First steps in the integration of institutional and personal learning environments

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1 Introduction

The Learning Management Systems (LMS) have become a mandatory element of the institutional policy to support teaching and training in the academic and corporate world. They offer the possibility to organise the learning material and activities and the learners registration and progress through the material. The design and use of this kind of platform is driven by the institutional needs and imposed to the learners. The LMS then provides a closed world which does not allow learners any appropriation and which is by nature disconnected from everyday learning experiences. This is particularly true in the case of lifelong and professional learning.

Meanwhile, Web 2.0 services and social software have gained momentum and are used daily in leisure and work settings. The capability to aggregate or *mash up* services and their data has enabled the emergence of a new type of learning environments : *Personal Learning Environments* (PLE). PLEs are an *ad hoc* an opportunistic aggregation of Web 2.0 services built to support a specific learning goal. They enable the gathering of existing information, its production and the integration of the learning in pertinent social networks and communities facilitating the sharing and creation of new knowledge.

These two worlds seem totally different : the first one is centred around the institution while the second is learner-centred. Although the LMSs are starting to integrate Web 2.0 services, they will never be able to cope with the rate of evolution of the Web 2.0 landscape. PLEs seem ideal for the support of a socio-constructivist approach. However, they are not *a priori* suited for formal learning (i.e., having an assessment of the new knowledge). For these reasons, it seems important to work on the articulation of these two types of spaces : institutional and personal. For this purpose, we have made a first contribution by prototyping the use of pedagogical scenarios (representing the institutional point of view) in which learners have the ability to choose the services (personal space) in which they will perform the activities. In the first part, we will present the main concepts associated with learning platforms and environments before describing the overall architecture we target. Then we will describe the prototype we have produced so far before concluding.

2 LMS, Web 2.0 and PLE

2.1 Learning Management Systems

The Learning Management Systems provide an integrated solution for the organisation of learning and teaching. Their main functions consist of providing access to resources in a structured way (i.e., a Content Management System), managing course registration and monitoring learners activities and results. As a result these systems are organised following the institutional needs rather that the learners' needs. This approach as raised criticism in light of the advent of Web 2.0 and social software and the activities they enable [9, 8, 3]. The main critics that are done are the following:

- They define a *closed world* where the tools and data are integrated and structured according to the course organisation without any possibility for the learner to change anything.
- They are *institutionally oriented* with very little consideration for individual learner's needs and asymmetric roles between the teacher and the learner.
- they provide a *limited scope and access*. Resources are mostly available based on registration and for a limited period (e.g., academic year)

2.2 Web 2.0, social software and PLEs

The Web 2.0 "revolution" is rather a change in the use than a drastic change in the core Internet technologies. Usability improvement has enabled the rise of personal and collaborative publication services facilitating the production and management of information at a personal and collective level. Social aspects provide support for the emergence of communities and social treatment of the huge quantity of information produced. In the scope of e-learning, Web 2.0 technologies are deemed for their support for constructivist pedagogy because of the ease of information production and management at an individual or collective level [7].

The PLE builds on the Web 2.0 services and social software. It is definitely user-centred. A PLE aggregates services that will help a learner manage information and relationships on a learning topic. According to Wilson, it is rather a pattern (of use) rather than a platform [9]. However, some works have emerged that aim at providing a supporting infrastructure for the building of PLEs. PLEX is an early prototype that integrates information from many existing Web 2.0 services in a desktop application [1]. Other works provide a browser based environment like PLEF [2] and MUPPLE [5].

3 Architecture

Our aim is to design an infrastructure enabling the integration of a set of services and information sources and to combine them to define a learning environment suitable for the learners as well as the teachers. Towards this aim, this infrastructure must :

- Enable the integration of services using different protocols such as REST or Web Services.
- Enable customisation and personalisation by the user which must be able to choose the services s/he likes while supporting collaboration between learners and with tutors.
- Enable the transmission of information between the services maybe with a transformation of data so as to enable activity awareness between the different actors.

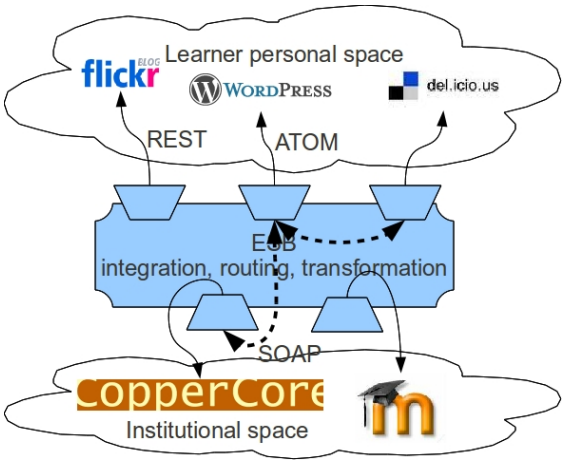

Figure 1: Integration architecture

Looking at enterprise infrastructures, these kind of functions are provided by an *Enterprise Service Bus* [4]. Figure 1 presents the typical use of a service bus. Different connectors enable the integration of heterogeneous protocols. It is possible to define routing rules and transformation rules based on message content and emitter or recipient. For instance a blog post could be registered automatically on del.icio.us for a group of learners or for a tutor and a notification could be published on twitter.

