



**A Digital Future for European Learning**

eLearning Summit

# **Access and Connectivity Workshop**

## **A Discussion Paper**

Brussels 10 –11 May 2001

## **Abstract**

Access & Connectivity are essential elements in creating eLearning environments. This paper highlights a number of key issues in the area of developing appropriate access & connectivity solutions for supporting eLearning from the end user perspective. A number of technical possibilities are explored for building access and connectivity to connect students, teachers, colleges, schools and homes. Consideration is given to the use of broadband and mobile infrastructures as possible eLearning conduits that enable access to eLearners in every situation. The challenges of enabling broad public access to eLearning content across the whole of society including rural locations are discussed. The possible role of new funding models based on public private partnerships is recognised as a potential means to implement these solutions. Some policy recommendations are offered as to how the needs of future eLearning can be met.

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## 1 Introduction

The European eLearning Summit is part of a larger European programme to develop new competences and skills that will ensure future European competitiveness in all sectors of society. As part of this framework, one of the key goals of the eEurope strategy is to promote new concepts in learning and foster greater social cohesion throughout Europe.

Access and connectivity are important elements in creating eLearning environments. Some of the key aspects of eLearning are support for interactive collaborative methods, inquiry, knowledge refining, new knowledge building, and problem solving. Network connectivity and access facilitate eLearning by enabling easy access to information and participation in learning and knowledge creation.

Network services, their availability and quality, do not only impact eLearning: digital communication represents a fundamental part of how modern society functions and interacts. The advent of digital technology has given rise to a fresh assessment of legislation needed to create healthy market conditions and to establish basic consumer rights [Annex 8].

The good news is that there are already some active eLearning communities in existence in some parts of Europe. In higher education, initiatives like the UK e-University [Annex 6], Finnish Virtual University [2] and the UK Open University [3] are engaged in eLearning research with early practical implementation of eLearning environments. Schools initiatives such as the European Schoolnet [6] and the MyEurope project [7] seek to promote eLearning in compulsory education. Experience gained from these projects help to identify new eLearning requirements and opportunities.

## 2 Opportunities for eLearning in Europe

New learning concepts in an age of information and digital communication will require a broad effort to create change. In any eLearning endeavour both technical and human factors need to be addressed. It is important that access and connectivity solutions fit the requirements for quality eLearning experiences based on sound pedagogical principles. To put it simply, eLearning should meet the learning needs of the end user.

Based on reported experiences from those active today in eLearning such as are covered in the case study material annexed to this paper, the following issues are highlighted as being essential to European success in this matter:

### 2.1 Common strategy for building connectivity between centres of learning

The European emphasis in eLearning has been on understanding how to achieve quality pedagogic experiences by utilising information and communication technology. Approaches in many other parts of the world have been more focused on the near term economic benefits of creating eLearning environments including saving costs or generating new revenue opportunities in education.

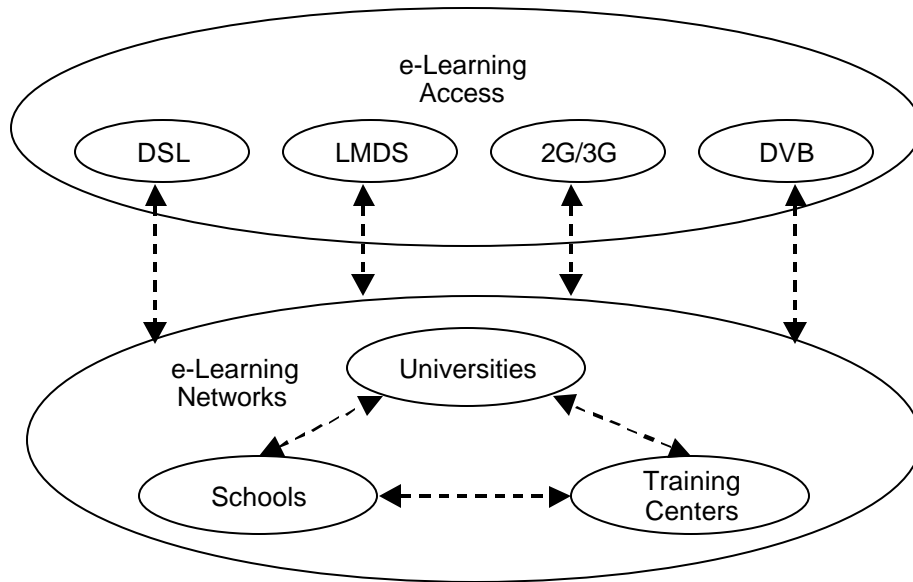
There already exist some initiatives in the field of research and higher education to establish good connectivity between universities both on the national level [4] and between certain academic centers located in different countries. This infrastructure is primarily used for supporting research and collaborative activities. However, there is a pressing need to expand connectivity between all places of education if Europe is to make progress in eLearning. Connectivity has its own reward in that it creates the necessary fertile conditions for new eLearning communities to take root and flourish.

In developing a common European strategy it would be a major mistake to do this in total isolation from the other major world players. Strategically, Internet technology has become the *de facto* way to achieve connectivity between disparate networks and with the general availability of robust Virtual Private Network (VPN) solutions, communities of common interest can be connected securely and efficiently over Internet. The architecture and standards of Internet continue to evolve based on the work of an open international community of network designers, operators, vendors, and researchers.

