

Final Report

Study of the e-learning suppliers’ “market” in Europe

**Danish Technological Institute
Independent consultant Jane Massy
Alphametrics Ltd
Heriot-Watt University**



Contents

1. EXECUTIVE SUMMARY	4
1.1 “MARKET” SIZE AND CONSTITUENTS	4
1.2 SUPPLIER CHARACTERISTICS	5
1.3 ”MARKET” DEVELOPMENT	6
1.4 POLICIES AND PUBLIC INTERVENTIONS.....	7
1.5 STANDARDS AND OPEN SOURCE	7
1.6 FUTURE TRENDS.....	7
1.7 RECOMMENDATIONS	7
1.8 OVERALL CONCLUSION	9
2. INTRODUCTION	10
3. ACTIVITIES AND METHODOLOGY	12
3.1 PHASE 1: DESK RESEARCH.....	12
3.2 PHASE 2: CASE STUDIES.....	12
3.3 PHASE 3: FUTURE ANALYSIS	13
3.4 PHASE 4: FINAL REPORT AND RECOMMENDATIONS	13
3.5 STAKEHOLDER ENGAGEMENT AND VALIDATION	14
4. THE CURRENT STATE OF E-LEARNING IN EUROPE	15
4.1 INTRODUCTION	15
4.2 DIFFERENT MARKET SEGMENTS	15
5. CURRENT STATE OF THE MARKET	35
5.1 SUMMARY OF FINDINGS	35
5.2 INTERNATIONAL TRADING.....	36
5.3 DIFFERENT SEGMENTS	37
6. ESTIMATING SIZE	39
7. THE BARRIERS TO GROWTH IN SUPPLY	43
7.1 GENERAL ECONOMIC GROWTH.....	43
7.2 SCALE	43
7.3 ORGANISATIONAL/INSTITUTIONAL BARRIERS	44
7.4 SKILLS.....	45
8. SOURCES OF INVESTMENT	47
9. FUTURE TRENDS IN E-LEARNING	50
9.1 FUTURE STRUCTURE OF THE EUROPEAN E-LEARNING SECTOR	50
9.2 SIZE AND GROWTH OF THE MARKETS	52
9.3 THE FUTURE MARKETS FOR MAIN TYPES OF SUPPLIERS	52
10. FUTURE TRENDS IN E-LEARNING TECHNOLOGIES.....	57
10.1 MOBILE AND PERVASIVE TECHNOLOGIES	57
10.2 LEARNING THROUGH SIMULATIONS	57
10.3 LMS AND LCMS	58
10.4 OPEN SOURCE E-LEARNING TOOLS	59
11. ISSUES AND CONCERNS.....	62
11.1 E-LEARNING AS A MANAGEMENT INSTRUMENT IN THE WORKPLACE	62
11.2 WHERE SHOULD PUBLIC MONEY BE SPENT IN THE MARKET?	64
11.3 DEVELOPING CONTENT	65
11.4 COSTS OF E-LEARNING	66
11.5 HIGHER EDUCATION AND E-LEARNING?	66

12.	CONCLUSIONS	68
12.1	THE “MARKET”	68
12.2	SUPPLIERS	69
12.3	POLICIES AND PUBLIC INTERVENTIONS.....	70
12.4	OVERALL	71
13.	RECOMMENDATIONS.....	72
13.1	RECOMMENDATIONS FOR POLICYMAKERS	72
13.2	RECOMMENDATIONS FOR SUPPLIERS.....	74
14.	ANNEXES.....	75

1. Executive summary

This document reports on the study of the e-learning suppliers' "market" in Europe conducted on behalf of the European Commission, DG Education and Culture by the Danish Technological Institute, in partnership with independent consultant, Jane Massy, Alphametrics Ltd. and Heriot-Watt University.

The study began with desk research between November 2003 and January 2004 (Phase 1), development of 16 suppliers' case studies in the spring of 2004 (Phase 2) and future analysis of the sector over the summer 2004 (Phase 3). A Supplier Summit was held on 8 September 2004 to present the results of the study and discuss industry drivers/inhibitors and trends for the future. Reports have been issued for Phase 1, Phase 2 and Phase 3 and are attached as appendices. The study concluded with this report at the end of September 2004.

1.1 "Market" size and constituents

The objective of this research as a whole was to examine the structure, characteristics and trends across e-learning suppliers. We define the term e-learning very broadly, to mean "technologies supporting learning of all kinds". Included are all education and training activities and learning design, development, administration, delivery and assessment. We do this to encompass the many variations of definitions and meanings of the term "e-learning" across the member states. Although this allows us to include most levels of supplier products and services relating to e-learning, it has also created difficulties in comparing developments in the various national markets.

Our review confirms difficulties previously recognised in estimating the size of traded e-learning products and services with any accuracy. E-learning is an element within the education and training sector and there is neither comprehensive comparable European wide education and training expenditure (traded products and services) figures nor data available on cross country trading.

The broad nature of e-learning means that even among suppliers, it is hard to break down what sales relate to learning and what relate to other workplace and institutional activities. Furthermore, it is very difficult given the fuzzy lines between public and private activity to estimate traded and non-traded activity.

There is no European "e-learning market" but segments where e-learning is being applied and which maybe be loosely linked and may be serviced by suppliers covering more than one segment.

Putting a value on the traded activities in these segments is a matter of estimates, which should be treated with great caution, because of the absence of broader education and training "market" data and more specific e-learning data.

Collectively these segments amount to probably less than €5B of traded activity in Europe. This estimate is based on our analysis of existing data sources and discussions with suppliers. It is an estimate of the value of sales of e-learning technologies, content and services across all segments of education, training and workplace learning. This should not be confused with the GVA (Gross Value Added) of e-learning related activity, which we

have not attempted to measure. There appears to be much greater growth in usage of learning technologies and related products and services than corresponding growth in sales from suppliers. We therefore recommend that research into the GVA of e-learning is the subject of further research.

The types of players and even the makeup of the value chain are still fluid; it is unclear how much total enterprise solutions will be adopted by large organisations, and the future of many commercial LMS remains uncertain. There has been consolidation of large players, with sluggish growth in revenues since 2001/2 and some stability among minor/niche/local providers. There is uncertainty in terms of content as a traded “product” and the question of “napsterisation” is looming.

1.2 Supplier characteristics

Across all segments, the majority of suppliers are small, usually micro- businesses. They are often “lifestyle” businesses, have no cash reserves, are unlikely to grow and their ebb and flow mirror that of most small and micro- businesses.

There are a very few large suppliers, comprised of very few pure e-learning players, a number of others from the publishing sector, and some from the ICT sector serving the different segments. Some broadcasters are also e-learning players but their activities cannot be described as traded where they are using public funds.

There are a small number of SMEs employing larger numbers (nearer medium sized) in most European markets, supplying technologies and content.

Market leaders are survivors of a very turbulent few years. Being a market leader carries the message – “I can be relied on to be here to continue to supply customers in the future”.

Their subject, occupational and sectoral expertise, is increasingly defining content suppliers.

Suppliers in the workplace-learning segment are benefiting from large-scale public sector workplace reforms, which have included investment in e-learning. However, these contracts are often more complex, involve more stakeholders and have longer lead times.

The high levels of losses among large and high-growth suppliers in the past have been reduced after very serious reductions in costs, but although the gap between revenues and costs is much narrower, there are few players showing real profitability. Several years of accumulated loss have left many suppliers without cash reserves to be able to continue operations if there is no growth soon. Further closures are likely, some more consolidation, probably through attrition rather than mergers. There is little available investment, and investment confidence is low.

The focus on cost reduction has resulted in employee reductions and a cut in R&D and product development budgets. Some suppliers are using low cost labour countries for part of their development and production capability. These include Asia but also some new Member States.

As the organisations mature, there is also a shift in their employment needs towards marketing, business development, project and customer management and sales staff and

less of a need for technology expertise. Suppliers have difficulties in finding employees with business development and customer facing skills.

1.3 "Market" development

Traded activities in most segments are showing little growth and remain largely stagnant after a period of significant decline in growth.

The private workplace learning segment has been hardest hit by the economic conditions in Europe over the last 2-3 years and would appear to show little sign of immediate improvement. Buyers in private workplace learning are demanding evidence that e-learning investment can be measured in terms of business impact.

Public sector investment in workplace learning is increasingly including e-learning. Currently, the public sector is a significant source of sales growth and is likely to remain so in the near future, although there are signs that buyers may be cooling.

There is no evidence of growth in higher education revenues through online learning.

A slowdown in growth in the sales of commercial "platform" technologies to higher education is likely as it enters an early mainstream phase and as open source platforms become more widely accepted.

VET adoption of e-learning remains very slow and traded activities into the VET segment are probably worth less than half that of the higher education sector.

Schools continue to extend their use of learning technologies. However, sustainable sources of finance for continuing purchases to meet computer/student ratios, upgrades and maintain equipment remains a major issue in every country. The market for traded "content" in schools remains very unclear. There are wide differences in policy and ideology and no one is very sure of the impact of various policies and funding interventions.

Online assessment is growing and is influenced by policy and stimulates growth in sales of services and technologies.

On the user side, the question of return on investment is not being well addressed, but is being increasingly asked, and the public sector is now seeking better evidence of return on investment and demonstrable value in terms of public policy objectives.

The barriers to increasing revenues and sales growth vary across suppliers. This is not surprising given their different sizes and different market segments. For those organisations moving across different country markets, sales opportunities need to be of a certain size to offer the potential of gaining a return on investment on the cost of establishing a foothold in the territory.

For most, business growth is strongly correlated with an improvement in the wider economy. Everybody considers the absence of a well-developed technology infrastructure a barrier to growth and most consider the presence of high-speed networks an important factor in business development.

A number of cases mentioned poor quality procurement acting as a barrier to business development; many said that there is often a real problem in helping clients understand what they need and educating them about what they are buying.

1.4 Policies and public interventions

There is no evidence that policies have helped to stimulate supply of traded services – with the possible exception of online testing/assessment services. This does not mean policies have had no impact. However, it does mean that there is no supporting evidence to link policies to supply stimulation.

Public policies and funding instruments have stimulated demand for traded products and services mainly in schools although it is impossible to know how much of this would have occurred anyway and how much has led to sustainable usage. In the case of e-learning credits in the UK, one funding instrument has been developed to counterbalance the impact of other public funding. As a great deal of public funding is not on a permanent or sustainable basis, the impact on growth on the supply side is not straightforward.

Policies have helped to foster partnerships and build public private dialogue.

Policies to encourage higher education to trade in online learning with the objective of generating new net revenues should be seriously re-examined.

Poor quality procurement practices (in all sectors but especially in the public sector) are a barrier to growth and adoption.

There is too little comprehensive and good quality evaluation of public policy objective impact or value for money in all segments.

1.5 Standards and open source

We report on suppliers' views about the relevance and value of current specifications and standards. We also review the future of standards. Moreover, we review the current position on open source technologies in education and training, the views of suppliers now and for the future and the issues facing suppliers if open source captures market shares from commercial providers.

1.6 Future trends

While the immediate future remains very challenging for most suppliers, we believe that e-learning is being increasingly adopted, even if there appears to be little growth in traded products and services. We provide some reflections on future trends, both in the immediate term and in a medium term perspective, examining market trends from the demand and supply side including possible technology developments.

1.7 Recommendations

We provide a number of recommendations for policy makers and suppliers.

Policy makers

- Keep the “e” in e-learning! Although this is about learning, the “e” dimension is distinctive and we are only at the very early stages of building our understanding of

how these technologies will be integrated into education and training systems, and how they may influence changes in those systems.

- Short term publicly funded projects are unlikely to either stimulate demand or supply. These types of projects should only be used to develop user “readiness” and good practices as well as undertake robust policy related socio-economic research.
- Funding content development with public funds is questionable and much better evaluation is needed as to whether this really is the way to develop usage and create sustainable continuous streams of quality content.
- Further funding for the development of LMS and VLE, etc., should be seriously questioned. There are already hundreds of such tools available in Europe. However, we recommend that there is an argument in favour of using funding instruments to encourage the implementation of open source systems, which may lead to improved systems and stimulate the growth of a critical mass of implementers and users, especially in HE.
- We urge policy makers and suppliers to invest in much more on going formative evaluation, comprehensive and in–depth impact including Return on Investment studies planned from the start of any e-learning project or implementation.
- We conclude that the various segments that make up the “e-learning sector” are not going to “take off” into high levels of revenue growth for suppliers in the immediate future. Therefore, we recommend that policymakers should not predicate other policies on the assumption that demand for e-learning products and services will grow either rapidly or much in the near future.
- Policymakers should consider how the public sector through its workplaces, can provide demonstrable leadership in implementing learning technologies that lead to measurable improvements in learning and performance and achievement of public sector reform goals.
- Policymakers should support the improvement of public procurement in relation to the purchase of e-learning. This could be done through the definition of standard procedures and competence development for personnel responsible for sourcing e-learning products and services.
- The Bologna and Copenhagen processes supporting credit transfer and portability of qualifications are extremely important, but need to go further so that the systems are flexible enough to allow learners to select from different institutions using different modes (e-learning, on campus learning, blended learning) to build their education and occupational qualifications.

Suppliers

- We strongly urge suppliers to include comprehensive formative and impact evaluation as part of their product/service mix. Including high-quality formative and well as impact evaluation will help suppliers and their clients build in mechanisms to gather

feedback to ensure objectives are being achieved and reinforce alignment, and it will help to gather robust and verifiable data to demonstrate impact and value.

- We strongly urge suppliers to adopt open standards and to work with European standards' bodies and researchers to ensure interoperability.
- We recommend that higher education suppliers and users consider the full costs as well as benefits of open source including their role in contributing to better quality e-learning through the contributions of the higher education community to improved platforms through adoption, development and implementation.
- We recommend that higher education suppliers endeavour to evaluate the real costs and benefits of developing and delivering commercial e-learning programmes and, where any public funds have been utilised, publish separate financial statements to allow public scrutiny of the value of these programmes.
- We recommend that information about suppliers from more developed markets in the old member states of the EU and suppliers and developers in the new member states (and candidate countries) be shared through some kind of "marketplace" where intelligence about market development, commercial partnerships and development opportunities can be exchanged.
- International suppliers and those working across different European countries need to build a better understanding of the different characteristics and processes operating in education, training and workforce development systems. Large suppliers are working with very large companies and have sophisticated dissemination activities. Thus, there is a tendency for much of the information about e-learning adoption and trends to be based on information from these large suppliers and users. This needs to be more clearly understood, as these users, as is the case with most large firms, do not represent the characteristics of most SMEs, or many public sector organisations or for that matter, the majority of users in the education and vocational training systems.
- We recommend that networks of suppliers and/or suppliers representative groups consider how they can build the skills and competencies of employees especially in customer facing, business development and project management and consult with relevant education and training bodies to develop the high-quality skills needed.

1.8 Overall conclusion

We believe e-learning is here to stay and will be increasingly adopted in education, training and workplace development. However, the picture emerging for e-learning is not one where high volume commodity trading will generally occur. Rather, traded services in technologies, e-learning content and services in education, training and workplace learning will be built around customer relationships and higher end/high value products and knowledge services.

2. Introduction

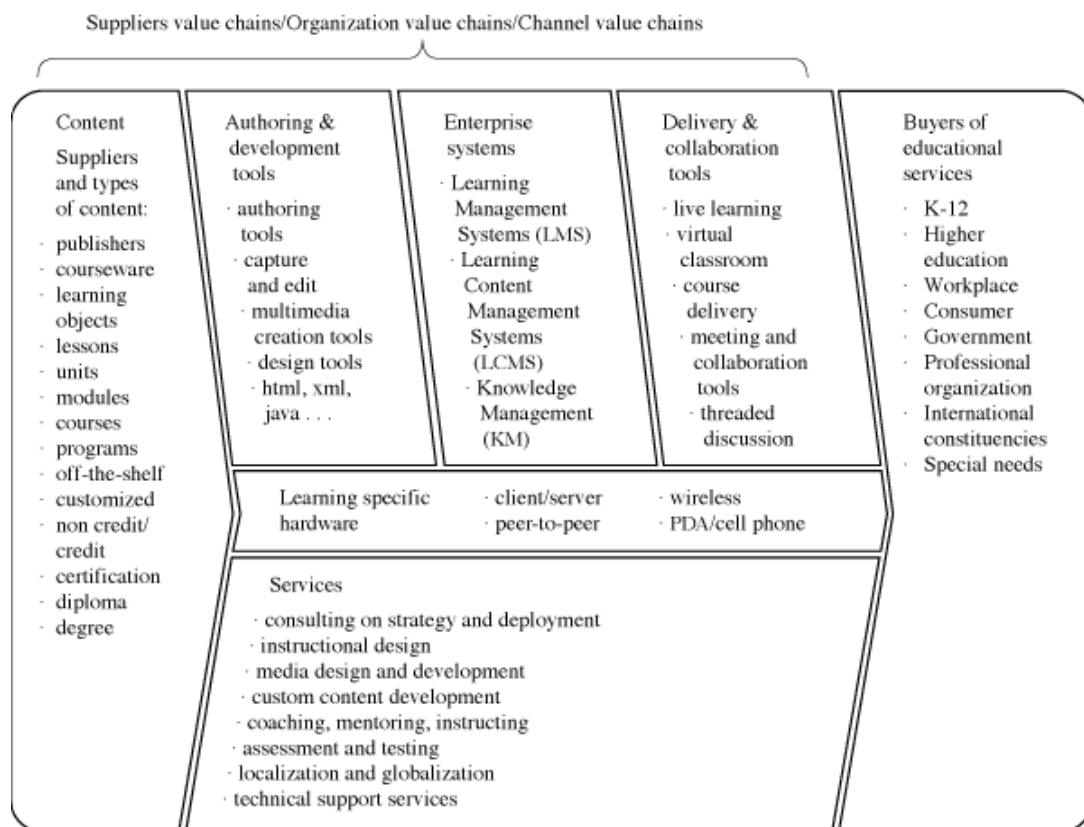
The objective of this final report is to:

- present the analysis of the collected data and information about e-learning suppliers in Europe,
- draw conclusions in relation to the status and future development of the e-learning sector relating to the key markets,
- provide recommendations to policymakers and market stakeholders with an interest in e-learning markets in Europe.

The objective of our research as a whole is to examine the structure, characteristics and trends across e-learning suppliers. We define the term e-learning very broadly to mean “technologies supporting learning of all kinds”. Included are all education and training activities and learning design, development, administration, delivery and assessment. We do this to encompass the many variations of definitions and meanings of the term “e-learning” across the member states. Although this allows us to include most levels of supplier products and services relating to e-learning, it has also created difficulties in comparing developments in the various national markets.

Although e-learning is still evolving, the value chain has already developed into a complex structure with many actors contributing as the below figure adapted from Stacey (2001) indicates.

