



European Software Industry: looking for a competitive advantage
European Software Association

EXECUTIVE SUMMARY

The European Software Industry: A Driver of Economic Growth

Information Technology (IT) is one of the key drivers of growth in Europe's increasingly post-industrial, service-based economy. Across the EU, the IT industry employs 7.8 million people and is projected to add another million jobs by 2011. Within this industry, the software sector is growing at an even faster rate: analyst firm IDC forecasts 8.0% CAGR between 2006 and 2011.

Not only is the software industry fueling its own growth, it is also supporting growth across other industry sectors by supplying technologies that enable organizations to conduct better, more efficient and more profitable business. Additionally, it is contributing to social improvements by developing technologies for more effective government, transport, communications, healthcare, public safety, social care and environmental cleanliness.

The software industry is also a major powerhouse of innovation – an aspect that will become increasingly important to sustainable economic growth as Europe faces fierce competition from other powerful economies.

For these reasons, the European software industry must be encouraged to grow if the objectives set out in the Lisbon Agenda are to be met. While applauding the outstanding progress made by the EU towards achieving these objectives, this paper highlights some ongoing barriers to growth and recommends some potential solutions. It also lists many opportunities for innovation in the software arena, and calls for investment in R&D to help European providers to take the lead in these new areas.

Barriers to Growth

Speed of Change

One of the most significant challenges facing the software industry is the disparity between the pace of change of technology and the ability of regulators, policymakers and standards bodies to keep up.

This paper sets out a number of examples of current trends in the software industry that are rendering some existing standards and regulations invalid or inadequate. They include the proliferation of different computing devices; the emergence of advertising-funded software that is free to the user; the increasing volume of user-generated content; and the shifting definition of what constitutes a software provider.

The paper seeks to bring these trends to the attention of policymakers and to urge them to review current approaches to industry regulation and intellectual property protection accordingly.

Skills Shortages

There is a serious and worsening IT skills shortage throughout Europe and at all levels of IT use – from consumers and business users through to software engineers. This shortage is compromising Europe's growth in several ways. For example, it prevents large sections of the population from participating in the e-economy; it makes the European workforce less attractive to companies seeking to base operations in the region; it inhibits the uptake of new technologies by European organizations, and it is threatening to slow down the rate of the region's technological innovation and development.

This paper explains the risks, outlines how the software industry is attempting to alleviate the problem, and calls for greater investment in IT skills at EU level. Recommendations include greater co-operation between government, industry and academia to deliver lifelong IT learning; the introduction of a pan-European IT skills certificate; and the pushing through of the proposed EU Blue Card initiative which would enable highly skilled workers from non-EU countries to join the EU workforce more easily.

Barriers to Cross-Border Business

While the creation of the single market has greatly improved the ability to conduct business across borders within the EU, there are still significant impediments to geographical expansion. These include the complexity of the various VAT and financial reporting regimes in operation across the region; the existence of different standards and regulations in different countries; and variations in employment law between different countries.

Small and mid-sized enterprises (SMEs) find these complexities particularly challenging. The paper calls on policymakers to do more to help SMEs to navigate these geographical differences. As SMEs account for some 99% of European businesses – and the software sector is no exception – helping them to grow and expand into new markets can only have a positive effect on the region’s overall economy.

Encouraging SMEs

Software-industry SMEs can make stronger contributions to economic growth in other ways as well. In particular, the paper calls upon policymakers to do more to help talented European software engineers to start their own businesses, for example by investing in business and management training for technical innovators. It also urges policymakers to revise the current structure for public procurement projects to enable SMEs to participate more easily in the tendering process.

Opportunities for Innovation

The paper concludes by examining the many opportunities for growth and innovation currently open to European software providers. It is an exciting time for the software industry, with many advancements currently in development that promise to transform the way Europeans live, work and compete economically.

The paper seeks to bring these opportunities to the attention of policymakers and to urge them to invest in R&D to allow them to come to fruition. It also calls for greater co-operation between governments, academia and business to ensure that technological advancements do not remain in the ‘ivory tower’ of academic and research institutions, but are developed and applied for the benefit of the region’s citizens, businesses, organizations and overall economy.

INTRODUCTION

The European software industry is a significant contributor to the European economy and a key driver of innovative change on the continent. Total IT employment today stands at 7.8 million and the sector contributes 25% of the growth of European economy. And we are not standing still – this is an area that is growing and growing fast. According to the recent IDC study, the sector has generated almost 670,000 new jobs in the period 2002 to 2006 and it is projected to add over 1 million additional jobs in the EU between 2006 and 2011. If we narrow this down further, we see that the growth in the software sector alone was even faster (6.2% CAGR in the period 2002-2006 and an expected 8.0% in the period 2006-2011), which is important as software spending typically results in greater economic multipliers and job opportunities to other parts of the IT sector

However, the region is economically, socially and geographically diverse and the levels of investment and growth in this particular sector are equally varied. Despite the fact that we have already celebrated the Single Market's 20th birthday, the software sector in Europe still faces many challenges, as SMEs, which constitute the large majority of this industry, try to navigate 27 countries with disparate rules and regulations.

This can often place them at a significant disadvantage in comparison to their competitors in China and the US, especially in the crucial early stage of growth. A large single domestic market can assist businesses grow to critical mass before having to break out of the home market and face the complexities of trading on an international basis. When combined with the associated costs of translation and localization, one of the reasons behind the small numbers of successful global European software companies becomes apparent. At the same time very few individuals are immigrating to Europe and starting new businesses here, which means that Europe is losing out on the Intels, Solectrons, Suns, Yahoos and Googles of the future, which were all created by immigrants.