Consequently, Europe should develop a vigorous strategy to implement a next generation Internet based infrastructure with enhanced capabilities not currently supported by the Internet of today whilst maintaining good links to other areas of the world. Much has already been done by way of developing standards and basic technology including the elements of the next generation Internet suite of protocols (IPv6), the 3G partnership project (3GPP), deployment of Digital Video Broadcasting (DVB) as well as progress in the area of new solutions for providing higher bandwidth local loop access. The essential ingredients of future communications networks are increased transmission capacity, higher access bandwidths and support for seamless mobility.

## 2.2 Enable broad access to eLearning content

In many senses the ability to remotely access information across digital networks will mean that learning will no longer be location dependent but rather will be possible from wherever one happens to be. The natural corollary of this situation will be that personal mobility will increase and that there will be demand to support eLearning for people in every part of society and in all manner of locations. There is no reason why eLearning cannot be meaningful for people of all ages including the elderly.



**Figure 1: Providing access to eLearning**

Given that the demands of working in the information age generates a need to develop a culture of lifelong learning, it is natural to assume that ultimately every individual will require their own personal eLearning environment appropriate to meet their own discrete needs. There are some good examples of how community focused programmes have been developed to encourage broader participation in learning [11].

Knowledge workers who are temporarily working in other countries or unable to physically attend courses of education will need remote access to eLearning content and centers of learning. The demand for self development will increase for general education and leisure. This will require extensive access to imaging and display devices both inside and outside the home.

This inevitably leads to many questions about how to service individual eLearning needs and how to support continuity of personal eLearning environments in a rapidly changing world and where there is increased work force mobility. Further research into how personal eLearning can be supported both from an academic and training perspective will help in this respect.

### **2.3 Enhance dialogue between institutions engaged in eLearning**

European member nations are each currently pursuing their own education development strategies and are at different stages in eLearning development. On a national level some eLearning efforts can be quite disjointed, although in some countries, dialogue between partners is well advanced. Many examples exist of bilateral or limited collaborative efforts involving institutions of similar affinity. Efforts such as the UK SuperJANET [4] network and the Finnish Virtual University program [2] represent truly exceptional cooperation amongst a broad range of partners.

Likewise schools can derive great advantage from developing partnerships and engaging in dialogue with others working in the area of eLearning. The UK Regional Broadband Consortia [8] or the Espoo Schools Project [Annex 2] are good examples of this.

In many more cases the projects contain just a few partners with a shared interest to cooperate on particular areas of research and development.

If the eEurope vision is to be realised it will require pursuit of a broad strategy, one that promotes transparency of access to knowledge across Europe. Digital communications has the inevitable effect of 'shrinking the radius' of Europe allowing fast exchange of information and seamless communication across all borders and indeed to the ends of the Earth.

This will make possible new degrees of collaborative work between geographically disparate teams. It has already been proposed that eLearning laboratories could provide a useful bridge between education and research. With excellent connectivity to provide access to eLearning research laboratories, participation can be broadened through creating "virtual centers of excellence" and speeding up the transition from research though to practice [Annex 5].

### **2.4 Commitment to support local initiatives in eLearning**

The good news is that teaching is alive and well in the 21<sup>st</sup> Century. History demonstrates that teaching manages to adapt to change, although the process is primarily one of evolution not revolution. The essence of teaching stays fundamentally the same whilst the pedagogy and style used in teaching adapt to contemporary needs and in order to make best possible use of available tools.

There are many sectors where eLearning can be advanced:

1. Preschool education - Kindergarten
2. Compulsory Education - Primary & Secondary schools
3. Higher Education - Universities, Polytechnics, Colleges
4. Professional Training - provided by enterprises
5. Adult education
6. Personal interests - leisure and sports

Each of these sectors share many things in common and yet exhibit marked differences in the way they operate. For example, schools in general are totally dependent on public funding whereas establishments of higher education can have access to supplementary revenue streams e.g. from teaching postgraduate courses.

Experience from schools tends to suggest that top down approaches to educational reform often fail because of the scale of the task and lack of success in securing 'buy in' from teachers. Sustainable change in education requires commitment from staff, parents, administrators and authorities responsible for education. Local initiatives, championed by dedicated teachers with the vision and purpose to adapt the way they work, are valuable in demonstrating the benefits from eLearning and disseminating 'know how' amongst their peers.

However, such local initiatives need to be supported with additional funding especially for teacher training. Due to the evolving nature of eLearning it will also be important to develop appropriate benchmarks for evaluating progress and to set up incentives for progress.

## **2.5 European cooperation in research & development of eLearning solutions technology**

European economic competitiveness in the global economy will depend on developing and strengthening the basic competences required in an all digital world. Whilst this is a broader issue than simple development of technological skills and solutions [Annex 7], the basic technologies of digital information and communication are nonetheless essential to future European competitiveness in all areas of the global economy.

It is anticipated that there will yet be many discontinuities in the unfolding of the digital information society. Current lines of research in eLearning have identified new requirements for eLearning devices and new network applications required to support access to information and communication in learning environments. This is especially true since user mobility and personal lifestyle issues mean there is a need to adapt learning methods and technology to satisfy the desire for greater flexibility in being able to access and participate in learning from an end user's perspective[5].