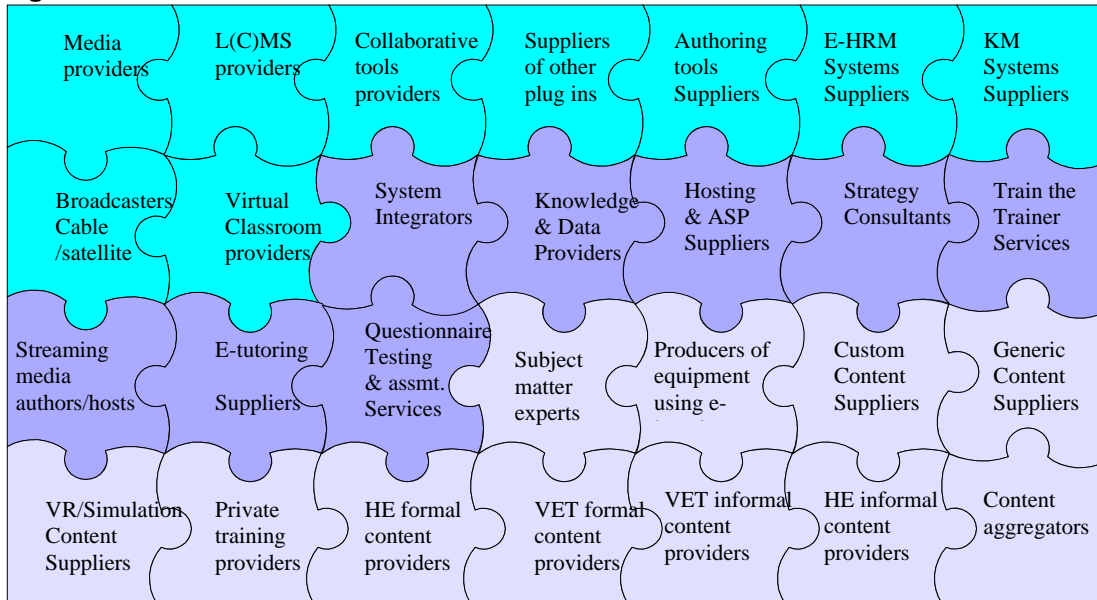
Figure 1



Source: Adapted from Stacey (2001).

E-learning providers appear to take up or combine three main roles as figure 2 below indicates: technology provider, content provider and service provider with a growing number of sub roles continuously evolving.

Figure 2



The top group represents technology providers, the middle group represents services' providers and the bottom group represents content providers.

3. Activities and methodology

The research study commenced in November 2003 was carried out in four phases:

- Desk research - to January 2004
- Survey and case studies - to May 2004
- Future scenarios for development - to August 2004
- Recommendations and final reporting - to September 2004

3.1 Phase 1: Desk Research

The objective of Phase 1 was to collect and reflect on what we know and what we do not know from published reports about e-learning in 26 European countries. It also helped us frame the questions for the next phases of research, i.e. the case studies, the building of scenarios and the survey of e-learning suppliers and actors.

The results of this phase are detailed in the first synthesis report (final version) and 26 national reports.

3.2 Phase 2: Case Studies

In Phase 2, case studies were prepared following detailed questionnaire/interviews with 15 organisations from 11 countries. The aim of the case studies was to identify internal and external barriers to growth and development, and business and market opportunities as the companies are directly experiencing them in the market place. Furthermore, we were seeking input from suppliers on how they foresee e-learning developing in the future and their business development strategies.

Table 1: Case study companies

Company & size*	E-learning sectors	Country of origin
TotalSum Systems (L) Www.sumtotalsystems.com	Technology and services	International - multinational
Young Digital Poland (M) www.ydp.com.pl/ part of a Finish publishing group	Standard language and other curricula content, e-learning platform	Poland
EPIC plc (M) www.epic.co.uk	Bespoke content development	UK
Giunti Labs (M) www.giuntilabs.com, part of a publishing group	Learning Content Management System and bespoke content development	Italy
Levande Böcker (S) www.levande.se www.panvision.com	Standard content development – publishing company	Sweden
Pearson Education (L) http://www.pearsoned.com/	Publishing and integration in platforms	UK
E-University (L) Heriot-Watt University Business School, www.ebsmba.com	Content development and learning system management	UK
Open Source Operator	Open source LMS and or	Germany

Company & size*	E-learning sectors	Country of origin
Ilias platform and network www.ilias.uni-koeln.de	Authoring tool	
ITACA SA (M) www.easyprof.com	Authoring tool supplier Standard content developer and provider	Spain
Promissor http://www.promissor.com	Competency test and assessment services	USA and international
Interwise http://www.interwise.com/	Virtual class room supplier	Israel/ International
Transware http://www.transwareplc.com/	Technical integration and customisation	Ireland
Celemi www.celemi.com	Simulation tool/engine suppliers	Sweden International
Academedi www.academedi.se	Bespoke content and solutions providers	Sweden
INSEAD (L) http://www.insead.edu/	Online coaching	France

* Size: (S) Small (M) Medium (L) large

The results of this phase are presented in the case studies report that includes the case studies for each company and a synthesis of the key findings.

3.3 Phase 3: Future analysis

The objective of Phase 3 was to:

- analyse the future development of market opportunities for e-learning suppliers,
- identify key factors impacting on where and how e-learning will evolve in the future in Europe,
- draw up possible scenarios for how e-learning may evolve given the evolution of certain factors,
- have experts and suppliers validate these scenarios.

The results of this phase is presented in the future scenarios report detailing four possible scenarios for 2010, the results of a web survey asking 143 e-learning operators to comment on possible future developments and the results of the validation workshop in Brussels.

3.4 Phase 4: Final report and recommendations

The objective of Phase 4 was to present a synthesis of the all parts of the study, draw up conclusions and present recommendations for policymakers and suppliers.

The results of Phase 4 are presented in this report.

3.5 Stakeholder engagement and validation

For each phase, we have endeavoured to engage the stakeholders in consultation and validation of our findings in order to ensure quality, correctness and relevance of the findings. The stakeholders were involved through the following exercises:

- At the start of the project, we made contact with suppliers, commentators and consumers of e-learning to identify key questions that this study should address. We have continuously returned to the questions that emerged from this exercise in order to validate our own work. (Cf. Annex 1 for a list of contributors).
- Each of the 26 short national reports highlighting the state of the e-learning sector in the various countries has been sent to a number of operators in the relevant countries and many have provided substantial feedback such as company information, market data and national policy information.
- In defining the key factors influencing the development of the e-learning sector in the future, a workshop was held in Copenhagen with Swedish and Danish participants in order to discuss and validate the key factors.
- A web survey was conducted with 143 participants (suppliers, users and commentators) commenting on the future development of the e-learning sector in Europe.
- Following the completion of the case studies and the future scenarios, a seminar was held at IBM's offices in Brussels with the aim of validating the key factors influencing the future development of the e-learning sector and gathering input to the recommendations.
- As a representative of the e-learning Industry Group (eLIG), IBM provided useful input to reports and the process.

4. The current state of e-learning in Europe

4.1 Introduction

This section reviews the current state of the supply side of e-learning in Europe as far as we have been able to ascertain. Our goal was to look at where e-learning products and services were being traded, regardless of the type (private sector, universities, and professional associations) or country origin of the supplier. That is not to say that we were not interested in the country of origin, and we have usually identified where these products and services originate. We have also tried to gather - from very meagre evidence - some data about international and Intra Union trading patterns in e-learning products and services.

We also aimed to examine some of the business characteristics and experiences of suppliers in different segments. Inevitably, any in-depth study of this nature can only focus on a few suppliers and, of course, every business is different. We believe, however, that our case studies, combined with the validation exercises, such as the supplier summit that we held, have endorsed our general findings.

This section begins with a review of the different segments where e-learning suppliers are operating. It then reviews the evidence we have gathered on the current state of trading activity in these segments. We have very tentatively estimated the value of traded activity before looking at the barriers to growth and market opportunities suppliers are facing in the different segments, including the issue of investment and return.

4.2 Different market segments

Our conclusion is that one cannot talk about an e-learning market in Europe. Several segments may be very loosely coupled under the broad umbrella of education and training and are sometimes serviced by suppliers working across different segments. Each of these segments has different drivers and barriers. In addition, suppliers may provide “full services” (including technology, content and services) on their own or increasingly for large-scale contracts, in partnerships.

As we described in detail in our first synthesis and country reports, education and training “systems” operate very differently in each country. Not only are there significant variations in what is covered by public funding and what is paid for privately (notably in vocational training and professional development but also in relation to higher education fees) but funding channels and instruments in the public education systems also differ widely. In particular, where the state at national or local/regional level provides financial support to institutions and individuals to provide access to ICT and e-learning, funding can come from multiple sources and instruments.

Table 2: Overview of market segments:

Sectors	Key developments
Schools	Small private content providers, publishers, public sector financing of content development, not-for-profit operators
Vocational Education and Training	Testing, VLEs, content development, technologies
Workplace Learning	Higher education, professional development, small private suppliers, various technologies, testing, localisation, games and simulations, publicly funded e-learning for in-house and market development
Higher Education	VLEs, MLEs, open source, content development, services
Home Segment	"Edutainment, standard products,

4.2.1 Schools

Education systems in European countries differ widely. Some common features in most countries are that compulsory schooling is completed at 16; every year more remain in full-time education beyond this age; and with demographic change, numbers entering the school system are falling. One other common feature is the age weighting of teachers with over two-thirds over the age of 40.

The sources of information on ICT penetration and usage in schools, primarily from Eurydice, are improving. However, there is no European equivalent of the Heller Reports providing in-depth information for suppliers in the USA on the school “market”.

Drivers and barriers

Policy

There is little doubt that public policy and funding instruments have given impetus to the purchase of hardware, software and training services in the school sector across all European countries. Unlike other sectors, this segment is less affected by economic cycles, although governments and educational authorities in poorly performing economies will obviously find it difficult to justify investment in competition with other funding demands. For those countries where there has been considerable investment, the question remains whether funding streams for investment in technologies, resources and services are sustainable or simply one-off and short-term. If the latter is the case, the impact on potential growth of sales opportunities for suppliers is uncertain.

Generational expectations

For pupils and students currently in education, the Internet, mobile telephony, digital games and data services are a natural part of life. There is widespread evidence that in many schools, pupils lead teachers in the use of technology.

Barriers

Most suppliers seem to agree that there are several common barriers:

- The short term limited nature of funding instruments from the public sector, creating barriers to upgrading and replacement and repeat business.
- The complexity and fragmented management of funding instruments is often too burdensome and resource-intensive to administer.
- Poor quality of institutional planning and procurement planning.
- Level of user immaturity.

Suppliers believe that users in the school sector are still very unclear as to what they want, why they want it and what to do with it. Educating users is an important requirement of any supplier's business but extremely costly when there is continuing pressure on prices and little awareness of the need to fund implementation and support.

Some suppliers believe that there is a link between low take-up and age and that the "tipping point" will only occur with generational change, especially among teachers.

Technologies

Policies at national and EU level have continued to reduce computer/student ratios and provide teacher training in ICT. Many countries at either national or local level have created funding instruments to support the purchase of equipment, including computers, white boards and projectors. Some schools are also using virtual learning environments, but the evidence suggest that they are not widely used, especially in primary and lower secondary education. At present, demand appears to be based on increasing numbers of computers, with replacement as a secondary market. This is partly due to public policies aimed at improving ratios and increasing access, meaning that the instruments are largely focused on these specific objectives.

Private suppliers

Private IT suppliers provide most technology. Local IT suppliers need to understand the way funding instruments work, and may often be the ones to educate schools about where and how to complete administrative requirements. Different instruments may support different types of purchases; and different agencies and state bodies at national and local levels administer these instruments. In most European countries, the responsibility is often at local (including schools) level (Eurydice 2004).

Maintenance and replacement/upgrading often constitute a problem, as funding instruments do not readily cover these requirements. Some suppliers, e.g. RM in the UK, have built a very successful niche in this market and are now expanding extending to become a more full-service supplier.

However, these types of policies supported by different types of funding instruments are often time bound and may only support "one off" purchases. For suppliers, the challenge is in building repeat business where there are no more funds to support purchases. There may also be changes in terms of the way they are administered - for example, where tendering rules move from being centrally planned to being locally (as far down to schools level) managed, as occurred in some countries in recent years.

Not for profit operators

Partly because of the limited amount of funds available and partly as a response to the need for maintenance and upgrading, a market in second hand equipment (the latter usually

coming from industry) has come about. Players in this market include major news media (e.g., the Guardian in the UK), and this can be seen as part of their extended business in building readers now and for the future. Some contributors also see this as a part of a broader Corporate Social Responsibility (CSR) exercise. Strictly speaking, this is therefore not always a “traded” activity. Currently, there is no direct evidence that this market will grow but it could expand if state funding instruments are reduced and/or if the demand for upgrading and replacement increases. Equally, some training institutes such as the NKI in Norway operate on a not-for-profit basis where profits from its successful e-learning activities are channelled back into the development of the institution.

Services

Traded services are largely built around training - primarily of teachers. While much of this occurs within the public systems, some provision is by the private sector and not for profit suppliers of ICT and pedagogical training including those providing technology supported (e-learning) courses.

A growing and potentially very significant related market is electronic testing services that have developed quite rapidly in the UK because of government policy, rather less so in other European countries. In the UK, this includes initial teacher training and CPD (continuing professional development), technology-based marking and processing of educational examinations.

Content

The status of the market for traded digital content for school use is still very immature and its potential growth strongly correlated with public policy decisions. There is a widely held view that there is a need for high-quality and pedagogically sound resources, which have not yet been met either internally or by the market. There is strong encouragement (including various public policy interventions) to teachers to create internal markets in content. Even where ideological positions differ, it is generally accepted that in order to develop pedagogically sound, curriculum related and contextually relevant resources, teachers need to be involved in their creation. However, providing teachers with the skills, time and resources to do so remains a huge challenge which some believe is unrealistic - not least because behaviour demonstrates that few teachers are driven to spend time developing resources, ensuring they are interoperable and re-usable and sharing them freely.

Public sector financing of content development

For suppliers, the experience is mixed both within different countries and between countries. In general, public policies have avoided directly funding the private sector to develop content although funding is being provided to different types of public agencies (e.g., BECTA in the UK, Swedish Agency for Flexible Learning) to develop content. According to a Finnish report “In terms of content production, the public administration organisations continue to be the most significant operators.” Among the “public” suppliers are broadcasting companies, such as the BBC in the UK. Similarly in Finland, the Finnish Broadcasting Company (YLE), a public service-providing institution, which, conducted under parliamentary supervision, operates YLE- Education’s Learning Gate (Opinportti) and provides web-based teaching materials produced for all School TV programmes intended for the comprehensive school levels.

Some state funding instruments have been used to provide schools with funds to purchase content, for example, the UK's e-learning credit system. However, some have argued (cf. the Pearson Education case study) that this was a response to the challenge from publishers and other content suppliers to the announcement by the BBC of their Curriculum Online project where public funds (sourced through licence fees) were allocated to create curriculum related content. The jury remains out as to how successful "e-learning credits" have been in stimulating schools to purchase content that meets their needs.

Publishers

Suppliers of traded digital products include large publishers, usually already supplying textbooks and other curriculum related materials. Some analysts have suggested that these publishers have been slow to adapt their traditional products and services to include digital content for fear of cannibalisation and a lack of understanding of the needs of young people in terms of digital products. They are also considered to be characterised as typical of market dominant players, slow to adapt and unable to respond swiftly to new market opportunities.

Publishers, in general, argue that the school market is very immature, that it needs to evolve organically and that public policies may sometimes exacerbate problems of over and distorted supply. However, they are adapting their products and services and in some cases, bringing teachers into the design and development process in order to ensure high-quality, pedagogically sound content. One example, described in our case studies is Pearson Education. For schools, they supply KnowledgeBox™, a digital learning system that provides access to digital resources and teacher lesson guides matched to the National Curriculum and National Literacy and Numeracy Strategies.

Some of these publishers operate across national boundaries, indicating that there is a business model in existence for international content provision. In Poland, YDP (see Young Digital Poland Case Study) aims to develop a universal content for curriculum that can be adapted to the needs in relevant countries and school systems. Their total exports represent 70% of sales. Young Digital Poland does not act directly in the international markets. It operates through local partners licensed as distributors and publishers in various geographical markets (e.g. Comgest in France) and through development partners or directly with educational authorities in countries like Malaysia.

Small private content providers

Our research (including the country studies) has identified many minor digital content suppliers working in specific subject domains. Some of them supply to schools or educational authorities directly, while others work in the supply chain of publishers. However, one company working for a large publisher said they were working to become both a direct supplier of comprehensive electronic curricula as they found the challenge of working for a large publisher too difficult to manage. Apart from the squeeze on costs, they stated that the problem of integrating with design and production schedules of very large multinationals was extremely difficult. Similarly, other small content providers in this segment have expressed this same view.

4.2.2 Vocational Education and Training

Available reports and studies suggest that learning technologies are less widely used in VET (Vocational Education and Training) than in higher education or in the workplace in

large firms. It is argued that this is due to state supported providers in some markets (e.g. UK) receiving less funding from the state (per capita than their HE colleagues), and that both where the social partners are involved in initial VET in the workplace (e.g. Germany) and where VET is largely managed in the schools system (e.g. Netherlands) it is slow to change. None of our case study suppliers saw this market as a primary market and trying to find any dedicated reports on the size or trends in this segment has yielded no concrete studies.

However, there is evidence that learning technologies are being widely deployed in this segment. This is partly about interpretation of the term VET. Initial teacher training, for example, is classified in many countries as vocational training, as are other “professions”. One could argue that training for the military, especially recruits, is also vocational training. Moreover, much of the activity in the VET sector is aimed at building basic skills, including ICT competence, where learning technologies are being most consistently applied both within classrooms and for remote self-learning.

In some ways, this is the segment with potentially the most interesting opportunities for growth for suppliers, especially those with subject, occupational or sector specific expertise. It is the segment where applying learning to skill development and demonstrating competence through occupational task completion is required most.

Drivers and barriers

The drivers for growth in this segment are public policies and social partnership (including sectoral) initiatives aimed at reforming vocational training. They include the increase in participation in initial VET as more and more seek qualifications beyond compulsory schooling. Other drivers include critical demographic problems in some public sector domains, demand for ICT skills for most occupations, and the upward pressure for advanced technical and higher level skills from employers seeking recruits that can be more job ready and ready to learn fast on the job.

The barriers are the slow pace of change in VET systems, the continuing difficulty in finding acceptable models for funding training, with shared responsibility between the state, employers and individuals all delicately balanced in different ways within different country and sectoral systems. The requirement not just for knowledge resources but media rich, complex software systems including simulations make costs in this sector a major issue. There are also barriers associated with VET teacher and trainer skills. Finally, failure to demonstrate economic, educational and social benefits in the absence of return on investment and full impact evaluations in this segment may also be acting as a barrier.

Technologies

Reports suggest that this sector has more difficulty than higher education in accessing funds to acquire computing equipment except in the case of those teaching subjects in the broad ICT domain. However, inclusion of ICTs in basic skills has probably helped to increase demand for computing equipment, as ICT becomes part of most occupational training.

This is a segment where certain domains, particularly engineering and other technical subjects utilising laboratories and workshops, are increasingly including computing/electronic equipment in workshops. This means that suppliers of laboratory and

workshop equipment are collaborating with training and ICT suppliers to provide complementary technologies.

Virtual Learning Environments

Take up of VLEs (Virtual Learning Environments) in the VET sector is considered by the reports we reviewed to be much lower than in HE. There are exceptions but in general, we find that VLE suppliers do not see the VET sector as a primary market opportunity. The reason may be financial, as noted above, but it may also be related to the skills of trainers and current pedagogical approaches adopted in VET. Not noted for its fast adaptation to change, there are also challenges for this segment in designing appropriate pedagogical strategies and deploying technologies to support them in a cost effective and sustainable way. A huge number of European pilot projects (under the Leonardo da Vinci programme and Social Fund initiatives, such as EQUAL and its predecessors ADAPT and EMPLOI) have applied technologies in the VET sector, but reports suggest there are few really effective evaluations and very poor sustainability among most projects.