The European Software Association recognizes that it cannot change the fabric of Europe and we have not set out to do so. However, we are passionate about influencing and informing policy makers about small things that could make a world of difference to small and medium sized businesses across the continent. It is now, in the period of profound change in how the software industry functions that regulators need to act and give the European entrepreneurs a helping hand. Europe needs a thriving software industry to reach its goals of knowledge economy, jobs and growth. This paper presents some examples on how to make that goal more attainable.

RECENT TRENDS IN THE SOFTWARE INDUSTRY

The software industry has rarely been in such a period of deep and speedy change. New technologies and business models with mass appeal are being introduced to the market almost on a daily basis. Software has reached a critical mass and has become ubiquitous in many aspects of 21st century life. As a result the driving force of consumer demand will continue to push this sector to reach new horizons for some time to come.

New technologies however also bring with them new ways of doing business and this can occasionally make existing regulation or incentives obsolete. Some of the major trends that the industry, consumers and policy makers need to adapt to and embrace are:

- § **Emerging diversity of devices:** The devices available are ever more diverse and that together with the ubiquity of technology means that consumers increasingly expect all devices, and in particular the mobile phones, to be an integral part of a total solution. They also look for intuitive applications that are easy to use, which includes new communication and new visualization paradigms.
- § **Increasing variety of communication and computing models:** The emerging diversity of devices will encourage an explosion in the variety of computing and communication models trying to make the devices work together better; software will be required to both run the device and “the cloud”. As a result, consumer preference will largely determine the choice of software, which will at the same time have to be able to seamlessly integrate with other solutions.
- § **Combinations of software and device:** We cannot yet foresee the complete range of emerging devices and communication and computing models, as each innovation will further accelerate the development process. We can however be certain that there will be a large variety of offerings available: some will include services, offline software, mobile devices or large servers; each combination creating unique offerings for the user.
- § **Separation of user and payer:** Advertising-funded software and services represent a radical departure from the traditional models, where the user directly pays for the software. The introduction of funding by advertisers has had a profound effect on the expectations of consumers and on the economics of software/services development. Revenue becomes a function of size and accuracy of segmentation of user audience rather than function of value brought to user and the consumer expect at least part of the service to be free of charge.
- § **Continued and reinforced specialization:** Software produced is expected to be of higher and higher relevance to the buyer, even if they aren’t looking for custom built systems. This is largely a result of a search for competitive advantage between the vendors, but also greater awareness of consumer of what software is capable of doing.
- § **Growing importance of user-generated content and involvement:** Users increasingly have the opportunity to act rather than just be spectators, creating content with creative tools and devices, and sharing it over the web. Combined with specialization this trend further blurs the line between software and content providers and opens up a whole host of new opportunities and issues for the market, such as content ownership and rights and quality of user-generated information.
- § **Broader reach and use of embedded systems:** The number and variety of computing and specific-purpose devices is on the increase, and with it the perception on how

software should look like and be applied. The opportunity to create new services that connect the various pieces of the ICT infrastructure be it in the manufacturing process or consumer offering, combined with an ever greater set of open standards, which allow for greater competition, drive a broader usage of solutions and embedded systems.

Certain industry sectors that were traditionally hardware focussed are looking to software for both differentiation and improvement in margins. Examples include Medical devices and Telecommunication systems. These organisations not only develop software that is embedded in their devices but also develop standalone applications and some have very large software businesses that are growing quickly.

- § **Changing definition of the software provider:** All the trends mentioned above have caused a shift in the perception of what constitutes a software company. Greater emphasis is being put on software content, resulting in increased investment in the creation of intellectual property for reusable software. Software licensing as a business model is therefore becoming a way to make a living for many more companies, outside the “sector”. For instance, a bank that may have invested large amounts in its internet banking solution only differs from a traditional software vendor through means of payment and distribution.
- § **Increased rate of merger and acquisition activity in the industry:** many European software businesses are being acquired as they grow and mature some by other European based businesses and some by US based businesses. In this respect the European industry is reflecting trends towards consolidation. This does provide a means of expansion / exit / growth in a maturing market. The reality is that the European industry operates in many respects in a global market.

All the trends described above have been incredibly beneficial to the industry as a whole, as they have acted as accelerators to increased quality of service and reduced cost and thus greater user and customer satisfaction. However, the broader definition of the software provider and the introduction of new software models have a profound effect on the way companies function. Changing a business model will have effects on the revenue numbers, including on how revenue is recognized, and will thus also impact funding availability and taxes, not to mention cash flow and capital investments. When addressing core industry issues like access to competence, innovation or recognition of intellectual property this shift must be taken into account. The rest of the paper will try to highlight ways for policy makers to respond to this change.

CREATING A STUITABLE LANDSCAPE FOR A FUTURE EUROPEAN SOFTWARE INDUSTRY

Creating a knowledge economy at all levels of society: permeation of eSkills

Information society already plays a large role in the lives of many Europeans. E-skills have become critical in enabling people to find and retain jobs in Europe. A recent study conducted by the IDC looked at 10 EU Member States, and confirmed that e-skills not only improve the chances of employment, but also those of job quality. The ICT sector and all related skills are indeed also one of the key assets enabling Europe to compete globally. However, we are still far from an inclusive information society and many Europeans are being left behind, to a great detriment of our economy. In Germany alone the skills shortage is costing the economy up to €20bn a year, or 1% of GDP, according to a study recently commissioned by the German Economics Ministry.

At the same time, fierce competition is putting more and more high-skilled jobs in Europe at risk. According to the OECD, 20% of total European employment could be replaced by ICT-enabled off shoring. This section explores some of the problems and possible solutions in how to ensure e-skills come to Europeans as naturally as breathing.

