FOSTERING THE COMPETITIVENESS OF EUROPE'S ICT INDUSTRY

EU ICT TASK FORCE REPORT
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EXECUTIVE SUMMARY

The ICT industry is critical to Europe's future both as a major industrial sector in its own right and as a driver of productivity and improved service quality in virtually all other industrial sectors and public services. The competitive challenge is sharper still in the face of a new wave of technological change and market opportunities, which carry the potential to reshape the industry and the ways in which its products and services are used. Europe needs to act now to ensure that it provides the right environment for this sector to flourish and to play its full role in driving the European Union's economic and social goals.

Since the mid-nineties, the European Union (EU) has been facing a constant decline in labour productivity, which is mainly attributed to the lack of investment in, and uptake of, Information and Communication Technologies (ICTs) by the various segments of the economy. Productivity growth in the US has been mostly driven by the services sector using ICTs but in the EU, these same sectors have not been in a position to capitalise on their investments in terms of productivity growth. The higher productivity growth rates observed in the US and the EU's other trading partners around the world are mainly the result of a greater use and integration of ICTs by all segments of the economy.

Europe's comparative productivity and competitiveness will increasingly depend on how effectively and efficiently technologies are developed and then used by citizens, enterprises and the current and future workforce, particularly given the ageing of the European population and a shrinking workforce. It will also depend on the level of public and private investment, particularly in innovation, research, and development. Today, the EU is investing less than other major regions in the world such as the US and Japan, and major countries such as China will be investing more than the EU by 2010. The EU must therefore consider the global landscape for ICT investment in its current strategies.

It is because of considerations around Europe's competitiveness, and not only because of the need for social and digital inclusion, that Europe urgently needs to increase the employability skills and opportunities for millions of low skilled people. This is especially about the 6 million early school leavers, the 20 million long-term unemployed in the EU, and those in low-skilled jobs where international competition is increasing the risk of widespread long-term unemployment.

MEETING THE LISBON OBJECTIVES

With the re-launch of the Lisbon Strategy in 2005, the EU has taken on an immense transition task to catch-up with the progress towards the 2000 Lisbon objectives and build a globally competitive knowledge-based economy to create more jobs and growth. ICTs are one of the keys to achieving this goal. Employing about 3% of the EU 15 workforce in 2003, the ICT sector is an important industry with a high growth potential in itself. While the Western European IT market is expected to grow at an annual average rate of 6.1% until 2008, the Central and Eastern European markets are expected to swell by 13.2%.

DRIVING DEMAND BY PROMOTING THE UPTAKE OF ICTS

While EU ICT policies focusing on availability and access to ICT are important, it is equally vital that policies also concentrate on encouraging the demand for ICT by all segments of the economy and society while enhancing the skills required to use them effectively. Increased demand will in turn drive investment and growth in the ICT sector.

The lack of investment in ICT by businesses, in particular small and medium sized enterprises (SMEs), is one of the main reasons behind Europe's decline in productivity growth. A wider integration of ICT by businesses throughout Europe would significantly contribute to improve effectiveness and productivity and could potentially revolutionise and maximise processes and organisations in a number of key sectors (health, transport, services, etc).

The lack of investment in ICT is largely explained by the difficulties for businesses to implement the necessary organisational changes to benefit from ICT investment and enhance efficiency and productivity, due to overly rigid legislation. The lack of awareness and demand, among SMEs and consumers, are also important issues. Investment in next generation broadband services and networks is also essential for further uptake of ICT.

Demand from public services is also a key driver of innovation in ICT and is at present not effectively deployed. By changing the culture of public procurement to favour innovative solutions and at the same time by focussing support for R&D and innovation and harmonisation of regulation in these sectors, Europe can provide lead markets that give the industry a powerful home base from which to dominate world markets.

THE IMPORTANCE OF EUROPEAN SMES

SMEs make up the vast majority of Europe's innovative community. SMEs make up a large part of Europe's economy: there are some 23 million SMEs in the European Union, providing around 75 million jobs and accounting for 99% of all enterprises. SMEs are a key part of European industry, not least, because they contribute up to 80% of employment in some industrial sectors, such as textiles, construction, or furniture.

Europe's best SMEs are a major source of entrepreneurial skills, innovation and contribute to economic and social cohesion. Challenges of growth, expansion, and entrepreneurship are issues that affect SMEs in all sectors. Due to the limited size of most European markets, SMEs need to expand to other markets to be able to grow. This in itself still poses an extra burden on SMEs. They also need better access to some European markets. Furthermore, it is recognised that most European SMEs in the ICT sector do not achieve significant growth and many still lack the necessary entrepreneurial skills and mindset.

EUROPEAN REGULATORY INCOHERENCE

In the ICT sector, Europe is still a patchwork of countries functioning under different regulatory systems. In many cases, EU Member States have failed to establish a common framework allowing technology companies to benefit from one set of standards and rules as is the case for example in the USA or Japan. Of course, in certain cases, measured up against the principles of subsidiarity and the interests of other stakeholders, total European harmonisation would not necessarily hold up. When the Member States implement a European regulation or standard, they tend to adapt it to local laws and business habits, with the result that, for global business, the advantage of uniformity in production and operations is lost.

This perpetuates a fragmented European market and therefore generates numerous obstacles to European competitiveness, as companies simply cannot implement strategies or solutions on a European or global scale. Such fragmentation reveals the Member States' tendency to continue to think and act based on national instead of European considerations.

The free movement of goods, people, services, and capital is a fundamental principle of the European Union. It is these four freedoms as set out in the EC Treaty, which form the basis of the Single Market but its full operation is inhibited by the market fragmentation created by regulatory incoherence.

LEVERAGING INNOVATION

Innovation in ICT is crucial for Europe's competitiveness, and social and economic growth. The European Union has a number of strategic advantages including its worldwide leadership in ICT equipment and services, which must be better leveraged to respond to Europe's current social and economic challenges. However, Europe also has a number of social and economic challenges including an ageing population, high expectations with regard to quality of life, in particular in healthcare, environmental and transportation concerns. ICT provides a number of solutions to respond to these challenges, and the leadership and technology expertise all remain available within Europe's borders, but strong political leadership is needed at all levels: pan-European, Member State and regions. Europe needs a strong "Push-Pull Innovation Policy", that is more company driven, by supporting and carrying forward the key actions announced in the EC Communications on

Innovation and also the "Aho Report - Creating an Innovative Europe". It must also focus on regional best practices, measures for manufacturing in the semiconductors industry, services, and the human dimension of ICT.

Recent innovations in web based ICT technologies mean that the provision of software-based services becomes a real opportunity for economic growth for both small and large companies as the use of the Internet becomes more and more pervasive. Such services will increasingly be provided through service providers that have the necessary networks and ICT infrastructure to host web services for many companies - and provide access on a metered pay-as-you-go basis. New systems architectures (GRID), new web software, and high-speed networking enable all this to happen on much more favourable economic terms thus providing a real incentive for adoption by SME's.

BENEFITING FROM STANDARDS AND INTEROPERABILITY

In Europe today, as in the global ICT marketplace, while broader connectivity and other developments have already achieved the result that a certain level of technical interoperability exists, perhaps to a greater degree than at any time in the past, interoperability nevertheless continues to be an important and growing challenge. Much has been achieved as the industry has responded to customer and government needs for greater technical interoperability, and new technologies have evolved that enable better interoperability. However, due to the huge opportunities made possible by the two components of convergence – digital information and universal connectivity – the reach, scale and complexity of what can and should be made interoperable in order for the benefits of convergence to be obtained has grown even more. Interoperability is now more important than ever before and sustained efforts are required to ensure that interoperability is broadly implemented in products and services while taking into account other important objectives such as incentives for innovation and security.

MAINTAINING A BALANCED AND EFFECTIVE IPR REGIME FOR INNOVATION

It is essential for fostering ICT investment and innovation that Europe maintains a balanced and effective regime of intellectual property protection that takes into account various business models in the ICT sector. Compared to other regions Europe already enjoys a reasonable IPR regime that is marked by high quality patents, which should be maintained. Nevertheless, Europe must improve the legal certainty and accessibility of its patent system for all players, including SMEs. Furthermore, the EU should continue and even increase its efforts against counterfeiting and piracy and reform the copyright levies system to enhance ICT uptake.

DEVELOPING SKILLS AND EMPLOYABILITY

Innovation and ICT uptake in Europe are highly dependent on the e-skills of the workforce, in terms of practitioner or user, as well as ICT-related business skills. However, evidence points to growing e-skills gaps (either a shortage of absolute numbers of ICT workers, or a mismatch between supply and demand of specific skills) and a worrying decline in the number of students studying IT and computer science. Europe's educational and professional training systems do not sufficiently deliver the 21st century skills needed to ensure workforce competitiveness and economic innovation. If not addressed, e-skills gaps risk slowing Europe's productivity growth and holding back business development and the competitiveness of European companies in the global market in virtually all industry sectors.

Moreover, the transition to a knowledge-based economy will make education and training a lifelong process rather than a one-off activity. Where knowledge becomes the main value driver for business and the key to be employable over the duration of a working life, technology-enabled learning (eLearning) can significantly contribute to lifelong learning and make it a reality – if it is effectively and consistently promoted and can build on the necessary ICT user skills of learners.