To be fair it can also be argued that two other factors act as barriers to the utilisation of VLEs in this sector. One factor is the limited, though growing penetration of broadband, especially where media rich and processing demands may be high for resources such as simulations. The second factor is that it could be argued that most VLEs are designed around the delivery of information and some communication (human-to-human) functions. In general, they are not designed to support the development (and testing) of complex occupational skills. In order to integrate technologies into learning, trainers have the task of building programmes from diverse applications and creating onsite and remote access to these systems. For trainers, assembling these within current VLEs is often difficult, resource intensive and requires high skill levels.

Content

This is a segment where content development has probably been slowest due to the difficulty of gaining economies of scale and the need for resources that specific to tasks and occupations. It is not a domain, with the significant exception of ICT skills, where digital “courses” are likely to find large markets. However, there are signs of increasing use of certain kinds of learning technologies, notably where practice and simulation can be integrated into other learning activities. A 2002 US report (ACTEN 2004/Brandon Hall 2002) suggests that the US market for e-learning simulations will grow from USD 0.3B in 2003 to USD 6.1B in 2006 and USD 37B in 2011. We have discovered no evidence at all in European markets to support growth rates at this level. We are treating these figures with caution in relation to any European comparisons; the same study showed growth in US vocational training, e-learning value growing from almost the same amount USD 0.4B to just over half that of simulations (USD 19.2B)!

The problem in relation to simulations relates to the cost of building these types of resources and the need to involve and engage teacher and trainer subject matter experts. Where large-scale public funding intervention is occurring, e.g., in defence and healthcare, resources are being built related to required occupational competencies. Many of these involve external suppliers working in partnership to custom build resources. The other domain where these types of resources are being developed, usually as customised services (and often for continuing and professional development and then transferred back into initial VET), is for compliance training, e.g., health and safety. Again, a challenge for

suppliers is helping VET providers understand the potential value of integrating these resources into initial VET, learning how to use them and identifying ways in which they can access funding to pay for them.

Testing

With the increased emphasis on competencies developed to higher levels and the need for proof of competence in many occupations, the cost of testing and assessment has created a major dilemma for both professional bodies and public education and vocational training authorities. One option considered increasingly attractive is the use of electronic testing, now widely used in the most obvious area “ICT skills”. This is a growing market particularly in the UK due to public policy, but it is also increasing in other European countries. Suppliers in this area are mainly large international players (sometimes part of large publishing/media groups). A number of national and professional examining authorities also cooperate with electronic testing services companies. Although adoption of these services is slower in Europe than in North America (especially among professional bodies), it does appear to be growing. The Promissor case study describes such a supplier.

4.2.3 Workplace learning

It is generally agreed that the highest levels of traded activities in technologies, content and services in e-learning occur in workplace learning - usually termed “corporate learning”. Descriptions of the market tend to describe this as the private sector. However, in our review we have included publicly funded workplaces, such as local government, the healthcare sector and defence - some of the most important users of workplace learning. The matter is further complicated by the question whether online higher (usually business related) education programmes undertaken by individuals but paid for by their employers fall into the category of the workplace learning segment or home learning. We have chosen to categorise them for this final report as workplace learning.

There are significant differences between individual companies, training-intensive ones more readily adopt e-learning; companies described as high performance working use more methods and tend to be more innovative in their approach, and large companies and organisations also tend to use e-learning as part of their training and development more than small and medium sized enterprises. Several surveys from this sector indicate that the central element in the successful use of e-learning in the workplace is found in organising appropriate, versatile support for the learners and making explicit links to tasks and performance requirements.

Drivers and barriers

Reports and our case study suppliers suggest that the primary drivers in this market segment are:

- a well performing economy,
- technology penetration,
- cultural “readiness”,
- focus on efficiency, performance and in the public sector, reform,
- regulation compliance.

In developing economies, demand for new skills linked to recognised qualifications is a strong driver.

For the large suppliers in the corporate segment, the presence of large organisations in a country is a pre-requisite given the cost of gaining a foothold. In terms of barriers, suppliers that cover more than one country market, and notably those operating across many markets globally, cite market size and the many language and cultural differences as a barrier, adding to the cost of gaining a foothold. These same large suppliers also consider that an absence of good local partners and vendors is also a barrier.

All our case studies considered the recent current economic slowdown and continuing poor economic growth in Europe a barrier. Not unexpectedly, poor technology infrastructure and for some - but not all - the low level of broadband availability was a barrier.

There are many comments in the various reports and our case study suppliers confirmed that institutional cultures are one of the biggest barriers to growth. The suppliers cited in particular poor quality procurement, especially - but not exclusively - in the public sector as a barrier to healthy demand.

In marketing their products and services in e-learning, suppliers in workplace learning emphasise the importance of demonstrating that any investment in e-learning will lead to the achievement of the customers' learning and performance and most importantly, business objectives. It is noteworthy that in our case studies, the suppliers emphasised the need to demonstrate their market leadership as an indication of their business stability and sustainability. Buyers are increasingly concerned that with the high levels of attrition of suppliers in recent years, they will find themselves with technologies that cannot be serviced and upgraded or legacy content that cannot be re-versioned and made interoperable.

Different types of suppliers

There is a range of providers some of whom have a direct relationship with their customers in the workplace segment and others who operate through intermediaries or in partnership. These intermediaries may include:

- public or semi-public agencies charged with “approving” suppliers where public funds are used to cover the cost of training (often the case for lower skilled workers or in sectors at risk),
- sectoral bodies working to support improved skill levels and new training needs in their domains,
- professional associations regulating and encouraging professional development and standards,
- employer and trade union bodies and occasionally,
- service aggregators (usually large consultancies) bringing together complementary suppliers to service large public and private contracts.

Technologies

The technologies most associated with the workplace e-learning market segment are *Learning Management Systems (LMS)* and *Learning Content Management Systems*

(LCMS), sometimes called learning platforms. When used for learning and performance management as well as learning design and delivery, they may also be termed *Enterprise Learning Suites*. Increasingly modular, they include applications to register, track and store assessment information on learners, they may also include testing applications, authoring tools, environments for delivery of content, communication and collaboration tools and repositories for learning resources. Users purchase most of these technologies under license from commercial suppliers. While probably at least 200 systems have been launched in recent years across Europe, few have survived as commercially viable ventures, and most markets will offer up to 20-30 systems with a handful of market leaders. Almost all the market leaders originated in the US.

Other traded technologies specific to e-learning include interactive classrooms which are often used for learning, marketing, internal communications and wider enterprise conferencing activities.

It is fair to say that the most common use of e-learning systems (there are noteworthy exceptions) in workplaces is to deliver and manage courses. While creating a learning organisation and deploying technology to support continuous learning and knowledge, sharing is a well-articulated aspiration reported among “best practice” firms, in reality it remains, in most cases, in the realms of aspiration.

Suppliers in this sector experienced high growth up to 2001/2 and then a severe drop in market development. The downturn in the economy coinciding with the bursting of the dot.com bubble led many new entrants to an early grave. Growth has remained very slow, some suppliers believe there has been almost no growth since 2001, and revenues are maintained by a handful who have learned to rein in costs and by their very survival, have become market leaders. The exceptional ones are those that have cash and are able to survive in a stagnant market, scooping up expertise and complementary or better technologies during the market attrition process. Finding any player that is profitable (some have begun to show some quarterly and even half-early operating profits) is almost impossible.

Part of the stagnation can be attributed to the continuing faltering European economy, and part must be related to the difficulties that company buyers have in making a business case for technologies that have yet to prove their effectiveness in improving the quality, cost effectiveness and value contribution in the workplace.

Content

To talk about content in terms of workplace learning is to stray into a very volatile area where the outcome is quite unclear. It is fair to say that a great deal of early workplace e-learning content was comprised of generic courses, a large proportion in the ICT skills area but also covering different business aspects such as team building, team training, communications, etc. Many of these “products” have become redundant and while a number of players developing and marketing generic products remain, they tend to comprise a small proportion of the supplier community. Increasingly, the range of subject matter covered is being extended to cover a wide number of professions and competencies with telecommunications, healthcare, banking, defence and government sectors (especially local government) as dominant. Compulsory training (regulations in the finance sector, health and safety training) is an area of real growth. Expectations of a market comprised of

commodity learning, products sold in volumes at low cost with margins geared towards economies of scale have faded. Increasingly content is built (courses and learning, knowledge and information resources) to order, and economies of scale can be achieved with large number of users requiring occupational training in a specific sector.

Higher education

One area often signalled with potential for growth has been online learning by individuals accessing higher education to support their career development. At a policy level, there is the oft-cited need for individuals to increase responsibility for their own learning as part of the lifelong learning agenda. US growth in higher education online has pointed to a significant opportunity for revenue generation in higher education with healthy demand for primarily “self-learning” online courses.

There is no doubt that in higher education, open and distance learning and in the old “correspondence courses” everywhere, ICT is being used, and courses are now being provided in digital form with a shift into online support/activities. However, many distance-learning courses continue to use print and video rather than make extensive use of the available digital technologies as a recent UK study for the HEFCE has shown (HEFCE 2003). The same study found no evidence of any real growth in distance learning; in 2002, the numbers in the UK registered with higher education institutions stood at just over 77,000 in 60 institutions, of which 63,500 were registered with the Open University. Five other institutions had over 500 registered students with the majority of institutions having an average of only 164 students each. They do not record whether any of these institutions were being pressed by demand. The study found that for most institutions the costs associated with distance learning were broadly in line with conventional costs with the differential being linked to the support provided.

Given the continuing need to provide support whether the resources are available digitally or on paper, and the need to expand numbers significantly to gain any cost benefits, it is hard to see why most of these institutions would consider expanding their provision of e-learning.

Their conclusions, which cover a range of flexible approaches, including e-learning, are worth quoting here:

“We would conclude that while these modes are clearly costing institutions more, this has not generally been the primary restraint on their growth. Their costs have generally been hidden or not understood, and the volumes of activity have been so low that any burdens on academic staff time could readily be absorbed within a department as a whole. However, if significant growth is to take place, then the impact of costs will be higher and more visible. This will be exacerbated by the need clearly to demonstrate quality (so that the forms of provision receive support by the wider academic community). This will require extra investment in staff time to provide a higher degree of learning support, assessment and quality assurance than might in due course be required when good pedagogic practice is more clearly established.” (HEFCE 2003)

Elsewhere in Europe, there is no clear evidence of any real increase in participation in open and distance learning as a result of the integration of technologies. What is unclear is how

much any growth is driven from the supply side or whether it is the result of real demand and if the latter, whether this has occurred as a result of any new state funding to stimulate demand.

This sector has grown quite significantly in the USA according to recent reports, but systems, cultural and funding of HE in Europe and the USA differ very significantly and there is little evidence to show that demand has increased in Europe to the same extent. The highest demand appears to be mainly in business and technical subject domains, which are the fields where most competition between HE institutions is occurring and primarily taken up by already well-educated individuals. These institutions are also beginning to provide continuing professional development online resources. A recent survey in the UK suggests that this is an area, where coordinated and even stimulated by professional associations, demand is likely to grow (e-learning age September 2004). However, currently this belongs in the realms of aspirations rather than reality, and the same issues in relation to costs, as mirrored in the quote above, will apply.

There are a number of European online ventures e.g. the Scottish IVMEDS project, but it is still too early to tell whether these are sustainable and potentially profitable (or at least likely to demonstrate financial as well as educational value).

Furthermore, the high profile closure of the UK eUniversities venture, (mirroring the failure of many similar ventures in other countries including the US) suggests that the markets are slow to respond even to very prestigious and well-established universities. As the Norwegian academic and author Morten Flate Paulsen has pointed out, establishing successful, sustainable and cost effective online higher education is proving extremely challenging. (Flate Paulsen 2004).

On the other hand, The Edinburgh Business School, a partnership between Heriot-Watt and Pearson Education, and Universitas 21 (which has five European partners, of which four are in the UK) suggests that there is an opportunity in the market for private online higher education, with the right kind of business model. What is interesting, a point highlighted recently in other analysis by the Observatory of Borderless Higher Education, is that the successful profit-generating models appear to have in common their separation from the university from which they were born. (Observatory, July 2004).

Professional

As noted above, the important recognition given to lifelong learning, new competency demands and compliance requirements is, among other factors, creating demand for the supply of continuing professional development courses and resources. In many regulated professions, evidence of CPD is now required: in non-regulated professions, it is increasingly encouraged. All this has led to expectations that e-learning will offer professionals accessible and flexible opportunities for CPD. There are examples of this occurring in professions such as medicine, accountancy and human resources. The actual level of e-learning in CPD and the value of this as a traded activity are unknown. Research in partnership with professional and occupational bodies at national and European level would provide a useful indicator of trends.

Private

As described in our country reports, there are many small content providers as well as a very small number of medium sizes and an even smaller number of large content providers for this market segment in all European countries. The subject matter covered by these small firms covers a range of subject and sector specialisms with inevitably ICT still the largest. Some of these provide their custom-built resources directly (often tailored to the customers' business processes); others operate through the large e-learning content providers and publishers.

One recent report from Finland states: "There are about 150 businesses operating in the private sector, plus numerous other business service providers working as their subcontractors. The majority of these operate in the Helsinki region. The average turnover of the businesses in this industry (or their e-learning business units) is still relatively modest and they typically employ 2-6 personnel. There are about 10 significantly large businesses/business units. About 50 businesses producing learning content or content packages." (Markkula, 2004)

Our country report from Norway describes a similar picture. "The e-learning market in Norway according to a report by Infosector in September 2004 was worth some NKR 411M (€49M) in 2003. In the same period, the 50 participating e-learning suppliers recorded a sector surplus of NKR 32M (€3.82M). There are some 100 e-learning suppliers in Norway within private educational institutions, consultancies, technology suppliers and publishers. Fifty of the suppliers had less than 5% of their turnover on E-learning products and services and were excluded from the survey on the basis that e-learning represented too small a share of their business. On average, e-learning revenue represented 22% of the participating fifty companies' total revenues. Compared to 2001 and 2002, the total revenue has not grown much, but the companies have turned around huge losses in these years to a significant surplus in 2003."

Although these reports do not differentiate between suppliers for educational, university and workplace learning customers, they do indicate that most suppliers are very small (50 companies generating revenues of only €49M between them). This picture is found throughout Europe with the majority of suppliers employing single figure numbers, a few employing up to 100 and a very tiny number employing any more than this. A very small number of large multinational providers, such as NetG and Skillsoft, have sales and business development employees across Europe but generally locate development staff in their countries of origin.(e.g. Skillsoft still employs over 100 people in Ireland, the original home of Smartforce - one of the two firms that merged to become Skillsoft). It is also worth noting that a number of small content developers are in supply chains for these large content suppliers, so while the user buys from NetG for example, a small independent developer may have developed the content.

Localisation

As our case study on Transware describes, large, mainly US e-learning content providers, and to a lesser extent, multinational firms developing or commissioning their own internal content, often require localisation services to distribute their content across different countries worldwide. Transware, a dedicated e-learning localisation provider, competes with other localisation firms (more general) for this business. The total value of this part of the workplace e-learning segment is unknown but likely to be less than €100M and largely earned outside of Europe.

Games and simulations

One of our case studies, the Swedish company Pan Vision, produces game-based e-learning for companies and organisations. Another case study, EPIC in the UK, has developed games as part of its customised e-learning provision. A third, again Swedish, Celemi includes simulations in its products and services portfolio. All these supply the workplace market.

While games and simulations have been used extensively in some sectors for many years (the military, airline, and oil sectors), usage according to reports is being extended into other sectors and occupations. The challenge for this segment is the relatively high cost of development and the conservative and cautious characteristic of most customers. Champions have argued that games and simulations are one of the ways in which technology can really help innovate learning, in engaging learners (especially younger learners) and providing some specific pedagogical approaches with new tools.

As with most e-learning suppliers, the change in the economy and the end of the dot.com boom in 2001 led to a reduction in revenues and for many, significant losses leading to a scaling down in size and activities.

Publicly funded e-learning for workplace skills

For a variety of EU and national policy reasons, there have been a number of large-scale state funded interventions into building skills among certain target groups in the labour market. Generally focused on the low-skilled, these initiatives (the largest is the UK's University for Industry "learnirect" initiative) have aimed at stimulating both demand and supply. Generally initiated because of inadequate market provision of the learning resources needed for these target groups, much of this supply has been paid for either in total or seed funded to kick start take-up and to stimulate demand. Suppliers have come from the private sector and may also include partners in the state education and training sectors and from social enterprises, trade unions and not-for-profit representative groups.

These large-scale interventions have provided content suppliers with a much-needed lifeline in a period when growth in the private "corporate" market has retracted significantly. For custom content developers, they offer an opportunity to build expertise and access to a ready-made market. However, these initiatives tend to be "project" based rather than customer/demand driven, and there is no evidence that most of this funding will be sustainable. While they are aimed at developing the skills of those in the labour market, employed and unemployed, the continuing investment in this target group is the subject of on-going policy debates between governments and the social partners.

Moreover, as is the case of the UK, the government now expects this initiative to begin to compete in the market to generate its own revenues at least in part, and strong concerns are voiced by the private sector that this use of state funds constitutes unfair competition. In targeting the workplace market, and business training needs, this move into commercial competition inevitably will focus on areas where needs are most easily identified. In the short term, users may benefit with inevitable price-led competition but whether it will result in a healthy market for e-learning content as liberal economists hope remains to be seen.

Sectoral

For some years, there have been expectations that in those countries in particular where sectoral competence development is co-ordinated through representative bodies, e-learning would be attractive especially in relation to building repositories of shared media-rich resources. There is evidence that in some sectors there has been much discussion about where and how e-learning might be usefully deployed for sectoral training and some evidence that some co-ordinated activities are being adopted in some sectors, usually nationally and occasionally regionally. Very occasionally, such co-ordinated activity using shared e-learning resources has grown out of EU funded projects although these are rarely sustainable in commercial market terms.

In some parts of the state sector, for example, in local government and healthcare, there are emerging co-ordinated training and development initiatives deploying e-learning as a result of focused reforms, and suppliers are competing for these opportunities, which are potentially quite significant. One of our case studies, EPIC Plc in the UK, has been successful in gaining large content in both these state funded sectors in recent years.

There is no data to give any indication of the size of any traded activity in this area and as many of these initiatives are relatively new, it is impossible to estimate the growth potential from this segment. Again, there are no reports of any comprehensive evaluations of the impact of e-learning on the reform and business objectives behind these state funded investments.

Services

Large numbers of small firms and a very small number of large firms are providing consultancy and implementation support services to the workplace sector. The large firms tend to collaborate with or have some strong link to a technology provider. For the large firms, the profitability of these services is unclear and some appear to have pulled somewhat back from the field. Only those with a strong case to provide the vanguard for technology sales seem to be persisting. The number of minor services (often one-person operations) is quite extensive and includes some subject matter experts and well as technology implementation and project management experts.

Other services include consultants who cross the boundaries with knowledge management and performance support services.

The existence of these players supports our view that workplace organisations are trying to understand how to gain value out of investing in e-learning and how to implement and integrate it successfully and avoid low take-up and resistance.

