

Identity technologies for worldware integration in collaboration and eLearning tools

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Most of the eLearning platforms in use nowadays originated in the technological and pedagogical scenario of the 90s when the goal for each platform was to include as many features as possible. However, the advances in middleware and identity technologies are broadening the horizon for a stronger collaboration between users and institutions, and opening up new possibilities for tool integration, making the principle "the platform is the net" real. These are powerful reasons for speaking of a true paradigm change in the way we design and use eLearning tools. This paper presents the work in progress being carried out on both the "Ágora Sur" interdisciplinary research team of the University of Málaga and the Central IT Services about the application of identity and access management technologies to the design and implementation of open, fuzzy limits learning and collaboration environments.

Keywords personal learning environments; middleware; identity and access management

1. The fall of monolithic platforms

Just like any other human artefact, software has a life cycle too. Integrated platforms for learning and collaboration are among the most used applications nowadays and nearly all of universities currently have, at least, one of them. However, almost all of these originate in the technological and pedagogical scenarios of the 90s: BSCW, ILIAS, WebCT, Blackboard, Moodle... In an attempt to stand out from other competitors, the goal for each platform was, and to a large extent still is, to include all possible functionalities... and more, even at the cost of adding a lot of unnecessary ones, thus falling into the well known kitchen sink syndrome.

What consequences has this situation had? The most dramatic one is that each platform wastes a lot of time, resources and efforts reinventing the wheel in search of solutions to problems already solved in other environments. The need to stand out from a flood of similar products leads to an endless gadget race, trying to add an increasing number of features already available in other tools. Paradoxically, however, there is no true technical innovation because, in the end, they all end up cloning each other; and there are no new practices in teaching: in most of the cases their implementation has only meant the extension from a physical space -the classroom- to a kind of virtual annex -the platform- in which the same old teaching and learning practices are still developed.

2. The times are changing

However, in recent years, we have witnessed a great number of changes on both, teaching and technological environments, and those changes are having an enormous influence on the way we use teaching and learning tools and also changes in the tools themselves.

For example, in the educational context there are new frameworks for international interoperability, such as the well known European Space for Higher Education, or its equivalent the UEALC for Latin America and the Caribbean. This means a greater data interchange and a higher rate of resource sharing between institutions, but also an increasing mobility for all users: teachers, students and researchers. To solve the problems arised from data interchange, there are initiatives as the SCHAC (SCHema for ACademy) Committee where experts from most European universities have elaborated a common data model to organise academic information [1].

On the other hand, we are witnessing in the technological field an increasing availability of new services, to such an extent that it is becoming common to speak about *worldware* to signify that extensive range of applications and services, formerly available in our desktop only, such as word processors or spreadsheets.

The above mentioned changes have triggered new practices among network users, too. For example, it is currently usual that our students and most of the staff on academic institutions have e-mail accounts on free services and that they prefer to use them -instead of the institutional ones-, as well as to make use of their usual instant messaging tools, in which they centralise most of its communication needs, such as Jabber (or Google Talk), Skype and others. In accordance with their daily experience in the net, they are used to sharing their

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resources easily and without a solution of continuity, just as they already do with their bookmarks, documents or images, and also use a lot of network and *social* applications.

All that is great, of course, but with that availability of services new problems arise too. Summarising, we have at hand more services than ever before... but also a puzzle of identities and passwords. Keeping all our tools at hand is nice then, but we need better integration solutions than rewriting the same applications time and again, as we have seen the platforms of the '90s do. In fact, there is an increasing feeling that current architectures are reaching the point of diminishing returns [2] so we require new concepts for the platforms [3].

Application integration is by no means a new problem and there is a wide range of models and solutions available. The most common alternative for eLearning tools is the one that we would name as *application-centred design* and whose tag line could be defined as "trying to enrich the user's experience by means of an integrated platform with all the gadgets one could imagine... and more". Current eLearning environments are then conceived as specific universes with their own access and authorisation mechanisms, resources management and communication services -mail, chat rooms-. However, this approach has important drawbacks in security, usability and integration with broader environments as those of our academic institutions.

On the contrary, the second alternative that we would name as *user-centred design*, is directed to rethinking the tools to be able of sharing a same user identity. This would be a clear use case for the *federation* pattern, where the identity and access system acts as a compulsory front-end to access the applications. This concept is not new in itself, and the Identity and Access Management (IAM) technologies required to develop this type of environments are already here for some time now, but just now it is becoming feasible to apply them to final user environments because of the appearance of better and easier ways to set up identity and access services based on accepted standards.