CONCLUSIONS

The EU has set itself an ambitious target in building a globally competitive knowledge-based economy. Fostering the competitiveness of Europe's ICT Industry, and addressing the obstacles outlined above, is a fundamental necessity if the Lisbon objectives are to be achieved. The EU ICT Task Force has examined these obstacles and made concrete recommendations that will lead to their removal. These recommendations are outlined in this report and cover the following major areas:

- Increasing the uptake and usage of ICTs by citizens, enterprises and most particularly the SMEs, and public administrations.
- Providing everybody, whether at the home or the workplace, with the skills necessary to take advantage of the benefits provided by ICTs.
- Implementing a truly single regulatory environment.
- Maintaining a balanced and effective IPR regime that fosters ICT investment, interoperability, and innovation, while improving legal certainty and accessibility to the patent system.
- Developing European innovation in ICT products, services and manufacturing by a strong "Push-Pull Innovation Policy" which leverages regional best practices across the EU.
- Enabling the interoperability of products, networks, and systems in a converged digital environment.

In summary, these recommendations are formulated with the objective of fostering the EU's competitiveness while contributing to meeting many of the other challenges modern societies are facing such as social, environmental, demographic, and educational issues.

The EU ICT Task Force now invites the European Commission and the EU Member States to take note of its policy recommendations and follow through on the actions needed to remove the obstacles that are hindering the development of Europe's competitiveness.

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Industrial Policy

In October 2005, the Commission launched a new integrated approach to industrial policy aimed at improving the coherence between different policy dimensions and increasing their relevance to individual industries. The Communication, "Towards a more integrated approach for industrial policy" included both new horizontal initiatives and tailor-made actions for specific sectors. For the Information and Communication Technologies (ICT) sector, the Commission announced the establishment of a multi-stakeholder ICT Task-Force to reinforce the Commission's other ICT-related initiatives, notably i2010.

i2010

In June 2005, the European Commission launched the initiative '*i2010 – A European Information Society for growth and employment*' as a framework for addressing the main challenges and developments in the information society and media sectors up to 2010. This initiative promotes an open and competitive digital economy and emphasises ICT as a driver of inclusion and quality of life. The initiative contains a range of EU policy instruments to encourage the development of the digital economy such as regulatory instruments, research, and partnerships with stakeholders.

i2010 - the first substantial initiative taken under the renewed Lisbon agenda - seeks to boost efficiency throughout the economy through wider use of ICTs. i2010 rests on three pillars:

- Creating the single European Information Space, which promotes an open and competitive internal market for information society and media services.
- Increasing investment in innovation and research in ICT.
- Fostering inclusion, better public services and quality of life through the use of ICT.

EU ICT Task Force

In June 2006, the European Commission invited representatives from the ICT industry, trade unions, SMEs, chambers of commerce, consumers, investors, and academia to form an ICT Task Force to: identify major obstacles to the ICT sector's competitiveness and the uptake of ICTs; help mobilise the sector and draw the attention of Member States to the obstacles identified; and recommend possible policy responses.

The EU ICT Task Force addressed the following topics: ICT uptake; IPR for competitiveness and innovation; innovation in R&D, manufacturing and services; SMEs and entrepreneurship; skills and employability; and achieving a single market. Six working groups were created to analyse these topics and prepare summary topic papers. The working group topic papers are available at http://ec.europa.eu/enterprise/ict/taskforce.htm. This report presents an overview of the topics addressed by the Task Force and the priority policy responses and recommendations that that have been proposed to foster the competitiveness of Europe's ICT industry.

FOSTERING THE COMPETITIVENESS OF EUROPE'S ICT INDUSTRY

Europe is at a crossroads. Global competition is accelerating, value chains are breaking up and new technologies are having profound impacts. Ageing puts more and more pressure on health and social care systems, transport systems are saturated, and the education system needs updating. Europe's assets of a high quality of life and social protection are at stake.

Europe must realise higher economic growth through improved competitiveness and productivity, whilst ensuring a sustainable future. It has to adjust to the changing economic realities brought about by the globalisation of markets and the ever-faster pace of technological change. At the same time, Europe has to modernise its public services to meet the needs of its changing societies and lifestyles. Emerging challenges in areas such as security, ageing, and inclusion have to be tackled.

Today, digital convergence – the marriage of computing, communications, content, and consumer electronics – is an over-riding influence on Europe's ICT industry. The coalescence of these technologies is unleashing a wealth of opportunities, blurring the boundaries between market sectors, and proving to be a powerful driver for innovation and change. Consequently, a global market for all digital services covering communications, IT, and media is emerging.

Driven along by the convergence wave, the structure of the global ICT industry is changing fundamentally. The industry is less and less identifiable as a discrete sector but is becoming part of a borderless digital system. In this system, firms are increasingly defined by their role within the converged value chain – as system developer, content provider, equipment manufacturer, aggregator, access/network operator, etc - rather than by traditional market segments.

The positive impact of ICTs on the quality of life and ultimately on growth and competitiveness is widely recognised. The growth of the ICT sector itself is essential for the growth of the economy as a whole. Beyond that aspect, a greater use of ICTs by society as a whole can significantly improve Europe's competitiveness on the global scene. This is why ICTs are a cornerstone of the EU strategy for growth and jobs.

While EU ICT policies focusing on availability and access to ICT are important, it is equally vital that policies also concentrate on encouraging the demand for ICT by all segments of the economy and society and enhancing skills. Increased demand will in turn drive investment and growth in the ICT sector, while not neglecting important supply-side considerations.

BACKGROUND[1]

In the past decade productivity growth in Europe has lagged behind that of competing economic zones mainly because of insufficient usage of Information Communication Technologies (ICTs are defined as telecommunications, computer hardware & components, software and computer services, consumer electronics, content & media, automation and security). This productivity growth gap of about 1% per year is further compounded by the ageing of the population, which will reduce the active population by about 0.5% per year. Only a dramatic increase in the use of ICT will allow Europe to bridge this gap.

EUROPE IN THE GLOBAL ICT MARKET

In 2004, the global ICT market increased by around 6%, to an estimated €2,530 billion. Information Technology (IT) was the most dynamic segment (+7% for hardware and +8.5% for software and services) and now accounts for approximately 32% of the global market. Telecommunications accounts for 48% with a 5.8% growth in 2004. Overall, there is a reduced gap in growth between equipment (+6.6%) and services (+6.4%).

In Western Europe, ICT market growth in 2004 was 2.9%. This was below North America, which grew by 3.9% and still accounts for more than one-third of the global market. With a 10% growth, Asia Pacific accounts for around half of all growth of the world market, with demand particularly strong in telecommunications equipment and services.

Europe's ICT industry is a major economic sector in its own right. The telecommunications, IT and audio-visual markets make up 6-8% (depending on the definition) of EU GDP, and 4-6% of employment. The ICT-producing sectors record very high productivity increases, an average of 9% over the period 1995-2002.

Worldwide industrial output experienced very high growth between mid-2002 and mid-2004 but has now dropped back slightly. In the US, investment in ICT is already higher than in 1999-2000 and accounts for half of tangible private sector investments: this is a key warning sign for Europe.

The share of ICT equipment in international trade has increased substantially over recent years and now accounts for around 15% of global trade. China is experiencing spectacular growth (ICT market up 24% in 2004) and has become a major exporter of consumer electronics products and mobile devices.

THE EUROPEAN ICT INDUSTRY

The EU represents approximately 20% of world ICT supply. This is comparable to Japan and less than the US, which accounts for 30%.

Telecommunications, embedded computing, micro- and nano-electronics, micro-systems, 'smart' integrated systems and rich audiovisual content are Europe's main industrial and technology strengths. Computers and packaged software are Europe's main industrial weaknesses. The main threats for the EU originate in ongoing industrial investments in emerging economies in Asia (China, India), in the expansion of US dominance in computing, and in a lack of user acceptance and uptake of new technology.

Telecommunications

Telecommunications services account for 38% of the ICT market and telecommunications equipment and services a further 9%. Telecommunications companies have recovered financially from the slow growth of the recent past but still face slow revenue growth. Digital convergence is bringing major changes to the communications sector, in particular its positioning towards the IT and media industries. The success of broadband and the migration to an all-IP infrastructure for both fixed and

1 Based on extracts from "Shaping Europe's Future Through ICT" - Report from the Information Society Technologies Advisory Group (ISTAG), March 2006

mobile networks are key features affecting market growth. European industry is in a strong position in both services and equipment, and has world-leading academic research.

Computer Hardware and Components

Hardware and components account for around 12% of the ICT market. Three distinct product/systems categories are emerging in the semiconductor market: applications for very high performance systems such as PCs and servers; applications for portable (battery powered), high bit-rate devices – mobile phones, PDAs, GPS; and applications for low bit-rate, low power systems such as wireless sensors and actuators. These categories have very different characteristics but are closely interlinked when embedded in major end-use application segments such as computer, automotive, communications, consumer, or industrial. Europe enjoys relatively strong positions in electronic design for high growth applications such as mobile phones and automotive electronics. Signal processing, smartcards, and microsystems are also key strengths. However, manufacturing in Europe is at risk due to a lack of comparable regulatory measures and response that hinder the attainment of a global level playing field with other regions.