Other services include those providing training and professional development services to individuals to assist them in gaining the skills (and associated qualifications) to design, develop, implement and support learning through technologies. These include professional associations, private training firms and education institutions.

Testing

Among the services on offer are a growing number of test services often linked to continuing professional development and compliance training. These may be supplied directly alongside the learning resources or may be part of the emerging professional

association use of technologies to manage and deliver testing for professional qualification and CPD. Not often large enough to be attractive to major test service companies, the quality of some of these testing services who may have difficulty accessing either psychometric professionals or those with test technology design expertise may delay the development of a healthy supplier group.

4.2.4 Higher education

Technologies are slowly being adopted within existing higher education institutions in Europe. In spite of early hopes that there would be rapid change of the systems, enabled by technology, the truth is that this has not occurred. The systems are changing, very slowly and in the process some technologies are being adopted within the systems although not necessarily within learning processes.

Learning technologies are customised in higher education in two ways:

Firstly, they are being used within existing traditional undergraduate and postgraduate programmes in a variety of ways to support the existing teaching and learning approaches. As a recent UK report stated:

“Most e-learning is being developed as part of flexible blended learning; there is very little provision currently provided to off-campus students” (HEFCE 2003)

There is no evidence that in the majority of institutions, anything other than standard everyday ICT applications – spreadsheets, email, word processing, PowerPoint and accessing texts or pictures from the Internet are being deployed. That is not to say there are not pockets of innovation and some academics in some institutions are adapting their practice. However, where these occur, they often remain peripheral and pilot type activities, dependent on specific funding to ensure their sustainability.

Secondly, there has been much discussion in recent years about opening up higher education, building new opportunities for lifelong learning and providing the workplace (or those active in the labour market) with new higher education provision. There is some evidence that higher education institutions are using learning technologies in open and distance learning. This is discussed above under the heading of workplace learning because much (but not all) of the ODL provision in Europe is targeted at undergraduate or postgraduate part time degrees and continuing professional development.

US forecasts suggest that the e-learning market in higher education will exceed the corporate market by 2011 (ACTEN 2004/Brandon Hall 2002). However, the structure and characteristics of US higher education systems differs quite significantly from those in most European countries and almost all our case study suppliers saw this as a secondary growth market.

Although conceived mainly as distance learning or distributed through local partners, some European universities are focusing efforts on markets in developing economies, notably in Asia and South America where there are hopes for economies of scale and significant levels of demand.

Drivers and barriers

Technologies

In this sector, generally two terms are used:

1. *VLEs*, Virtual Learning Environments (generally virtual environments accessed by teachers and learners to access or post information, learning resources and communication tools and activities) and
2. *MLEs*, Managed Learning Environments, which may include registration, assessment, administrative and other processing applications.

There is no available data on how many different VLEs or MLEs are being deployed in European higher education systems, but there is no dispute that many use homegrown systems easily numbering in the hundreds. A recent survey of the UK higher education sector (with over 350 respondents) found that over half were undertaking in-house development and integration, 9% were outsourcing, and 18% were commissioning bespoke work from systems vendors. (MLE Study 2004). The same study report notes that when asked about VLEs, almost 50% of all respondents use an intranet-based learning environment or other VLE developed in-house. Use of commercially provided systems was greater in higher education than in further educational institutions.

Although most of the market leaders in VLEs used in the HE sector were developed within universities, few manage to grow beyond the boundaries of their institutions. The largest players in this segment are from North America (WebCT and Blackboard), and to a lesser extent, the UK (Granada Learnwise and First Class), Ireland (Top Class) and Germany/Austria, (Hyperwave). Blackboard is the market leader in the US according to independent studies with a user base of 12 million students in 50 countries, the vast majority in US post secondary education. The UK JISC study suggests the same; 43% of HE respondents that use a commercial supplier cited Blackboard as the supplier. (MLE study 2004)

Some players have partnered with higher education institutions to provide a platform closely integrated with content (e.g. Edinburgh Business School, Blackboard and Pearson Education). According to Blackboard, at the end of 2003, 16 education publishers had partnered with them and developed “more than 2,500 digital course supplements that are designed for delivery through our products”. (Blackboard Prospectus 2004)

Reports suggest that mainstream adopters (as opposed to early) are less likely now to develop their own systems and that even those with home grown systems may move to adopt a commercial, or possibly more likely in Europe, an open source VLE, once they decide to broaden the use of e-learning across the institution.

Other technologies used in higher education include interactive (real time classrooms) which are generally traded services licensed to users, with a proportion buying hosted services rather than hosting their own service. While the interactive classroom has some champions, in general, the HE sector in Europe has been slow to license what are seen as costly technologies requiring extensive use to justify their cost. In addition, many higher education institutions had already invested in some older technologies (ISDN supported

video conferencing) providing a “good enough” service for their needs and eschewing the more sophisticated environments offered by real time virtual classrooms.

Open source

The scale of open source VLEs use in higher education is unknown. It does appear to be growing as a proportion of total VLE institutional users and this is probably the segment where it will gain the largest foothold. This is for a number of reasons, not least, the availability of staff in the institution to take on the required development and implementation work needed for integration. A review of the Moodle web site (one of the best-known open source systems reveals that there is already quite wide usage in Europe (cf. Table 3 below).

Table 3: Moodle open source user sites in Europe

Country	Number of sites
UK	129
France	19
Czech Republic	18
Austria	20
Belgium	29
Germany	60
Italy	69
Netherlands	49
Poland	45
Spain	92

While some schools are using open source VLEs, the largest percentage is in HE as is the case for Claroline, Ilias, Sakai, and many others. Many research units at universities are experimenting with several open source VLEs/LMS.

The dominant player, Blackboard, recognises the threat to established commercial providers. “The growing acceptance and prevalence of open source software may make it easier for competitors or potential competitors to develop software applications that compete with our products, or for clients and potential clients to internally develop software applications that they would otherwise have licensed from us.” (Blackboard Prospectus)

While the topic of the development of open source is not the subject of this study, it is clear that certain drivers influence its growth and take-up. These include quality and a desire for pedagogical compatibility. Cost is also cited as a driver but there is no evidence of any real cost analysis and many of the costs of development and implementation may be absorbed and not easily identifiable. The resource requirement is not always highlighted, as advocates are often champions from a philosophical perspective rather than concerned for detailed return on investment analysis. Furthermore, as our ILIAS case study describes,

there are significant challenges in continuing development of open source systems, not least sourcing core investment.

Content

At present, almost all e-learning resources in higher education either are produced internally or may be provided as part of traditional publishers' supply. Pearson Education is a good example of the latter, providing companion web sites to complement textbook publishing. Other content purchased may include subject specific materials such as language resources or simulations for science, mathematics and technology. The market for traded products is developing slowly, and barriers to entry include the cost of marketing for low margins in a segment where the best presence is often through the support of academics more likely to support online resources if they are associated with textbooks that are core to their courses or written by them.

Subject matter experts drawn from the academic community are engaged by publishers to provide content expertise for online resources and some are beginning to earn quite substantial sums from this activity. It is unclear how profitable as a separate activity these digital resources are for publishers, because they do not usually report on these activities separately. It is also likely that their business models include these as integrated activities where different resources help to "bring customers to the store" anyway.

Services

Some institutions are using services from the private sector, but these tend to be part of service content associated with either technology purchases or software implementation. An interesting note from the Blackboard IPO prospectus points to the lower margins in services rather than product license sales.

4.2.5 Home Segment

A number of European HE institutions provide online learning for individuals where the relationship is between the institution and the customer (the individual). While much of this segment relates to building competencies for the labour market and in this report is dealt with under workplace learning, there are individuals learning in the own time and at their own cost, often subjects quite separate from their careers. The most prominent example of this segment is the UK Open University.

There is no available data available on the numbers, subject areas or characteristics of adult learners in this segment across Europe or whether the numbers are growing or declining. Demographic and other changes (such as in relative wealth of retired persons) suggest that this could be a growing segment among third age learners but there is no clear evidence available.

Some home learners are in full time school education looking for additional resources and services to support private study. The size of this private market within the education sector (public and private) is unknown but does appear to be growing. It presents a challenge to policy makers because it is stimulated generally by demand from higher income families, the "haves" and is perhaps an example of e-learning contributing to the "digital divide".

Some publishers and broadcasters are also providing digital learning content for individual adult use at home. While this “home” market is expected to grow, there is no data available on the actual traded value of this segment and currently much of it is provided free of charge by broadcasters.

The games market has grown very significantly in recent years. There are a number of games suppliers that have designed games products for learning - both for children and adults. We do not have any data on the size of this segment. One of our case studies, Pan Vision, sells consumer edutainment games products in addition to the custom made games it builds for companies. Studio’s consumer-oriented products are sold to retailers through re-sellers throughout Scandinavia as off-the-shelf products.

Drivers and barriers

Drivers

Drivers for growth in the home market include demographic change (leading to opportunities among both older and younger learners), increased broadband penetration, a reduction in access costs and technology convergence leading to seamless access across different types of media and instruments.

Barriers

These include costs to individuals and households, especially those on low incomes and with young families or fixed unearned incomes. A further barrier is cultural. On the one hand, there is a concern about paying for what many believe should be provided by the state. On the other hand, there is also a changing view about value in terms of what individuals are prepared to pay and the potential “napsterisation” of popular educational products.

5. Current state of the market

5.1 Summary of findings

As noted earlier, we have concluded that this is not one single market but a number of segments where learning technologies are being applied and which, occasionally, are served by some suppliers covering more than one segment.

However, we do believe we can draw some broad conclusions:

- Where there is growth in sales, it is very low and the immediate outlook is not much brighter. This applies to technology, service and content providers.
- The private corporate market is largely stagnant in most countries, and where growing, doing so very slowly.
- The public sector is critical to the survival of many current suppliers. Whether as a buyer of technologies, content and services for use in workplace learning (for example local government, military and healthcare), as a source of funding for schools, VET institutions and HE to purchase technologies and content, and financing large scale initiatives in basic skills training and targeted social groups.
- The continuing sluggish economy is a factor.
- Implementation and take-up has been far more difficult in all segments than most anticipated.
- A significant factor in the poor growth is the lack of evidence that investment will either achieve business benefits commensurate with the investment returns expected, or meet policy expectations (in terms of improved cost benefits, increased quality, greater access). Part of the problem lies in the failure to undertake sufficient really high-quality evaluation and ROI studies.
- With little revenue growth, suppliers have focused very hard on costs and the market leaders are closing the gap between revenues and cost. However, losses continue and the number of large suppliers in all segments put together that are actually profitable can probably be measured in single figures.
- Suppliers of technologies are spending significantly less than in the past on R&D and generally much less on product development and proportionately much more on business development.
- Being a market leader means “We have survived” and “We will be here in the future” - probably the most important message to customers nervous of finding themselves in such a volatile market.

5.1.1 Comparisons with the ICT sector in general

In some respects, these conclusions are similar to those reported in the broader ICT industry. According to the EITO 2004 report, there are significant challenges for ICT firms in Europe. The pressures they note can be equally applied to those providing technologies and traded content for e-learning, largely in the workplace segment. In 2003, “With European companies struggling because of the uncertain economic environment, gaining efficiency and cutting costs became top priority.” They suggest that “Going forward, investments will be increasingly tied to the specific business processes of companies’ value chains.” (EITO 2004)

While this statement applies to suppliers in the ICT sector, it can also be applied to suppliers supplying training of all kinds in the workplace learning market (public and private). Training is increasingly related to companies’ business needs. Where minimal, this means compliance training, where more strategic, it means linking training to performance needs.

According to EITO, 2003 saw growth in a small number of sectors one of which was education. However, education ICT investment remains relatively down the scale in terms of investment, and in terms of percentage growth, it appears to be in the very low single percentage figures (0-2.5%). The public sector “with local governments leading in investment”, followed by healthcare were the fastest growing sectors. (EITO 2004) In the private sector, banking and utilities were the sectors exhibiting growth, the former largely driven by regulatory compliance. Suppliers in our case studies and at the supplier summit confirmed this in general as being the case specifically for e-learning.

5.2 *International trading*

In the absence of any survey data on trading across borders in Europe or into and out of Europe, we can only make the following tentative conclusions from our country studies and more general reports. In terms of technologies, market leadership in most European countries goes to international suppliers of LCMS or VLEs such as SumTotal, Saba, and IBM in the corporate sector, and Blackboard and WebCT in higher education. However, there are local technology providers in every country in both HE and workplace learning that have originated in that country, and in some cases they have a percentage of different segments into double figures.

There is no evidence that any provider in any of the more developed EU Member States has anything like a dominant market share of any single segment. The position in the new Member States is somewhat different. The penetration of e-learning into all segments is lower, and some of the major international players have been gaining a fast foothold and may be positioned to hold a dominant position. At this very early stage, it is too difficult to make any predictions but their current position in what are small markets (e.g. the Czech Republic) is clearly relatively stronger than in the old Member States.

In terms of content, the pattern appears to be quite similar in all countries.

- A very small number of large suppliers (trading internationally) in some segments (usually publishers and corporate learning content aggregators)
- Some small local players
- Numerous micro local companies

A few large (multinational) consultancies, some specialist niche international providers (with few competitors), a handful of local small firms, and large numbers of local micro companies provide services.

5.3 Different segments

5.3.1 Home

We are unable to ascertain much about this segment. There does appear to be some growth in private purchases to support school students. We are unable to discover whether this growth is of any significant level.

We have no evidence to support any conclusions about the market for leisure purposes (or at least non-work/career-related learning), but equally there is no compelling evidence to say this market is significant or growing.

We suggest that the market for home study of career related learning using e-learning technologies may be growing in Europe but probably caused by switching from older technologies such as video and print resources. In addition, some growth may be the result of less learning in the workplace (or during working hours) with more home learning but with resources/licenses purchased by the employer. However, we are unable to support this with any clear evidence one way or another.

5.3.2 Schools

The school market is almost wholly dependent on government funding for technology purchases. In some countries, as we noted in our first report, this is managed centrally, in others through agencies and in others through local authorities and municipalities, if at all.

In terms of content, the picture varies widely and there is no clearly successful model. Policies continue to support strongly the development of resources by teachers, with the ensuing problems and barriers described earlier. Some governments support the development of resources by the private sector through direct commissioning (or commissioning indirectly through “arms-length” agencies). Some governments also indirectly fund resource development by these quasi-public agencies. As we noted earlier, public funds at the discretion of broadcasters with a public remit are developing resources. In the UK, at least, schools are offered credits to buy resources from the private sector.

We conclude that not only is it difficult to get any clear idea of the existing scale of the market for traded services, but that some of these interventions are probably acting as a barrier to market development in their attempts to overcome “market failure”. It appears that while there are continuing concerns about the lack of good quality resources for schools, publicly funded supply is often unable to bridge the gap and may be directly duplicating what is already available.

One of the problems, as we have commented earlier, is that the education and training systems differ widely and little really thorough and transparent evaluation has taken place. Furthermore, the issue arouses strongly held views and the reports on the use of e-learning in education are often written from very specific philosophical perspectives making it difficult to gain any understanding of whether there are really substantial sustainable traded

markets in existence. The position of the major education publishers is cautious, but it should be remembered that they have a wider business remit with textbook and other curriculum resources and so they can afford to manage their e-learning resource business in different ways to a supplier of solely digital content.

5.3.3 Workplace

European companies' financial reports and analysts' reviews suggest that the revenues for suppliers providing workplace e-learning (technology, content and services) grew rapidly until 2001. A US report reported growth rates in the corporate e-learning sector of 40% in 2001 that fell to 10% in 2002 with little change anticipated in 2003 (Training Magazine 2003).

Our detailed look at the financial performance of our supplier case studies (where they were available) suggests this pattern also occurred in Europe. Most of our supplier case studies in this sector reported significant reductions in growth and revenues in 2002/3 but anticipated improvements in 2004. While some are clearly achieving some revenue growth, more recent information suggests that this may have been optimistic. It is too early to make any full judgement but stock market performance and quarterly reports filed by those that are publicly quoted as well as verbal reports at our supplier summit suggest that while the first quarter of the year 2004 showed some improvements, this does not seem to have been maintained for the next two quarters. Consequently, our study suggests that if this segment is growing at all, it is in very low single figures and largely because of public sector workplace investment.

5.3.4 Vocational Education and Training (VET)

There is no evidence to suggest that formal VET players are increasing spending on either buying technologies, content or services from commercial providers. A UK 2003 report suggested that FE Colleges (the main VET institutions in the UK) have purchased fewer VLEs than in the HE sector. The same study indicates that less than one third of HE institutions buy a commercial system, either custom built or outsourced (MLE Study 2004).

Growth would appear to be occurring in two areas. One is publicly funded programmes supporting e-learning usage mainly for those with basic skills and lower level training qualifications. The second is in training required either for compliance requirements or for ICT skills.

There is however, some evidence that some occupational and sectoral users, often working in co-ordinated approaches, are examining e-learning as a means to build skills in their respective sectors. However, currently actual spending appears low. As mentioned earlier, there is also some evidence that CPD provision, led by professional associations is beginning to commission e-learning as part of their services to members. However, again this appears to be more planned than taking place widely.

6. Estimating size

We have tried hard to uncover what information we can to estimate a market size - or as we have concluded earlier, an overall estimate for the traded activities occurring in these different segments.

As noted in the earlier sections on the different segments, identifying any evidence on the value of traded activity in any of these segments has been difficult and in some cases impossible. A number of information services firms produce data on market size. One problem with using these data is the lack of transparency on methodology and original sources. We have therefore been very cautious and tried to triangulate data from different sources to come to our very tentative estimates. We have made use of the Blackboard Prospectus published in 2004, not only because it is current, but also because the regulatory requirements for the presentation of market data when publishing these investment documents are stringent and for that reason, we feel more confident in the validity of the data.

“Gartner, Inc., estimates that worldwide spending on hardware, internal services, information technology services and software in the education industry was \$34.0B in 2003” (Blackboard prospectus)

In 2003, EU (25) GDP was valued at €9,500B, and 26.7% of world GDP. The total value of the IT market in Western Europe in 2003 is estimated at €287B, 32% of calculated world values. (EITO 2004) An extremely rough estimate based on a calculation of a 30% share of world value would suggest that the total market including hardware is worth something around €10B. We shall assume that a declining proportion of this spending is on hardware and note that Gartner have included internal services.

Table 4: European IT market within education in perspective

Markets 2003	Total in million €	Share of World market
Total EU (25) GDP	9,500,000	26.7%
Total EU IT market	287,000	32%
Total estimated EU IT technology and services within Education	10,000	30%

Together with information gathered from other overall reports, from our segment analysis, country reports and supplier analysis, we estimate the market for traded services across all segments to be worth around half this expenditure, i.e. approx. €5B. This is a very modest estimate, especially when viewed alongside some of the forecasts predicted even three years ago.

6.1.1 Estimating the value of each segment

Table 5: Overview of market sizes of different e-learning segments

Market Segments	Estimates in billion €
Higher education	0.1
Workplace learning	3.5-4.0
Vocational education and training	0.05
Schools segment	1.0
Home segment	0.01
Total	4.66 – 5,16

Source: Estimates calculated based on data from several sources

Higher education

In the higher education sector, traded services arise in terms of purchases and sales. The value of HE purchases of e-learning technologies (VLEs/MLEs) is unknown but we estimate sales in the UK to have been less than €10M in 2003. We have based this estimate on data on the share of HE systems provided by commercial providers, the number of installations claimed by a major provider (Blackboard), and the average value of each annual licence. Given that the UK is considered the largest market for learning technologies in all segments, we estimate that the total European market for these technologies is unlikely to be more than €50-60M.

