ACCESSIBLE ESERVICES –  
THE DEVELOPMENTS OF THE EU4ALL PROJECT

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Summary
This paper gives an up to date report on the work of the EU4ALL project in developing a framework and technical architecture for accessible lifelong learning. The paper then goes on to give a more detailed description of the aspect of the project developing a means and components for implementing accessible e-services for students. The validation of the project's developments does not take place until the first half of 2010. However, providing this is successful the project anticipates widespread impact on eLearning across the Higher Education Sector in Europe.

1 Introduction
Approximately 15% of the adult population has some form of disability

Figures for the incidence of disability vary from country to country mostly because of differing definitions of accessibility. 15% is an estimated mean value.

 Thus in any web based application or service significant numbers of people are excluded or disadvantaged if accessibility is not addressed. In most developed countries antidiscrimination legislation exists than makes meeting the accessibility challenge in eLearning and educational administrative systems an imperative; not withstanding that it also fits with the ethos of most educational establishments.

Firstly the EU4ALL project is introduced and a summary given of its achievements to date (it is now over 60% way through its 4 year programme). Then the rationale for accessible eServices is expounded. The work of the EU4ALL project in developing a

Accessible technology was the term used in the Microsoft commissioned study to collectively refer to all technical responses to promote access for disabled people to computer hardware and software.
framework and specific prototype services conforming to that is described. Some concluding points are given.

2 The EU4ALL Project

The EU4ALL (European Unified Approach for Accessible Lifelong Learning) project is ongoing, running for 4 years from October 2006. The European Commission’s IST eInclusion programme is providing overall funding of € 7.4 million; equating to about 100 person-years effort across the 4 years. The EU4ALL consortium consists of 13 partners across Europe with the Open University (OU) in the UK being one of the two major distance teaching universities in the consortium; the other being Universidad Nacional de Educación a Distancia (UNED) of Madrid, Spain. The developments of the project will be validated in the context of these two universities in the final year of the project.

EU4ALL addresses systemic issues in providing access for disabled learners to Lifelong Learning particularly where this is mediated by technology. Where such technology is inappropriately introduced with insufficient support, disabled people face further exclusion from the interlinked worlds of education and work. The project is focused on distance learning, principally at the Higher Education level.

The project has coined the term Accessible Lifelong Learning (ALL) uniting three key strategies:

1. That the technology that mediates lifelong learning does so accommodating the diversity of ways people interact with technology and the content and services it delivers.

2. That this technology is used to bring specialist support services to disabled learners.

3. By providing support services and technical infrastructure that enable staff of educational institutions to offer their teaching and services in a way that is accessible to disabled learners.

The EU4ALL project’s aim is to improve the efficiency and efficacy of implementing the above strategies by developing an open service architecture for Accessible Lifelong Learning. To achieve a wide impact the approach taken is not to develop a single EU4ALL system but a standards based framework that facilitates the integration of the approach with a wide range of e-learning systems.

The EU4ALL project is an ambitious one that seeks to make a widespread impact on the delivery of lifelong learning by providing an open, standards-based, reusable and extensible architecture of services (in a SOA[2] approach) and a reference framework that supports doing so in a way that is accessible to learners with all kinds of disabilities.

(For further information about EU4ALL see: www.eu4all-project.eu.)

3 Overview of EU4ALL Achievements to date

The EU4ALL project begun with a period of background research of: the socio-political/educational context; the state-of-the-art in the relevant technologies; and eLearning technical and accessibility standards. Some of these findings are publically

It is beyond the scope of this paper to report the technical and standards researched but the areas covered included:

- Trends in eLearning technologies
- Web services and semantic web technologies
- Status and trends in learning technology standards
- Accessibility standards

In this initial period a lot of detailed student and stakeholder research was also undertaken to inform the specification of the EU4ALL Framework and its implementation in the project. This included a detailed survey of student services in higher education establishments across Europe.

The next phase project was to design the technical architecture that will constitute part of the EU4ALL Framework and develop the component parts that would enable a realisation of this for evaluation within the project. Integration of first prototypes was successfully achieved by January 2009. The implementation of the proposed EU4ALL Framework consisted of the functional components given in Figure 1.