Another key area of eLearning research concerns early exposure of children to computer technology and online environments. Learning by playing is a very important part of a child's development and this can include eLearning [9]. Later on in life, people will use eLearning solutions to support all aspects of their social, leisure and work-related activities. For example, they will want training to help themselves develop all kinds of talents (e.g. sports) which will demand new technical solutions. Innovations applicable to eLearning (e.g. electronic book) could therefore be expected to have a broader application in the life of society as a whole and not just for academic studies and work related training.

The essential elements of these future concepts of eLearning are identified to be connectivity, accessibility, storage, displays and imaging.

*Connectivity* involves the basic technology required to support conveyance and routing of digital content in a networking sense. It involves the transport, switching and end system devices which together form the infrastructure and terminals of the communications fabric. Of particular importance are solutions for providing higher bandwidth access to all end users including those in rural locations.

*Accessibility* refers to the higher level functions above the transport layer which cover issues of authentication of users, authorisation for use of particular applications as well basic interoperability between software applications. Key areas of interest are methods for supporting electronic identities, support for mobility and capabilities to adapt applications to context and location.

*Storage* is the technology relating to the caching and serving up of digital data. It is typically understood as the technology of servers but also encompasses portable storage formats like optical disks and memory sticks.

*Displays* are the user interfaces of the digital age. They are the means by which a human user views and interacts with content.

*Imaging* is concerned with the content production process and includes scanning and digital camera technology.

Successful solutions in eLearning will depend upon definition of open standards and proven interoperability.

### **3 Constraints and Barriers**

#### **3.1 Human Factors**

##### **3.1.1 Society's perception of schools**

Over the past 50 years there has been a running debate over the so-called 'crisis' in education. Schools have represented a relatively firm and ordered canon of knowledge and skills. The generally accepted model for teachers is that of an authority figure dispensing knowledge and pupils are typically supposed to be recipients of that knowledge. Consequently, eLearning initiatives that challenge this model will potentially face the risk of being attacked at all levels as further 'evidence' of a declining education system and an indicator of falling educational standards.

##### **3.1.2 Teacher self perception**

Teachers traditionally perceive of themselves as artisans or craft persons whose role is essentially one of a 'solo artist' not group performer. This perception, however, is being challenged by the introduction of new eLearning methods that encourage learner discovery, collaborative working and activities within and beyond the school that involve team-teaching. The role of the teacher, no less than those of other professions, will inevitably and irrevocably be altered under the impact of the Knowledge Society. If eLearning initiatives are to succeed, much effort will be needed to ensure that teachers are not alienated by this process and their need to adapt their perception of what it means to be a teacher. The good news is that at the grass roots level there already exist individual teachers with the enthusiasm, entrepreneurial spirit and the ability to innovate. Continued investment, particularly in local ICT and eLearning awareness training, will help to catalyse change in the teaching profession.

##### **3.1.3 Student perspectives on eLearning**

New learning methods especially those that exploit eLearning technology present a new challenge to the student as an end user. Some early studies conducted amongst students tend to suggest that they can have limited views or misconceptions about eLearning [5]. This is understandable because the historical norms and institutions are ingrained in society and this can limit vision as to what is possible. Clearly, there is a need to further promote both existing best practice and new opportunities offered by eLearning and to further enhance user-friendly tools to support learners of all abilities.

## **3.2 Business Factors**

### **3.2.1 Cost of connectivity**

The cost of connectivity is a significant barrier to the widespread implementation of eLearning. In the face of rapidly increasing demand for connectivity and access bandwidth, educational ICT budgets can be a major constraining factor.

### **3.2.2 Profit**

Ventures set up to develop eLearning environments can represent a true business proposition for the parties concerned complete with revenue opportunities and associated risks. However, the public and private sectors traditionally have different mandates concerning fiscal management which raises the question as to how to allocate any profits generated from a public private partnership. The public sector is traditionally perceived of as a not-for-profit organisation and morally obligated to keep all financial resources within the system. The private sector is expected by their shareholders to make investments, create value, run their operations efficiently and ultimately generate profit which can be redistributed as dividends.

### **3.2.3 Procurement Processes**

Procurement processes in the education sector currently assume a 'customer supplier' relationship. Purchase decisions depend on product fit, after sales support services and price. Schools typically participate in joint purchasing processes whereas many places of further and higher education have more liberty to explore sourcing options. Since purchasing departments tend to follow conservative processes, however, this may present a barrier to new thinking concerning sourcing.

### **3.2.4 Immaturity of "Open source" business models**

Related to the previous point, "open source" software may provide some innovative solutions to building aspects of future eLearning environments. However, due to issues related to maintenance and the immaturity of the "open source" business model, institutional procurement policies generally disqualify open source software.

## **4 Draft Proposals and Actions**

The following proposals are recommended as being essential to European success in eLearning and are offered for further discussion during the main Summit workshop on Access & Connectivity on May 10.

### **4.1 Connect Everything**

Europe needs to follow a broad strategy for creating the most connected society in the world. An important part of this strategy will be to ensure that all places of higher education, training and schools have the best possible access to digital communications in support of eLearning. Additionally, special attention needs to be given to mobile and remote access requirements to enable broad and equal access to eLearning environments by all citizens.