Low levels of e-skills throughout the society

Eurostat estimates that 37% of European citizens have no computer skills. In the 21st century, this is a shocking figure for one of the most developed economies. We therefore welcome that the European Commission has recently tabled an action plan on ICT skills. The Commission's communication focuses on four key areas, notably on motivating and empowering future generations with e-skills, promoting ICT practitioner education and training, boosting the employability of the workforce with ICT user skills and providing foresight and support for future skills needed in the changing environment.

We also applaud the European Commission for recognizing the persistent problem of digital illiteracy in both the Communication, but also through its monitoring and research. We agree that the ambitious goal of digital literacy will not happen by itself. Europe needs a long term inclusion strategy to avoid the risk of marginalizing 30-50% of European population and the Communication represents an important step in the right direction. In this respect we would especially like to single out the call to bring the industry-based and formal education closer together. If we want e-skills to be disseminated throughout the population, we need to pursue more flexible approaches to learning, bridging the different interests of civil society, industry and government in order to achieve a common goal. One such example could be the development of an EU-wide certificate for ICT skills, similar to those in accountancy – a CPA, or in architecture. This would facilitate cross-border mobility of workers already in the EU. Another point to note is the demographic challenge that Europe is facing. Not only must we consider the challenge of including the elderly in the information society through lifelong learning initiatives, we need to face the problem of an ever dwindling generation of entry level professionals.

Shortage of skilled professionals

More specifically the European Software Industry now faces a significant shortage of highly skilled IT workers, which will in the long term lead to competitiveness and productivity problems for Europe. This issue has severely plagued both industry and government institutions over the last few years and the situation is expected to deteriorate further. An

IDC White Paper¹ on the topic shows that 75% of the respondents in a survey across 10 European countries believe that the level of ICT skills of their employees will influence the competitiveness of their organizations, its ability to innovate and its ability to grow. This is a critical situation and indicates that outside the basic ICT skills European organizations may be held back by a lack of ICT skills, particularly in the areas of Advanced IT skills (use of common software tools and specialized tools supporting business functions) and eBusiness skills (ability to exploit ICT and notably Internet to ensure efficient and effective performance different types of organizations and explore possibilities from conducting business and organizational processes in different and new ways). If Europe is serious about creating a knowledge based economy, we need to significantly increase the number of our skilled workers in order to both build and energize it.

To keep up with their competitors from America and from Asia, European software companies have to apply best software engineering practices. However, there is a significant lack of appropriately educated software engineers. Furthermore, software engineering knowledge evolves in shorter and shorter cycles. That is, the knowledge of most currently employed software engineers, who received their education 10-15 years ago, is outdated. All in all, there is a great demand on innovative software engineering knowledge.

The shortage of skilled software engineers can be remedied if the following three issues are tackled:

- § Ensuring that the current software engineers working in the software industry are up-to-date with the latest software/technology developments. In other words continuous training for the current workforce.
- § That the software industry creates a more positive image for itself. Whereas the IT industry as a whole had a very 'fresh' image in the past- it is currently viewed as a boring sector. The perception, amongst the younger generations in Europe of the skill base needed to work in the software industry is that a high technical know-how is needed whilst in actual fact a much broader skill base is needed. . The number of IT graduates has dropped considerably, especially in the software sector where the drop in software engineering students has dropped dramatically in the UK the number of software engineering student has dropped by 60% in the past 5 years². It is indeed necessary that private-public partnerships raise awareness of the opportunities that the industry provides.
- § The European software industry should become an attractive job haven for software engineers from abroad.

Some of our members are already working closely with other stakeholders to deliver better results in these areas. We recognize the pivotal role of the Career Portal and the European Qualification Framework in this respect, as they have done much to encourage effective training and employment of e-skills practitioners. We would therefore like to express our approval of the Commission's impetus on these initiatives and encourage further involvement by the industry in advancing and developing these activates further.

To highlight some examples of the efforts of the private sector in this regard companies like Oracle and Microsoft offer programs, which provide infrastructure, curricula, software resources, and professional development for teachers and students in order to develop top talent in Europe. For instance, the Oracle Academy partners with 980 institutions,

¹ WHITE PAPER: "e-Skills – The Key to Employment and Inclusion in Europe", IDC Whitepaper, January 2007

² <http://www.vnunet.com/vnunet/news/2159726/20bn-risk-uk-skills-shortage>

supporting 108,000 students in 22 of the EU Member States yearly. Similarly, Microsoft's IT Academy program has to date supported more than half a million of students in Europe with training for both students and teacher. Additionally, the company's Partners in Learning program targets primary and secondary schools and has reached more than 53 million students worldwide to date. The SAP University Alliances program supports almost 800 universities in developing the business and IT talent required for tomorrow's 21st century workforce. In 2007, the program established its presence in Eastern Europe with three educational institutes in Bulgaria and two universities in Romania becoming members. The international education program FIRST LEGO League is SAP's major volunteering initiative with SAP employees inspiring children and young people to get excited by science and technology. In 2007, more than 200 employees coached about 1,000 children in 28 countries on the topic of "Power Puzzle. Energy Resources – Meeting the Global Demand."

The main reasons behind many R&D intensive industries remaining in Europe are the skilled workforce, particular expertise and strong partners. Oracle has for instance recently opened a new an International Consulting Services Centre (Near Shore Centre) at Andalucía's Technological Park in Spain. Similarly, Microsoft has over the past ten years opened innovation centers and R&D labs across Europe and placed production facilities in countries such as Ireland and Denmark.