Software and services

IT software and services account for around 20% of the ICT market. Several major breakthroughs in software have been generated in Europe in the last 10-15 years. Examples include the Web, mpeg2 and mp3 encoding, and the Linux operating system with its influence on the open source software movement. Key European strengths include enterprise software; embedded and distributed software; hard real-time design and dependable/fault-tolerant systems; software engineering; and high-end computing and GRID architectures.

Consumer electronics

Consumer electronics amounts to around 9% of the ICT market. It is a diverse and highly competitive sector and is profoundly affected by convergence, which carries strong potential. Despite booming sales, firms face tough competitive conditions: prices are decreasing dramatically and new competitors (e.g. Apple, HP, and Dell) are entering the market as the digitisation process creates bridges with the computer world. China has emerged as a major player in the production of electronic goods over recent years, and Chinese firms are increasingly active in international markets. Europe's strength in mobile devices presents a major opportunity to open up new areas within the converged consumer marketplace.

Content and media

Audio-visual services make up 12% of the ICT market. Europe's online content sector is still in an embryonic phase and represents less than 3% of total revenues from music, video and games content. Nevertheless, it is still a €10.2 billion market. EU markets are dominated by US companies and content: for instance, only 20% of the DVDs sold in Europe have European content and over 70% of the films shown in Europe are American or are co-produced with the US. Europe has key strengths in media technologies such as image processing and related fields; semantics and knowledge management; computer vision; virtual and augmented reality.

A BORDERLESS DIGITAL SYSTEM

Digital convergence continues to transform and restructure the three traditional market segments – IT, telecommunications, and media. Separate, vertically integrated "silo" networks (fixed, mobile, broadcast, business, and residential) are being transformed into horizontally interconnected functional layers. In this new scenario, network operators, IT and EC players as well as the big media conglomerates are all competing for market share.

Digital content and services are the main beneficiaries of the convergence revolution. The growth of network infrastructure and access platforms has given rise to a proliferation of content-based products and services for the consumer and business markets. In this new system, all sorts of actors will be able to generate and transact digital content and services over global networks. Content and service providers will be as diverse as small businesses, professional football clubs, local and specialist libraries & museums, writers & artists, and individual hobbyists and enthusiasts.

ICT is emerging as a key driver of technology development and innovation in major professional and application sectors, such as health, automotive and security. Some of these applications will start to cross-over into consumer systems as applications move closer to the consumer marketplace. The strong growth of in-car satellite navigation is an early example of this; markets such as personal healthcare monitors and home security systems are likely to be the next growth areas. Future progress in these sectors depends not just on the ability to integrate ICT building blocks into systems, but to tailor technology development to meet the specific needs of the final applications.

Europe's ICT firms need to be increasingly aware of these shifting global value chains and to position themselves within them to derive the greatest competitive advantage.

THE NEXT GENERATION OF ICT

The convergence of technologies; the deeper embedding and wider integration of technology into products, services and processes; and the tighter links between technology and its use are all orientations shaping the future development of ICT. This is having major impacts on the ICT industry making it less and less identifiable as a discrete sector.

The next generation of ICT will be characterised by its functionalities rather than by traditional product or service categories. In particular, four main trajectories are noted.

Networked, Mobile, Seamless and Scalable

The next generation of ICT will take networking and mobility to new levels and will continue to benefit from digital convergence – the fusing of computing, communications, and content.

The overall picture will be one where seamless broadband communication networks span from the personal area to the regional and global area. This will be made possible by meshing different computing and communication networks, whether these are fixed wired and wireless networks, third or higher generation mobile networks, personal wireless and local area networks, and satellites. Ever higher bandwidth communication networks and the integration of fixed and mobile, all-IP, communication infrastructures and their interconnection and interoperability will permit the seamless delivery of ever-higher volumes of data and services anywhere, anytime.

Convergence will continue to redefine devices and give them new functionalities. Already today, mobile phones are not just for talking but are able to send and receive email, pictures, and even video. As well as word processing and databases, PCs are used to store and manipulate all types of media and are becoming the hubs of our digital world. Consumer equipment, such as hi-fi and cameras, and even kitchen appliances, are able to communicate with each other and with computing devices. Content of all forms – music, video, images – is being generated, or converted into, digital form.

Convergence is a powerful force for innovation and competition. With many potential configurations of access platforms, applications, services and market players, conditions are ripe for the 'creative destruction' necessary for successful innovations to emerge. In particular, deeper levels of service integration will increase both the value for the end-user and the potential revenue for the service provider. Service convergence has its own dynamics and the strategic business case will vary depending on the type of services, network operator, and market conditions.

Embedded and Invisible

Another important characteristic of future systems will be that they will be integrated into everyday objects. The systems will be embedded into our everyday environments, so that they are invisible to the user. Such functionalities are made possible by developments in miniaturisation, embedded systems, networks and the convergence of ICT with other fields. The cost of communications is insignificant relative to the potential convenience and value obtained by connecting nearly all devices with a processor to the Internet and with each other.

The complexity of future systems presents profound technical challenges. They will need to "know" themselves, their environment and the context surrounding their use and act accordingly. System entities will need to be able to find and generate their own rules on how best to interact with their neighbours, while always looking to optimise their own workings and their own relations with the environment. Systems must be dynamic, able to configure and reconfigure themselves under varying, and even unpredictable, conditions. They must be reliable and secure and protect the privacy of the users. They must be able to store and make sense of the vast amounts of data and information generated.

Many legal, social, and ethical issues remain to be addressed. For instance, what are and what should be the user's rights to data collected over sensor nets? How can privacy and security be safeguarded in such massively distributed networks?

Intelligent and Personalised

The next generation of ICTs will enable the creation of systems that are more intelligent and personalised, and therefore more centred on the user. Semi-intelligent and highly adaptive networks will augment the physical environment with new properties, enhancing the way people interact with it while keeping the underlying system out of sight. They will hide the overall system complexity and provide stable functionality, with functions being revealed only "on demand". Human attention will be preserved by delivering only information that is rich with meanings and contexts. Together with situated and cooperating smart artefacts, these network resources will boost the creation of new ambient environments that are tailored to individual needs and will increasingly link the real and the virtual worlds.

Smart ambient environments could revolutionise many sectors in terms of control and monitoring and give rise to "invisible intelligence". With less central infrastructure, devices will have the capability to act as terminals and access points in their own right.

Content-rich, Interactive and Experiential

Future ICT systems will be visual, interactive, and content-rich. The 'PlayStation generation' is used to the world being highly visual and fast-moving: they will expect to have interfaces and content as rich, fluid, and reactive as games.

ICT UPTAKE

The positive impact of ICTs on the quality of life and ultimately on growth and competitiveness is widely recognised. The growth of the ICT sector itself is essential for the growth of the economy as a whole. Beyond that aspect, a greater use of ICTs by society as a whole can significantly improve Europe's competitiveness on the global scene. This is why ICTs are a cornerstone of the EU strategy for growth and jobs.

While EU ICT policies focusing on availability and access to ICT are important, it is equally vital that policies also concentrate on encouraging the demand for ICT by all segments of the economy and society and enhancing the skills required to use them effectively. Increased demand will in turn drive investment and growth in the ICT sector.

THE ISSUE

The ICT sector continues to drive about half of the EU's productivity gains but this is not sufficient to improve the EU's global competitiveness. Uptake of ICT by businesses in general remains much lower than in the United States and the trend does not significantly improve. The contribution of investment in ICT (by all economy segments) to GDP is about half of the US level. Businesses in Europe, and in particular SMEs, remain slow in embracing ICT applications in their organisation and processes.

Europe invests substantially less than the US does in various forms of "knowledge", including IT and software, communications infrastructure, R&D and higher education. ICT investment in Europe is now half the level of that in the US as a share of GDP – with the gap having widened in recent years. Investment in bringing the SMEs up to speed is also lacking.

Since the mid-nineties, the EU has been facing a constant decline in labour productivity, which is mainly attributed to the lack of ICT-related investment and uptake by the various segments of the economy. A wider use of Information Society Technologies has the potential to revolutionise and maximise processes and organisations in a number of key sectors (health, transport, services, ...). Evidence shows that higher productivity growth rates observed in the US and the EU's other trading partners around the world are mainly the result of a greater use and integration of ICTs by all segments of the economy.

The healthcare sector is illustrative of this lack of ICT-related investments. While industries such as manufacturing and financial services invest 8-10% of annual revenue in ICT-based solutions that improve their competitiveness and profitability, the healthcare industry only invests an average of 2%. Such lagging investment contributes to workflow inefficiencies and preventable errors that lead to rising costs and affect the quality of patient care.

Broadband represents an enormous potential for the retail sector. Broadband does not only have the potential to boost online shopping but can also improve retailers' relationships with customers and suppliers. Moreover, it can revolutionise traditional shopping habits. Broadband can also help customers discover more about a product while in the shop. However, before retailers can benefit from these opportunities, more investment in the retail sector will be needed.

As highlighted in the European Commission i2010 initiative, a wider usage of ICTs would not only have a positive impact on Europe's competitiveness. Broadband-based services offer new opportunities in many sectors and can contribute to meeting many of the challenges modern societies are facing including social, environmental, demographic, and educational.

