

Integrated Project
Expression of Interest - Call EOI.FP6.2000 Submission date 7th June 2002

7th June 2000

**PERSONALIZED ACCESS to eLEARNING through LOOSELY LINKED ARCHIVES
(PAeLLA)**

1. Aim of the Proposed Work

This project is inspired by the goals for the European educational system that are expressed in the Bologna Declaration as well as by the general e-accessibility goals of the e-Europe initiative to establish an information society for all. The project will promote the necessary provision of ICT learning opportunities within education and training systems by accelerating integration and standardisation of ICT-based interactive learning environments. This is of strategic importance in developing and disseminating skills in ICT for the emerging European knowledge society.

The aim is to contribute to developing e-learning for all citizen for the new labour market in the context of lifelong learning. The project combines innovative approaches to both pedagogy and technology, and with its special focus on accessibility issues, it will contribute to various forms of regional development and enable flexible learning for traditionally underprivileged groups, such as functionally disabled, unemployed, rural inhabitants and women.

PERSONALIZED ACCESS to eLEARNING through LOOSELY LINKED ARCHIVES (PAeLLA) is a proposal for an integrated project addressing several key actions within the Sixth Framework IST Programme.

PAeLLA addresses crucial issues in connection with the role of ICT in the education processes of tomorrow. It aims to establish a "democratic" learning environment - a kind of "ecosystem" of effective digital learning resources that increase their quality in an ongoing competition for increased learner usage. European competitiveness demands that universities assert their position as educators in the emerging global education market. It is far from obvious how ICT could best be used in education, and the active collaboration of leading researchers and leading practitioners of e-learning in this project will strengthen Europe's competitiveness within this field. The project consortium university members are Uppsala, KTH, Hannover, Braunschweig, Karlsruhe, and Stanford.

Today, the massive investments in closed, proprietary Learning Management Systems (LMS) give rise to interoperability bottlenecks that hinder the effective development of a European e-learning market. The lacking interoperability of LMSs is especially detrimental to SMEs that are prevented from operating on the e-learning market by the high costs involved. The aim of this proposal to establish Europe as the dominant player in the establishment of international standards and best practices in e-learning. Members of the core team are already active in such development, both within e-learning (<http://kmr.nada.kth.se/proj/elstandards.html>) and e-commerce (<http://kmr.nada.kth.se/proj/ecimf.html>).

The aim of this proposal is to mobilise the European scientific expertise in learning with new technology to provide the public and private professionals in education with relevant, up-to-date information, methods and tools for a "learning web infrastructure". It must become possible to respond to increase in unemployment by offering access to just-in-time (and just-in-case) education. The project partners represent more than 450 ongoing e-learning projects, and the PAeLLA project will aim to establish a European community of practice for e-learning that will promote the quality of e-learning resources.

1.1 Contribution to Priority Thematic Area of Framework 6

The priority is to support the eEurope action plan, by helping to build an information and knowledge based society across Europe, encouraging the participation of less developed regions and underprivileged user groups. The project contains a well balanced mix of subprojects that cover research, implementation, demonstration, assessment and dissemination, which will effectively guarantee widespread deployment of its results. Moreover, each subproject will be assessed from a learning perspective. The project is addressing priority areas:

1.1.2.i: This project will concentrate on systems enabling access for all, on barrier-free technologies for full participation in the information society, and on assistive systems that will restore functions or compensate for disabilities thereby enabling better careers and a higher quality of life for citizens with special needs - "e-inclusion".

Research into eLearning will focus on personalised access to, and delivery of, learning, as well as on advanced learning environments at universities, in the workplace and in life-long learning in general, taking advantage of the development of ambient intelligence and semantic web techniques.

1.1.2.ii The project will contribute to develop European strength within mobile communication by addressing PDA (Personal Digital Assistant) supported e-learning (“palm-top learning environments”). We will continue to develop our “conceptual navigation tools” for the next generation internet (semantic web), developed within WGLN, and adapt them to mobile platforms (“thin clients”), which could be expected to influence the development of future cellular phone technology in general.

1.1.2.iv: The project will contribute to the development of more efficient ways to acquire, model, integrate, navigate, search, represent, visualize, interpret, and share data and knowledge. The core team contains leading researchers and developers of data and knowledge management systems based on semantic web techniques. The Conzilla concept browser (<http://www.conzilla.org>), the Edutella peer-to-peer search and exchange system for educational metadata, the Personalized Search Engine to Learning Objects (PSELO), and the Standardized Content Archive Management system (SCAM), developed partially within WGLN, are four such tools that are attracting increasing international attention. We will continue to develop these tools and secure their effective deployment within the European e-learning community. Core team members are already pursuing e-commerce interoperability standardisation work within the CEN/ISSS Workshop for Electronic Commerce (<http://www.ecimf.org>).