Content purchases in HE are very low, largely restricted to ICT courses and some specialist simulations and equipment or subject specific domains. We are not sure of the value of e-learning services provided by publishers but we consider these are probably still quite low.

There are some e-learning content sales for this sector, as the example from Pearson Education indicates. However, we do not believe this part of the publishers HE activities is currently generating significant revenues. We are erring therefore on the very cautious side and estimating the market for traded services in the HE segment as probably not much more than €100M.

Table 6: Estimated breakdown of European higher education expenditure on e-learning

Expenditure type	Million €
E-learning technologies	60
E-learning content and services	40
Total estimated expenditure	100

Source: Research team estimates

On the revenue side, it is extremely difficult to make any estimate of earnings from e-learning in this segment, as most universities do not publish separate accounts detailing these earnings, and much distance learning is covered at least in part, by state funding so it

is outside our scope of traded services. We do not imagine that it exceeds the low tens of millions. This is a very different picture from the US.

Eduventures Inc., an education consulting and research firm, estimates that 350,000 students, or slightly less than 2% of the total postsecondary student population (USA), were enrolled in online distance learning programmes in 2002 and that this market will grow from \$2.5B in the 2002-2003 school year to more than \$4.2B in the 2004-2005 school year, representing a compound annual growth rate of 31% (Blackboard prospectus)

Home

We are unable to provide any estimate of the size of this segment of e-learning activities but we do not believe it is yet very significant in terms of revenues.

VET

Data on traded services in e-learning in VET is nowhere to be found. We know expenditure on technologies and content by VET players is lower than spent by HE but may be actually growing slightly faster. Our best guess is that the VET sector is probably equal to less than half the value of the HE sector, i.e., about €50M. We are not including EU and national public sector pilot and special project funding which involves the private sector, as we do not consider these “traded” activities.

Workplace

The market for workplace training and development e-learning has been regarded correctly as the largest market for traded products and services. Reports point to a US market worth USD 4.6B in 2002. Estimates for growth to 2006 and 2011 in the US were for \$16.4B and \$42.6B respectively (ACTEN 2004/Brandon Hall 2002). In addition, government is classed separately (and probably includes spending by the US Department of Defence), and was expected to grow to \$2.7B and \$13.4B in 2006 and 2011 respectively. A table from eMarketer.com (ACTEN 2004/eMarketer) quotes a figure of \$2.1B for 2001 worldwide revenues from corporate e-learning from Gartner with a forecast for this to grow to \$33.6B in 2005. The same table lists Cortona Consulting offered a figure of \$5B for 2001 for the combined US and European markets. Finally, IDC (also in the eMarketer table) are quoted with a figure of \$6.6B for worldwide revenues in 2002 rising to an estimated \$23.7B in 2006. Given the relatively modest baselines of 2001, and the Training Magazine survey findings of US growth in e-learning in 2002 at 10% and single figures in 2003, these forecasts now appear to be quite excessive.

As we noted in our first report, the picture in Europe is less well documented. Because there is no reliable data to cover CVT expenditure across Europe, we have used the data available and erred on the very cautious side. “Across the EU (for the limited sectors for which we have data from the 1990s) private enterprise expenditure on CVT courses is estimated to amount to between €17-20B. These calculations are based on a subset of sectors and enterprises, representing about half or less of the economy, so total training course expenditure is likely to be far higher. As one would expect, higher levels of expenditure are found in large firms.” (EduLearn Report 1 2004.)

The 2002 European e-learning market report survey concluded that as a percentage of total workplace training, e-learning expenditure rose from 10% in 2000, to 17% in 2001 and

23% in 2002. If we assume that in 2003, up to 20% of expenditure on training was spent on e-learning (which we concede is a very big assumption!), a very conservative estimate would put the size of this segment at between €3.5B and €4B. Given the reports from suppliers of the shift in business (with little overall growth) from the private to the public sector, we suggest this figure should be used as a conservative estimate of all workplace training spent on e-learning in 2003. (Some anecdotal data provided recently from German and Italian sources suggest this is in fact rather over-estimating the value of sales in this segment).

We urge caution with this figure. Firstly because we do not have comprehensive data for workplace training in the private sector, yet alone the public sector. Secondly, because we have an equally cautious estimate for the percentage of training budgets spent on e-learning in 2002 and assumed by us to be carried through into 2003. We are confident however, in the light of the US and global estimates quoted above, that our estimate is as accurate and probably better than anyone else's is.

Schools

Surprisingly, we have been unable to find any data that provides information of schools' expenditure on ICT technologies, content and services. This is largely because decisions about expenditure on ICTs and content in most European countries are made at local and even school level. A further difficulty is isolating expenditure on e-learning related purchases from products and services for administration and schools management. We estimate traded services in this segment are probably around €1B but this is a very cautious estimate.

7. The barriers to growth in supply

“We operate in highly competitive markets and generally encounter intense competition to win contracts.” (Blackboard Prospectus, 2004.)

The barriers to growth are moderately different for each segment, but overall there is no doubt the customer has the upper hand in almost all segments, which is not necessarily, in this case, a very healthy situation.

We have built our understanding about these barriers from the reports we have reviewed, our case studies, future survey and the discussions with suppliers.

7.1 General economic growth

General economic growth, especially for those working in the workplace is very important and probably also impacts the home markets, especially for adults learning part time. In the case of the former, there is a direct link between the poor economic conditions that started to appear in 2001 and continued to the end of 2003, and purchases in the private firm sector. The sluggish economic conditions in 2004 across most European countries are certainly contributing to the stagnant levels of trade in these segments. In some respects, e-learning is not unlike the ICT sector generally and the challenge is not just about economic conditions and tight budgets as companies reign in costs. Spending on technology carries the burden of being associated with hype and waste, where business value is unclear. Suppliers now have a harder time demonstrating that investments will yield real benefits. The same can be said of large content purchases; the days of customers buying large libraries of content are past. Buyers focus on cost and relevance to their business processes and needs. This does not mean however, that they always fully understand what they want or how to implement it.

7.2 Scale

For the majority of suppliers in all segments, the potential scale of the market is not a barrier. They are small, more usually micro firms, working at a local level supporting technology implementation, providing custom content and support services. However, to move beyond a “cottage industry”, players wanting to grow and trade internationally need to find markets that have potential volume.

In Europe, the small nature of some markets and their language and cultural specificity can be a real barrier for internationally trading suppliers. Several technology providers said they need the presence of large organisations in any country to justify the cost of gaining a foothold in that country. The more large organisations there are in any country or region, the more likely it is that there will be more suppliers (both local and international) competing. In small countries where companies and the education sector have been investing in e-learning for some time, there appears to be more mixed suppliers - small, large, local and multinational. In large countries, investment by large suppliers in building a strong presence is higher and proportionately they appear to have a larger market share (this appears to be the case in Germany and the UK). In emerging markets, such as the new Member States, with a relatively undeveloped local supply side, the presence of large organisations offers particular attractions to multinational suppliers who face little internal competition. Such are our impressions from our country reports and discussion with suppliers.

7.3 Organisational/institutional barriers

Organisational or institutional barriers are widely cited as a major barrier across most segments.

In schools and higher education, even today enthusiastic early adopters undertake most e-learning adoption. As a recent UK report noted (HEFCE 2004), in most universities most e-learning activity has emerged from the work of an individual or a single department. Betty Collis in her work on models of ICT use in HE describes a similar picture as do a range of other European reports (Collis 2002). Few universities have a fully developed strategy for change management including addressing the very human issues of time availability, working conditions, reward, recognition, motivation, skills and IPR. Under these circumstances, the attempts to implement e-learning as a mainstream activity immediately face critical institutional barriers.

The issue of IPR is a potential barrier to growth in the HE sector, is rarely discussed in the literature, and applies whether universities utilise an open source, commercial or other technology solution. While the quote below applies primarily to Blackboard's experience in the US, there is no reason to think that it does not equally apply in Europe.

“In addition, the growth and development of the market for online education may prompt some members of the academic community to advocate more stringent protection of intellectual property associated with course content, which may impose additional burdens on clients and potential clients offering online education. This could require us to modify our products, or could cause these clients and potential clients to abandon their online education initiatives.” (Blackboard Prospectus).

As noted also in the UK HEFCE report, *universities* have not developed sound business models for e-learning and costs are often not transparent. This combined with ideological preferences means that many universities have either built their own VLEs/MLEs and have developed their own content without there being any clear evidence that this was the best value approach. As open source technologies become more widespread (as they seem to be doing in the HE segment), the same applies and it is a rare voice that points to the need to understand the real cost and administrative implications of this route.

Barriers encountered at the *school level* are similar, with the additional issue of identifying and managing often multiple, administratively complex instruments for funding which may have a finite life and often fail to support sustainable adoption.

For *suppliers*, the challenge also includes the need to work with multiple agencies and intermediaries instead of, and sometimes in addition to the direct users.

In *workplace learning*, the organisational barriers are not dissimilar and suppliers emphasise the importance of customer service and repeat business - not least because it allows them to recoup their high upfront investment in educating customers and supporting them through early implementation. Many suppliers in our discussions described the difficulties of delivering high-quality pedagogically sound technology supported learning at work. Their customers want to know that they are able to deliver business results.

However, few organisations have developed highly sophisticated and seamless learning and performance systems directly linked to business impact. Demonstrating business value from their e-learning investments (because they tend to be high profile) without the requisite organisational systems and culture can provide suppliers with major challenges and high business development and support costs.

The same issues are in *public sector* contracts, which according to most suppliers have longer lead times, more stakeholders and fewer clear business objectives than their private sector counterparts. Procurement practices are often poor, leading to the need for considerable extra time re-designing specifications after contracts are awarded and the failure to meet quality, time and cost limits.

These institutional barriers impose significant costs on suppliers including high upfront costs associated with assisting clients design appropriate specifications, educating clients on what to expect in implementation and prepare for it, longer lead times, the need to consult multiple stakeholders and often high levels of support service. When the suppliers' business model is primarily one based, on the one hand on sales of licenses, or on the other, content development hours, these additional business development and service costs cannot usually be recouped because of the competitive markets and downward price pressure. In a highly competitive market, with low margins, there is little room for these costs to be absorbed and more importantly for sufficient profits to be generated by suppliers wanting to grow, and right now, to generate the cash to survive.

7.4 Skills

One particularly interesting finding from our case studies, and supported by further discussions with suppliers at meetings and the summit, was around the question of their skills' needs.

Almost every one of the organisations we interviewed for the cases experienced similar patterns of changes in staff numbers in last four years; early rapid growth, downsizing with redundancies, and maybe a little employment growth since 2003 or in some cases only in 2004, but less so than in the pre-2001 period. As the organisations mature, there is a shift in their employment needs towards marketing, business development, project and customer management and sales staff and less of a need for technology expertise. In fact, none of them appeared to have had problems with recruiting high-quality employees with the right type of technology expertise.

However, the job profiles that are primarily and consistently hardest to fill across most of the organisations are those relating to sales, customer facing, and customer project management. This emphasis on the need for customer facing competence as critical to their business is common through almost every case. One supplier notes that "Many of the technical consultants are being replaced by business consultants, because the customers ask for people who can do a requirement analysis from a business perspective – and they are willing to pay for it." While these refer mainly to workplace learning contracts, those supplying to other market segments also cite the same skills needs.

Martin and Doig throw some further relevant light on this question. Cairncross (2003) argues that success based on making and selling commodity products is only limited to a few major companies and that new business models need to be based on preserving

margins and differentiating through relationships with customers.” “The implications for skills arising from such business models and architectures are all too obvious, with a premium being placed on customer-facing competencies, using ICT to deal with customers and analytical skills connected with understanding customers and markets (Martin and Doig 2004).

What appears to be at issue is where to source this kind of talent. Some organisations have chosen to work in partnership and/or alliance arrangements specifically to meet this need. However, for most finding the right type of person – with the right levels of technology, pedagogy, business and project management expertise and customer relationship skills – is a real challenge. One respondent (INSEAD) said she just did not believe these people were available and that they would have to “grow” them internally.

There appears to be a real skills shortage here and the question arises in such a relatively immature sector, “how can sales/customer facing/customer project team skills be developed and where might these competencies be learned and refined through application?” Are there related industries from which people with suitable transferable skills can be attracted? Are traditional education and training players supporting the needs of the industry by providing appropriately skilled graduates? And a more basic question, for general needs such as customer relations and customer project management skills, can these be developed in formal training programmes and if not, how can they be developed?

8. Sources of investment

For the majority of suppliers in all segments, finding significant upfront investment is not particularly critical. They are small, micro-firms – sometimes called “lifestyle” businesses – able to adapt relatively flexibly to market conditions and opportunity that may emerge and fade depending on the expectations and interests of their owners. In effect, they could be described collectively as a “cottage industry”.

However, if there is to be any real growth and wide adoption of e-learning across the education and training systems and workplace learning, a mix of suppliers that can invest in new products and services, offer economies of scale and service large organisations in the public and private sectors and potentially, the consumer market will be necessary.

In order to grow, these suppliers require capital. During the late 1990s and even into 2000, for US firms in particular, one popular route to investment was private sector finance through venture capitalists and for some, following IPOs, public ownership. Investment was significant, and revenue growth rates were high until 2000/2001. However, so were costs, and the sector (along with many others it has to be said) showed remarkable tolerance toward losses - running into hundreds of millions every year.

The size of the potential for losses needs to be borne in mind by those advocating the growth of new European businesses in this sector, and especially those who believe the university sector can compete. Below, for example, is a quote from the Blackboard Prospectus issued when the company issued an IPO in mid-2004. It should be pointed out that the nature of this prospectus and disclosure requirements (especially in the post Enron climate) means that they are obliged to be extremely cautious and avoid anything that might mislead or hype their potential for investors.

“Although we have been profitable in the last three quarters on a net income basis, we have not yet been profitable for a full year, and may not be profitable in future periods, either on a short- or long-term basis. We incurred a net loss of \$41.8M, \$41.7M and \$1.4M for the years ended December 31, 2001, 2002 and 2003, respectively. As of March 31, 2004, we had an accumulated deficit of \$131.9M. We can give you no assurance that operating losses will not recur in the future or that we will ever sustain profitability on a quarterly or annual basis.” (Blackboard Prospectus)

Losses of \$40-60M a year were not uncommon among these e-learning firms in the late 1990s and into 2000. Needless to say, many firms and their investors have now disappeared. There is very little continuing private sector investment and at the time of writing e-learning firms on the stock market are generally not performing very well. While share price is not necessarily a sign of anything except investor confidence, it does indicate ongoing concerns for future growth and more importantly, returns in this sector.

In Europe, very few firms followed the same route to investment but there were some, few of which are yet profitable. A rarity, such as EPIC PLC in the UK, while smaller than many US counterparts, has been consistently profitable for a number of years and built substantial cash reserves relative to its size. Perhaps European investors are more cautious and have less tolerance to such large-scale losses. The scale of markets and their potential

for generating significant capital to support growth exacerbates a problem for European businesses wishing to grow. A typical small and fairly advanced market is Norway. As we quoted above, the e-learning market in Norway was estimated at €49M in 2003. In the same period, 50 participating e-learning suppliers recorded a sector surplus of €3.82M. A total surplus of less than €4M earned across 50 firms does not provide a strong basis for expansion and international growth!

The challenge for all firms that raised funds through private and stock market investment is that without market growth, and with most unprofitable as yet, they are faced with investor pressure for returns. Investors take risks but usually not for long, and as the recent Blackboard Prospectus noted: “the viability and profitability of this market is unproven”. Worse still, as so few are profitable, many face serious survival problems, as they have been unable to build cash reserves due to lack of profits over the years. In such a position, they are hardly attractive to new investors. Some, as we note in our future trends, may end up being taken over by stronger players, others will not be so attractive, although may provide skilled employees for other firms.

This leads us to support predictions that there will be further closures and, unless there is a significant change in the market, many medium and large firms may not survive. In these circumstances, it is easy to see why firms that are profitable or at least have good cash reserves, push the message out so strongly to customers, linking their financial strength with “market leadership”, and focusing strongly on building confidence that they have the capacity to survive and grow.

Of course, these are not the only large suppliers. A number of suppliers from on the one hand the ICT sector (e.g., IBM and Microsoft and on the other, from the publishing and broadcasting world are casting their nets over various segments of e-learning users. These suppliers are building new potential businesses or extending their offerings to deepen and expand customer bases, and through their educational offerings, they hope to establish lifelong customer relationships. These organisations have deep pockets. They can afford to build their e-learning businesses with a longer-term perspective. While they will have a very strong focus on costs and margins, their e-learning businesses are often being built interdependently with other offerings, and for this reason, they can absorb losses in ways that suppliers working solely in e-learning, are unable to do. However, as one supplier pointed out at the Summit, even these companies have a limited horizon in a stagnant market.

A further rather important note of caution is the fact that in any innovation cycle, there are various stages of adoption across users. In most e-learning segments, they have passed the “early adopters” and are moving into mainstream early adopters. Again, the Blackboard prospectus highlights an important issue, which though describing the educational sector in the US, applies equally to the workplace-learning segment in Europe and to some extent the higher and VET segments as well.

“Given our clients’ relatively early adoption of enterprise software applications aimed at the education industry, they are likely to be less risk-averse than most colleges, universities, schools and other education providers. Accordingly, the rate at which we have been able to establish relationships with our clients in the past may not be indicative of the rate at which we will be

able to establish additional client relationships in the future.” (Blackboard Prospectus).

In other words, growth in the mainstream is likely to be slower anyway than growth among first buyers.

Finally, the public sector is a large source of investment, particularly in Europe. Many, many universities, research institutes and consortia of suppliers and users have collaborated on publicly funded projects that have developed technologies, content and services. However, almost none (there is a very small number of exceptions - among them two of our case studies) of these has proved sustainable, partly because they were probably never likely to be. But mostly, we believe because they have no sustainable investment following the end of the project to build any real business, which as we can see from the above, may need to be very substantial. It should also be added that few of these projects are led or have partners that are capable of or really interested in actually building a new business or developing new business products and services that might be commercially successful.

There are also very strong differing views among policy makers and other stakeholders about the role of the public sector in funding potentially commercial products and services, about the importance of sharing results for the public good, and about the benefits and value from using public funds in this way.

9. Future trends in e-learning

In this chapter, we will present the synthesis of the future analysis carried out during the study. The aim here is to reflect on the likely developments within the European e-learning supply side, some considerations about the current and future structure of the sector, and which market segments suppliers might service in future. Furthermore, we seek to identify the key future technological trends and how they might affect the European e-learning sector as well as the main barriers for future growth in the e-learning sector.

The synthesis draws on information from several sources:

- Firstly, we will take into account the future scenarios developed within the study and the web survey on the future trends in e-learning. It should be noted that the EduLearn Third Report details the work carried out in building future scenarios and reports on the results of a survey of suppliers about their expectations for the future.
- Secondly, we have identified a significant number of reports, articles and surveys that considers the future of e-learning as whole as well as specific segments.
- Thirdly, in concluding on future trends, we will reference the work of other analysts to substantiate the arguments and projections that we are bringing.

The analysis of the future of the e-learning sector is necessary in order to identify areas where the growth of the sector and the market development can be supported by European and national policies, dissemination and co-ordination across the sector.