3. The need for evolving technologies in a new scenario

Our research group has some years of expertise with collaborative projects on subjects mostly related to the use of ICT for learning, teaching and cooperation for development [4]. On the technological field we have been working on component based platforms for learning and collaboration for some years now [5]. In 2005 we started the development of *Agora Virtual*TM, an innovative environment for collaboration with a modular architecture, serving both as a daily tool for current courses and research projects (either those being carried out with Latin American universities and funded by AECID, the Spanish international cooperation agency, or Tempus projects) and as test bed for new technologies and collaboration models. [6] [7]

Looking for the simplest solutions, our approach to address worldwide integration issues is based upon a set of already available underlying technologies:

PAPI [8] (Point of Access to Providers of Information) is a system developed by RedIRIS, the Spanish NREN, to provide access control to restricted information resources. It is based on the concept of Point of Access (PoA) and benefits of libraries and tools in diverse programming languages as Perl, PHP and Java. The current PHP version, although simplified, it is fully compatible with the canonical one but with an easier implementation and it constitutes the least complicated way to put single-sign-on into already existing PHP applications.

SimpleSAMLphp [9] is a clever SAML 2 SP and IdP PHP implementation developed by Norwegian NREN Uninett and easily integrating any service in that language with any identity management infrastructure using SAML 2. It is the easiest way to put federation into PHP applications and it is being used to adapt some existing web applications, as well.

Our proposal makes use of both mechanisms in an integrated way for giving some applications the ability to share a unique access control.

Finally, for interoperability of applications, the way to go are OKI OSIDs (Open Knowledge Initiative Open Service Interface Definitions), an initiative started in the Massachusetts Institute of Technology with interoperability as main goal for standardising the development of educational applications and services, addressing two important issues for eLearning tools: choice and sustainability [10], and *Harmoni*, a project led by the Curricular Technologies Group at Middlebury College for OKI based rapid development and easy maintenance of curricular IT projects. [11]

4. Putting the pieces together

With these pieces we are pointing towards a true *personal environment* made of a cluster of web fronted applications plugged in as components. Thus, we can benefit from all that great software already in the net and get much better integration without being forced to reinvent the wheel every time. Federating the tools we don't need to rewrite them again: in an user centred environment all tools are aware in each moment about the user identity. For example:

DokuWiki [12] is a well-known and very widespread tool for elaborating shared documentation in a collaborative way. The proposal presented here uses the above pointed identity mechanisms to give this application a single-sign-on solution, provided by the PAPI component, and federated access with SimpleSAMLphp. On its side, the *Ágora Virtual*TM framework uses the implementation we have developed of the OKI OSID authentication interface with the same PAPI and SimpleSAMLphp components as well.

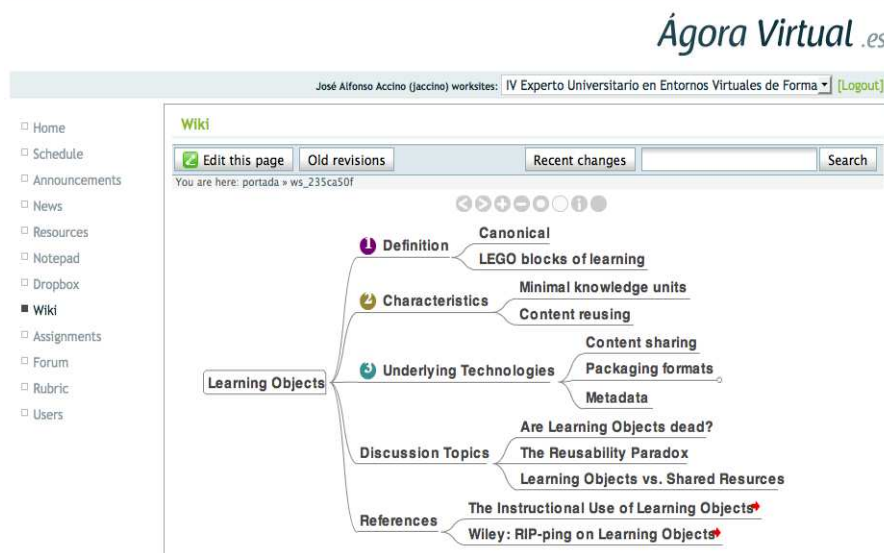


Fig. 1 DokuWiki tool embedded within the *Ágora Virtual*TM environment. The wiki shows a conceptual map created using the FreeMind desktop tool..