In Figure 1 the CP (Content Personalisation) module is the decision engine of the content personalisation system. It decides what content is served to the student following a given request to the VLE depending on their needs and context. The VLE (Virtual Learning Environment) is the educational software adopted by many institutions to manage student and tutors online interactions with content and each other. The EU4ALL framework is designed to integrate with diverse VLEs; Moodle\(^3\) and dotLRN\(^4\) are the two Open Source VLEs being used to validate the project’s developments. A VLE normally has an embedded or associated a content repository of some form. An intranet portal is used to implement staff specific interfaces to the system. The UM (User Model) stores the preferences and needs of all registered students with other student data such as contact information and courses registered for. In the DM (Device

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\(^3\) See: [http://moodle.org/](http://moodle.org/)

\(^4\) See: [http://dotlrn.org/](http://dotlrn.org/)
standardised descriptions of device properties are read from the device accessing the content. A MR (Metadata Repository) is included in the system to facilitate the storage of suitable indexed metadata sets of the content metadata needed for content personalisation. It is envisaged long-term that such content metadata will reside in the VLE or repository with the content. The ESS (E-Services Server) is essentially a state engine and workflow manager that implements the accessible services that are discussed more fully in the next two sections.

The project is currently evaluating these initial prototypes from technical, functional and accessibility/usability perspectives. These evaluations will inform the evolution of second generation prototypes due the end of 2009. Through the first part of 2010 there will be detailed evaluation of the EU4ALL Framework and component modules in instantiations at the OU and UNED; i.e. in real educational contexts. This evaluation is scheduled over about 6 months with then enough time before the project’s end in September 2010 for further technical iteration.

4 Rationale for Accessible eServices

It is essential that accessible technology is used in all aspects of the adoption of computers in the educational institutions interaction with its students. Disabled students do no only need to participate in the teaching and learning but also have equal access to student services and communications channels and more broadly participate in the educational community they are part of. Further there is often a need to provide specialised support services to enable disabled students to study effectively.

Two of the threads of the Accessible Lifelong Learning strategy set forward by the EU4ALL project are that the technology should mediate accessible services and that tools are provided for educational institutions to readily adopt and implement such accessible services. To achieve these, the ESS (E-Services Server) is being developed as a flexible and configurable core component of such services.

5 The EU4ALL Framework for eServices

The E-Services Server (ESS), the core EU4ALL Framework component for service implementation, was developed after an extensive requirement gathering exercise reviewed the different activities that educational establishments carry out to support the students generally and particular services targeted at disabled students. Its design is based on contemporary approaches to workflow management and planning. The ESS provides institutional level support for the implementation and delivery of services.

The requirements gathering exercise has led to the development of a broad ‘ontology of services’. This ontology can be conceptually mapped to existing institutional processes and further used to inform the creation of new services. It is further used in the configuring of the ESS in the implementation of a particular service.

Figure 2 presents a high-level conceptual schematic of the E-Services Server. The role of the ESS is to co-ordinate the delivery of accessible services. Service provision is often dependent upon a number of different actors operating within different departments, as illustrated by the three stick figures. The ESS is a state engine and can mange the whole service process including where aspects of this service are automated or where they are dependent of human actors and thus subject to significant process delays.
6 Prototype Services being Implemented

Various services are under consideration for implementation within the project and then for validation at the two major test sites (OU and UNED). The criteria for selection includes what services are currently offered at those institutions, what gaps in service provision have been identified and what could be useful and possible to evaluate in the context of the project. The basic service evaluation methodology will be to run EU4ALL Framework based services in parallel with existing services, where possible using real data and real actors and comparing EU4ALL with existing provision. Some of the services under discussion for implementation for the pilots are described here in brief. The process of final selection is currently underway.

6.1 Tutoring Appointment service / Technology Reservation Service

These services are relatively simple and have been offered by many Higher Educational Institutions without extensive technological support. However they have been identified as important for UNED as their provision in an accessible e-services manner would improve some aspects of their Study Centre’s operation. It would enable them to address issues of accessibility to tutoring sessions and Study Centre events and accessibility in Computer Labs.