### **4.2 Remove barriers to access**

The target of eLearning should be to facilitate continuous learning for all age groups and sectors of society i.e. access for everyone. This will involve removing barriers of access to eLearning content, finding solutions to enable network access at reasonable cost and developing support for location independent access.

### **4.3 Adopt an open approach**

Europe needs to follow a policy for developing an eLearning infrastructure based on open standards and proven interoperability. It is recommended to proceed with pragmatic phased steps towards developing access and connectivity in support of eLearning rather than delaying until more comprehensive frameworks can be specified. This is considered both the best way to advance the evolution of eLearning and to ensure maximum access to eLearning environments.

### **4.4 Create eLearning communities**

Much has been published already concerning the need for eLearning but now is a time for action. The public sector has already started the process and made significant progress in changing existing models of teaching but now needs to be supported by the private sector in order to accelerate collaborative work, information exchange and communication between teachers and pupils. Practical steps towards creating eLearning communities need to be further encouraged both locally and cross border. The challenge of building multilingual communities and portals requires particular attention.

### **4.5 Promote new business models**

Development of new infrastructure in support of eLearning initiatives will require major new investment. While the public sector has indicated a willingness to support the development of eLearning environments, there is also a need to identify new sources of funding and new models of partnership between the public and private sectors. Possible business models to support eLearning include outsourcing, joint ventures, consortia, broker models and University-Corporate partnerships.

### **4.6 Adapt technology to meet end user eLearning needs**

Current end user devices like laptop computers, digital phones and personal digital assistants all can support eLearning today. Experiences from eLearning development projects have already identified a range of requirements for improving devices used in eLearning. Further research in the area of eLearning will help to define potential improvements in the user friendliness of devices and identify new ways in which individuals can interact with network-based services and online content. Technological innovation and free market competition will deliver solutions at attractive price points appropriate to broad participation in eLearning.

## **5 Issues and Questions for the Summit**

### **5.1 Connect Everything**

*What kind of network infrastructure is needed to provide quality eLearning experiences?*

*How will these initiatives be funded, and can Public-Private Partnerships play a role?*

*Does connectivity represent a 'smarter' investment opportunity for learning budgets?  
(e.g. networked printer or networked microscope with 24 hr access)*

*In what ways can Government help to create favorable conditions for advancing eLearning?  
(e.g. support for universal access and unbundling the local loop)*

## **5.2 Remove barriers to access**

*How to provide access for rural communities?*

*How to provide affordable network access?*

*What opportunities does digital broadcasting offer for eLearning?*

*Will 3G offer new opportunities for location independent eLearning?*

## **5.3 Adopt an open approach**

What needs to be done to ensure openness?

## **5.4 Create eLearning communities**

*How to create inclusive models of eLearning?*

*How to create eLearning communities that transcend national borders?*

*What are the technical and economic possibilities to support multilingual eLearning communities?*

Do Application Service Providers have a role in hosting eLearning content?

## **5.5 Promote New Business Models**

*Will eLearning always be dependent on public funding or are there ways to involve commercial enterprises without compromising quality?*

*What will be the relationship of content to access & connectivity in eLearning?*

Traditional networking business models follow a 'broker' model. Network operators provide connectivity while content providers are responsible for applications. In a content rich environment the boundary between the role of network operator and content provider may blur leading to new models for supporting eLearning especially with a strong trend towards centers of learning outsourcing ICT intensive operations.

*What will be the future roles of network operator and content provider?*

*What are the feasible business models for support of eLearning both now and in the future?*

In many respects eLearning can be considered a public service. Concerns over funding have led some to advocate more commercial models for funding eLearning. However, eLearning is still in its infancy and private enterprise can today view that the risks outweigh the potential returns on investment.

In response, some have taken the view that initially the public sector should lead the way with funding until the commercial opportunities become more apparent and enterprises can start to play a larger role in eLearning content and its delivery. This is broadly understood as the 'television' model after the way that the broadcast television business has evolved down the years. Nevertheless, some have argued that the television model cannot be applied to eLearning because of the strict demands for maintaining high quality content independent from commercial interests.

*Will eLearning always be dependent on public funding or are there ways to involve commercial enterprises without compromising quality?*

## 5.6 Adapt technology to meet end user eLearning needs

*In what ways can the public and private sectors cooperate on eLearning research?*

*Are there technology areas where Europe needs to invest as part of the broad eLearning strategy?*

*How to support lifelong eLearning? (e.g. classroom, work, leisure etc.)*

*What are the end user needs for terminal devices that support eLearning?*

## 6 References

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2. Finnish Virtual University (<http://www.virtuaaliyliopisto.fi/english/index.html>)
3. UK Open University 'FirstClass' online conferencing (<http://www.open.ac.uk>)
4. UK SuperJANET network (<http://www.superjanet4.net>)
5. Helsinki University – Educational Center for ICT (<http://ok.helsinki.fi>)
6. European Schoolnet – (<http://www.eun.org>)
7. MyEurope Schools, includes schools portals – (<http://www.en.eun.org/myeurope>)
8. SW Grid for Learning – (<http://www.swgfl.org.uk/about.asp>)
9. PoGo Project , Philips ([http://www.news.philips.com/mondial/archive/2001/february/artikel4\\_1.html](http://www.news.philips.com/mondial/archive/2001/february/artikel4_1.html))
10. GoDigital Initiative – (<http://europa.eu.int/ISPO/ecommerce/godigital/Welcome.html>)
11. Scottish Power Learning – (<http://www.scottishpower.com/community/>)