LACK OF FLEXIBILITY OF THE PRODUCTION ENVIRONMENT

For businesses, the lack of flexibility of the production environment is one of the main reasons explaining the lack of ICT investment by businesses. Companies are deterred from investing in ICT as overly rigid employment legislation make it difficult for them to implement the necessary organisational changes to benefit from ICT investment and enhance efficiency and productivity accordingly. Similarly, the use of ICT can allow companies to enter new markets and develop innovative products and services. Product market regulations should not prevent companies from extending beyond their traditional markets.

LACK OF AWARENESS/ SKILLS AMONG SMES

Figures show that investments in ICT are much slower in small and medium sized enterprises than in large companies. One of the main reasons for this slow take up of ICT by SMEs is the failure to grasp the benefits that ICT can bring in terms of productivity and efficiency and a lack of awareness of the available solutions.

The lack of uptake by SMEs can be attributed to two problems: firstly, there is not enough internal expertise to choose the appropriate technology from a diverse and rapidly changing market and so the SME often has to rely on external advice. Secondly, there are not enough suitable applications for SMEs. They should be encouraged to contract specialised service providers that customise existing applications and make them usable for SMEs.

INTEROPERABILITY

Interoperability is another important topic linked to ICT uptake. The industry remains primarily responsible for delivering technical interoperability to meet market needs, and technical interoperability has advanced considerably in recent years. At the same time, concerns about fragmented national markets also continue to increase. The legal, semantic, and organisational interoperability issues that exist in Europe have a more direct impact on the differing levels of ICT uptake in this region vis-à-vis the rest of the world. Differences between EU Member States in regulatory requirements have slowed the widespread usage of some technologies (for example, digital signatures). Lack of agreement on semantic data requirements, and organisational differences between administrations, have hindered the uptake of available technology that could improve productivity and created obstacles to the roll-out and take up of eGovernment services. One key area in which legal, organisational, and semantic interoperability is necessary is eHealth.

INVESTMENT IN NETWORKS AND SERVICES

Investment in the development of next generation broadband access and core network infrastructures, service platforms and new service propositions is essential for the delivery in the future of new services to professional, residential and public service markets. Their success will largely determine the future competitive position and welfare state of Europe and the success of its ICT sector and European industry as a whole in the global competitive environment.

LACK OF CONSUMER DEMAND

The lack of consumer demand is also a factor that can explain the delay in the roll-out of innovative ICT products or the reluctance to develop eBusiness applications. There is generally a lack of awareness among individual users of the benefits and opportunities of ICT in private life. More compelling products and service platforms for the mass market are needed in order to increase general public interest. Higher speeds, lower prices, advanced services (IP TV, fixed mobile convergent offerings, etc…), are also important.

Sources indicate that the lack of uptake of new innovative digital broadband services is mostly the result of a lack of skills rather than a problem of broadband availability. The Dutch Presidency, in its report "Rethinking the European ICT Agenda", suggested that there should be a shift from "access to all" to "skills for all". Enhanced skills and motivation would in turn increase demand and hence lead to more investment and service roll-out.

In order to be competitive, ICT companies need to come up with offers and solutions that are more attractive for consumers than those offered by competitors. However, consumers in ICT markets have relatively limited possibilities to drive competitiveness and may have to be better motivated to do so (increased consumer confidence). In order for the ICT industry to become more competitive, it is vital that consumers are better empowered to reward competitiveness.

INSUFFICIENT USE OF EGOVERNMENT APPLICATIONS AS A DRIVER FOR ICT UPTAKE

New information management technologies and a more systematic use of efficient company management techniques should be encouraged in governmental institutions in order to enhance their efficiency. The high level of services that administrations provide in Europe, the cultural and linguistic diversity, and the great complexity of administrative structures create a complex situation. Many European governments have quite ambitious eGovernment programmes in place or in development. Examples include the Nordic approach, with the latest success in Denmark of eInvoicing, and the Austrian, Belgian, and Dutch programmes. Even older programmes like the UK eProcurement programme are now growing with success.

BARRIERS TO ICT UPTAKE

The relatively low levels of ICT investments are explained by various factors that include the lack of: an innovation culture; flexibility in the production environment; interoperability; network and service investments; awareness and skills among SMEs; consumer demand; and suitable education and training policies to rapidly changing requirements for new skills.

The main explanations for low ICT investments are the fragmentation of markets in Europe and the multiple levels of regulation and requirements innovators have to face, but there are also difficulties in implementing the necessary organisational changes to benefit from ICT investment. Other barriers are inappropriate educational and skills levels, product market regulations and the low levels of market integration for services across Europe.

RECOMMENDATIONS FOR THE UPTAKE OF ICTS

1. Ensure a more flexible production environment by: implementing a package of reform measures including liberalisation of product, service and financial markets; fostering entrepreneurship and experimentation with low barriers to entry and exit enabling firms to experiment and test new business models; and promoting greater adaptability of firms and improve adaptability of the workforce through strategies to secure access to education and lifelong learning, in particular e-skills training and workforce development while adapting overly strict employment legislation that impacts firms' abilities to respond quickly to changing market conditions.
2. Closely follow and support the development of next generation networks and services at the highest policy level. The conditions to achieve the objectives will continue to be discussed in the context of the review of the EU regulatory framework for eCommunications services. Investment in the roll-out of new broadband infrastructure and networks must remain market driven. The use of public funds to bridge the digital gap should be limited to those cases where private investment is not economically viable and under clear conditions to avoid distortion of competition.
3. Consumer demand and skills should be increased by: encouraging public administrations to make eGovernment services widely available in order to stimulate citizens and businesses to embrace broadband and to commit themselves to specify a date by when all relations with citizens could be carried out by electronic means; organising campaigns to raise awareness among end users of the benefits that broadband can bring to their everyday life; making ICT more affordable and accessible to all people including those with low incomes or special needs; implementing programmes (such as tax incentives) to promote the purchase of broadband enabled PCs and training packages; setting an objective of 100% European schools connected to broadband Internet.
4. Adopt a European public procurement policy in key areas such as health, mobility, and security. A significant amount of European public procurement should be dedicated to innovative products and services and to underpinning R&D in the ICT domain while fully incorporating SMEs in government procurement programmes. The ability to specify and purchase these innovations requires "intelligent customers" with technical capability and a shared forward vision with their suppliers.
5. Public authorities should take a simple and direct measure in the short-term by working with stakeholders on possible measures that could readily facilitate that new housing and new business sites in Europe have access to innovative broadband technologies, applications, and services.
6. Foster consumer confidence by developing a charter of consumer rights in the digital environment including the development of labelling schemes designed to inform consumers about playability features in Digital Rights Management (DRM) protected content.

SMES AND ENTREPRENEURSHIP

With the Lisbon Agenda, the EU has taken on an immense transition task to catch-up and become the most competitive knowledge based economy in the world. This has been recently re-revised to "Partnerships for growth & jobs", which stresses the importance of promoting a more entrepreneurial culture and of creating a supportive environment for Small and Medium sized Enterprises (SMEs). SMEs are the main (technical) innovators and are the main job creators in our society. SMEs are the main indirect job creators for service and support functions.

SMEs make up the vast majority of Europe's innovative community. SMEs, defined as having fewer than 250 employees, make up a large part of Europe's economy: there are some 23 million SMEs in the European Union, providing around 75 million jobs and accounting for 99% of all enterprises. SMEs are a key part of European industry, not least, because they contribute up to 80% of employment in some industrial sectors, such as textiles, construction, or furniture. SMEs are a major source of entrepreneurial skills, innovation and contribute to economic and social cohesion.

THE ISSUES

Lack of Awareness

Whereas ICTs are a key enabler for SMEs, there is still an extreme lack of awareness and trust in the benefit of ICTs. SMEs are also unaware of the ICT solutions that are available to them (both tailored solutions as well as general solutions), and how to use the most flexible ICT solutions. There is limited knowledge among SMEs, firstly on the different channels available from local governments, regions and the EU to disseminate information for them on access to finance, and secondly, about all the financial instruments available for SMEs, from governments and private initiatives, according to their different needs.

Barriers to efficient information exchange with SMEs

An issue that is evident in many contexts is the issue of information exchange to and from SMEs. Even though there are many projects on a European as well as on National level targeted towards SMEs and disseminating useful information to SMEs (be they ICT SMEs or ICT-using SMEs), somehow the information does not filter through the communication channels designed to do so. Similarly, detailed information on the needs and requirements of SMEs does not seem to flow back through the communication channels either. This very important issue needs to be addressed by the relevant institutions at European and National levels but also by their industry counterparts.

Growth, expansion and entrepreneurship

Entrepreneurship is the driving force for growth and change in our economy. Experience has shown that nations that support their courageous entrepreneurs have grown and prospered over the last 30 years, while nations that have placed barriers to the growth of their small business enterprises have done poorly. Even among countries that previously discouraged or prohibited such activity in favour of the government as the driving force for economic growth, there is now growing recognition of the importance of fostering entrepreneurial activity.