The Tutoring Appointment Service is a particular application of a generic appointment service identified in the service ontology mentioned in Section 5 above. It will also enable booking of any access provision, for example a sign language interpreter, to be made at the same time as the tutor appointment.

The Technology Reservation Service is similarly an instance of a generic booking service from the ontology. The Technology Reservation Service enables disabled students to ensure that the access equipment they need is available where and when they need it on campus. This might include for example a hearing induction loop for a lecture or their selected assistive technology for use with a campus computer.
6.2  **Interim Loan Kit Service**

The Interim Loan Kit Service is already provided by the OU’s Student Services section but without computer support. It addresses the problem that there is often insufficient time between the assessment of a student’s assistive technology needs and their course start for their equipment to be ordered and delivered. In the mean-time they are leant equipment that meets their needs so they are not disadvantaged at the beginning of their course. The e-service version of this service being developed is envisaged as yielding efficiency benefits. It also allows for stock control and inventory management.

6.3  **Assistive Technology Feedback Service**

The OU runs an Access Centre that assesses new students declaring a disability for their assistive technology (AT) needs. The equipment this recommends is then either purchased by the students, usually with funding from national grants called DSAs (Disabled Student’s Allowances), or borrowed from a university maintained loan pool. Now it is a long term issue experienced by Occupational Therapists and Assistive Technology Assessors that in many cases this equipment is underused. The reasons for this are diverse and include: poor assessment of need in the first place resulting in inappropriate equipment being supplied; insufficient training; and techno-phobia.

To address this problem it is planned to use EU4ALL to pilot a new service: an Assistive Technology Feedback Service. This will instigate computer based follow ups with students at predetermined periods after they receive their equipment to ascertain how they are getting on with it. This will include information about the degree to which they use it; the range of the AT’s features they use; and give the student the chance to flag any problems with its use. From this additional support or training needs can be identified.

6.4  **Course Resources Audit Service**

The Content Personalisation part of the EU4ALL Framework provides and automated way of delivering alternative formats of learning resources to meet access needs of different disabled people. However these alternative formats still have to be commissioned and produced. The purpose of the Course Resources Audit Service is to enable computer based audits of all the resources that belong to a course as to what, if any, alternative content versions are in existence. There is a difference between these services planned for the OU and UNED. At the OU the service interrogates metadata held in the Metadata Repository relating to content stored in the Moodle based VLE. At UNED the service will interact with an institutional repository called eSpacio. These services are based on the same modules used to implement Content Personalisation.

6.5  **Course Accessibility Information Service**

A key challenge for any educational establishment is how to answer enquirer’s questions about the specifics of accessibility for them of courses they might register for. This service is intended to collate all the information about accessibility issues for different groups of disabled people for a course. It builds on the Course Resources Audit Service however a more comprehensive course modelling approach is being explored. This will enable all accessibility issues to be included not just those relating to online resources but also, for example, those relating to practicals, field trips, and exams.
7 Conclusion
If the EU4ALL E-Services approach is to gain widespread acceptance it has to demonstrate real benefits to educational establishments. A key question they will ask is: “what does it gain us over a bespoke implementation of the e-services we seek either in-house or by a third party?”. Any service definition is usually highly dependent on the institutional context, its existing systems and organisational structures. The intention is that the EU4ALL approach based on the E-Services Server will provide flexible building blocks to enable the desired services to be implemented at lower cost; taking into account the local circumstances, and with accessibility adequately addressed. This will have to be demonstrated in the rest of the project.

This paper has concentrated on the e-services aspect of the EU4ALL project. The project is also undertaking innovative work in yielding a system for Content Personalisation for Accessibility briefly referred to in Section 3. Other aspects of the project’s work includes the development of a Guidance4ALL package that offers advice on all aspects of making education accessible to disabled people and psychological and pedagogical support services. Together all the project’s developments contribute to the overall strategy of enabling educational establishments to truly offer Accessible Lifelong Learning.

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