Mobility of skill workers

The final challenge, and at the same time an opportunity, in this space is the fact that skilled workers are becoming increasingly mobile - changes in the work model with an increasing number of dispersed offices and project engagements rather than long term employment, and the willingness of graduates to follow a career abroad have had a significant impact on employers. This trend has been reflected in off-shoring, but not just outside the European Union, but also within.

The European Software Association believes that the development of ICT skills in the EU should be complemented by a strategic immigration policy targeting highly qualified workers. The EU currently is singularly unsuccessful in attracting skilled immigrants when compared to countries like Switzerland, Canada, Australia or the United States. Strictly national approaches to immigration have been proved inadequate when addressing the needs of the software sector. For instance, European software vendors often provide support and services to their customers on a pan-European basis. A client may be based in one EU Member State, but deploy a major software application in numerous subsidiaries across the European Union. Currently, cumbersome work and residency permit requirements impede and sometimes even prevent software vendors to employ third country nationals on pan-European projects, resulting in lower levels of service to customers and lost opportunities for the providers.

We therefore welcome the European Commission's proposal for a Council Directive on the conditions of entry and residence of third-country nationals for the purposes of highly qualified employment, the so called Blue Card, as a positive development. The Blue Card work permit system will help us attract the talent we need and also address problems such as the one outlined above by permitting, after an initial two year period, third country nationals to work across the 27 Member States and not be restricted to work opportunities in the one Member State, which initially grants the work permit.

Recommendations:

- § Development of skills through lifelong learning initiatives as a result of joint industry, civil society and government action
- § Continuation of initiatives such as the E-skills Industry Leadership Board (ILB), a coalition of 14 industry leaders, which announced in June 2007. The ILB is cooperating closely with the European Commission to ensure that every European is equipped for the challenges of today's labor market and has the ability to use information technologies.
- § Making Europe more attractive for third country highly skilled immigrants via the EU Blue Card Proposals

CREATING A CONDUCTIVE REGULATORY FRAMEWORK IN EUROPE

In a world where physical proximity means little, it is pivotal that the software industry can operate in a strong e-market. Technology has created a situation where jobs can be taken or given and revenue can be created without any physical entities entering the market. At the same time, the speed of innovation in this sector means it is difficult for regulators to keep up with the new technologies entering their domain. An internal market for goods, labor, capital and services is therefore often not sufficient when it comes to the software industry.

Governments can play a crucial role not only in supporting growth in the software economy, but also in establishing clear rules in which the players operate. However, due to the nature of the software industry legislation is often not the best form of regulation. The speed of development in this sector makes it crucial for regulators think out of the box and adopt new regulative processes that are flexible and encourage growth as well as prevent abuse. Whereas a legislative framework can provide the overall guidance on how the industry should behave, it is essential that overregulation does not end up hindering and limiting the growth potential of such a dynamic industry.

The section below gives an overview of the key areas which the Association thinks European policy makers should be aware of and where a crucial difference can be made for thousands of small business across Europe, helping them grow, innovate and realize their potential.

Encouraging SMEs

Small and medium-sized enterprises are considered the backbone of the European economy, providing jobs for millions of European citizens and the basis for economic innovation. However, this might not be the most favorable situation for Europe: SMEs are more often than not dependent on large companies, which when it comes to the software industry, are largely headquartered outside Europe. We therefore need to encourage them to grow into successful multinationals.

However, conditions for SMEs and start-up companies are not as favorable in the EU as they are in the US and entrepreneurial initiative and risk-taking are less developed. A 2002 Eurobarometer survey found that EU citizens are less inclined to become entrepreneurs, and more risk-averse than their American counterparts. Once a new company has been created, it also tends to grow at a slower rate than in the US.

The reason why fostering entrepreneurship amongst software professionals is so important is because this is an area where creativity usually stems from an individual's effort. In recent years it has been evident over and over again that the creative thought often does take place in Europe but when it comes to 'creating a business' many creators decide to sell their creativity to large (usually multi-national) companies. Europe needs to capitalize more on the wealth of creativity that its software professional have. There is a need to include entrepreneurship skills in the educational packages of our upcoming software engineers. Furthermore, here is a need to encourage the creatives to risk setting up their own businesses and thus to encourage the growth and consolidation of a strong European software industry.

A report from Library House in 2007³ on venture capital, innovation and IT also suggest that not only does Europe lag the US in terms of commitment to IT innovation, but India and China are rapidly catching up.

³ REPORT: "Venture Capital, Innovation and IT; Driving forward the knowledge based economy", Library House June 2007

The Commission has made significant inroads to address this challenge with its “think small first principle” launched in 2005. It has made real efforts to cut red tape for SMEs and has increased the SME focus within major EU spending programs for the period 2007-2013. Member States have also substantially improved the SMEs’ environment and progressed in their implementation of the 2006 Spring European Council conclusions, e.g. by introducing one-stop shops for company registration and reducing the time and costs required to do so. Despite these significant improvements, in its Communication to the October 2007 Meeting of Heads of State and Government: "The European Interest: Succeeding in the age of globalization" the Commission underlined the need to fully unlock the growth and jobs potential of SMEs and make full use of their innovative capacities. We agree that much more has to be done and await the Small Business Act for Europe, which will look at market access, skills, access to public procurement, encouraging a knowledge based economy and the environment, with great anticipation.

Recommendations:

- § Development of entrepreneurial skills in Europe by a continuation of the efforts the Commission has already begun in this area
- § Continue to stress the importance of SME access to public procurement while upholding the principles of technology neutrality
- § The Commission should encourage Member States to review their processes to make public procurement accessible to SMEs.

Public Procurement Policies

Today it is widely acknowledged that Information and Communication Technologies (ICT) - and in particular modern software solutions - are essential to enhance the cost efficiency as well as the quality of public services. In turn, public sector investments in technology will reduce administrative burden for businesses and citizens and will significantly contribute to European growth and competitiveness.