4 Prototype

As a first step towards our global objective, we have started the integration of two typical services : a blog representing the Web 2.0 area and personal space and the CopperCore learning design engine to enact pedagogical scenarios which represent the institutional design of the learning activities. In the next sections, we present the technologies we used before describing the operation of the prototype.

4.1 CopperCore

CopperCore is a reference implementation of the IMS-LD standard. It offers a command line administration interface as well as a web based client representing the learning environment. It has been integrated into the RELOAD editor so as to permit testing while editing the scenarios. CopperCore is based on the J2EE technologies and provides three types of interfaces in the form of Java objects, RMI interfaces and Web Services for the integration within learning environments such as LMSs (Cf. figure 2). These interfaces correspond to the administration and execution services which are the core of the engine.

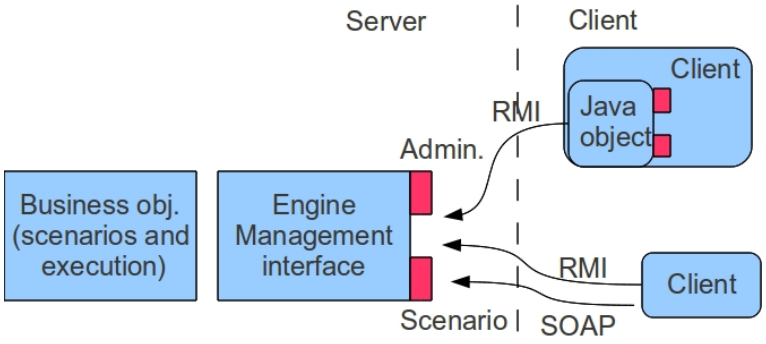

Figure 2: CopperCore : architecture and interfaces

4.2 Atom and Atom Publishing Protocol

An Atom feed [6] enables the publication of the modifications of a web resource. Such a resource corresponds generally to a blog but it can also be of a different type like a Content Management System for instance. Atom enables the description of *feeds* which contain a collection of *entries* corresponding to the resources (e.g., blog post, photo...). These entries are described by metadata (title, author...). Atom Publishing Protocol provides the methods for the modification of a Web resource based on HTTP methods (GET, POST, PUT, DELETE). These two standards combined enable read/write access to web resources.

4.3 Operation of the prototype

The prototype is designed for both the trainers and the learners providing the capability to monitor the activities which can be performed on a personal service. The use scenario is the following (Cf. figure 3):

1. The trainer defines a learning scenario based on IMS-LD and publishes it on the CopperCore engine.
2. The integration infrastructure searches for new activities for learners on a regular basis.

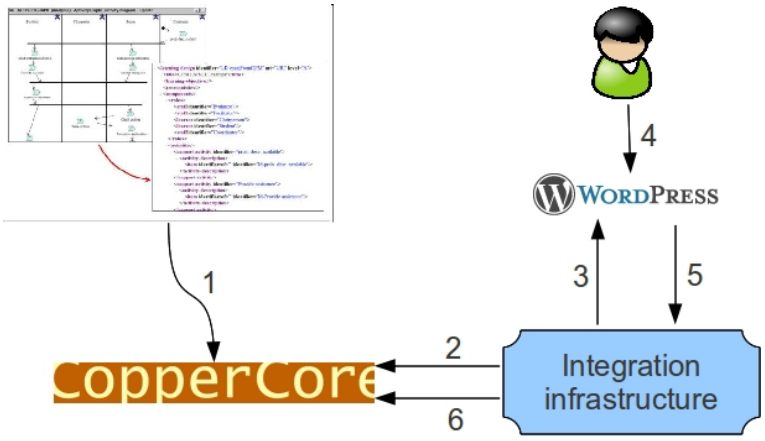

Figure 3: Prototype operation

3. When there is an activity, it is published on the learner personal blog. A specific tag is associated to the activity for its identification.
4. The learner can see the activities on his blog and performs them. The outcome of the activity will be described by a blog post using the activity identification as a tag.
5. The infrastructure monitors the Atom feed and can then detect the end of the activity.
6. It can then notify CopperCore of the end of the activity which may lead to the delivery of new activities...

In addition to the publication of the scenario on CopperCore, is is necessary to configure the integration infrastructure so it can know the details necessary for publication on a personal blog.

5 Conclusion

This work is a first step that shows the technical feasibility as well as the principles of the integration of the personal and institutional spaces through the aggregation of services. It is now necessary to extend this work to other kind of services so as to build a more comprehensive learning environment which can be used in experiments with real users. Some use scenarios like project based learning will be used to determine which services would be the most useful and to identify information flows that will better support collaboration and learning. Based on that, we will be able to build a sound infrastructure including information routing and transformation rules.

At a longer term, we would like to take benefit from semantic web technologies to monitor more finely activities occurring on the different services. Indeed, more and more Web 2.0 services export RDF data about their use [7].

Acknowledgement

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