Growth, expansion, and entrepreneurship are issues that affect SMEs in all sectors. Due to the size of most European markets, SMEs need to expand to other markets to be able to grow. This in itself continues to pose an extra burden on SMEs. Fragmentation still exists within the European Union in such areas as eSignatures. Furthermore, it is recognised that most European SMEs in the ICT sector still remain relatively small and one reason for this is the lack of entrepreneurial skills and mindset in the ICT SME sector.

Access to finance

Access to finance continues to be an obstacle for European SMEs, including technology companies. Improving access to funding for the ICT sector (one of the most dynamic sectors of the economy) is fundamental to European competitiveness. Although the ICT sector continues to be one of the main beneficiaries of European Venture Capital investments, the overall investment level is low compared e.g. to the US. The European Commission recognised the problems in accessing risk capital some years ago and had a "Risk Capital Action Plan" in 1998-2003 to address them. Further policy initiatives have been taken, for example, in the 2006 Communication "Financing SME Growth – Adding European Value".

ICT Skills and digital literacy

There is a problem in Europe with basic computer skills and digital literacy. More than half the population (aged 16 to 74) have never taken a course (of at least three hours) on any aspect of computer use. Only a minority (of about 11%) have taken a course in the last year, and the course taken by about half the 42% who have taken a course at all was more than three years ago. With the current ageing population in Europe, most "old" entrepreneurs are not aware of the benefits of ICTs and how they can be used to create a competitive difference. Most entrepreneurs only have a basic knowledge of ICTs and do not consider them as a strategic tool but rather as an unavoidable cost. They prefer investing in their core business rather than in ICT.

Intellectual Property Rights

One of the main issues is the misperception on the definition and roles of IPR protection to support the development of ICT SMEs. Due to the different business models used, ICT SMEs often opt for different types of IPR Protection. Some find that the patent system is too complex and time consuming and thus opt for another form of IPR. The global cost of a European Patent is too expensive; it includes the costs of translation and litigation, renewal fees, and patent agent's fees. These represent 86% of the costs, whereas the European Patent Office's (EPO) application costs represent only 14%. Therefore, the method chosen to develop, protect, and release innovations varies according to the type of ICT product, the investment made in developing it, its usage and the business model adopted. Various intellectual property protection models are beneficial to ICT/SMEs as they protect different elements of the product.

Adoption of new technologies

The limited adoption of new, sophisticated technologies made available by research centres, universities, and Commission-funded programmes is due to the limited take-up capability of SMEs compared to large companies. In particular, the creation of easy-to-use interfaces to new computing paradigms such as GRIDs and the specialization of technologies like optimization and scheduling tools for the needs of SMEs is one of the most effective approaches. An interdisciplinary mediation between universities (and the research world in general), service companies, and SMEs can be an effective technology transfer approach for such high technology and high-knowledge content services

SERVICES

Services are one of the upcoming elements of economic activity and value creation in western economies in the 21st century (approximately 70% of GDP and employment). Successful innovation as well as management of advanced services, requires a different skills set than the skills of traditional ICT professions. It requires cross-discipline skills ranging from traditional ICT to management disciplines. The services economy will require fundamental changes in curricula at schools and universities.

PUBLIC PROCUREMENT AND SMES

Public procurement accounts for around 16% of the EU's GDP with a value of approximately 1,500 billion euros. Public procurement projects above certain financial thresholds have to be published in the Official Journal of the European Union. These 'European' public procurement contracts account for approximately 16% of all public procurement. However, the large majority of public procurement contracts, which are of interest for SMEs, fall under national procurement legislation. Up to 78% of the successful enterprises in European procurement are SMEs, while 99.8% of the enterprise population is made up of SMEs. Therefore, there is scope for further measures to help SMEs' access public procurement contracts.

INTEROPERABILITY

To a large extent, 21st century business growth of SMEs will be built on multi-disciplinary partnerships, both within and outside the home country. In order to enable these companies to exchange information at the requested (high) speed, a high level of interoperability is needed. Interoperability is a concern for SMEs.

Collaboration between SMEs and large companies will include the sharing of data (in most cases driven by the large company, for example GM and its suppliers). In order to enable SMEs to work with multiple large companies, a high level of interoperability amongst large companies and between large and small/medium companies is needed. The same request will be made in the research area, where collaborative research models will strengthen the need for interoperability of research data and related information. This means that a sufficient amount of documents and information related standards (data formats, document standards, databases) should be made available for SMEs.

ESIGNATURE

Five years ago, the EU adopted the Directive on a Community framework for eSignature. Although meant to be technology free, the Directive was influenced by Public Key Infrastructure (PKI) concepts (among them digital ID certificates, digital signatures and Certification Authorities), the objective being "to facilitate the use of electronic signatures and to contribute to their legal recognition". Today, we observe that the coexistence of two, possibly three types of signatures combined with the principles of the country of origin and of non-discrimination, served mainly to justify the *status quo ante*, possibly making the legal framework and its national implementation redundant.

RECOMMENDATIONS CONCERNING SMES AND ENTREPRENEURSHIP

1. Entrepreneurship should be encouraged throughout the EU by ensuring that training on entrepreneurial skills are taught to students in the technical and scientific fields and that training in entrepreneurship skills is provided to start-up ICT SMEs. Business Angels type of financing should be supported by tax incentives as it helps "would be entrepreneurs" with the support of experienced entrepreneurs.
2. SMEs should be encouraged to take-up and use ICTs, for example, through awareness raising programmes, conducted by Member State government bodies as well as the European institutions in collaboration with chambers of commerce, industry, and trade associations. Further steps can include the provision of financial incentives like consultancy vouchers, and the creation of neutral one-stop shops to provide information on the benefits of ICT usage and case studies.
3. Member State governments should encourage European ICT SMEs by simplifying public procurement requirements and by making payment and selection procedures more efficient. Some preference should be given to ICT SMEs in public procurement.
4. The framework for fostering the development of Europe-wide electronic signatures and eIdentity should be improved to facilitate more electronic transactions and build confidence in ICT services.

A SINGLE REGULATORY ENVIRONMENT

The free movement of goods, people, services, and capital is a fundamental principle of the European Union. It is these four freedoms as set out in the EC Treaty, which form the basis of the Single Market.

The ICT sector is characterised by convergence across platform, services, and even national borders. Despite this convergence, a lack of coherence in the way that legislation is implemented has led to a fragmentation of the European ICT market, with companies often effectively prevented from implementing Europe-wide strategies. The lack of harmonisation and the multitude of possible solutions that impact SMEs create a real barrier for them. For all market participants involved this adds costs, hinders development and slows the deployment of new ICT solutions and services.

When it comes to the ICT sector, Europe is still a patchwork of countries functioning under different regulatory systems. In many cases, the Member States have failed to establish a common framework allowing technology companies to benefit from one set of standards and rules as is the case for example in the USA or Japan. Of course, in certain cases, measured up against the principles of subsidiarity and the interests of other stakeholders, total European harmonisation would not necessarily hold up. If the member states implement a European regulation or standard they tend to differentiate it locally to adopt it to local laws and business habits, with the result that for global business the advantage of uniformity in production and operations is lost. This perpetuates a fragmented European market and therefore generates numerous obstacles to European competitiveness, as companies simply cannot implement strategies or solutions on a European or global scale. Such fragmentation reveals the Member States' tendency to continue to think and act based on national instead of European considerations. It contrasts in particular with Internet solutions that by definition do not recognise physical borders.

REGULATORY STRUCTURE

Digital convergence is changing the business of traditionally separate industries such as media industries, software industries, network operators and other service providers as well as consumer electronics and ICT industries. All these industries are in a process of radical transformation and are all looking for new positions within the digital convergence space and in the new emerging value chains. The traditional borderlines between these industries are blurring and the way that value is generated and captured is being challenged. In this environment, many existing business models are under pressure.

In the newly emerging environment, markets are evolving towards a horizontal structure. The traditional vertical market structure (telecommunications, broadcasting and the Internet) is being organised into open systems around different capabilities: content creation, service provision, delivery, and consumption. It has also revolutionized new ways of consumer participation and open collaboration that can foster innovation. Some of the new horizontal markets are international. A satellite or a web server may reside outside the relevant jurisdiction. For example, video on demand services can be distributed across borders and can be translated into any language. However, existing business models are still based on market segmentation. While this is sometimes due to differences in culture and tradition, the existing copyright regime supports this segmentation – and sometimes makes it a necessity. As long as copyrights remain national, it will be difficult to achieve a truly European market in copyrighted content.

MARKET FRAGMENTATION

Currently, there is a fragmentation of the ICT services, hardware and software markets, and a lack of semantic and organisational interoperability among Member States. The full potential of convergence can best be promoted by avoiding fragmentation of national markets for information technology-based services and products through concrete actions by all stakeholders. Industry needs economies of scale to create affordable products and services. Interoperability is the main counterforce to fragmentation, which can act as an impediment to the "network effects" opportunity in the new converging services to boost European competitiveness. Interoperability favourably influences intra-European and extra-European trade as it supports the cross border movement of goods and services.

CONSTRAINTS ON PRODUCT DESIGN

Information and Communication Technology has a central - perhaps predominant - role to play in eventually reaching sustainability and improvements in the quality of life. The evaluation of the economic, environmental, and social impacts of ICT highlights a series of critical junctures at which action on the part of business and government is necessary if the environmental impact of ICT is to be minimised and the positive opportunities are to be fully exploited. There is a range of policy tools available to government and business in attempting to influence the development of ICTs and their impacts. Maximising the potential of ICTs to promote sustainable development will depend on how these policy tools are implemented, and the degree of co-ordination between different levels of government, business, and other policy actors such as NGOs.