Unfortunately, public administrations in the EU do not yet fully exploit the potential of ICT. Member States investment in eGovernment is not sufficient and cross-border eGovernment services are still the exception. A truly internal market for eGovernment applications does not exist.

The public sector accounts for over 40% of European GDP. Therefore significant and EU wide coordinated investment in eGovernment would not only enhance public services in Europe but also create tremendous market opportunities for European software vendors. In particular the role of public administrations as an “early buyer” could create a breakthrough for new innovative solutions on the market. Against this background the European Software Association welcomes various EU initiatives such as the i2010 eGovernment Action Plan, the Ministerial Declarations on eGovernment.

But not only the public sector investment, also the public procurement policies affect the European ICT market. The large majority of public procurement contracts, which are of interest for ICT SMEs, fall under national procurement legislation, while public procurement contracts for the European institutions account for approximately 16% of all public procurement. This has enormous macro economic implications, and strongly impacts the ICT industry and wider business stakeholders.

The general practice at a national or European level is that governments set their own public procurement policy, which often expresses a preference of one software model over another. However, it is often not noted that the decisions governments make impact the choices other organizations that work with them follow. The European Software Association believes that such activities inhibit the ability of software companies to compete on a level playing field. Providing that software is creative, competitively priced and licensed on a valid model it should be equally considered irrespective of its development methodology. The Association believes that there are many successful models to building, selling and deploying software and encourages governments to follow technology neutrality in their considerations:

- § Software is equally valid whether built in open source, closed source or hybrid models. Regardless of the development model, interoperability achieved at the technical and semantic levels, through commercial arrangements and/or through implementation of open standards where they exist. This should be done with the overall objective to promote: competition, vendor choice and adaptability to evolution in technologies and user needs. Functionality, security, reliability and price are also important factors. Consumers should be allowed to select which model works for them.
- § Deployment models including self-hosted, hosted, Software and Services or pure Software as a Service are all valid. Consumers should be given open choice on how they wish to consume software in order to increase the size of the market.

Where historically we have seen this in the open source vs. closed source debate, we predict that the same prejudice may occur in the self-hosted to service based delivery mechanisms. Europe should do everything it can to prevent such a wasteful debate, since the delivery method should be a matter of choice and not a mandate.

Furthermore, public procurement projects are often not a feasible option for SMEs due to the fact that public institutions are very slow in deciding and paying for particular services. SMEs cannot endure the costs of these extended processes. Additionally, the size of public tenders tends to be prohibitive, as SMEs, especially in their start up process, do not have the resources to compete with big players. This is amplified by the fact that only 78% of the successful enterprises in the European procurement process are SMEs, while in face they constitute 99.8% of the enterprise population. Public procurement is therefore a large unexploited area where governments could encourage domestic ICT production.

Recommendations:

- § Member States should effectively use the different provisions included in the European Public Procurement Directives to promote SMEs' access to public procurement and work on best practice exchange
- § A substantial increase in investment in e-Government.
- § A debate should be encouraged at a European level to examine the benefits of an act promoting the use of smaller subcontractors, allowing SMEs to work on government contracts.
- § To allow public procurement to encourage and foster ICT SMEs in Europe it is essential that Member States look into possibilities of making smaller projects needed by public institutions available to SMEs without a complex process of call for tenders. It is also

essential that public institutions look into methods to speed-up their decision-making and payment processes.

Standardization

Standardization plays a crucial role in the development of the software industry, as it is a key element for innovation and interoperability. However, due to the rapid evolution of the industry, many standardization developments have occurred outside the process of the official standardization bodies and have led to the rise of de facto standards and of non-formal standardization organizations. At the same time, the official standardization bodies have made considerable efforts to adapt to the pace required for the making of standards in the ICT industry. Over time, this has led to a fragmentation and a need for an in-depth reflection on the coherence and efficiency of the entire landscape.

For the software industry, standards have to respect three major principles: their initiation and drafting have to be market-led, their acceptance and usage have to be voluntary and flexible and the development process should be open and transparent, allowing for implementation in a range of competitive products to ensure consumer choice. Moreover, given the international character of the industry, it is important for Europe to focus its efforts on benefiting and influencing the development of international standards, rather than on promoting European standards once they have been adopted. This should also apply to the reference of standards in public procurement.

The software industry, notably via the European Software Association, has been involved with this reflection work carried out by the European Commission, most recently the “EU study on the specific policy needs for ICT standardization” of July 2007, and “The Way Forward” document prepared in view to the Open Meeting of February 2008, and have participated in the activities of the ICT Standardization Steering Committee. This work has led to a broad conclusion that the European standardization system needs improvements rather than a fundamental reform.

Recommendations:

- § The Commission should engage in an upfront consultation prior to the issuing of a mandate
- § The Commission should consider the possibility for informal standards to be directly referenced in EU policies (provided that certain criteria are met).
- § Continuing dialogue should take place between standards bodies, governments, industry and users in the EC Steering Committee or a multi stakeholder platform.
- § An evaluation of IPR policies currently used in the standardization process, not exclusively focusing on problems, should take place
- § The dialogue between the different standards bodies, governments, industry and users should continue to achieve a better understanding of the definition of an open standard.
- § Further participation of SMEs and their industry associations in the standardization processes should be encouraged

Intellectual Property Rights

Innovation is the driving force for the creation of jobs and growth and intellectual property rights are an essential requirement for ISVs to be able to invest into innovation and attract venture capital. Over the last decade, this has become even more apparent, as technological developments have made piracy and patent infringements easier. At the same time IT has become a part of the critical infrastructure of companies, governmental institutions and society at large. In this new environment, companies need to be able to choose from a portfolio of intellectual property rights, to ensure that their rights of the creator are protected from illegal and illegitimate copying.