## Appendix 1

### Terms of Reference

The Access & Connectivity Workgroup studies the needs for access & connectivity from the end user perspective and explores what kind of technical possibilities are available for supporting eLearning including:

- Basic architectures for access and connectivity: students, teachers, trainers, colleges, schools, homes.
- Utilisation of various infrastructures and terminal types for eLearning.
- Broadband connectivity - speed of access, availability for remote learning purposes.
- Mobile and portable computing for eLearning.
- Universal access, including location of public information and access points.

The workgroup further examines innovative models for public private partnership for implementation of this infrastructure.

### Planning Workshop

As part of preparations for the eLearning Summit, Nokia hosted an Access & Connectivity planning workshop on 27 March 2001 in Espoo Finland. Sincere thanks to all who presented case studies and participated in making the day a great success.

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Radiolinja	Harri Alamäki	Finland
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## Appendix 2

### Case Study: Espoo Schools Project

By: Christian Lupander, Espoo Schools

#### 1 The Vision

*"...the most competitive and dynamic knowledge-based economy in the world capable of sustainable growth with more and better jobs and greater social cohesion."*

#### 2 The Espoo Schools Project

The Espoo Schools Project is a four year project for the primary and secondary schools in the city of Espoo, Finland.

The goal is to make sure that by 2004 all pupils will have the opportunity to acquire the ICT skills needed by a citizen of an information society. These skills are, among others, digital literacy, the ability to access and check digitally stored information, the ability to form and maintain virtual communities etc.

To achieve this goal we have to implement new possibilities for our schools to do their work. We need to add to the educational skills of our teachers and we have to build the technical infrastructure that will make it possible to use these new skills in a pedagogically meaningful way.

The tools of eLearning are part of the solution we are looking for as they bring some added value to our work as teachers.

#### 3 The Challenge

The main challenge we are facing is that it is not possible to solve 'the Implementation Problem' by putting into practise only one or a couple of innovations at a time. Substantial change can be made only by changing roles and organizations.

This means that not only will we have our hands full with implementing educational change, we also have to master the skills needed to evaluate technological alternatives. And not only for their technical merits but also for their possible value as tools for education.

#### 4 The Way We Do It

As a mental model for how we face this challenge we have chosen the *The Bazaar Model* of the Open Source community.

We are actively seeking and in the process of forming partnerships. All these partnerships will be organised under the umbrella the Espoo Schools Project.

The decisions we have made so far are:

**Connect everything.** All schools are in the process of being connected by 100 Mbit/s optical fibre. Every single class- and staffroom will be connected with 100 M Cat 5+. WLANs are installed in all secondary schools and will gradually be expanded to all schools.

Where there is added value to be had by connecting other spaces, such as libraries, youth centres and teachers homes this will be considered.

**Outsource the hardware.** We will stick to our educational knitting and will in the future procure all hardware, with licenses and support, on a priced-on-service-level basis.

**Invest in people.** Three different Universities are at this moment preparing tenders for a 3 year program during which 50% of our teachers will be seconded for 6 weeks each for further education. 100% of our teachers will receive at least 5 days of familiarisation training with PC:s, 50% are expected to study for an additional 10 days during the three year period.

**Form partnerships using the Bazaar model.** To ensure success in our project, we are looking for the skills and knowledge that we educators lack. In return we can offer our partners an environment of purposeful change in which the absolutely necessary trinity of educational reform is present; political will, financial muscle and local commitment.

The forming of the partnerships are still in process. Some are suppliers with which we have a long standing relationship, like **Elisa Communications**, who are responsible for connecting our schools and ensuring that the content of our choice can be delivered to any classroom. It soon became obvious that all of our old suppliers could take the mental leap needed to change from supplier to partner.

Some partners have no prior relationship with us but we have sought them out to gain access to their knowledge and asked them to take part in our project. Not all of these have wished to do so, and not all of those who did have fitted in. Among those whom we are happy to have formed partnerships with are **Otaverkko OY**, a company established to administer and maintain the MediaPoli Development Environment for high-capacity wireless broadband network. Another example are the universities which have been asked to develop a model for continuous further education for our teachers

Some partners have actively sought us out. They have products or solutions they feel that could form a part of our schools' future. While we are quite happy to receive this attention, we naturally have had to severely screen these applicants. Among those with which we have formed a partnership are **Ionstream OY** which is developing a graphically light groupware suitable for primary and secondary schools. This groupware is to be released under the Open Source license.

All these partnerships have in common that we need an understanding of where everybody's enlightened self interest lies. The business models have to include, besides charging for a product or service, some sort of product development or evaluation. Only if all partners in the Espoo Schools Project are expecting to come out on the other side of the project wiser than they were entering, can we trust our partners to aim for what we want; a successful project.

**Cultivate pioneer spirit, promote pilot-projects.** We cannot succeed if we do not dare to try new solutions and at times risk failure. By cultivating the right spirit among teachers and partners we can maintain the attitude so that, while we might not yet know exactly how teaching will face the challenges of the information society, we will be among those who make sure it will.