1.2 Contribution to the European Research Area

PAeLLA will contribute to the European research area at least in the following ways: (1) an already ongoing successful European frontline research collaboration in an area crucial for Europe's future can be extended beyond the limited time and scale allowed for by present funding arrangements; (2) the results of this frontline research can now be deployed on a wider scale through the existing and new academic partners, resulting in useful societal benefits, and also in an industrial setting, through the (new) commercial partners, leading to economic benefits.

2. Background to the Proposed Work

The Wallenberg Global Learning Network (WGLN) was launched in 1999, financed by the Knut and Alice Wallenberg Foundation. WGLN is a collaboration between Stanford Learning Lab at Stanford University, Learning Lab Lower Saxony (the Universities of Hanover, Braunschweig and Karlsruhe), and the Swedish Learning Lab (Uppsala University, KTH/Royal Institute of Technology, and Karolinska Institutet). The projects pursued within WGLN have as their objective to utilize ICT in higher education in a pedagogically sound way.

One of the WGLN projects, *Personalized Access to Distributed Learning Repositories* (PADLR), aims at developing, testing and evaluating new infrastructure and new tools for personalized access to digital learning resources. However, the PADLR Project should be considered a pilot study on a fairly modest scale, where the focus is on the development of an infrastructure as well as some tool prototypes for evaluation in a few representative testbeds, mainly in Science and Technology Education. The PADLR Project is committed to the use of emerging international standards in the area of digital learning resources, and project members are actively involved in shaping such standards, e.g. in the IMS Consortium, the IEEE LTSC (Learning Technology Standards Committee), and other organizations. Intellectual Property issues arising in connection with the use of new technologies for learning and teaching are also investigated in the PADLR Project. The infrastructure prototype, called *Edutella*, relies on RDF as the resource description format (for metadata, ontologies, etc.), thereby ensuring compatibility with the W3C *Semantic Web* initiative. It is desirable that the work already initiated in the framework of PADLR be broadened and deepened in a larger European context, in an integrated project which we propose to call *Personalized Access to eLearning through Loosely Linked Archives* (PAeLLA). In doing this, we will be able to consolidate and refine the results from the PADLR project, by bringing in the private sector and end-users, thus achieving in the project a vertical integration from research prototype over public and private sector e-learning system development to real-life end-user deployment and evaluation in a broad range of educational settings.

PAeLLA addresses crucial issues in connection with the future of e-education. The point of departure of the project is the increasing importance of higher education to the future of Europe, but also the circumstance that the number of students is increasing, while the resources allocated for higher education are not, at least not to the same extent. The net effect of this will in most cases be fewer personal contact hours, which puts new demands on the form and content of student-teacher interaction. We see a need for effective and personalized learning resources capable of supporting the students' learning process. This is where ICT comes into the picture. The driving vision for this project is a distributed “learning web infrastructure”, which will make it possible to exchange / author / annotate / organize / market / integrate and personalize / navigate / search / use / reuse modular learning objects, and also to

access and use other digital resources not primarily intended for education, supporting a variety of courses, disciplines and universities. The common infrastructure will support both non-commercial and commercial products, to the extent that they can be made to conform to the standard interchange and metadata formats used in PAeLLA. The participating companies will strengthen their competitiveness in adapting their products to such standards, or require that suppliers of e-learning products adhere to them, which in the longer term will increase the range of available products.

The vision in the PAeLLA project is to use the learning web infrastructure and prototype tools (a modular archiving system (SCAM), the Conzilla concept browser, the Edutella search and exchange system, the PSELO semantic search system, large text archives, Courseware Watchdog, and others) for realizing a learner-centric knowledge-pulling learning environment. In order to realize this vision, we will also need to address the issue of learning styles. The heterogeneous learning resources made interoperable via the common infrastructure will consist of text, images, video, conceptual structures, and interactive simulations. A learner should be able to actively find and combine learning material which suits her individual style of learning; this makes the pedagogical potential inherent in simulations and interactive multimedia interesting to study from a human-computer interaction perspective. One form of annotation which has not been addressed in the present WGLN collaboration is that of quality marking in general, and also which learning styles are supported by a particular resource. These issues will be pursued in the PAeLLA project.