The European Software Association believes that those who innovate and invest deserve the right to protect their creation, if they choose to and in the way they choose to. The method picked to develop, protect and release innovations will vary with the type of software, the investment made in developing it, its usage and the business model adopted. The variety of intellectual property protection models is beneficial to the software ecosystem as different rights protect different elements of software:

- § patents: the technical solution implemented in the program, if it is novel and inventive
- § copyright: the program as a form of expression - used as a tool against piracy or in combination with open licensing models
- § trade secrets: the valuable and confidential information contained in the program.
- § trademarks: used to protect various distinctive signs used for the marketing of products.

The Association believes that a more efficient and consistent European IPR framework, especially when it comes to patents, would contribute to the growing European software industry and is in fact it its best interest. The complexity of the system has to be significantly reduced, as SMEs do not have the expertise to navigate the legal battles needed to be granted a patent across the whole of EU or cannot afford to. As a result they often choose to patent the innovations in their products elsewhere (e.g. the US) where the cost of patent protection is much lower, or they choose not to patent at all.

We also believe that the industry and policy makers need to work together in order to preserve the high quality of patents Europe enjoys today. Therefore, we plead for further improvements in the processes for granting patents either within the existing legal framework or through more efficient and better administrative processes (better case allocation, easier access to opposition, reduced delays in decisions on oppositions, etc.).

Recommendations for a European IPR framework:

- § ISVs should be allowed to choose the IPR protection systems most appropriate to their business model.
- § Patentability should continue to be limited to technical solutions and should not be expanded to include business methods.
- § While the London Agreement is a first step, the costs of patents, and in particular the translations costs, should be reduced further.
- § Incentives should be available to encourage SMEs to apply for European patents.
- § The adoption of a Community Patent granted by one central authority and subject to the same rules throughout the EC is to be encouraged so long as the costs of obtaining,

maintaining and translating such patents is affordable to all patent holders including SMEs.

- § There is a need for a new, specialized European Court system for patent validity and patent infringement cases which would develop a uniform interpretation of patent issues and replace the diverging national case laws.

Furthering the Single Market

Some of the barriers that software companies face in trading across multiple countries are common across all industries. The costs of supporting all the requirements of the different legislations across the 27 EU Member States increases the costs of development and the price of the end product - in the software sector more than in most others. This is because software companies also develop applications that support the business processes of organizations that function cross nationally and must understand not only their own, but also their clients' needs. The European Software Association realizes that harmonization of legislation in certain areas is difficult to achieve, however we recommend that policy makers look into the following areas, where great savings for SMEs could be made:

§ *Tax and Investment Benefits*

Across the Member States, there are various initiatives to encourage R&D in this sector. The schemes are not harmonized in across Member States, but more importantly there is no central repository of investment benefits, where developers could explore the options available to them. The Association believes that a study should be undertaken to create such a repository and then promote the most effective schemes across the EU.

Every Member State also has different rules for the calculation and reporting of VAT. Whilst we recognize that harmonizing the rates would be impossible, a single method of reporting VAT to governments should be investigated. For example, Belgium has around twenty-two rates of VAT vs. the UK's five. The number of rates is less important than the fact that Belgium VAT returns require a different form of analysis than the UK's five. So not only must a business understand the different rates and how to calculate them, but also how to produce the tax returns in both countries.

Recommendation:

- § We propose that in the short term this problem is addressed by resources being made available to educate SMEs on the rules of each Member State they operate in, and in the long term look into harmonizing the reporting format.

§ *Fiscal Reporting*

Despite the introduction of IFRS, each Member State still requires its own format of financial reporting. Therefore businesses present in several Member States have to understand the reporting formats and prepare different statutory reports for each country. This increases both internal and external costs for the company.

Recommendation:

- § We propose that in the short term this problem is addressed by resources being made available to educate SMEs on the rules of each Member State they operate in, and in the long term look into harmonizing the reporting format.

§ *Electronic Invoicing*

An area that is easily addressed and could be of particular advantage to SMEs is electronic invoicing. The variety of electronic formats is increasing rapidly and SMEs are often forced to trade electronically with larger companies using their own electronic format. This often means that the complexity and the cost of what should be a simple business transaction increase with the number of trading partners.

Recommendation:

- § As this is an evolving area, there is an opportunity to create a standard European format for the exchange of electronic business documents. If software vendors were able to adopt a common format, the cost of electronic invoicing would drop and the use increase substantially.

§ *Employment Law*

European SMEs typically venture outside the borders of their own country earlier than their Asian or American counterparts, who only embark on this once they have reached a critical mass. One of the reasons is that trading with the outside world soon results in the need to employ local management and employees and brings with it a plethora of challenges and costs when it comes to understanding employment legislation.

The Association understands that employment law is outside the competence of the European policy makers, however providing support for business to be able to navigate this arena would result in faster growth rates of SME businesses in software and other sectors, as well as distribution of wealth and tax revenue across more Member States.

Recommendations:

- § Information on different employment laws should be provided to businesses both in an online form and in consultation
- § Information on employment laws should be centralized and available in multiple languages
- § Advice and guidance should be available to all businesses seeking to establish themselves and provide employment in countries other than their home country

RESEARCH AND DEVELOPMENT

When the Lisbon Strategy was relaunched in 2005, European economic growth was slowing down, and innovation was seen as the only appropriate response. We find ourselves in a similar situation today. Reversing this trend was and remains the major competitiveness challenge facing the Union. Increased R&D investments in research are necessary to close the productivity gap to our main existing and raising global competitors. But this also requires effective public expenditure, favourable framework conditions and powerful incentives for companies to engage in innovation and R&D required.