INEFFECTIVE TRANSPOSITION OF EU LEGISLATION

The costs generated by the lack of homogeneity in the European regulatory landscape negatively impact industry investments in the Member States. There are increasing problems with ineffective, incoherent, and disparate transposition of European directives, from copyright to electronic waste.

Recent years have seen an increasing amount of legislation imposing requirements on industry for the purpose of law enforcement. It is important that such obligations are developed in close cooperation with all stakeholders concerned as they can have a severe economic impact on market players as well as on consumers.

COPYRIGHT LEVIES

Copyright Levies have been applied in some EU Member States since the 1960s to analogue copying equipment/media to compensate for legal private copying. The scope of private copying exceptions varies dramatically between EU Member States. The UK, Ireland, and Luxembourg, for instance, work with a narrow private copying exception and impose no levies. In order to compensate right holders for economic harm from legal private copying that might occur to them because of the exception; the EU Copyright Directive prescribes "fair compensation" to right holders. The Directive, however, certainly does not establish a requirement to introduce or continue levies schemes to compensate for the possible prejudice to right holders caused by private copying. On the contrary, the "fair compensation" approach was meant to be new and different to the old system of "remuneration" which was the legal basis for levies. However, in practice, the 'collecting societies' are increasingly imposing levies on any electronic equipment and media sold in the Member States which is capable of allowing consumers to copy works protected by copyright.

TRADE BARRIERS

Despite the service sector's large share of the economy, services account for only 20% of intra-EU trade. Trade in services at a global level accounts for 20% of exports. One reason for the low level of trade in services is that significant trade barriers exist across a range of services sectors in many countries.

EU Regulatory Framework for electronic communications

While the ICT Task Force was preparing this report, some of its members and the European Commission were undertaking a review, as part of a separate activity, of the EU Regulatory Framework for electronic communications networks and services. Therefore, the Task Force was unable to examine this particular topic and consequently will not make any specific recommendations.

Recommendations for a Single Regulatory Environment

1. Deliver a regulatory environment in order to benefit from ICT development and digital convergence, which facilitates convergence, improves the European knowledge base, and builds conditions for an inclusive information society in an increasingly competitive global environment.
2. In the context of the 2007 Reviews of the Copyright and Consumer Acquis, take the opportunity to review the balance between the interests of the public and that of right holders, and strengthen and clarify consumer rights in the digital environment.
3. Regulatory authorities should ensure competition in ICT markets ensuring consumer welfare and encouraging investments.
4. Foster the creation of an Internal Market for knowledge intensive services beyond the provisions currently discussed in the Services Directive.
5. The establishment of the European Forum on Services in the Internal Market (EFOSIM) is welcomed and the ICT Task Force encourages Directorate General Internal Market to continue this effort as a sounding board and forward-looking "think-tank" on the service economy in Europe.
6. Lift regulatory barriers to the delivery of quality digital content through new online distribution channels in order to benefit fully from the potential offered by electronic business.
7. Create a tax environment to support the service sector. Where appropriate, a R&D tax credit that includes R&D in services and business processes should be implemented. The EU must ensure that tax laws do not hinder the development of an efficient domestic service sector or discourage service exports.
8. Secure an ambitious outcome in the WTO Doha Round, including significant market-opening commitments in services from as many countries as possible.
9. Support the European Commission in its initiative to reform the copyright levies system in the EU and issue additional guidance for Member States on the determination and application of fair compensation for private copying in the digital environment to address the ICT uptake barrier they create, particularly given the fact that levies can create significant trade distortions and obstruct the free flow of goods within the Community. While the Community has established rules in this area in recent copyright legislation (Directive 2001/29/EC), these mandates have not been implemented at a national level and further guidance is needed.

INTELLECTUAL PROPERTY

The ICT Task Force started from the premise that intellectual property protection is widely recognised as a key driver of innovation in the ICT arena. The ICT sector produces a full spectrum of products including hardware, software and services, and companies in the ICT sector pursue a large variety of business models.

While the Task Force recognised that positively proving a direct link between IP protection and innovation represents a challenging task, empirical data and evidence in support of this premise was identified. Studies performed by independent authoritative researchers came to different conclusions depending on the context. In some contexts, some forms of IP protection are beneficial to innovation and economic growth; conversely, in other contexts other forms may have a negative impact on innovation, in particular if there is a lack of patent quality or an abuse of the IPR system.

Particular tensions in the discussion of the ICT Task Force were caused by the participants' different business models, and respective IPR considerations. Some business models (e.g. service based business models or open source) favour free or easy access to all IPRs. Other business models rely on an IPR regime to protect their investment in new technologies and products. Ultimately, some companies operate simultaneously under both business models.

Due to the scope of the issues involved and the diversity of opinions that emerged from the discussions, the ICT Task Force recognises that certain issues remain too controversial for consensus at this time. The ICT Task Force has therefore tried to clarify or at the very least identify those issues which require additional debate and insight. At the same time, the Task Force would like to stress the importance of upholding, and, where necessary and feasible at the present time, improving the legal certainty, quality and accessibility, including the cost, of the existing IPR regime in Europe, notably for SMEs.

In the absence of broad agreement, no major changes should be made to EU legislation in the IPR field until the various controversial issues are resolved. Where broad agreement might exist in the future, the appropriate EU or European authorities should consider action.

In particular, the proposed EU legislation on criminal sanctions should be reconsidered - at least in its scope. To the extent that the EU has competence in this area, the following should be considered:

- The scope of any Directive on criminal sanctions for IPR infringements should be limited to wilful trademark, counterfeiting and copyright/design piracy,
- Otherwise, the ICT Task Force believes that criminal sanctions in the IPR field should continue to be left to Member States´ legal systems. This should hold true in particular – although not exclusively – for patent infringement.

Regarding the use of the existing IPR regime, the Task Force's major findings are:

- The enforcement of existing IPR notably at the EU's borders is a key objective to safeguard the competitiveness of European industry.
- The impact of the Internet on existing IPR is an area for further investigation.

In terms of improving legal certainty, quality, and accessibility of the IPR system, the Task Force advocates the following, in particular:

- Accelerated implementation of the London Protocol and carefully considered progress on the European Patent Litigation Agreement as key mechanisms for achieving facilitated access for all companies.
- Locally focused information campaigns tailored to the specific needs of SMEs.

Furthermore, the Task Force identified the following issues as being particularly controversial:

- The link between IPR and interoperability, even if the key European ICT industry recognises the success of the existing system. The ICT Task Force recognises that any IPR policy of standard organisations that undermines the widest participation in standardisation efforts thereby increasing the problem of availability of essential IPR must be avoided.
- In the same context, the definitions and practices of open standards and open source.

IPR, Open Standards, Interoperability and Open Source

There are various opinions about the links between IPR, open standards, open source licensing, and interoperability. Starting from the assumptions that interoperability is an important market feature for all industrial and service sectors, including the entire ICT industry, and that there is an assumed benefit for consumers. One of the Task Force's preliminary conclusions concerning "Open Standards" is that they are ways of achieving interoperability.

However, the definition of "Open Standards" is still a controversial point. Such a definition is understood as being linked to IPR policies of the different ICT standards organisations as well as the participation and management rules of these organisations. There is a fundamental debate regarding the way that interoperability can be achieved and the role of open standards in this. The Task Force identified multiple options for achieving this objective, often reflected by different business models. These reflect differing views on the role of the ICT industry in standard-setting procedures which the Task Force believes requires clarification.

Some basic delimitations between the Open Source licensing model and notions of Open Standards were identified, but details, including their relationship and the effect on interoperability, innovation, and users´ choice, must be elaborated.

Recommendations concerning Intellectual Property

1. Criminalization of Patent Infringements – IPR Directive. Ensure that the scope of any Directive on criminal sanctions for IPR infringements should be limited to wilful trademark counterfeiting, copyright, or design piracy.
2. EU Patent Reform
   - Enable enhanced access – for all players – to the European patent system by the accelerated implementation of the London protocol and careful progress on the European patent litigation agreement.
   - Create a new, specialised 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, and especially by making some careful progress on the European patent litigation agreement.
   - The costs of patents, and in particular the translation costs, should be reduced substantially by promoting the adoption of the London protocol and the quality of the patent system should be improved.
3. Fighting counterfeiting and raising awareness on the value of IPR. Continue to improve and extend enforcement of existing customs and border rules while ensuring that public authorities have adequate resources and are fully committed to fighting piracy and counterfeiting. In doing so, work toward a meaningful implementation of EU and international enforcement obligations, develop collaboration with industry to tackle specific cases of counterfeiting and piracy, and continue efforts to address piracy and counterfeiting problems in third countries. Raise public awareness for the value of IP and the scope and impact of piracy and counterfeiting, in particular for SMEs, the media and policy makers, by encouraging the creation of an ICT industry platform that supports and pursues the above objectives.