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## **Appendix 3**

### **Case Study: UNIWAP Project**

**By: Janne Sariola, University of Helsinki**

#### **1 Introduction**

The aim of the UniWap project is to develop the educational use of mobile technology and to discover pedagogical applications that will be of use in a virtual university. The project deals with WAP technology that is being tested, piloted and completed in order to facilitate teaching and learning in the university. An environment of activities will be developed in order to provide services for flexible teaching and studying.

One of the tasks of the Educational Centre for ICT is to develop flexible web-based support services for university teachers and students. The project is a part of the wider research and development activities of the centre.

#### **Implementation of the UniWap project**

The first stage of the project concentrates on discovering new ideas and pedagogical applications in which mobility could benefit in the in-service education of university teachers. In the spring term 2001, a group of university teachers was selected as a pilot mobile group to complete their in-service training. The course focuses on educational use of information and communication technologies and is provided by the Educational Centre for ICT. The students (i.e. university teachers) conduct their studies in teams of 2 to 4 persons, and the aim is to design and to realise a subtask which is related to their own work as a teacher. Their efforts are supported by a mentor. The first group of 14 persons was established in February 2001. Nine students were provided with Nokia 9110i Communicators and the rest with Nokia 6210 WAP mobile phones. The training includes face-to-face meetings, using the WebCT environment and mobile studying. In addition, the pilot group has its own web pages, which are mostly used for informational purposes. These different elements are associated with particular forms of network-based studying, each of them in their own way supporting the subtasks that the students are working with.

The UniWap project is considered to be a 'Public Private Partnership' by both parties (University of Helsinki and ICL Invia).

#### **2 Project Information**

The UniWap project has brought together technological expertise of mobile technology (ICL Invia), knowledge of educational use of technology (Educational Centre for ICT) and the heroes of everyday life of higher education, i.e. the university teachers.

ICL Invia's mCastor technology has an essential role in the project. This technology enables the user, who may have several terminals like WAP, PC or Communicator, to use the same information service or system adapted to the actual user environment.

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## **3 The Business or Funding Model**

The UniWap project is a joint venture of the Helsinki University and ICL Invia. The nature of UniWap project is e- and m-learning development. No substantial return for investment is expected for either of the parties. The business model of the UniWap project will become more focused in the next phases of project.

## **4 Lessons Learned**

The initial benefits of mobility include the extended possibilities of providing support to the students. Between the face-to-face meetings a mentor has provided instructions through technology according to the actual situation of the students' subtasks. For students, the mobile technology has enabled them to immediately write short messages in order to process their learning experiences to be added to their study portfolio. These activities have been possible, even though both the mentor and the students are often moving between different places, including different campuses, during their working days.

One lesson learned is that telephone network technology needs to be improved. UniWap implementation is made on a circuit switched GSM-network. This makes connect times a bit too long. GPRS-technology will solve this problem.

At the second stage, the Educational Centre for ICT will support departments and multi-disciplinary research groups by training and consulting. The centre will make efforts to network different academic fields together in order to create collaborative development projects during 2001 to 2002. Contacts to companies will also be fostered in this process. The companies will provide the project with equipment, software and information systems.

The third stage will focus on the diffusion of innovation by training and rollout throughout the Helsinki University and the system may also be taken into use in the Finnish Virtual University.

The UniWap project is in its first stage. The results so far are promising. The practice, as well as the theoretical elaboration, provides a challenging field both for technologists and educationalists.

Further information about UniWap from <http://ok.helsinki.fi/sivut/uniwap.html>

## Appendix 4

### Case Study: Nokia best practices on eLearning

By: Riitta Vänskä, Nokia Research Centre

Nokia is a global company with requirements in many technical skills. We recognise that there is no single way to encourage eLearning or provide such opportunities for our workforce. Nokia's approach to eLearning is based on a vision that development of expertise and lifelong learning are the critical success factors for individuals and the company. This places a greater emphasis on people and knowledge as the cornerstone of a company's success.

We think that eLearning is much more than information delivery systems. Utilizing the power of eLearning technology we are not only delivering content centric eLearning solutions but our learning solutions are utilising heavily the virtual collaborative functionalities. eLearning content should fulfill many needs, content should be used for traditional proactive competence development but also for the need to find answers in every day work life, combining learning and working towards on-the-job learning, towards problem based approaches for eLearning. The power of eLearning is also in multi-faceted courses where we combine classroom sessions, internet-based learning activities, and conferencing to make learning more collaborative, available and flexible for learners. Multi-faceted courses take advantage of the IBL environment to provide learning materials for collaborative and individual learning activities to enhance the classroom.

Especially, Nokia Management courses utilise the possibilities for sharing information and building knowledge together with colleagues and outside experts. Before a classroom session, prerequisite learning materials can be provided to ensure everyone is prepared for the class. Between sessions, lecture presentations and learning materials used in the class should be included in the IBL environment along with assignments, collaborative activities, and test questions to ensure understanding. After the class, discussion communities and materials can be continued for ongoing learning.

We also provide Mobile learning possibilities to allow study outside the office during business trips and whenever there is some time. This extends the traditional scope of learning and brings new elements to professional development.

