Jan Cromwijk 21-7-2020

BIMCert LMS (Learning Management System) [Moodle]

- E-learning modules
- Open for others to add new modules

Not implemented. Modules can only be created by administrators.

- Earning certificates
- Earning XP-points
- Can generate x-API statements

Issues

The LRS is external to Moodle and implemented by you, correct?

Moodle acts only as an Activity Provider, passing information to the LRS, correct?

What kind of Moodle events you want to generate x-API statements? All clicks?

- Supports LTI (Learning Tools Interoperability)

As an LTI consumer or LTI provider?

Which LTI version? (Learning Tools Interoperability)

- Supports SSO (Single Sign On)

How? SAML? OpenID?

If a new account is created on BIMCert, how is the account created on the federated system? Webservices?

Learner Record Store [based on x-API] <https://xapi.com/ecosystem/> <https://docs.learninglocker.net/welcome/>

- Log of (Micro-)learning activities (personal)
- Learning analytics (over all learning data anonymized)
- Trigger points for guiding to the next learning step

Blockchain

- Ledger
- Coins

How is the communication between Learning Management System (LMS) and Blockchain? Webservices? We pass events and receive the user balance?

BUILD UP Skills advisor-app (iOS and Android, with web-based Backoffice)

- CPD-supply repository (maintained at national/regional level) (trainings available in the field including E-learning modules in BIMCert) (an EU repository & repositories at national and regional level)
- Building errors interaction & repository (open for creation by 3rd partners) (learning from good and wrong examples from practice)
- Earning XP-points
- Register for recognitions & certificates (maintained at national/regional level)
- Unit of Learning Outcomes database suitable for translation into x-API and skill maturity modelling (in order to generate upskilling advice) The ULO's are mutual recognizable by design Co-creation by all persons with rights to work on ULO's
- JSON API's for data-requests, for example to request available course on a specific competence/recognition
- LTI and SSO to LMS

Please explain interaction between this platform and LMS.

Optional Gamification Engine developed by BUS-app IT developer [Geckotech] This gamification engine can be used to form teams, play challenges, trigger nudges, publish rankings and store XP's earned in different learning tools. It is used in H2020 TripleA-reno to nudge craftsmen to prepare for proper execution of their own work & to perform self-inspections of their own work.

Please explain interaction between this platform and LMS.

Protocols needed to be implemented

- LTI

- SSO
- x-API statements expressing acquired competence (levels)
- Badges (Mozilla open badges?)

You can visualise the 'ecosystem' in a VENN diagram, where the learning transactions are the connecting sphere.

How is the communication between LMS and Blockchain? Webservices? We pass events and receive the user balance?

Notes:

Visual Dashboard:

Can photos or avatars be used to identify users? In such a scenario then types can be placed in likeminded situations CEO's in boardrooms, carpenters on roofs, renderers in 3D virtual models. Closed groups can be placed in an identifiable space within the concern.

Clustering moodle data as a tool for profiling users

It is possible to predict users performance during an online curriculum on a Learning Management System (LMS) to keep them from falling behind. Using data mining, machine learning and artificial intelligence methods to monitor e-learning training. Conversely, it can also be used to promote good practices, reward users and encourage further involvement.

<https://ieeexplore.ieee.org/abstract/document/6644359>

It creates an intelligent virtual tutor, by defining relevant clustering features. Also, it can determine different learning behaviours, which helps identify trends and developments.

Another way to present performance is to automatically plan student-oriented learning contents in Moodle. Rather than offering the same contents for all students, we provide personalized contents according to the students' background and learning objectives. Although curriculum personalization can be faced in several ways, we focus on Artificial Intelligence (AI) planning as a very useful formalism for mapping actions, i.e., learning contents, in terms of preconditions (precedence relationships) and causal effects to find plans, i.e., learning paths that best fit the needs of each student. A key feature is that the learning path is generated and shown in Moodle in a seamless way for both the teacher and student, respectively. We also include some experimental results to demonstrate the scalability and viability of our approach.

<https://ieeexplore.ieee.org/abstract/document/6644359>

Motivating users does not currently evaluate the background that they bring to the platform, meaning differing levels of interaction might be required. Mapping this best path so that each user achieves their learning objectives starting with their initial characteristics.

For example, in a course composed by n activities, we can have learning paths of n, n-1, n-2... 1 activities, and in different orderings. And the personalisation can be even more flexible. If two activities achieve the same learning outcome (e.g., by means of a multimedia document and by reading a paper, respectively), one student could take the former and another student the latter. In other words, it is possible to find learning paths that involve, for example, the same number of learning activities but in a different sequence (in line with the course's constraints of causality) or different sets of activities, depending on the specific learning outcomes and students' profiles/learning styles.

Recommender System

A recommender system, or a recommendation system, is a subclass of information filtering system that seeks to predict the "rating" or "preference" a user would give to an item.

Information Management System for Databases (IMS DB).

IMS DB is a joint hierarchical database and information management system that supports transaction processing (unlike a relational or a network database). It is made out of segments and their relationships. A segment is a record., it can have many siblings but only one parent.

Machine Learning Backends

Machine learning backends process datasets to help prediction and models evaluation. These files are written in code (PHP, Python, or cloud services),

<https://moodle.org/mod/forum/discuss.php?d=429096>

Blockchain Algorithms

The consensus algorithms of blockchain are Proof of Work (POW), Proof of Stake (POS), Ripple Protocol Consensus Algorithm (RPCA), Delegated Proof of Stake (dPOS), Stellar Consensus Protocol (SCP) and Proof of Importance (POI).

Terminology:

Moodle (Module Object-Oriented Dynamic Learning Environment)

PHP server Hypertext Preprocessor

LIS Library & Information Science