European competitiveness demands that universities assert their position as educators in a global learning market. However, education takes place not only – or even mainly – in universities. In this respect, the present PADLR Project is circumscribed by its WGLN brief of furthering the research and teaching missions of its member institutions through international collaboration in the innovative application and advancement of technology to higher education. The PAeLLA Project will not restrict itself to higher education. On the contrary, we see lifelong learning, flexible learning, just-in-time learning, workplace learning/in-house training, and distance education as important applications of the PAeLLA technology, furthering the “Europe of Knowledge” vision of the Bologna Declaration. Lifelong learning is a goal set by EU and most developed countries. To make lifelong learning a reality, many barriers have to be overcome, among others the uneven access to opportunities for learning. Here ICT-based learning will be a strategically important factor. The project will deal with the fact that teaching practices have not yet been adapted to fully exploit the new technologies or the new broader concept of lifelong learning. Many of the new learning modes will demand, even in the informal sector, a minimum of face-to-face teaching and tutoring. A first requirement, therefore, is a new form of learning, where we will see a shift in emphasis in formal education away from the traditional acquisition of facts and information, towards more efficient and effective ICT-assisted methods and tools that support the development of self-learning ability in individuals. A globally oriented Europe needs ICT-based education. Flexible learning and distance education will be important components in such European-level objectives as that of “proficiency in three community languages” (from the EC “White paper on education and training”), that of furthering European regional, cultural and linguistic diversity, that of supporting minority languages, and that of providing equal opportunities for disadvantaged groups.

3. Expected Results from the Proposed Work

Expected Result	Users of the Results
mature standards-conforming infrastructure (“public service e-learning platform”) for building personalized e-learning applications from distributed learning resources	educators, developers of e-learning applications (public and private sector), learning communities
best-practice guidelines for use of e-learning in a manifold of educational settings	educators
metadata for learning resource quality and pedagogical style	learning resource producers and consumers
support for mobile e-learning applications	educators, SMEs, learning communities
improved e-learning standards (IMS, IEEE-LTSC, ISO/IEC JTC1 SC36)	educators, developers of e-learning applications (public and private sector)
improved accessibility to e-learning by automatic adaptation of tools to the user’s cognitive profile	learners with various forms of disabilities

4. Activities to Achieve the Proposed Objectives

4.1 Integration Activities

The project will start with training for all partners in the state of the art of the different scientific fields. Workshops will be held throughout the project with researchers, users of the system (testbeds) and industry. Workshops will cover the definition of the integrated approach, the interfaces between the different fields, the state of the art of e-learning, usability, and standards. Electronic communication networks, videoconferences, discussion boards, website for the project, and newsletters will be established. Conferences will be held during the project with our partners in Eastern Europe about e-learning and technology. We will also collaborate with the European Civic Network for the e-enhancement of democratic governance, and with the Network of Excellence on Supporting Second Language Acquisition with Natural Language Technology (SLAinTe). In addition, the PAeLLA project itself will serve as a testbed for some of the collaborative learning infrastructure and tools being developed in the project, for knowledge transfer and distance collaboration between project partners.

4.2 Research Activities

Within PAeLLA, there will be several interlocking and interdependent but still delimitable areas of research, each of which will deal with a specific problem on the way towards our goal. We will continue the work on necessary infrastructure, tools and courselets and distributed archives (to be designed/developed in accordance with international standards for modularisation, metadata and accessibility), and we will make them compatible across the whole PAeLLA project. We will specify how courselets are put together (both from a technical and a pedagogical point of view), how they are organised and how they are exchanged and reused, and how distributed content archives can be queried and navigated.

We will use several testbeds at our universities and in the companies participating in the project, for providing a rich source of requirements, feedback and evaluation results. These will be the test and application areas of our infrastructure, tools and courselets, helping us to steer our project in the right direction. We will also collaborate with the European Civic Network for the e-enhancement of democratic governance. They will use our e-learning tools and technology and be a testbed for the PAeLLA project. The aim is to evaluate the user-interface and the personalization and accessibility aspects of the technology.

The main research activities of PAeLLA will focus on:

- integration of existing digital resources into the common learning web infrastructure, e.g. adaptation to digital library and other standards, and meeting the demands which are put on the infrastructure.
- interoperability with other widely used standards and resources accessible through the web.
- mobile applications of the learning web infrastructure, e.g. PDA-based learning platforms.
- enhancing the e-inclusion perspective by adhering to (and influencing) emerging accessibility standards.
- ontologies for digital learning resources, automatic extraction of ontologies, translation between ontologies, ontologies in a multilingual and multicultural context.
- cross-lingual and multilingual retrieval of digital learning resources.
- intellectual property and copyright issues in connection with distributed learning resources.
- pedagogical perspectives on resources, tools, ontologies, and interfaces.
- the overarching pedagogical vision of the Knowledge Manifold.
- evaluation of infrastructure, tools and pedagogy in academic, industrial and “public service community” testbeds.