9.1 *Future structure of the European E-learning sector*

In the medium term (5-6 years from now), it can be expected that the e-learning sector in Europe can be characterised as follows:

9.1.1 Small operators - consolidation

Many small e-learning operators in all product areas (technology, service and content) will have disappeared, merged with others (both international and national) or evolved into a different sub sector. Those that survive will have identified a valuable niche or built strong ties to a loyal customer base. Today, there are many very small operators (companies with less than 10 employees estimated to be between 85 and 97% of all e-learning companies in the different European countries. Often companies that have more employees provide other services in addition to e-learning. It is likely that these will represent a smaller share of the total European e-learning suppliers (both in volume and in Euros) as the bigger multinational and national players are likely to consolidate and achieve a larger share in the future in all segments. There is already evidence of this taking place in Norway, Finland and the UK. Currently, there are only eight e-learning suppliers in Finland with more than 10 employees (see the Finnish national report).

Consolidation among European actors is likely to take place in different ways. We may see acquisitions among national operators where large players acquire small ones in order to add competencies and/or gain access to new customers. However, there are significant barriers to this strategy. Firstly, it requires significant revenue growth and profitability in order to accumulate enough capital to acquire companies. Secondly, achieving substantial benefits from the acquisition is by no means a certainty. Often customers are linked to

personal relationships and hiring a strong sales person may be a better option than buying the whole company (subject to status of employment).

Currently, there are a significant number of national L(C)MS providers in each country, each providing their own platform targeting both the educational and the workplace segments or more rarely both. In future, some of these providers will find it increasingly difficult to survive in the competition with multinational providers and open source platforms and many will probably cease to exist. Those that survive may choose either of the following strategies: convert to open source and sell integration services, expand into other national markets through partnerships, convert to ASP solution and sell access to learning content and services. Some of the strong European actors are likely to invest in e-learning companies in the new Member States to gain access to a cheaper multimedia production line and a growing market. Examples of this can be seen in Finland where two of the leading providers have invested in Poland and Latvia. Others will partner with firms in developing economies.

9.1.2 New emergent actors

At the same time, there is evidence to suggest that new operators could emerge either in niche areas (game based learning, simulations, open source integration) or by complementing their current offerings with e-learning services. Our web survey suggested that suppliers expect telecommunications operators and professional associations to enter the market as suppliers of e-learning services for their customers. These in turn will present opportunities for current e-learning suppliers as subcontractors and suppliers of relevant technologies and will help to expand the markets by increasing the awareness of e-learning possibilities.

9.1.3 Large multinationals

The international (predominantly US and Canada-based) e-learning operators can be expected to continue their strong market presence in Europe and in some markets they will increase their dominance. Firms offering L(C)MS and enterprise suites include companies like IBM, Oracle, SAP, SumTotal and SABA, all mainly addressing the needs of large organisations. Within education segments, they will include companies like WebCT, Blackboard and Microsoft. Within live e-learning platforms, they will include Centra, Interwise and Webex. Within content suppliers, they will include Pearson Education, Thomson Corp and Skillsoft as well as a number of specialised aggregators.

In addition, the presence of strong actors, such as Tata Interactive Systems from India, and interest in European markets on the part of others in India, China and other Asian countries, will increase competition from countries with access to low-cost labour for development, potentially putting downward pressure on prices.

9.1.4 Game-based learning

Strong international entrants can also be expected within emerging segments such as game based learning where US-based operators like Horn Interactive, Digital Mill, Socratic Arts, Breakaway Games, ACLS Interactive could be tempted to enter the European markets seriously on the back of a growing and more developed market in the US (Financial Times 8 Sept 2004).

9.2 Size and growth of the markets

We have argued that the traded e-learning products and services market remains small and has experienced limited growth over the last couple of years. It is difficult to foresee market growth of between 10 and 20% as several analysts are claiming over the coming years for a number of reasons:

- The optimism among suppliers that would support this kind of outlook is non-existent
- The main source of funding for this growth would need to come from the public sector, because this is where the majority of the market is today.
- Users of e-learning are increasingly demanding proof of impact and ROI calculations, and those solutions that do, have not been well enough documented and disseminated to encourage other consumers to invest to any extent.

We would therefore expect a much more conservative growth rate overall - more likely to be in the single percentage figures with emerging sub-markets like simulations showing two digit growth rates, from a very small base.

9.3 The future markets for main types of suppliers

9.3.1 Higher education

The study “Virtual Models of European Universities” (European Commission 2004) indicated that a large increase in the number of courses offered in e-learning format could be expected in the future. 65% of the more than 200 responding universities stated that this would be one of their key priorities over the next couple of years.

The study furthermore identified three preferred models for collaboration with the private sector in terms of e-learning development and technology supply in the future. However, less than half of universities either already practice this type of collaboration or plan to do so in the future. Those that expect to collaborate with private operators will do so through consortia type partnerships with publishers, through project type collaboration often with public funding, and finally through outsourcing of IT and platform management.

Our web survey indicated that higher education is the market where open source is likely to gain a foothold first. 67% of respondents believed that Open Source e-learning platforms would represent a serious competitive alternative to commercial products in 2010. In order for open source platforms to generate a market that is not just of an experimental character, the capacity for development and implementation resourcing will need to be addressed at university management level as well as processes for integration across the institution.

Mainly academic publishers are likely to address the HE market, perhaps a very few HE institutions with specific online learning services and modules, and a small number of commercial platform providers that will produce revenue and earn profits in the HE market in the future. Small specialised ICT companies and large suppliers of administrative systems to HE may also benefit from ICT integration requirements in the future.

9.3.2 Workplace segment

Sectors

Strong e-learning sectors in the workplace market will continue to be the ICT, business services, financial and pharmaceutical sectors. In the public sector, it will continue to be the national health services, the defence departments and public including local government authorities. Sectors that may emerge as potential growth markets include the retail sector and some knowledge-intensive industry sectors. Apart from internal education and training for employees, there is likely to be more focus on training through e-learning to external partners and customers in the future starting with customers and eventually reaching suppliers. E-learning suppliers will need to focus on tailoring their offerings much more to specific sectors, and they are likely to be asked for references within the same sector when approaching potential customers.

SMEs

E-learning for SMEs has been a stagnant market for several years. Too many barriers around access, customisation of products, incentives, motivation and ICT skills of employees and employers, etc., has meant that this market has not developed. We foresee this trend will continue. Our research has shown that there is no indication from suppliers that they see the SME market as an attractive market unless it is through an intermediary (e.g. trade or professional associations) or supported by public funding. Work by Graham Attwell for Cedefop proposes the creation of supported networks, on a territorial or sectoral basis to support the adoption of e-learning in SMEs (Attwell 2004a). Most e-learning among SMEs will continue to take place in knowledge intensive companies and ICT companies and the collaborative learning element will remain very limited. Only suppliers with good relationships with intermediaries and funding agencies will succeed in this segment.

Intermediary organisations

Our web survey found that respondents expect the intermediary market to develop as the telecommunications sector becomes more involved in service delivery via mobile devices and as trade and professional associations develop their services further in order to satisfy and engage their members. Therefore, it is expected that this segment may experience some growth in the future. However, much will depend on how quickly these channels develop the knowledge and competencies required to adequately develop the e-learning services, manage the e-learning procurement process, and market the services to their customers. Suppliers of technology platforms, services and content will need to be patient with most customers in this segment. It will take time to build the trust and common understanding. They are likely to prolong decision-making because of uncertainty about cost/benefit and impact and customers may not react as positively as first imagined.

Social partners

The different trade unions (particularly in the oldest Member States, but increasingly also in the new) realise the need for training and development of their members to stay competitive in comparison to low-wage countries. In the future, many of these trade unions will develop e-learning services for their members to reduce costs in training provision, but also to reach more members with more training opportunities as a good supplement to the traditional courses they are offering. This is already happening in limited areas (typically around ICT training) in the more developed markets such as Denmark, Norway, Sweden,

Germany, Austria and the UK, but is likely to evolve further in the future. There are opportunities for both suppliers of platforms and content, but they will need to understand the needs and characteristics of the trades unions and the challenges they are facing.

In-house development

There is already a tendency among large consumer organisations to establish internal content production teams in order to develop and maintain content that is needed here and now, is reasonably low-tech (although future authoring tools will allow easy integration of multimedia and animations), is targeted at internal learners and mainly builds on internal knowledge components. These activities are likely to intensify in the future as the tools become better and the need and expectation for swift training solutions grows. Already tools targeted at subject-matter experts, such as RoboDemo, BoxMind, Macromedia Breeze and Microsoft Producer for PowerPoint 2003 are making it easier for people to create their own digital learning content. As these and other tools improve even more, they are going to make it easier for people outside of the training departments develop courses quickly and easily. Suppliers will have a role to play in terms of selling the tools needed, training the people in-house to develop e-learning, developing templates to be used by the team and supplying parts of the content in terms of the more complex media.

9.3.3 Schools

The school segment will continue to be driven by the level of public funding and policy decisions regarding the role of ICT and e-learning in education. Although several national governments are planning investments in e-learning content and infrastructure, (Finland, Denmark, the UK, Ireland, etc.) the European market for e-learning to schools is not likely to grow much in the years to come. Many schools have introduced platforms for sharing information and supporting the pupils in their learning. Nevertheless, it is likely to take years before the teaching staff and culture is ready to adopt comprehensively pedagogical approaches that take full advantage of e-learning. In the medium term, learning material publishers will continue to introduce text-based curricula resources supplemented by e-learning elements, but these will typically require access to different external platforms and be linked directly to specific textbooks.

Whether multimedia publishers succeed in developing complete multimedia curricula age groups and establish a powerful position in the market both in relation to book publishers and regional purchasing authorities for schools remains unclear.

On the platform side, there will be increasing price pressure as more and more open source tools and in-house developed solutions are shared around. If in-house developments and the open source tools succeed in overcoming problems of reliability, interoperability, documentation, continuous development and standards integration, commercial offerings will have a very tough time trying to achieve market shares in the school market.

As teachers become more ICT literate, the learning cultures slowly change in schools and ICT infrastructures and tools improve, teachers will be developing more of their own learning materials and sharing these with each other and pupils, tailoring these to individual learners. This development, expected to happen some years from now, is likely to present opportunities for authoring and platform tools suppliers as well as publishers who may wish to market the best of such learning materials to a broader audience, maybe even an international audience (subject to digital rights issues being solved).

9.3.4 Vocational Education and Training (VET)

According to our web survey, 47% of the respondents believed that open source e-learning platforms will offer a serious competitive alternative for users in the VET market in 2010. This is strengthened by the fact that there is already a solid base of in-house developed learning platforms at VET institutions. The future growth will again depend on the level of public funding invested in infrastructure and e-learning development, but also how well the employers, the social partners and the VET institutions co-ordinate e-learning initiatives between them and gain a mutual understanding of expectations of benefits and implementation requirements.

9.3.5 The consumer market

The consumer e-learning segment will consist of Internet and CD-ROM based edutainment products primarily for children and young people and in the long term, also mobile, location independent edutainment to handheld devices. It will also include standard and individualised language learning products for the same media, and educational products that allow parents to supplement their children's education with online or CD-ROM based learning opportunities. This market is partly an opportunity for the existing specialised publishers already operating in the segments of edutainment and game based learning, but it will also be of interest to telecommunications operators.

In future, more and more guidelines and manuals associated with complex domestic appliances and small machines will be multimedia based with simulations of the assembly process, maintenance, cleaning and/or usage. It will be possible to access the simulations from various devices (PDA, Mobile phone, TV connected to Internet or a PC). Similarly, "Do it yourself" instructions on complex tasks presented by suppliers of building materials or DIY stores, and "educational" introductions to heritage and cultural sites are likely to be delivered via multimedia devices in future.

How big this market will become depends on how easy the tools for developing the learning materials are to use, the level of competitive edge it will offer the companies providing these services in the first few years and how quickly it becomes the standard manual in the various sectors. There are already services established in connection with the purchase of, e.g., cameras, but as the technology and infrastructure improves, it is likely to expand in the future.

This market will be an opportunity for multimedia, computer agents and simulation developers. Moreover, telecommunications operators and mobile devices suppliers will benefit from the future developments of this segment. It is, however, uncertain just how quickly it will develop.

9.3.6 Lifelong learning

For many years, the European Commission and many national governments have positioned lifelong learning as a centrepiece in its education and training policy. This segment is difficult to estimate as it overlaps with most of the other segments (particularly VET, workplace learning and higher education). Although it is an obvious market for e-learning products and services, it is unlikely to show much growth in the future unless public funding is earmarked for e-learning development. The motivation of learners to choose lifelong learning via e-learning is limited unless it is part of a formal postgraduate education financed by employers or required education in order to change or advance in

careers while still in employment. In the near future, educational institutions will continue to focus primarily on numbers on campus.

As globalisation is forcing outsourcing of production to low-wage countries, we can expect several occupations going through major changes if not disappearing altogether. This development will require rapid action from public institutions, trade and professional associations as well as unions to create training opportunities that will allow the people affected to access training that can re-skill them to other jobs as fast as possible. E-learning is likely to play a role in this process; however, much will depend on the IT skills of the target groups, and the culture and motivation of the institutions involved.

Suppliers addressing this market segment will need to understand the VET market and build relationships with the relevant organisations. Suppliers could be VET institutions with commercial offerings, e-learning content developers, and aggregators of e-learning content and professional associations with their own developments.

10. Future trends in e-learning technologies

10.1 *Mobile and pervasive technologies*

There is little doubt that in the future learning solutions and services will be integrated into a whole host of mobile technologies (mobile phones, PDAs, digital pen and paper, and in the long term, mobile devices we have not even seen on the market yet (including wearable devices)). Two distinct potential markets are evolving:

1. Learning services to people on the move (people in jobs that require them to continuously move, people learning and receiving information while visiting sites and buildings, certain types of full- and part-time students needing individualised learning education, on the move and while on external projects).
2. Learning services to people that are without infrastructure and fixed access, in rural or remote areas and learners in developing economies.

Through large-scale projects, such as the IST MobiLearn (www.mobilelearn.org) and [m-learning](#) projects and many other research activities, several demonstrations of mobile learning have already been developed and tested. In the US, Using PDAs in schools and for workers on the move has already been adopted with significant results in terms of improved learning effectiveness (SRI 2003). In Europe, mobile learning is beginning to develop, and telecommunications companies such as Nokia and Vodafone have already integrated these technologies into their training and development systems. However, the real growth across sectors not in the telecommunications sector remains to be seen. Any growth in this market is likely to happen in the medium to long term, and adoption even in the medium term is more likely among high-stakes mobile employees, and among target groups in education that are generally outside mainstream systems. Mainstream growth will depend on how successful all the major players in the education and training systems are at removing the cultural and organisational barriers that continue to stand in the way of change of this kind.

In the long term, learning solutions and services are also likely to be integrated into electronic appliances, machines and information interfaces.

Technology adoption in the home is now going from just one computer to several networked computers, from ISDN to broadband, from computer to convergence of computer, game console, TV and sound systems.

10.2 *Learning through simulations*

For a number of years, simulations have played a significant role in the training activities of certain sectors, notably the defence and aviation industries in several countries. Simulations are being adopted in other industries and for a broad range of skills and competence development.

Among other factors, technical barriers and the cost of development have until now prevented the widespread use of simulations as learning tools. In the past, high-quality simulations were simply too hard to develop at an acceptable cost and bandwidth limited their distribution.

Today, computer technologies, such as Macromedia Flash, have become ubiquitous and e-learning vendors with simulation-development expertise are beginning to develop more industry- and topic-specific simulation templates.

Technology and cost barriers are continuing to shrink, opening up the potential for wider adoption of simulation technology. Already the US market has experienced growth in this type of learning tools and expect significant growth rates in the future.

There are still barriers to be overcome, particularly in terms of design innovation, explicitly meeting learning objectives, demonstration of achievement of performance or behavioural change, poor organisational integration and implementation and evidence of effective exploitation in training environments. Computed mediated simulations are expected to gain a larger share of education and training activities both in workplace settings and in education.

Simulations may offer advantages over handbooks or user guides. They can complement lectures, demonstrations and real world practice opportunities. Champions of simulations argue that they engage students and learners while helping them retain and apply what they have learned. As simulation technologies become more sophisticated and more cost-effective to build, and with the increased emphasis on evaluating their effectiveness, it is likely that the market will continue to grow. (Billhardt 2004). Growth may be at a higher rate than other learning technologies, but this is a reflection of the lower base.

10.3 LMS and LCMS

Replying to our survey, and asking about the management of workplace learning by 2010, 44% of our 143 respondents supported the statement that the dominant strategy would be integration of LCMS (learning content management system) with other enterprise systems in enterprises, thereby creating synergies across the company. 37% believed that outsourcing as much as possible to full-service suppliers or branded networks of suppliers will be the strategy chosen by companies.

Whether choosing an internally or externally managed strategy, it appears that in the future L(C)MS will become much more integrated with other workplace systems in the organisation, particularly other human capital related systems.

One expert (Driscoll, IBM 2004) sees the makeover of training and development changing over the coming years due to two other factors apart from outsourcing, i.e. global competition and the introduction of so-called smart suites. Smart suites are systems that integrate knowledge sharing and learning with business planning activities to make the operations smarter.

Smart enterprise suites will include the following three learning relevant elements:

1. **Portals** - providing a consistent user interface for business-to-employee (B2E) users (they may be employees within the enterprise or those within the extended enterprise of value-chain partners)
2. **Collaboration** - including messaging, alerting, real-time application sharing, presence and threaded discussions – enabling the management and facilitation of communities and learning groups providing connectivity to a range of desktop and

mobile devices via a mix of connectivity methods is supported for both content management and collaboration - dynamically profiling users and facilitating access to their knowledge.

3. **Content Management** - including document management and Web content management, extending to digital asset management and support for rich media – enabling the categorisation, taxonomy generation and profiling of information.

We believe this may occur in a small number of firms where the primary capital is embedded in expert knowledge and where there is intense focus on knowledge building and sharing processes, and in “high performance” organisations. However, experience so far in the use of all technologies, and especially e-learning, suggests that for most workplaces, such a vision is unlikely to be translated into reality for some time to come.

10.4 Open Source e-learning tools

10.4.1 Open source v commercial products

E-learning is often conceived (in our view erroneously) as a product (content) delivered through a range of technology media (Internet, CD-Rom, etc.), some of which have become specialised and built for the objective of supporting learning. As our research has shown, suppliers of e-learning technologies are very heterogeneous with a large product variety: Learning Management Systems, Content Management Systems, Virtual Classrooms, Authorware, Test & Assessment Tools, Simulators and many more. Each of these e-learning applications is available from multiple vendors and middlemen.

Commercial and Open Source LMS offerings

It is estimated that there are already more than 250 providers of commercial Learning Management Systems. In addition, the JOIN project recently identified more than 40 open source LMS offerings. Some of the most well known are Moodle, ILIAS, eduplone, Claroline and SAKAI. Most of these have extensive developer communities and present strong arguments for considering open source a direct and potentially viable competitor of commercial products (Cuppola 2004). Therefore, it is a valid question to ask if in future, open source applications for e-learning offer an alternative to commercial offerings.

European research (Wichmann/Berlecon 2002) has shown that out of the top 10 criteria for making a decision in favour of Open Source software applications on the desktop (not operating platforms or databases), half of the criteria deemed “very important” are related to cost savings and four relate to technical criteria such as protection, stability, performance and access to code.

