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Report topic: **Trends for community-aware learning services over wireless infrastructure by the example of Greece**

There is a long history of evolution of e-learning systems which has been ongoing for the last few decades. A combination of technological and pedagogical innovation as well as new patterns of social interaction are leading to a paradigm shift in all forms of learning. People use technology and in particular the Web to learn and interact with each other. Increasingly, however, they are starting to interact more frequently and in novel ways (e.g. instant messaging, blogs, etc) and, at the same time, they start to produce and classify content (social tagging, content management services, etc). Therefore, people are members of a learning society in which each member can be both a producer and a user of knowledge.

Both pedagogical and technological innovation is behind this evolution. In terms of technology, it appears that this new e-learning paradigm (for which the term e-learning 2.0 was coined) is largely supported by technological innovation enabling more interactive rich-media applications over the Web to empower user communities. This set of technologies is often referred to as Web 2.0. Infrastructure for deploying software as a service and broadband networking for high quality communication and efficient access to content repositories are also important enablers of this paradigm shift.

The new learning paradigm seems to benefit communities of learners who are involved in *informal* learning activities. However, it also seems very promising in a more *formal* context in both businesses and universities. For example, businesses can enable their employees to store and have access to corporate knowledge and work in teams anywhere, anytime, while universities can enable their students to work on collaborative projects and communicate with their academic supervisors.
Some of these issues have been addressed by the European Commission funded research project ELeGI (project number 002205 - www. elegi.org). As part of the work in the ELeGI project, a number of learning services were elicited in both formal and informal contexts. For example, one of the services that emerged from the elicitation phase in a formal context is that of an application for the collaborative setup of parameters for simulation-based virtual scientific experiments. Other services elicited in ELeGI make use of Grid infrastructure for communication, collaboration and self-learning.

The number of users who are active participants in the new learning paradigm is set to increase further. There seems to be demand for learning services for emerging communities around the globe. The availability of adequate broadband and service infrastructure is therefore increasingly important. Emerging communities are often located in isolated areas and wireline broadband infrastructure is not available in many parts of the world making the deployment of wireless infrastructure a promising solution. In addition, the elicitation of learning services that will meet the needs of emerging communities can be a challenging task given the diversity of the emerging community members in terms of familiarity with e-learning services and infrastructure.

The European Commission funded research project BASE2 (project number 516159 - www.dat.demokritos.gr:8080/base2) is working towards a wireless-based network and service architecture

for e-learning services to isolated agrarian and maritime communities of learners in Greece and Cyprus. The network infrastructure is based on a combination of satellite and terrestrial wireless technologies to provide for sufficient and cost effective coverage of isolated areas.

One of the objectives of the project has been to kick-start the involvement of isolated user communities in formal and informal learning activities. A solution to this problem can involve many iterative cycles between the learning solution providers (pedagogical and technological experts) and the communities for the definition of e-learning services, the identification of e-learning scenarios and eventually the finalisation of e-learning platform requirements. In addition, it involves the setup and fine-tuning of a communication infrastructure that can provide reach to isolated areas. Adherence to a service oriented architecture for the definition of services, the evaluation of the appeal of each service to specific community members and the composition of service features into service scenarios to suit the needs of each community appears to be a promising approach based on the early research results of the project.

As part of the work in the BASE2 project a methodology was developed for providing e-learning services to isolated learner communities. This methodology involves the following phases:
1. *Service Elicitation phase*: isolated user communities were involved in the process of eliciting services and service scenarios that can empower communication, collaboration and learning. Initial services were identified and potential learning scenarios were outlined.
2. *Evaluation phase*: community members were invited to provide detailed feedback on the first compilation of services and service scenarios.
3. *Scenario finalisation phase*: based on the outcome of the evaluation phase, it was possible to finalise the learning scenarios that combine identified services into learning experiences for the community members.
4. *Service and Network Requirements*: the requirements for the performance of the terrestrial wireless and satellite network as well as the communication services for learning were compiled as part of this phase.
5. *Deployment and Trial*: implementing the software and network architecture and running trial sessions to examine the extent to which the service and network requirements are respected and to evaluate the community members' satisfaction with the implemented learning experience.

The initial feedback from this work shows that high quality communication is an important motivation factor for learning services and that there are certain challenges when deploying such services over a wireless infrastructure. In addition, there are strong requirements in emerging communities for efficient and easy to use e-learning services, which are not currently efficiently addressed by complex e-learning systems. It is therefore essential to re-think e-learning services and infrastructure in this new context.