Multi-faceted types of courses have made learning more interesting because learners have opportunities to interact in different ways. This variety also provides additional flexibility, and allows learners to take more responsibility for their own learning. Using the Multi-faceted type of course will allow you to provide flexible, effective, and engaging learning opportunities for Nokia.

In addition, Nokia New learning solutions team provides various methods for co-operation, the most often used being discussion forums, net meeting, e-mail support, FAQ's, audio and video conferences.

In sum, Nokia eLearning approach has great emphasis on:

- Development of expertise via virtual collaborative learning
- Pedagogical principles behind the Nokia-specific course creation
- Multi-faceted type of courses utilizing various types of learning methods
- Facilitation and support workforce with the flexibility

## Appendix 5

### Case Study: The Geneva Interaction Lab By: Pierre Dillenbourg, University of Geneva



On January 2001, the University of Geneva has opened a new research laboratory, the Geneva Interaction Lab. This lab was created inside Tecfa, the learning technology unit that was set up 12 years ago by the Faculty of Education and Psychology. TECFA is a leading center in Europe, known as a pioneer in various research directions and for running a web-based degree since 1993!

The mission of this lab is to carry out research on a series of projects in the field of e Learning and human-computer interaction. The list of projects is negotiated on a regular basis with the funding partners. See <http://tecfa.unige.ch/gil/>

The GENEVA INTERACTION LAB is funded by two companies based in Switzerland:

- VIVIANCE NEW EDUCATION has become a major player in eLearning. Viviance raised research questions aiming at the improvement of learning environments, namely on-line tutoring and virtual spaces.
- PICTET & CIE is the largest privately held bank in Europe. Pictet's eBusiness team has raised several research issues in the area of human-computer interaction.

The return on investment for the funding partners is multiple.

- The main objective is that the lab produces useful knowledge, i.e. knowledge that helps these companies to become better in their own business field. This knowledge includes design recommendations (e.g. "we observed that this use of video communication is more productive than this one") and prototypes as a form of concretised ideas.
- The privilege relationship between the partners and the lab is supposed to speed up the transition from research through practice. This transition is usually mediated by scientific publications followed by consultant work, i.e. if there is a long delay between discovery and application, we aim to reduce this delay.
- The transfer of knowledge between the lab and the partner cannot solely rely on reports, but rather on people participation. This implies that both some space is available in the lab for the employees of our funding partners in order for them to interact within our projects and that the lab researchers spend an agreed number of days with each company to feed concrete projects with the results of their research activities.
- Finally, and to a lesser extent, the idea of having a partnership with an university lab is, for our partners, an expression of the company commitment to high quality and innovative approaches. This commitment may contribute to improving trust and raising levels of both customer and employee satisfaction.

This partnership is too recent to produce clear lessons, although we can already see that the last point mentioned above does actually occur.

## Appendix 6

### Case Study: UK e-University

By: Paul Bacsich, Sheffield Hallam University

#### 1 Introduction

The aim of the UK e-University is to deliver eLearning worldwide, mainly at postgraduate level, to individuals, companies and other organisations including universities and governments. Learners will study at home or in the workplace. It is assumed that the learner will study using a PC which is connected to the Internet at a nominal speed of 56 kbit/s (whether by dial-up or a LAN). The project is normally described as a Public Private Partnership.

#### 2 Project Information

The e-University is a Joint Venture between all the universities in the UK (at this stage represented by an Interim Board) and a small consortium of commercial partners. At this stage of the discussions, it has not yet been decided which of three short-listed commercial consortia will form the commercial Joint Venture partner.

The appropriate technical contact is Professor John Slater, Interim Head of Technology – email [j.slater@lon.ac.uk](mailto:j.slater@lon.ac.uk) – web <http://www.hefce.ac.uk/Partners/euniv/>

#### 3 The Business or Funding Model

Funding is roughly on a 50:50 basis between the UK Higher Education Funding Councils and the commercial partners. The e-University has to become profitable in the longer-term. (However, note that UK-based students do attract certain funding support from the Funding Councils.)

#### 4 Lessons Learned

The project started only one year ago and it will still be several months before the final shape of the organisation is clear. However, some interim lessons have been learned:

- A great deal of work has been needed to ensure that UK universities understand and accept the concept and its business implications for them and their competitors.
- The technology required is demanding because of its scale, degree of distribution and reliability required, but technology choice has not been the most challenging part of the exercise.
- For a global eLearning player, it is still not possible to make a business case to use network access at more than 56 kbit/s or technologies other than a PC.
- Marketing and business planning has been the most challenging.
- Perhaps because of these above points, the Joint Venture negotiations are time-consuming.

## **Appendix 7**

### **Case Study: REMIT-MOE project**

**By: Paul Bacsich, Sheffield Hallam University**

#### **1 Introduction**

REMIT and MOE are a twin pair of projects designed to provide an advanced testbed plus an information and learning environment in the Yorkshire and Humberside Region of the UK. The objective is to establish an online platform for jobs growth in multimedia production by facilitating the flow of communications, information resources, skills supply-chain relationships and skilled people. Subsidiary aims are to transfer technology, knowledge and skills in multimedia content production, and to encourage the development of “new build” multimedia producers, and services that are “Internet ready”. The advanced testbed consists of wireless LANs at the two universities and the Wired Workplace, linked by point to point wireless broadband links.