INNOVATION, INVESTMENT & FINANCE

INNOVATION

The ICT Task Force confirms that innovation in ICT is crucial for Europe's competitiveness, and social and economic growth. Innovation in ICT must be supported by strong political leadership at all levels: pan-European, Member State, and regions. Moreover, the Task Force firmly believes that Europe needs a strong "Push-Pull Innovation policy", in part by supporting and carrying forward the key actions announced in the recent EC Communications on Innovation and the "Aho Report- Creating an Innovative Europe", and the additional measures presented by the Task Force elsewhere in this report.

It must be noted that, in general, the European Union has a number of strategic advantages including its worldwide leadership in ICT equipment and services, which must be better leveraged to respond to Europe's current social and economic challenges. For example, Europe today has an excellent ICT infrastructure with over 80% broadband territorial coverage in most Member States, a skilled population, technology expertise in key areas such as telecommunications, consumer electronics, and semi-conductors. Europe however also has a number of social and economic challenges including an ageing population, high expectations with regard to quality of life in particular in healthcare, environmental and transportation concerns. ICT provides a number of solutions to respond to these challenges, and the leadership and technology expertise all remain available within Europe's borders.

The Task Force strongly believes that ICTs can respond to Europe's current social and economic challenges, and permit European citizens to readily access innovative solutions, which address key daily concerns including health care, environment, transportation, and rural isolation.

INNOVATION AND CURRENT INITIATIVES

Two important reports have recently been published addressing the issue of Innovation in Europe: "The Aho Report - Creating an Innovative Europe " and the discussion note addressed to the informal Competitiveness Meeting of the Finnish Presidency in July 2006 "Demand as a Driver of Innovation- Towards a More Effective European Innovation Policy". Both reports highlight the importance of Innovation to Europe's Competitiveness but also draw on key "push-pull" aspects of R&D and Innovation.

The European Commission also recently published a Communication on Innovation "Putting knowledge into practice: A broad-based integration strategy for the EU". This Communication lists 10 broad action points on how to improve the framework for innovation in Europe with particular emphasis on: education, labour mobility, funding tools (structural funds, state aid, tax incentives), a favourable regulatory framework for key areas such as Intellectual Property Rights (IPR), lead-markets and public procurement.

These initiatives are critical to Europe in order to leverage the worldwide leadership areas that Europe currently holds in the ICT domain. The ICT Task Force fully endorses in particular the "Aho Report" and the EC Communication, and strongly urges that the European Commission and Member States take these concrete actions forward.

INNOVATION, PRODUCTIVITY GROWTH AND GLOBAL COMPETITION

It is widely accepted that innovation is central to the growth of output and productivity. According to recent studies, the US achieves around three times the productivity payoff from ICT compared to Europe, with around two-thirds coming directly from ICT services. It has also been widely accepted that investment in ICT underpins future economic growth thus allowing European citizens and customers to benefit from new services including better public services, enhanced democratic processes, improved service quality, and lower prices for existing services. ICT is also considered a key factor in facilitating European integration by allowing more effective cross-border provision and procurement of services.

However, Europe is currently investing less than other major regions in innovation, research and development. According to European Commission statistics, in 2003, EU R&D intensity was 1.93%, well below the US (2.59%) and Japan (3.15%), but above China (1.31%). Moreover, according to EC reports, if the EU continues investing at the same rate, China will soon catch up in terms of GDP allocated to R&D. Innovation in Europe must therefore position itself in the larger global market in order to respond to global competition, in particular from low-cost countries such as China.

LACK OF INNOVATIVE CULTURE

One of the first reasons explaining the lower level of investment is the lack of an "innovation friendly market". The market does not sufficiently reward innovation leaders. Other reports point to the weakness of the innovation culture in Europe, despite efforts made by companies in the ICT sector to compensate for this. There is also a lack of access to risk capital. There is a lack of incentives for venture capitalists to invest in Europe's ICT sector. According to a recent ranking of the most innovative companies, only three European companies are in the top 20, and only one of them is in the ICT sector.

An innovation culture cannot only be promoted through a top-down approach; it has to be developed at the level of each enterprise as well. Innovation has to go beyond technical aspects; it has to be built on innovation friendly company cultures. Such a culture is characterised by features such as failure tolerance, interdepartmental teams and networks, no status symbols, horizontal instead of vertical career paths, open and transparent information flows, high density of informal communication, tolerance towards diverging opinions, etc. A company culture that promotes diversity, creativity, develops individual potentials, encourages thinking "out of the box", and overcomes traditional silo mentality is required.

INNOVATION AND R&D

The ICT Task Force has only scratched the surface of what ICTs can do to improve people's lives and how they can drive growth and opportunity not only across Europe but also across the globe. It is also known that innovation is the heartbeat of growth and opportunity. In fact, the role of innovation in economic growth and productivity is well established. Nevertheless, for innovation to thrive, local conditions must be supportive. Research shows that economically powerful innovations originate primarily in advanced economies where commitments to a "knowledge capital eco-system" are strong. These commitments include investments in research and development, developing greater manufacturing capacity, barriers to starting new business models and services are relatively low, investing in human capital and respecting intellectual property rights (IPR), as well as having a stable and predictable regulatory environment that promotes investment and competition.

ICT relies on R&D more than any industrial sector, and the very nature of the industry requires short innovation cycles, which respond to new market demands. This intensity is outstanding compared to other important industries such as the automobile and chemical sectors. ICT is also the innovative driver of applications in other key sectors. Its effects are therefore horizontal on society and business at large.

INNOVATION AND MANUFACTURING

There is a converging industry view that there is a very strong relationship between advanced R&D, innovation, and leading edge manufacturing that is the prerequisite for competitive success in the global market today. The semiconductor industry is a key industry in Europe for the entire ICT innovation cycle, with a major enabling role and specific R&D/manufacturing situation. The capability to design and produce chips using the most advanced technologies requires very sophisticated processes and production equipment that a scientific laboratory is unable to provide: *The Fab is the Lab*.

Therefore, ICT manufacturing, and in particular semiconductor manufacturing, faces the challenge of providing the most advanced technology and production capability while at the same time having access to significant capital investment in order to assert its competitive advantage versus other world regions. This warrants specific measures dedicated to securing a global level playing field with other industrialized regions in the world, achieving strong support for Europe's manufacturing base and strengthening ICT clustering potentials. Where research and manufacturing meet, effective networks between companies and research institutes emerge, attracting engineers, researchers and academics to share knowledge and experience, thus stimulating and accelerating the innovation processes in a geographic area. The proximity of research and manufacturing facilities benefits technology transfer and the creation of an ecosystem of global centres of excellence.

SERVICES

The services sector in the EU is growing considerably and now accounts for over 70% of total EU economic value added. Over 70% of EU employment is in the services sector and this figure is set to rise in the coming years. However, traditionally considered as a heterogeneous 'left-over' collection of activities, the services sector has, until recently been a neglected area of economic policymaking. An urgent call for action to become more systematic about services innovation is necessary. This also requires a reconceptualisation of what is understood by R&D and R&D support programmes.

HUMAN FACTOR IN ICT SECTOR INNOVATION.

There is a European working-life tradition, which, to a greater extent than in other parts of the world, values dialogue and good relations as strategic production factors. This capacity and willingness to cooperate should constitute a basis for a successful innovation policy for economic and social progress. This approach results in countries that have, in relation to the surrounding world, greater manpower costs being able to develop compensating IT strategies, where technology can improve employee knowledge and learning needs. The "human factor" within an ICT context therefore has a decisive role since innovation arises from complex interactions between individuals, companies, research institutes, customers, and suppliers. Europe will need to assess strategies to keep talented innovators in Europe, and prepare for a new generation of home-grown innovators. The conditions for research and researchers in Europe must be world-class.

RECOMMENDATIONS FOR INNOVATION

1. The EC must play a key federating role in fostering better exchanges of "innovation best practices" between Member States and regions. This includes:
    - Any Member State that wishes to replicate innovation best practices in other European regions should be encouraged to do so.
    - In the long term, the EC could consider a "light" and flexible European Innovation Agency, which would have the main objective of making regional best practices known, and federating stronger links between regions, with the overall objective of pushing large-scale European projects with global leadership ambitions in key ICT sectors (eHealth, eMedia, Mobile TV…).
    - The EU should push existing funding mechanisms (cohesion and structural funds, state aid, tax incentives, EIB loans) across European regions for innovation initiatives.
2. Ensure that innovation in R&D is rewarded through appropriate means such as tax credit schemes for R&D and support for technology clusters as global poles of competitiveness.
3. Prioritize and support effective collaborative R&D partnerships by strengthening European Technology Platforms (eMobility, NEM, NESSI…) that are currently being developed and new Joint Technology Initiatives (Artemis and ENIAC) and ensuring the funding for projects in the upcoming EC Seventh Framework Programme for R&D.
4. Prioritize leading edge markets and a European public procurement policy. With Europe's current enormous social and economic challenges (ageing population, rural isolation, transportation, environment, security…), public authorities must play a leading role by launching innovative markets with important growth potential. Current initiatives are fragmented across Europe and need to be leveraged on a pan-European scale in order to respond to increased European large-scale private investment and citizens' demand for these services.
5. The semiconductor industry is a key industry in Europe for the entire ICT innovation cycle, with a major enabling role and specific R&D, manufacturing situation. Specific measures are needed to securing a global level playing field with other industrialized regions in the world, to ensure stronger support for manufacturing and strengthen ICT clustering potentials.
6. Launch a specific action to develop ICT services for innovation in Europe. This includes providing research funding for innovation in services at all levels (European and Member State), create an academic discipline and research area aimed at improving the teaching of services innovation, create measures to promote entrepreneurship and learn from best practices in other Member States.
7. Focus on the Human Dimension of ICT by developing a shared vision with all stakeholders regarding the human factor impact on the innovation process. This includes promoting schemes for lifelong education and training, establishing IT councils between industry and higher education institutes, and creating specific education initiatives aimed at attracting postdoctoral experts in Europe.
8. Firms and universities should be encouraged to form longer-term R&D partnerships, which reduce the transaction costs of negotiating individual collaborative projects and foster the building up of mutual trust. These should seek to ensure academic freedom and creativity and provide a more professional interface from universities to industry that respects agreed goals and deadlines.