One of the challenges in considering this question objectively (will open source e-learning technologies capture current or future market share from commercial providers?) is the strong ideological flavour of arguments on both sides. As noted above, clearly Blackboard sees this as a threat to their position in the higher education segment. (Blackboard prospectus). On the other hand, there is a strong case for ensuring that users in the immediate future as well as the longer term have access to the best available applications, and these clearly should be built on open standards.

“When procuring software for education, public authorities should consider all software options, chosen on their merits and added value for the given

particular learning environment and not on their model of development (i.e. open source or commercial software). Above all, public authorities should be encouraged to adopt software and applications based on open standards and interoperable systems permitting heterogeneous environments incorporating software regardless of its development model.” (Deweever 2004/e-learning Industry Group 2003)

The above advice from the e-learning Industry Group (eLIG), while clearly representing the views of its members, is a reasonable best practice guideline not only for governments, but also for academia, industry, SMEs and others. It is a reminder that the adoption decision for e-learning should always be based on a thorough business case, regardless of the type of purchaser. Moreover, it stresses that choosing an application based solely on its model of development is no alternative for a well thought thorough selection and procurement process. As our suppliers noted, poor procurement practices are currently a barrier to effective adoption and market development, and it is clearly an area where buyers must improve their competence.

It is also important to examine the demographics of the existing Open Source Community, which is:

- Overwhelmingly male
 - Predominantly Generation X
 - Concentrated in the United States and Europe
 - IT professionals
 - Mostly college and high school graduates
 - Part-time participation.
- (Deweever 2004/Blue Oxen 2003)

These communities built the first and second generations of open source platforms, and in general, the developers and user communities were the same technically skilled people. However, for desktop applications, such as e-learning, the picture is different. Users may have limited IT literacy and have decision patterns which, while based on functionality and usability, also consider other factors such the long-term stability of the provider or the availability or relevance of training. As we know from our research and discussions with suppliers, users more often than not rely on external suppliers and service providers to assist them in adoption and integration. (Deweever 2004)

10.4.2 Building an open source e-learning market

Open source software is also referred to as FLOSS or Free/Libre Open Source software, as it gives users the right to freely read, redistribute, and modify the source code. The Open Source Institute definition stipulates, however, that open source does not just mean access to the source code, but also that it needs to comply with specific criteria for the distribution. “Free” in this context refers to the first criterion: “Free Redistribution”. This means:

“The license shall not restrict any party from selling or giving away the software as a component of an aggregate software distribution containing programs from several different sources. The license shall not require a royalty or other fee for such sale.” (Open Source Institute, 2004)

The definition of Free/Libre software consequently does not limit the potential to profit from the software, as long as the redistribution (and other) terms of the applicable license are respected. The implication is that open source applications can be available for free (at no cost) or at a commercial cost. Experience has shown that open source adoption in any organisation requires development for integration and implementation, and many commercial providers build their services offerings around supporting this implementation process. (Deweever 2004)

10.4.3 Standards

The web survey indicated that our respondents believe that standards and specifications such as IEEE LOM, SCORM and more recently IMS specifications such as IMS LD, IMS LIP and IMS QTI will be successfully evolved and become flexible enough to allow for the integration of real time learning processes, simulations, games, customised adaptive learning, digital rights management, etc., by 2010. Nearly 75% of respondents agreed or strongly agreed that this would happen. Most researchers, even those closely connected with standards development, agree there is some way to go regarding standards before they will represent the sort of flexibility that is needed for all actors in the e-learning sector to totally accept them. It is generally accepted that all systems, whether commercial or open source, should be built on open standards if the market is to develop. In the meantime, developers of standardised content and platforms will introduce the standards whereas bespoke e-learning content producers will be more concerned with interoperability for the individual client. Discussions with our suppliers suggest that the stage at which standards are adopted for any application or in the integration processes is related to a certain stage of market maturity.

11. Issues and concerns

Our conclusions are presented in a separate section. In this section, we want to highlight some additional issues and concerns that have arisen during our research.

11.1 *E-learning as a management instrument in the workplace*

In their work on technology and human resources management, Martin and Doig (2004) ask the question “To what extent is there a choice between using ICT as a dominating and centralizing force, perhaps leading to a deskilling of employees, or as a potentially liberating and empowering force, enhancing the role of employees and HR managers and in re-skilling work?” (Martin and Doig 2004)

We believe that most suppliers of VLEs and LMS and arguably also of content, are building their markets in organisations where the technologies of learning are being used as a centralising and dominating force. Economies of scale, attempts to create and sustain routine work tasks and patterns, and reductions in HR and training costs are some of the drivers. One could reasonably argue that in this context worker alienation, powerlessness, meaninglessness, isolation and self-estrangement as well as issues of ICT skills and learning self-efficacy all contribute to the failures in take-up and continued resistance to adoption.

As Attwell noted in his study on SMEs and e-learning:

“The challenge for developing e-learning in enterprises is the integration of ICT in such a way that it supports developmental work tasks, rather than merely electronically cataloguing and regulating routine tasks.” (Attwell 2004a)

Our discussions with suppliers also indicate that many would like their customers to use their products and services as “a potentially liberating and empowering force”. Some, such as those providing games and simulations, believe they are doing so, as do those developing and supporting collaborative technologies.

The repeated references to poor procurement practices among customers are not just about failures in project management, it is also about a failure to understand and address the wider social and organisational conditions for change. One factor relates to the power position and status of the HR/training function viz. a viz. the rest of the organisation and particularly their relationship with IT departments and operational management. There is also a view expressed that HR and training managers and IT departments quite simply do not have the business and organisational knowledge needed to define their needs and carry through implementation effectively. Suppliers continuously refer to the need to educate customers, weak specifications, unclear business objectives and the lack of understanding and planning for implementation.

Given the wider evidence between the effective integration of technologies and successful organisational change programmes (OECD 2004), it is obvious that integrating technologies into workplace learning requires complementary organisational change.

We should point out that HR and training specialists are not alone in their failure to manage processes of IT procurement and implementation. Martin and Doig note:

“Bassanini and Scarpetta explained the significant time lags that were apparent between technological investment and the “hoped for” benefits in productivity in terms of the inability of related institutions, human capital and organizational coordination to catch up with ICT spend. In essence, this was a reworking of the implementation problem that bedevils any form of technological change and one that highlights the importance of people and organizations.” (Martin and Doig 2004)

An approach that deploys technologies as a dominating and centralizing force can be aligned to the expectations (or naive determination) that most tasks can be analysed and turned into routine and learning (provided as objects) associated with routine tasks. Given that the requisite task and competency analysis is rarely undertaken (and extremely costly to undertake) and that fewer and fewer jobs are actually composed of simple routine tasks, suppliers to this market would appear to face an uphill battle.

We should also consider this issue in relation to whether in workplace learning, learning technology applications will be integrated into wider enterprise applications suites, creating seamless learning and working environments. In our first report, we discussed the work of Sam Adkins (Adkins 2003) and his belief and those of other analysts that this is the direction of the future. There is much debate whether learning technologies and the management of learning in the workplace should, in the drive to support business performance needs, be managed separately and operate as separate systems. It seems to us, that the argument for full integration not only assumes the existence of highly defined work processes linked to specific competencies, but that is also predicated on this approach that sees technologies as a dominating and centralising force.

As Martin and Doig point out in their critique of the work of Charles Perrow, there is “[...] an important distinction between *routine* technologies, which allow for few exceptions to known procedures and provide well-documented ways for dealing with any exceptions that arise, and *non-routine* technologies, which permit many exceptions and rely on high levels of worker discretion and levels of tacit knowledge to deal with these exceptions.”

The former is characterised by the use of ICTs to either remove drudgework and/or de-skill workers. On the other hand, knowledge workers, and those working in knowledge industries, are increasingly less and less likely to be undertaking tasks that “allow for few exceptions to known procedures and provide well-documented ways for dealing with any exceptions that arise. They are also increasingly less likely to require courses and learning objects built around routine jobs and clearly defined tasks.” (Martin and Doig 2004)

Is the adoption of higher levels of e-learning in some markets (notably the UK) linked to this drive towards using learning technologies as a dominating and centralising force? Felstead et al (2001) have found that despite the claims made for greater discretion at work thought to result from increases in work complexity, the opposite has been the case. In their study of task discretion between 1992-2001, they found that

“[...] in 2001 only 40% of employees thought they had a great deal of discretion over how they did their jobs, which increased with measures of job skills levels and with the “Required Time to Learn” index. Influence was felt to be highest in employee perceptions of control over quality standards and work effort. However, comparisons of 2001 with earlier years showed employees not to have experienced a rise in perceptions of discretion but of a sharp fall over the period 1997- 2001, especially over work effort. With respect to control over work quality, the decline was most marked over the period 1992-97.” (Martin and Doig)

We believe that one of the reasons that workplaces adopting e-learning to date have experienced such levels of resistance is because of the failure of managers to understand this issue and to seek ways of using technologies to support better workplace learning practice and improved performance. Suppliers can help by attending to this question and perhaps by supporting quality research and evaluation that demonstrate how and when learning technologies can lead to improved motivation, greater engagement in performance improvements and increased innovation and competitiveness.

11.2 Where should public money be spent in the market?

We have already highlighted some of the issues concerning investment by the public sector in the section “Sources of Investment” we have the following considerations to add.

In very recent years, increasing attention has been given to the “public good” benefits of public funding in research generally, and the funding of research and innovative approaches in education and training. Developments such as Creative Commons, the Public Library of Science and recent high profile debates with the publishing sector on free access to research findings in academic and scientific papers suggest a sea change in attitudes to sharing the results of publicly funded projects. In well over a decade, there has been significant (running into hundreds of millions of euros) funding of R&D, pilot developments and support for dissemination of e-learning related products and services. As we noted earlier, very few of these has ever reached the stage of becoming a viable commercial business or generating surplus revenues for their creators. In many cases, the policy argument for funding has been to help to stimulate supply, stimulate demand, advance innovation or intervene where there is clear market failure. Many now question these policy arguments or the efficacy of policies and instruments that have been applied in the hope of achieving them. One of the most respected voices is Graham Attwell, who has described his position in the quote below:

“The second precept is that the public sector has a critical role to play in education and training and that education is a public right. This means I would oppose the idea that public authorities should only intervene in the situation of a market breakdown and even more importantly, would oppose the idea of a two-tier market between private and public education providers. This is important in that it means that public education authorities should attempt to develop e-learning provision, rather than concentrating only on traditional education delivery and systems, and allowing the private sector to develop high value added e-learning applications.” (Attwell 2004b.

Leaving aside the different philosophical positions, it is evident that the aim of any public intervention is to support policy objectives - assist those that need support in preparing or re-skilling for the labour market, providing support where there is evident market failure and supporting research where the private sector is unlikely to invest. In the case of e-learning, funding instruments supporting policy objectives cover a wide range of objectives and aim to operate as different types of interventions and market levels.

We believe that there has been far too little in-depth research into how much these interventions have supported policy goals. There also needs to be attached to every intervention, thorough evaluation to identify whether it achieved its policy aim (whether this be stimulating supply, demand or supporting genuine innovation), and the impact in terms of value and return to the public purse. These evaluations need to be planned alongside the planning of the intervention, and need to be continued after the lifetime of the intervention if they are to provide any useful information for policy decision makers.

11.3 Developing content

A number of comments we received from suppliers point to significant variations in views between them and other stakeholders including policy makers about the role of the public sector in stimulating content development and usage. In the UK, the use of public funds (through license fees) by the BBC to develop curriculum online was clearly perceived by the suppliers in the schools market as damaging to market development. The attempt to redress the balance by investing in e-learning credits where schools were given access to funds to purchase content does not appear, at least so far, to have successfully stimulated demand.

Across Europe, there are different views about whether a market in commercial content is desirable or whether learning content in the education sector should be transacted freely within a community of teachers and only supplemented in a minority of cases by commercial products. There are also debates on how to ensure pedagogical quality, relevance and contextual value and the role of teachers and subject matter experts in building resources whether for sharing or commercial trading. Finally, the questions of intellectual property, economic copyright and the public good are unavoidable in these debates.

In terms of sustainability, a major development is the growing movement for open content, the argument for open content parallels open source. There are three key parts to this argument:

1. The first is that the present restrictive copyright system is morally and ethically wrong and that ideas cannot be treated as privately owned objects.
2. The second is that innovation and the development of new ideas and content is naturally a collaborative activity and that the open content model builds on the natural way in which content creators work.
3. The third argument is that present economic and social models for developing e-learning content are failing and that an open content model can overcome many of the existing problems in e-learning. (Attwell 2004b)

There are no easy answers. Policy makers may wish, however, to share more widely and transparently the specific outcomes, expected and unexpected market responses and impact

studies (of which more are needed) of any interventions regardless of philosophical position.

11.4 Costs of e-learning

Many reports point out that e-learning has been widely promoted as a cheap or cost effective answer to promoting lifelong learning, reducing workplace-training budgets, increasing the value of educational expenditure etc. At the same time, most researchers, and many consultants, are adamant that e-learning cannot be seen as a cheap solution. There may be economies of scale in the future, but even this is open to doubt. (HEFCE 2003; Attwell 2004; Leavis 2002)

There are two issues we consider worthy of further elaboration:

- The first issue is that we should not allow arguments that point out the absence of cost benefits to deflect us from looking for improvements in cost efficiencies in terms of development and delivery. There are almost no reports into the design, development and delivery processes in e-learning and where cost efficiencies might be made. This may reflect poor business skills among many suppliers in this sector, especially those in the education segments and understandable given the “cottage industry” characteristics of the majority of suppliers.

Efficiencies do not need to come at the expense of quality, and we believe European suppliers will soon face tough competition from suppliers in developing countries such as India and China operating in European markets and who are not only able to exploit their lower labour cost advantage but are also more focused on managing costs along their business processes.

- The second issue returns to the question of good quality and comprehensive evaluation. Thorough evaluation leads to improved knowledge of learner behaviours, learning outcomes, performance outcomes, business and policy impact and value for money including return on investment. The quality of evaluation in general across all segments is poor, too limited in scope, undertaken often too late and completed too early and the results insufficiently disseminated. There is a serious need to identify and measure impact, whether in terms of policy objectives, public good, or value for money spent and preferably all three as well as to provide formative feedback to improve impact potential.

11.5 Higher education and e-learning?

Why are HE institutions adopting e-learning in their provisions? In many cases, the objective is not specifically articulated. For some, it is to earn new or alternative revenues, gain efficiencies as well as explore new access opportunities and improve quality or a combination of all of these. Where learning technologies are being used in traded activities, the primary aim appears to be to generate new revenues or to reduce costs. The question is “are they able to generate revenues and more importantly avoid losses, either as technology providers (product and services sales), content providers (sales of courses), or service providers?” Few have access to investment to launch any significant new product or service, and the investment needed to absorb initial (which may mean a number of years) losses. Most successful providers that have emerged from universities have quickly

become separate entities with access to commercially driven investment (WebCT, Blackboard, Universitas 21).

“A further error was the assumption that the private sector will make significant investment in e-universities. There is little reason to see why they should regard e-universities as a better source for their funding than traditional institutions (especially given the difficulties of undertaking research projects through the Internet). Neither is there any reason to see why e-universities should be seen as generating higher incomes than traditional institutions. There have been no convincing total cost of ownership studies to support such a strategy.” (Attwell 2004b)

Attwell’s view is supported by a very detailed study into the costs of different models of delivery in the higher education sector in the UK (HEFCE 2003). This comprehensive study concludes that for the majority of higher education institutions, e-learning cannot and will not generate any real additional revenues with sufficient margins to make them worth any risk investment. This is not to argue there is no value in investing in e-learning, nor the importance of using learning technologies to extend access. It is, however, our belief that there are naive and over optimistic expectations that e-learning will be a potential source of new income for universities. Our conclusion suggests that the market for private online learning (paid for by workplace organisations or individuals) is very small in Europe and likely to remain so for the near future.

12. Conclusions

12.1 The “market”

- There is no European “e-learning market” but segments where e-learning is being applied and which maybe be loosely linked and may be serviced by suppliers covering more than one segment.
- Putting a value on the traded activities in these segments is a matter of estimates, which should be treated with great caution because of the absence of broader education and training ”market” data and more specific e-learning data.
- Collectively these segments amount to probably less than €5B of traded activity. This estimate is based on our analysis of existing data sources and discussions with suppliers. It is an estimate of the value of sales of e-learning technologies, content and services across all segments of education, training and workplace learning. This should not be confused with the GVA (Gross Value Added) of e-learning related activity, which we have not attempted to measure.
- There are no records of cross border e-learning trading within or into Europe in these segments.
- Traded activities in most segments are showing little growth and are largely stagnant after a period of significant decline in growth.
- The private workplace-learning segment has been hardest hit by the economic conditions in Europe over the last 2-3 years and would appear to show little signs of an immediate improvement.
- Buyers in private workplace learning are demanding evidence that e-learning investment can be measured in terms of business impact.
- Traded activity in the workplace learning segment (public and private sector workplaces) was unlikely to have been more than €3.5-€4B in value in 2003.
- Public sector investment in workplace learning is increasing including e-learning.
- There is no evidence of growth in net revenues in higher education through online learning.
- Higher education revenues from traded e-learning activities (revenues from privately or company funded courses) may not exceed much more than €150M.
- A slowdown in growth in the sales of commercial “platform” technologies to higher education is likely as it enters an early mainstream phase. If open source platforms become more developed and more widely accepted, this will further erode potential growth opportunities for commercial providers.

- The total value of traded activity into higher education (technologies, content and services) is probably less than €150M in Europe.
- VET adoption of e-learning remains very slow and traded activities into the VET segment probably worth less than half that of the HE sector.
- Schools continue to extend their use of learning technologies, but sustainable sources of finance for continuing purchases to meet computer/student ratios, upgrades and maintain equipment remain a major issue in every country.
- The market for traded “content” in schools remains very unclear. There are wide differences in policy and ideology and no one is very sure of the impact of various policies and funding interventions.
- Online assessment is growing, is influenced by policy and is stimulating growth in sales of services and technologies.

12.2 Suppliers

- Across all segments, the majority of suppliers are small, usually micro- businesses. They are often “lifestyle” businesses, have no cash reserves, are unlikely to grow and their ebb and flow mirrors that of most small and micro- businesses.
- Content suppliers are being increasingly defined by their subject/occupational/sectoral expertise.
- There are a very few large suppliers, comprised of a very few pure e-learning players, a number of others from the publishing sector, and some from the ICT sector serving the different segments. Some broadcasters are also e-learning players, but their activities cannot be described as traded as they are using public funds (e.g. BBC in the UK, and YLE in Finland). The large pure e-learning and ICT players are more likely to be operating multi-nationally.
- There are a small number of SMEs employing larger numbers (nearer medium sized) in most European markets, supplying technologies and content.
- Market leaders are survivors of a very turbulent few years. Being a market leader carries the message – “I can be relied on to be here to continue to supply customers in the future”.
- Suppliers in the workplace-learning segment are benefiting from large-scale public sector workplace reforms that have included investment in e-learning. However, these contracts are often more complex, involve more stakeholders and have longer lead times.
- The high levels of losses among large and high-growth suppliers in the past have been reduced after very serious reductions in costs. However, although the gap between revenues and costs is much narrower, there are few players showing real profitability.