The partners do not consider the consortium to be a Public Private Partnership, but it probably is.

#### **2 Project Information**

Partners are:

- Sheffield Hallam University
- University of Sheffield
- Fretwell-Downing Education Ltd (in their capacity as ISP to the Wired Workplace)

The named contact is Professor Paul Bacsich, Project Director – email [p.bacsich@shu.ac.uk](mailto:p.bacsich@shu.ac.uk)

#### **3 The Business or Funding Model**

The REMIT-MOE project is funded under three Measures of Structural Funding from the EU is £886K with £2071K total budget. Obviously within the project timeframe no return on investment is expected, but the partners are formulating an Exit Strategy to ensure the sustainability of the service beyond December 2001.

#### **4 Lessons Learned**

The project timescale was originally from November 1999 until December 2001; however, due to some changes in the partners, the project did not realistically get under way until October 2000. The use of wireless LANs is becoming routine (over 50 universities in the US are now using these; and the first home products are for sale). The challenge in the project is more likely to be whether the YHR is a vibrant and large enough region to sustain this type of “full-service” support for the design and multimedia community.

## Appendix 8

### Briefing on the state and future of European telecommunications legislation By: Kari T. Ojala (Finnish Ministry of Transport and Communications)

The existing legislative framework was primarily designed to manage the transition from monopoly to competition and was therefore focused on the creation of a competitive market and the rights of new entrants. It has been successful. The market has already changed, liberalised, and the old legislation does not respond to the demands of the new era. The new legislative package under preparation will correct the situation in the light of developments in the markets, the evolution in technology and the changes in user demand.

The new policy framework takes into account in particular the convergence between telecommunications, broadcasting and IT sectors. It seeks to reinforce competition in all market segments, while ensuring that the basic rights of consumers continue to be protected. It is therefore designed to cater for new, dynamic and largely unpredictable markets with many more players than today.

The new regulatory package contains the following documents:

- Framework Directive
  - Access and Interconnection Directive
  - Authorisation Directive
  - Universal Service Obligation and Users' Rights Directive
  - "Privacy and Data Protection" Directive
  - Frequency Decision
- a) The **Framework Directive** establishes a harmonised framework for the regulation of electronic communications services, electronic communications networks and associated facilities. It lays down the duties of national regulatory authorities and establishes a set of procedures to ensure the harmonised application of the regulatory framework throughout the Community. It covers all satellite and terrestrial networks, including both fixed and wireless (i.e. the public switched telephone network, networks using internet protocol (IP), cable TV, mobile and terrestrial broadcast networks) but not such as broadcast content, electronic commerce services and telecommunications terminal equipment.
- b) The general objectives of regulation in the **Access and Interconnection Directive** are to foster a dynamic marketplace with sustainable competition at network and services level, providing incentives for investments, guaranteeing user choice and maintaining public policy objectives in areas such as broadcasting and consumer protection. In a competitive market, interconnection of and access to networks should in principle be agreed on the basis of commercial negotiation between the companies concerned.
- c) The key elements of the **Authorisation Directive** are the prohibition of any limitation in the number of new entrants (except to the extent required to ensure an efficient use of radio frequencies), priority being given to general authorisations, as opposed to individual licenses, and the definition of harmonised principles, including an exhaustive list of licensing conditions.
- d) The **Universal Service Obligation and Users' Rights Directive** requires national regulatory authorities to place obligations on designated network operators to ensure that a defined minimum set of services of specified quality are available to all, independently of their geographical location, at an affordable price.

## Clarification of terminology:

### 1. Universal access

Universal access as such is not defined in the regulation package but *the access directive* states that that the end-to-end connectivity can be taken into account if the obligations for Significant Market Power operators to give the interconnection and access for the other operators do not provide communications for users.

Universal Service Obligations (USO) directive guarantees that the basic services defined in the directive are available on equal terms for the users. The aim of USO is to fill the gap, which may arise in the markets under competition. The administration may set some operators to take care of USO if it is not reached by competition.

### 2. Internet services

Internet service is well known to be the sum of many pieces. It contains physical networks, routing on different levels, address services, gateway services, content services and the user equipment, perhaps with intranet-facilities. Many of these pieces are out of the regulated range of communications and the slowest part in the system, private or public, sets the quality of the service (QoS).

The regulation does not guarantee a certain quality level of Internet but gives the certainty and quality for basic services, which can be used for Internet.

Moreover the European Commission is going to give **.EU** domain regulation in order to improve the legal certainty to get European wide and type Internet addresses and their administration. This is one of the following recommendations from the eEurope initiative related to the development of the Information Society. The administrations attend keenly to the global work of Internet administration via ICANN (The Internet Corporation for Assigned Names and Numbers). The Commission also supports strongly the take up of the longer addressing space called IPv6 in order to enable new services.

### 3. Local loop unbundling

The Regulation of the local loop unbundling came into force in the beginning of January 2001. The purpose of this regulation was to increase and improve the competition in the tail networks where this bottleneck was a big problem in many European countries.

The user benefits from the regulation as a result of increased competition between communications service operators and the possibility of using more than one operator at the same time for the services.

This regulation will be transposed into the new regulatory package.