5. Expertise Needed to Achieve Objectives

5.1 The expertise needed to achieve the objectives

The preliminary consortium already has expertise in IT (Computing Science, Computer Science, Human-Computer Interaction), Computational Linguistics, Education, Government, Teacher Training, Law. We also need publishers, and SMEs in the e-learning field. The universities in the Core Group are already partners in the Wallenberg Global Learning Network (WGLN). In addition to the present WGLN partner institutions, the other PAeLLA university partners are found in Estonia and Portugal, all with a keen interest in and a deep knowledge of educational matters, with or without new technology. There are SMEs, in the areas of education, software development, IT-based learning platforms, video conference systems, etc., and larger enterprises, in particular Ericsson, which will take part in the management of the project and provide assistance on technical issues as well as business aspects and commercialisation of research products. Ericsson University offers a wide variety of courses on an international scale, and contributes to the project its long and deep experience of e-learning.

The collaboration with ECNEDG /ELVIL will throw light on important issues of usability, democratic and legal aspects of ICT use and availability. More Eastern European partners will be invited; there are ongoing discussions

with the Universities of Roussa and Sofia (Bulgaria). In the area of ICT support for language learning, we plan to collaborate with the proposed Network of Excellence on Supporting Second Language Acquisition with Natural Language Technology (SLAinTe).

5.2 Proposed Consortium *= Core Group

Uppsala university, Sweden* <http://www.uu.se/> (Uppsala Learning Lab, Dep. of Linguistics, Dep of Information Technology, Dep. of Information Science, Dep. of Teachers Training).

KTH (Royal Institute of Technology), Sweden * <http://www.kth.se/> (The KMR group at the Centre for user oriented IT Design (CID) <http://kmr.nada.kth.se/>).

Learning Lab Lower Saxony (L3S), Germany* <http://www.learninglab.de/> (Universities of Hannover, Braunschweig, Karlsruhe).

Stanford university, USA* <http://www.stanford.se/> (Stanford Learning Lab, Stanford Infolab).

Ericsson AB, Sweden * www.ericsson.se (Ericsson University).

WM-Data, Sweden <http://www.wmdata.se/>

Sydkraft AB, Sweden <http://sydkraft.se/>

Tallinn Pedagogical University, Estonia, <http://www.tpu.ee/english.html>

Tartu University, Estonia, <http://www.ut.ee/>

Baltic and East European Graduate School, Sweden, <http://www.sh.se/>

Catholic University of Portugal, Viseu <http://www.fiuc.org/> (The Dental School).

<http://www.planmeca.com/news/news23.htm>

Luleaa University of Technology, Sweden, <http://www.lth.se/>

Alkit Communications AB, Sweden, <http://www.lul.se/>

The Swedish Educational Broadcasting Company (UR),* <http://www.ur.se/>

Swedish Agency for Flexible Learning, <http://www.cfl.se/>

DATEL Ltd, Estonia, <http://www.datel.ee/>

Telda Ltd, Estonia,

STV Video Data, Sweden, <http://www.stv.se/>

6. Promotion of Results Outside of the Consortium

The dissemination of the results will take place through participation in workshops and conferences as well as by academic publishing of research reports. Special seminars, workshops, and courses will be arranged for users within universities (Teach the Teachers) as well as for companies and the general public. Project members will provide input to EU and national policy committees and international standards bodies. Information about the project and its results will be available on a special PAeLLA project web site. Uppsala University hosts a Swedish IT-user center (NITA), which will coordinate the dissemination of the results to the private and public sector. The e-learning tools and technology developed by the PAeLLa project will be used among others by the ECNEEDG/ELVIL project in its Learning Lab on European legislation. We will also collaborate with the Dental School of the Portuguese Catholic University, that provides audio/video for tutors/teachers to interact with and evaluate. A joint course in "EU knowledge" by means of distance learning technology with Tallinn Pedagogical University and Uppsala University, will also be arranged.

7. The Role of SMEs in the Proposed Work

The participating SMEs work with software development for distributed learning (Alkit Communication AB), education within the ICT-field (WM-data) and video conferencing systems (Datel AB, Estonia, Telda Ltd, Estonia and STV Video Data, Sweden). SMEs will benefit from this project by gaining access to technical and pedagogical solutions for e-learning, which can be used in in-house training.

8. How the Project will be Managed

Uppsala university will act as a coordinating contractor and will have the overall responsibility for the project. The other contractors will partake in the management of the project by their representation in the core group and team leadership. The core group will provide overall project management through a project management group. A full time project manager and an administrator will be appointed. The assistant partners will be universities and other projects which have the role of being test-beds in the project.

Calls for proposals will be launched by the consortium to invite new members in to undertake specific tasks. A 'Governing Council' consisting of senior representatives from the Core Group organisations will be established.