- The focus on cost reduction has resulted in employee reductions and a cut in R&D and product development budgets.
- Some suppliers use low cost labour countries for part of their development and production capability. These include Asia but also some new Member States.
- Several years of loss accumulated has left many suppliers without cash reserves to be able to continue operations if there is no growth soon.
- There is likely to be further closures, some more consolidation, probably through attrition rather than mergers.
- There is little available investment and investment confidence is low.
- Suppliers have difficulties in finding employees with business development and customer facing skills.
- Suppliers seem to be looking more to Asia for sales opportunities rather than new the Member States and Eastern Europe. This may be because there is an expectation that greater volumes and economies of scale are likely in Asia.

12.3 Policies and public interventions

- There is no evidence that policies have helped to stimulate supply of traded services - with the possible exception of online testing/assessment services. This does not mean policies have had no impact, it does mean that there is no supporting evidence to link policies with supply stimulation.
- Public policies and funding instruments have stimulated demand for traded products and services mainly in schools although it is impossible to know how much this would have occurred anyway and how much has led to sustainable usage. In the case of e-learning credits in the UK, one funding instrument has been developed to counterbalance the impact of other public funding. As a great deal of public funding is not on a permanent or sustainable basis, the impact on growth in the supply side is not straightforward.
- Policies have helped to foster partnerships and build public private dialogue.
- Policies to encourage higher education to trade in online learning with the objective of generating new net revenues should be seriously re-examined. Poor quality procurement practices (in all sectors but especially in the public sector) are a barrier to growth and adoption.
- There is too little comprehensive and good quality evaluation of public policy objective impact or value for money in all segments.
- Although, there is evidence of much development work on a wide range of open source virtual learning environments and management systems, too few of these are actually having a real impact on the delivery of education and improvement of the learning process at HE institutions.

12.4 Overall

Finally, we believe the picture emerging for e-learning is not one where high volume commodity trading will generally occur. Rather, traded services in technologies, e-learning content and services in education, training and workplace learning will be built around customer relationships and higher end/high value products and knowledge services.

13. Recommendations

13.1 *Recommendations for policymakers*

- Both at national level (across ministries/departments) and European level (across DGs and between countries), a key recommendation is to continue to develop a coordinated vision and action with regards to e-learning infrastructure and development and to exchange experiences and good practices not just in relation to SMEs, but also in relation all aspects of the e-learning sector.
- Keep the “e” in e-learning! Although this is about learning, the “e” dimension is distinctive and we are only at the very early stages of building our understanding of how these technologies will be integrated into education and training systems, and how they may influence changes in those systems.
- Short term publicly funded projects are not likely to stimulate sustainable demand or supply. These types of projects should only be used to develop user “readiness” and good practices as well as to undertake robust policy related socio-economic research.
- Funding content development with public funds is questionable and much better evaluation is needed as to whether this really is the way to develop usage and create sustainable continuous streams of quality content.
- Further funding for the development of LMS and VLE, etc., should be seriously questioned. There are already hundreds of such tools available in Europe. However, we recommend that there is an argument in favour of using funding instruments to encourage the implementation of open source systems, which may lead to improved systems and stimulate the growth of a critical mass of implementers and users, especially in HE.
- There appears to be much greater growth in usage of learning technologies and related products and services than corresponding growth in sales from suppliers. We therefore recommend that research into the GVA of e-learning be the subject for further research.
- We urge policy makers and suppliers to invest in much more ongoing formative evaluation, comprehensive and in-depth impact including Return on Investment studies planned from the start of any e-learning project or implementation.
- We conclude that the various segments that make up the “e-learning sector” are not going to “take off” into high levels of growth in the immediate future. Therefore, we recommend that policymakers should not predicate other policies on the assumption that demand for e-learning products and services will grow either rapidly or much in the near future.
- Policymakers should continue to support skills development among users, not just teachers in the public systems and not just in pedagogical and IT competencies. The poor quality of procurement experienced by suppliers suggests there is a need for other competencies such as those required for project and change management, business skills, value chain and business process analysis etc. There is also a strong argument to

introduce more flexible instruments to support those in public education systems deploying and implementing open source systems – both to ensure they have the right skills and to fund the human resources needed in the educational institutions to carry out the development work needed for implementation.

- We also recommend that policy makers consider how public interventions could support skills development among suppliers. Particularly in areas such as the management of customer relationships, business skills, value chain and business process analysis, e-learning procurement - as well as pedagogical knowledge.
- Policymakers should consider how the public sector through its workplaces could provide demonstrable leadership in implementing learning technologies that lead to measurable improvements in learning and performance and achievement of public sector reform goals.
- We recommend that policymakers examine the availability and investment requirements of suppliers, especially those developing high risk, innovative products and services. We recommend that any review of the availability of investment looks beyond start up funds and covers the lengthy lead-time into profitability.
- We support Attwell's recommendations with regard to SMEs. We believe that SME adoption will not happen much at an individual company level and provision of e-learning products and services needs to be part of structured local/sectoral networks/business support structures. We consider that achieving a feasible supply and distribution chain here will require really sophisticated analysis and experimentation.
- Policymakers should support the improvement of public procurement in relation to the purchase of e-learning. This could be done through the definition of standard procedures and competence development for personnel responsible for sourcing e-learning products and services.
- Policymakers should promote e-learning use to professional associations. These have the potential scale, but lack knowledge and competence to exploit the opportunity.
- Generally, information about e-learning policies/initiatives is not well known amongst e-learning suppliers. While we acknowledge the important existence of ELIG, most suppliers are more likely to access information about e-learning policies and practices either through local business services sources, business and news journals and directly through the web. More needs to be done to engage directly with them.
- Policy makers supporting e-learning need to work more with curriculum and assessment bodies to encourage the adoption of technologies in mainstream education and occupational training.
- The Bologna and Copenhagen processes supporting credit transfer and portability of qualifications are extremely important, but need to go further so that the systems are flexible enough to allow learners to select from different institutions using different modes (e-learning, on campus learning, blended learning) to build their education and occupational qualifications.

13.2 Recommendations for suppliers

- We strongly urge suppliers to include comprehensive formative and impact evaluation as part of their product/service mix. Including high-quality formative and well as impact evaluation will help suppliers and their clients build in mechanisms to gather feedback to ensure objectives are being achieved and reinforce alignment, and it will help to gather robust and verifiable data to demonstrate impact and value.
- We strongly urge suppliers to adopt open standards and to work with European standards bodies and researchers to ensure interoperability.
- We recommend that higher education suppliers and users consider the full costs as well as benefits of open source including their role in contributing to better quality e-learning through the contributions of the higher education community to improved platforms through adoption development and implementation.
- We recommend that higher education suppliers make more effort to evaluate the real costs and benefits of developing and delivering commercial e-learning programmes and, where any public funds have been utilised, publish separate financial statements to allow public scrutiny of the value of these programmes.
- We recommend that information about suppliers from more developed markets in the old Member States of the EU and suppliers and developers in the new Member States (and candidate countries) be shared through some kind of “marketplace” where intelligence about market development, commercial partnerships and development opportunities can be exchanged.
- International suppliers and those working across different European countries need to build a better understanding of the different characteristics and processes operating in education, training and workforce development systems. Large suppliers are working with very large companies, and have sophisticated dissemination activities. There is therefore a tendency for much of the information about e-learning adoption and trends to be based on information from these large suppliers and users. This needs to be more clearly understood as these users, as is the case with most large firms, do not represent the characteristics of most SMEs, or many public sector organisations or for that matter, the majority of users in the education and vocational training systems.
- We recommend that networks of suppliers and/or suppliers’ representative groups consider how they can build the skills and competencies of employees especially in customer facing, business development and project management and consult with relevant education and training bodies to develop the high-quality skills needed.

14. Annexes

- 1 Contributors
- 2 References
- 3 Abbreviations
- 4 Previous reports within the study (enclosed separately):

Phase 1 Report: The e-learning industry and market in Europe. A general description of the current situation in the field under study

Phase 2 Report: Case studies summary, Work Package 2. 2003-3212/001-001 Edu
ELEARN

Phase 3 Report: Future analysis of the e-learning supply sector

Annex 1: List of Contributors

The researchers would like to extend their sincere thanks to all those who contributed to this study.

Those who helped define the questions we began by asking

Carlos Oliveira, DG InfoSoc, Luxembourg
Gary Bellamy, LloydsTSB, UK
Martyn Sloman, CIPD, UK
Kevin Oakes, SumTotal, USA
Kari Mikkela, Culminatum, Finland
Adrian Snook, Training Foundation, UK
Jean-Louis Michelet, Icus Pte, Singapore
Peter Buchanan, EDS, UK
Gerry White, educationau, Australia
Clark Aldrich, SimuLearn, Inc. USA
George Edwards, Canadian High Commission, London, UK
Curtis J. Bonk, Indiana University, UK
Svend Hansen, Courseware A/S, Denmark
Arie Leino, Nordea AB, Finland
Christian Ravn, MOCH, Denmark

Those who contributed to the national reports or provided feedback

Carlos Oliveira, DG InfoSoc
Carina Batista, INOFOR, Portugal
Fabrizio Cardinali, Giuntilabs, Italy
Kari Mikkela, Culminatum, Finland
Jaana Heikkila, Netikos, Finland
Aisling King, Enterprise Ireland
Michael Cantwell, Enterprise Ireland
Martin Good, CTAD, UK
Chris Webb, ERA, UK
Paddy Morgan, FAS, Ireland

Those who attended the Copenhagen workshop

Svend Hansen, Courseware, A/S (Denmark)
Jane Massy, Independent Consultant, (UK)
Jakob Rasmussen, Copenhagen Business School (Denmark)
Ola Badersten, Luvit, (Sweden)
Jonas Svava Iversen, Danish Technological Institute (Denmark)
Trine Pantan, Danish Technological Institute (Denmark)
John Bay Hansen, Zenaria A/S (Denmark)
Niels Andreasen, Denmark's Ministry of Technology, Development and Innovation,
National IT and Telecom Agency (Denmark)
Knud Erik Hilding-Hamann, Danish Technological Institute (Denmark)

Those who provided information on their organisation for the case studies

Organisation

Epic Plc,
Transware

Name and title

Donald Clark, CEO
Kieran McBrien, CEO
Alastair Kerr, VP Sales EMEA
Pat Greene, Business Relationship
Manager
Sudheer Koneru, Senior VP
International Operations
Suzana Lopes, Business Development
Director, EMEA
Ofer Tal, Regional Director
Ian Necus, Professional Services
Director, EMEA
Lorna Cocking, Education Director for
Pearson Education
Jane Sommers-Kelly, Director of
Company-Specific and Consortium
Programmes and Director, INSEAD
OnLine
Graeme Martin, Professor
Claes Magnusson, Chief Knowledge
Officer and co-founder
Katarzyna Derenda, Deputy Director of
Research and development
Piotr Mróz, Sales Marketing director
Marie-Christine Jené, General Manager
Fabrizio Cardinali, CEO
Matthias Kunkel, Project Manager
David Nordberg, New Business
Manager Marianne Hafner, Studio
Manager
Klas Mellander, Founder and Chief
Consultant

SumTotal Systems

Interwise UK
Promissor

Pearson Education UK

INSEAD

Edinburgh Business School
Academedi AB

Young Digital Poland

Itaca
Giunti Labs
University of Koeln (ILIAS)
Pan Vision

Celemi AB

Those who attended the supplier summit in Brussels

Company	Name
E-learning consultant	Jane Massy
Danish Technological Institute	Knud Erik Hilding-Hamann
Danish Technological Institute	Jonas Svava Iversen
Transware Plc	Julian Wragg
Transware Plc	Kieran McBrien
IBM Europe	Corinne Schulze
Promissor	Suzana Lopes
Training Foundation	Hywel Thomas
E-learning consultant	James Kigin
University of Reading	Keith D. Baker
IBM Europe	Fanuel Dewever
Norway Opening University	Dag Rune Ramstad
SumTotal Systems	Sarah Nesbitt
Tieturi Online Oy	Pia Erkinheimo-Mennander
IBM Europe	Craig Yetter
European Commission	Maruja Gutierrez-Diaz
Heriot Watt University	Graeme Martin
EPIC PLC	Donald Clark
Microsoft	Kimberly Voltero
Explo	Marc Devijver
European Commission	Brian Holmes
European Commission	Patricia De-Smet
European Commission	Salvatore-Pasqua Angilletta
European Commission	Kirsti Rye-Ramberg

Responses to the survey

The project conducted a web-survey and in total 143 people from suppliers and other relevant organisations responded to the survey.

Other commentators

Diana LAURILLARD, Department for Education and Skills, UK

David R Worlock, Electronic Publishing Services Ltd

Terry Jordan, General Manager and Belinda Hynes, Hyperwave UK

Annex 2: References

The references below refer to this final report. Other references are contained in the annexes of other reports from Phase, 1 2 & 3.

ACTEN 2004. Market Analysis of the 2002 E-Learning Industry. Brandon Hall 2002. Table reproduced in Nagy, Attila. e-Learning E-Content Report 6, an integrating report by ACTeN. (Anticipating Content Technology Need). Editor in charge: Zeger Karssen (Digital Dispatch)Published in a series of E-Content Reports by ACTeN (www.acten.net) June 2004. Downloaded September 2004.

ACTEN 2004. Comparative Estimates:Worldwide Corporate e-learning revenues 2000-2010. eMarketer 2003. Table reproduced in Nagy, Attila. e-Learning E-Content Report 6, an integrating report by ACTeN. (Anticipating Content Technology Need). Editor in charge: Zeger Karssen (Digital Dispatch)Published in a series of E-Content Reports by ACTeN (www.acten.net) June 2004. Downloaded September 2004.

Adkins 2003. Adkins, Sam S. SE#1 Centrifugal Force: the race for eLearning in the real time extended enterprise. Simulation in the Enterprise: the convergence of eLearning, Simulation and Enterprise Application suites. Published by Internet Time Group January 2003. http://www.internettime.com/Learning/enterprise/Overview_0803.pdf

Attwell 2004a Attwell, Graham. The challenge of e.learning in small enterprises. Issues for policy and practice in Europe.Cedefop Panorama series; 82. Luxembourg: Office for Official Publications of the European Communities, 2003

Attwell 2004b Attwell, Graham. E-Learning and Sustainability. Report for the University of Bremen as a contribution to The European Commission Socrates supported Lefo Learning folders project. 2004. Published under a Creative Commons licence. http://lefo.net/lefo_sustainability_graham.htm

Blackboard Prospectus 2004 REGISTRATION STATEMENT UNDER THE SECURITIES ACT OF 1933. BLACKBOARD INC. June 2004. <http://www.hoovers.com/free/co/secdoc.xhtml?ipage=2653855&doc=1%20> Downloaded May 2004.

Collis 2002. Collis, Betty and van der Wende, Marijk, Models of Technology and Change In Higher Education. An international comparative survey on the current and future use of ICT in Higher Education. CHEPS, NL 2002.)

Coppola, Chris (2004) Open Source opens learning, why open source makes sense for education, Rsmart Group <http://www.opensource summit.org/open-source-200408.pdf>

Deweever, Fanuel. IBM Belgium. Market opportunities for open source eLearning. 2004. Belgium Sent to EDU-Elearn Researchers, September 2004.

EITO 2004 European Information Technology Observatory. Frankfurt, Germany. 2004. www.eito.com

E-learning age. September 2004. Professionals to move online CPD. Report about market research carried out by the University of Edinburgh. www.elearningage.co.uk

Elearning Industry Group, Elig Response to eEurope 2005 Questionnaire, March 2004
<http://www.elig.org/Downloads/eLIG%20response%20to%20EU%20questionnaire.doc>
Downloaded September 2004.

Erik Kim, Eugene, Introduction to open source communities, Blue Oxen Associates, April 2003 <http://www.blueoxen.org/>

Financial Times, How playing power drives lessons home, 8. Sept 2004).

Flate Paulsen, Morten, 2004. Online Education Obituaries. In Online Education and Learning Management Systems. Global E- learning in a Scandinavian Perspective. <http://www.studymmentor.com/studymmentor/> Downloaded August 2004.

HEFCE 2003. The costs of alternative modes of delivery: A study for HEFCE by JM Consulting Ltd. August 2003. Downloaded September 2004.
<http://www.hefce.ac.uk/pubs/rdreports/2003/rd14%5F03/rd14%5F03main.doc>

JOIN project www.ossite.org

Markkula, Markku. 2004 eLearning in Finland. Enhancing Knowledge Based Society Development. Report of the One-Man-Committee appointed by the Ministry of Education. Prepared and approved by the Ministry of Education for the Education and Research Programme for the Information Society 2004-2006.
http://www.dipoli.hut.fi/europro/matkat/oeb2003/ws6/materials/oeb2003ws6_markkula.pdf 28.April, 2004

Martin and Doig 2004. Martin, Graeme and Doig, Rosalind. The Changing Technological Context, Human Resource Management and the CIPD's Research Agenda. A Review of Relevant Literature and Bibliographic References. Edinburgh Business School. Paper prepared for CIPD UK, 2004.

MLE Study 2004. Managed Learning Environment Activity in UK Further and Higher Education. A Supporting Study for the Joint Information Systems Committee (JISC) and the Universities and Colleges Information Systems Association (UCISA). Prepared by The Social Informatics Research Unit, University of Brighton. Education for Change Ltd The Research Partnership 2003 <http://www.mlestudy.ac.uk/>

OECD 2004 Understanding economic growth: Macro-level, industry-level and firm- level. London: Palgrave Macmillan

Observatory July 2004. What's the Difference? Indelta and UkeU/Sun Microsystems LMS fall while Blackboard boasts early IPO success. The Observatory on borderless higher education Breaking News Article 1st July 2004. www.obhe.ac.uk Downloaded July 2004.

Open Source Institute, Open source definition version 1.9,
<http://www.opensource.org/docs/definition.php>, last visited 24 September 2004.

Predictions for 2004, eLearn Magazine, Driscoll, IBM Global Services and others
<http://www.ladlass.com/archives/001799.html>

Schadler Ted et al., The Linux Tipping Point, Forrester Research, March 2003

SRI 2003, Learning-on-Demand European Meeting Summary, Enterprise Ireland, Dublin, Ireland, 15 October 2003, Meeting Summary, <http://www.sric-bi.com/LoD/meetings/2003-10-15.shtml>

Training Magazine 2003. The State of the E-Learning Market. Training Magazine. Marc Hequet. Sept 18 2003
www.trainingmag.com/training/reports_analysis/feature_display.jsp?vnu
2003 eMarketer, Inc

Wichmann, Thorsten , “Free/Libre Open Source Software: Survey and Study”, Berlecon Research GmbH ,Berlin, Germany, June 2002. Downloaded August 2004.
<http://www.infonomics.nl/FLOSS/report/>

Annex 3: Abbreviations

DG	Directorate General
EU	European Union
EITO	European Information Technology Observatory
ELIG	The e-Learning Industry Group
HE	Higher Education
ICT	Information and Communication Technologies
IST	Information Society Technologies
IEEE	Institute of Electrical and Electronics Engineers
IMS	Instructional Management Systems
ISDN	Integrated Services Digital Network
IT	Information technology
LMS	Learning Management System
LOM	Learning Objects Metadata
LCMS	Learning Content Management System
MLE	Managed Learning Environment
PDA	Personal Digital Assistant
SCORM	Sharable Content Object Reference Model
SME	Small and Medium Sized Enterprise
SRI	Stanford Research Institute
VET	Vocational Education and Training
VLE	Virtual Learning Environment