As shown in Fig. 1, the DokuWiki tool can be easily embedded within the *Ágora Virtual*TM environment because both are federated using the technologies shown above: PAPI and SimpleSAMLphp, and share a common identity provider. The wiki takes the users privileges from the attributes returned by the identity provider and sets their permissions according to their role within the environment: for example, if they are teachers, they would be able to edit the wiki content, while if they are students, they would have reading access only.

5. A true personal environment for teaching, learning and collaboration

The greatest benefit of this approach is to take advantage of a great range of available applications: conceptual maps, knowledge bases, shared calendars, specific tools... Having a great number of exciting available services at hand we are now able to elaborate more dynamic learning materials while working in groups with our students, and users from diverse organisations can collaborate still keeping their own institutional identities.

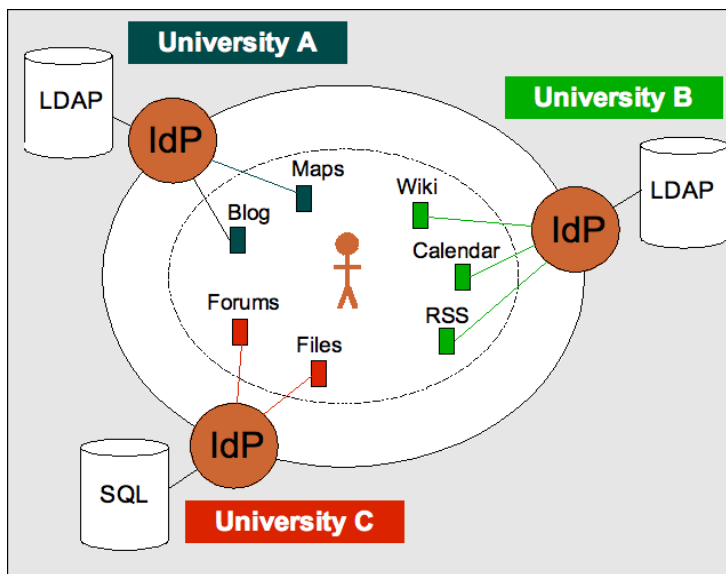


Fig. 2 *Federated services.* Users can choose among these to build their own working environment.

Even more, provided that all tools are federated, users will be able to build their own Personal Environment for Teaching, Learning, and Collaboration choosing among services and applications offered by other organisations beyond the limits of their own institution while keeping their original identity, as shown in Fig. 2.

6. Known issues and future directions.

Integrating worldwide applications seems to be the best way to build real personal environments without the cost of rewriting the same tools time and again. However, although current results look promising, there are some open issues yet.

For example, we need some way to keep track of the applications opened by the users to be able to close the sessions and to log them out from all federated services. This question becomes more complex when we use distinct protocols, but both PAPI and SAML 2 have their own strengths and weaknesses, so finding a way of integrating their logout processes is required. According to the overall BAR (Browser Activity Registry) principle exposed in [13] we are currently working on a Single Logout (SLO) solution for PAPI PoA. Although fully functional in a PAPI environment, more research is still required to achieve a closer integration with SAML 2 SLO [14].

Another issue is related to group management. Provided that current web applications do not always collaborate nicely among themselves, some way to transfer the group information between the attributes provider and the application itself is required for mapping it to the roles allowed by the application. Our current research on this issue is addressed to technologies like SPOCP [15] because of its well established relationship with PAPI, but also to other group management solutions.

Finally, there is an obvious need for more applications which are able to interoperate and delegate their authentication and authorisation processes to external mechanisms as those provided by the above identity and access management technologies.

7. Conclusion

The future is already here, really. Today the real platform is the net but we need a way not to get lost in its overflow of services. Advances in middleware technologies are breaking the barriers among users, institutions and services opening up a lot of new possibilities formerly not available in the platforms of the '90s. Identity, access and interoperability technologies make us able to use existing worldwide for building a true personal environment and using it as a starting point for learning and collaborating with other users, offering better opportunities for innovation to teachers, students and researchers.

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