Europe has already identified and started addressing some of the major challenges over the past few years. The European Commission has involved both the academia (via the European Research Council) and the industry (via the Joint Technology Initiatives and European Technology Platforms) in shaping its policies. The European Software Association welcomes this combined approach, as it promises to foster both excellent basic research driven by curiosity and search for answers to grand questions, and research based on industry needs and technological demands. Nevertheless, bridging the gap to our competitors requires from us to go a step further and ensuring these technologies can be introduced into the market, either by large enterprises or small high-growth companies.

Content and service interoperability

As outlined above, the variety of devices and computing & communication models is increasing exponentially, and with it the number of opportunities for new business models: platform providers, application providers, solution providers and what is yet to come. There clearly is more than one business model.

From a solution provider's perspective, instead of offering drilling machines they deliver the service of holes being drilled, instead of selling heating systems they ensure comfortable heated homes with low emissions. These developments raise a number of challenging research questions that should be addressed within a new and much more holistic approach. This approach should combine both the customer and producer's views on a product and not be limited to the functional elements (e.g. Mechanical parts, electronics and software), but also includes other elements such as contracts, services, accessories, user instructions and possible derivatives.

Recommendations for research to be undertaken in order to encourage innovation in this area:

- § Metadata / ontologies for semantic access to information:
- § Support for (semi-) automated ontology generation and enhancement for content experts, as well as mechanisms for efficient storage and access to large amounts of ontologies and semantically enhanced content
- § Concepts and mechanisms for composing and decomposing various ontologies of individual range, maturity or consensus level (e.g. at individual, community and enterprise level)
- § Reasoning mechanisms based on semantically harmonized content that provide advanced support for configuration management, compatibility, upgrade paths, conformance to regulations when doing system modifications and maintenance.

- § Integration of heterogeneous and federated information sources including the Internet of Things allowing for information extraction (e.g. crawler or agent based), information pull from and information push to Smart Items and Embedded Systems
- § Mechanisms for ensuring Intellectual Property identification and protection
- § Mechanisms for process mining, enrichment and redefinition

The Internet of Things

Ongoing hardware commoditization, increased pervasiveness of network connectivity and the rapidly increasing number of Smart Items and their processing capabilities allow for new communication and collaboration models, as well as a growing amount of information accessible. This provides for better decision making in the business process, based on near real-time physical data and events. As a result a new form of business process adaptation emerges, which is sometimes characterized by the term ‘High Resolution Management’.

The “Internet of Things” provides possibilities that go even beyond that. It allows the breaking up of today’s centralized systems and the distribution of business logic and processing to the ‘physical edges’ in a peer-to-peer manner. This new approach will impact all aspects of our lives in the future from increased workplace safety, smart vending machines, pay for use models to more effective tax systems. New devices will impose new ways of using these technologies, via novel graphical user interface techniques, paving the way for new application fields.

Recommendations for further research:

- § New computing devices and their applications
- § Service-oriented architectures for embedded systems
- § Software lifecycle management for embedded systems
- § Design methodologies for distributed intelligent systems
- § Business process innovation, renovation, and optimization based on smart devices
- § Advanced data management at all layers from Enterprise Resource Planning (ERP) level to device level resulting from increased data volumes and filtering, aggregation and sensor fusion processes

The “connecting” Internet

The service sector in the EU accounts for 2/3 of overall GDP and a large part of this sector is heavily reliant on the software industry. However, in many cases internet scale and interoperability of service delivery platforms remain a major challenge.

Nevertheless, service-orientation has been broadly adopted in the market through service-oriented architecture (SOA) implementations from major software vendors. Simultaneously a variety of services that are being offered through standardized interfaces have started to reach the critical mass. Once a service reaches that point, it instantly becomes a growth opportunity, as other services and platforms can be built upon it. Currently, Business Process Management combined with SOA provides dynamic orchestration and composition of

services according to business goals and allows organizations to quickly respond to changing conditions that affect their business processes. However, there is more that can be done.

We believe that, besides business processes and customers, there is a large potential in communities that do not yet use ICT, but probably will in the future. This trend has been accelerated by the fact that ICT is becoming more and more available and accessible. New communities have to be involved in the design of new scenarios and applications.

Recommendations for further research:

- § New system architectures that harmonize service orientated architectures (SOA) and service orientated infrastructure (SOI) architectures, advance the structure of multi-tier, federated and Internet scale architectures and allow for automated data and computing centre management
- § Advanced infrastructure technologies in terms of hardware, middleware and related programming models that meet the needs of the increasingly required flexibility of the networked economy
- § Advanced system lifecycle approaches including engineering, deployment, composition, management and decommissioning phases, supporting transparent knowledge tracking, prediction and simulation and allow for a clear separation of concerns between different stakeholders and support the full variety of business
- § Service composition comprising semantic services description, composition validation, testing and debugging as well as service adaptation.
- § Rapid service-based composite application prototyping, development and deployment

Effective ICT

ICT cannot be seen as a goal onto itself, be it in a business or consumer environment. Its goal is to support a friendly, flexible, adaptive, integrated, and collaborative working environment. In order to be easy to use user interfaces need to blend into the environment, rather than pushing a desktop computer metaphor into inadequate situations.

This is becoming more and more difficult, as people master increasingly complex issues and businesses focus on interactions between different people and environments. The key to a good software solution is to leverage the existing knowledge and ensuring people complement each other's work through interdependent informal networks. This can be achieved through work in areas such as social networks, content development and conceptual and organizational structure mapping.

Computer and software systems are becoming increasingly complex, partly because of emerging computing devices, calling for new ways of handling software reliability and verification in the early stages of software engineering and development.

Recommendations:

Embedded systems provide alternative User Interfaces that users can intuitively utilize.

- § Federated device interaction

- § Multimodal user interfaces; New Human-Computer-Interaction (based on new interaction paradigms) and Graphical-User-Interfaces (based on new devices)
- § Intelligent interfaces and smart interaction (i.e. smart desktops)
- § Managing and verifying large computer systems during engineering and development

Security Methodologies

The trend for increased collaboration between enterprises coupled with network convergence increased the importance of adequate security and dependability solutions. Greater flexibility and distribution of controls and the fact that systems and applications have deliberately opened their resources and facilities to a changing and potentially unknown environment, mean that the security risks are greater than ever.

While many security considerations have been based on the investigation of standard attack scenarios and known vulnerability patterns targeting systems, services and software technology, the networked economy introduces a business dimension to security - protection needs are defined in terms of business assets, their associated risk, and their exposure to the ecosystem. Adequate protection needs to take business context into account and asks for risk evaluation. There is no “one size fits all” approach to security in software. Mapping business considerations to technical security measures will lead to tailor-made security architectures, whilst a common methodological framework spanning both business and technology will enable the systems to cope with changing contexts and evolving ecosystems. In addition, greater attention needs to be paid to the development of security skills in formal and informal education of software developers.

Recommendations for further research:

- § Specification and enforcement of security and dependability requirements including; risk-based requirements elicitation, relating and transforming business security models, as well as flexible security architectures based on decoupled security functionality
- § Security and reliability of the provisioning and the functionality of services as well as applications composed of services
- § Ensuring trusted collaboration between entities in an ecosystem
- § Model-based system security and dependability monitoring providing decision support based on information about physical and logical context.
- § Making security and dependability characteristics of the application as well as its security status accessible to application users and system as well as service providers
- § Performance Measurement analysis and definition of indicators related to security configurations, policies and runtime behavior.

Compliance

Companies and their business processes have to comply with social and ethical standards as well as internal and external rules and regulations. Achieving compliance of business processes and their supporting IT systems is often a large and costly task, done without automated tool support and on an ad hoc basis.

Today's ICT Technologies appear to be critically lacking support for compliance analysis and compliant design. Current approaches are too often manual, based on ad-hoc activities and partial system patching. Achieving compliance is a continuous and ongoing activity, thus efficiency and effectiveness of supporting compliance efforts throughout the ICT stack is paramount.

Recommendations:

- § Encourage compliance engineering or compliance by design
- § Support a fine decomposition of domain specific and local regulations to implement common principles into mechanisms and services and to allow to declaratively specify compliance aspects to cope with the complexity
- § Foster a gradual, stepwise approach to compliance in the context of security risk analysis, dependency analysis, measurements and metrics

Information Management and Analytics

In order to support decision-making, information needs to be created from raw data and be made readily accessible. The increased availability of powerful embedded systems, new regulatory requirements and the drop in raw storage prices have lead to a situation where we collect a large amount of data without gaining sufficient information from it. Conversely, we expose citizens and enterprises to privacy concerns and competitive risks by not adequately protecting data privacy and integrity from competing interests.

The advent of new storage technologies and the emerging successors to the relational database management systems provide opportunities for European vendors to claim a market share in a historically non-European dominated market.

Recommendations for further research in:

- § Formally verifiable methods for information management that can ensure privacy without relying on perfect" security of the underlying infrastructure
- § Analytics, clustering and search methods for new data and information sources
- § Lifecycle management of large scale and complex data to adhere to regulatory requirements
- § New data management engines (i.e. stream management, new storage media)

Software Engineering

In the software industry itself, there has been a shift from single-tier development to multi-tier development and production, similar to what is happening in other manufacturing industries. This has had a significant impact on the lifecycle of software systems – there is a need for programming languages (general and specific), as well as for modeling languages (e.g. markup and design languages), addressing the different communities with different needs and working on different levels.

Recommendations for further research in:

- § Development and standardization of meta-data for software components
- § Understanding and modeling the architectural and behavioral aspects of software components, covering software visualization and simulation at different levels of abstraction, as well as software tomography
- § Industrialization of software development dealing with organizational aspects such as team organization, workflows, etc., as well as with process-oriented aspects such as product lifecycle management for co-designed hardware/software products, industrialized process and quality measurement and control
- § Software engineering for services comprising methods and tools for development of software services, service-level agreement engineering, services deployment and configuration and lifecycle management
- § End-user driven adaptability and development tackling the design that allows users to develop or modify their own applications on one hand and end-user consumable semantic models for data and process representation of software on the other
- § Foster the languages that have the potential to bridge communities: XAML bringing together designers and developers; languages bridging science and computing; language drawing together software engineers and mathematicians.

CONCLUSION

The European Union's Lisbon Strategy sets out to make the EU 'the most dynamic and competitive knowledge-based economy in the world' by 2010. Europe's software industry is playing a major role in achieving this goal, as a creator of jobs and wealth, as a provider of technologies that support and enable economic growth, and as a developer of innovative products, services and business models.

Through their work with customers, partners, governments and academia, European software providers have gathered extensive insight into how the pan-regional regulatory framework could be adjusted to allow the region's software industry to compete more effectively. These adjustments, many of them minor, would bring widespread positive benefits to the region in terms of employment, competitiveness, innovation, skills and growth.

This paper collated these insights and puts forward a number of recommendations for consideration by Commissioner Reding in her plans to develop a European Software Strategy.