INVESTMENT AND FINANCE

The lack of investment in R&D is perceived to be one of the problems for the future development of the ICT sector in the EU. R&D and innovation in ICTs is not only an issue for integrated and well-capitalized companies. Research institutions, innovative SMEs and governments have also played a capital role in innovation, more than in other sectors.

Investment in the development of next generation -access and core network infrastructures, service platforms, and new service propositions is essential for the delivery of new services to professional, residential and public service markets in the future. Their success will largely determine the future competitive position and welfare state of Europe and the success of its ICT industry and European industry as a whole in the global competitive environment. Completion of the Information Society objective will act as a strategic advantage for Europe.

RECOMMENDATIONS FOR INVESTMENT AND FINANCE

1. Reform EU state aid policy to create a global level playing field. A single category "industrial R&D" with allowable aid intensity of at least 50% should be created. This category should speed up the innovation process to face global competition and should include the development of commercially usable prototypes, pilot projects, experimental production, and product testing.
2. Use trade associations, chambers of commerce, and local banks by making them prime actors in the dissemination of information on finance to all companies whether small or large.
3. Promote investment in broadband infrastructure and services throughout the EU, in rural and urban areas: competing fixed and wireless access networks and services to ensure availability, capacity, and choice for European citizens and businesses.
4. Ensure a global level playing field for ICT investments, including R&D and manufacturing investments, in particular in the case of the semiconductor industry by creating a specific Sectoral Framework for the Industry. This should implement policies that facilitate access to, and availability of, short and long-term risk capital able to attract new and ongoing investments in strategic electronic manufacturing and counterbalance artificial advantages that other world regions provide.
5. Create a venture capital friendly environment to support the entry and growth of new entrepreneurial firms. The Aho Group Report suggests the creation of a "Single Fund" structure.
6. Encourage the larger ICT corporations willing to act as partners with VC to boost these ICT/SMEs.

STANDARDS

Interoperability policy discussions have advanced in recent years to identify distinct areas that involve a variety of market and government considerations and often require different policy responses and actions by different stakeholders. Specifically, interoperability issues can be categorised as technical, legal, semantic, and organisational. The industry remains primarily responsible to deliver technical interoperability to meet market needs. Technical interoperability has advanced in recent years, but at the same time, the complexity of the ICT industry and concerns about fragmented markets also continue to increase. These are important issues for the ICT industry and for ICT uptake, yet they are not unique to the European market and do not themselves explain differences of ICT uptake between Europe and other regions. On the other hand, the legal, semantic, and organisational interoperability issues that exist in Europe have a more direct impact on the differing levels of ICT uptake in this region vis-à-vis the rest of the world. This section addresses these distinct aspects of interoperability separately.

LEGAL, SEMANTIC AND ORGANISATIONAL ASPECTS OF INTEROPERABILITY

Differences between EU member states in regulatory requirements have slowed the widespread usage of some technologies (for example, digital signatures). Lack of agreement on semantic data requirements, and organisational differences between administrations, have hindered the European uptake of available technology that could improve productivity. While this affects all vendors, SME producers in particular are less able to develop separate solutions for 25 countries, depriving them of the opportunity to serve a wider market of 450 million users, and SME customers cannot cope with multiple forms and requirements (eInvoicing is a typical example). In areas of electronic authentication or electronic payment, more focus is needed on consistent legal and semantic interoperability in order to enable increased uptake across the EU.

In Europe today, as in the global ICT marketplace, while broader connectivity and other developments have already achieved the result that a certain level of technical interoperability exists, perhaps to a greater degree than at any time in the past, interoperability nevertheless continues to be an important and growing challenge. Much has been achieved as the industry has responded to customer and government needs for greater technical interoperability, and new technologies have evolved that enable better interoperability. However, due to the huge opportunities made possible by the two components of convergence – digital information and universal connectivity – the reach, scale and complexity of what can and should be made interoperable in order for the ecosystem to deliver the benefits of convergence has grown even more. Therefore, interoperability is now more important than ever before and sustained efforts are called for towards ensuring that interoperability is broadly implemented in products and services while taking into account other important objectives such as incentives for innovation and security.

At the same time, the ICT sector continues to innovate and launch new products and services at an unprecedented speed, and as ICT uptake is an important overriding policy objective, it is appropriate for policy makers to continue to monitor developments in this area. Many ICT products and services result from close industry collaboration in standardisation groups or direct collaboration among competitors to test products or to license intellectual property, and policymakers should continue to encourage such collaboration.

RECOMMENDATIONS FOR STANDARDS

1. Ensure that any policy effort relating to technical interoperability should encourage broad stakeholder cooperation and voluntary market-oriented solutions to achieve the goal of interoperability rather than implement legislation defining the specific means to achieve it. In support of industry-led efforts, the EU and the Member States should maintain a policy priority for interoperability along with other key objectives such as innovation and security, support industry-led standardisation, and promote the widespread adoption of standards in products and service implementations.
2. Give greater priority to the current efforts underway in the Commission to address technical, legal, semantic, and organisational interoperability issues. This should include work to understand the requirements of interoperability. In order to support industry efforts towards interoperability, regulators should commission projects to identify the key enablers of interoperability in the converging networked marketplace, set targets in dialogue with service providers and ICT and software industry, and measure the achievement of interoperability in services and devices for those enablers over time, across delivery channels, service and device types and national borders.
3. Promote effective conformance systems, including an option for a Supplier's Declaration of Conformity (SDoC), that account for and leverage existing best practices, that account for an understanding of the perspectives of the regional and global marketplace. In this respect, national regulators are encouraged to seek alignment of principles for product approvals and implement adequate market surveillance activities as a complementary tool to the suppliers Declaration of Conformity instead of considering enforcement of certification schemes.
4. Support current efforts by the European Commission to stimulate a wide and harmonized application of eGovernment, as outlined in the European Commission's April 2006 communication on an action plan for eGovernment for i2010, in particular by undertaking the announced revision of the European interoperability framework for pan-European eGovernment services including its proposed definition of open standards to contribute to the development of a technical framework that guarantees interoperability for eGovernment applications and permits the development of heterogeneous computing environments in which commercial and open source software based solutions have a role to play.
5. Develop procurement policies that promote interoperability through purchasing solutions, focus on interoperability of IT systems, provide a variety of interoperable technology choices in eGovernment applications, and evaluate open source solutions on an equal footing with commercial software solutions in public sector procurement.

SKILLS AND EMPLOYABILITY

With the re-launch of the Lisbon Strategy in 2005, the European Union has taken on an immense transition task to catch-up with necessary progress towards the 2000 Lisbon objectives and build a globally competitive knowledge-based economy to create more jobs and growth.

ICTs represent one of the keys to achieve this goal. Employing about 3% of the EU 15 workforce in 2003, the ICT sector is an important industry with a high growth potential in itself. While the Western European IT market is expected to grow at an annual average rate of 6.1% until 2008, the Central and Eastern European markets are expected to swell by 13.2%, which could result in almost 1 million new jobs in the EU's ICT sector.

More importantly, ICT has significant indirect effects on productivity, knowledge diffusion, and innovation across the economy. ICT is driving a rapid evolution in product design and process by embedding both automation and intelligence into nearly every product and service. In addition, tackling and solving some of the world's toughest challenges needs ICT-literate scientists, economists, doctors, engineers and architects. As a result, a steadily growing demand for people with "e-skills" (ICT and e-business skills) is a long-run trend for businesses of all sizes and sectors, and in the public sector. Similarly, non-ICT related professions increasingly require at least basic user e-skills.

Innovation and ICT uptake in Europe are thus highly dependent on the e-skills of the workforce, in terms of practitioners and users, as well as ICT-related business skills. However, evidence points to growing e-skills gaps (either a shortage of absolute numbers of ICT workers, or a mismatch between supply and demand of specific skills). Europe's educational and professional training systems do not sufficiently deliver the 21st century skills needed to ensure workforce competitiveness and economic innovation. If not addressed, e-skills gaps risk slowing Europe's productivity growth and holding back business development and the competitiveness of European companies in the global market in virtually *all* industry sectors.

Moreover, the transition to a knowledge-based economy will make education and training a lifelong process rather than a one-off activity. Where knowledge becomes the main value driver for business and the key to being employable over the duration of a working life, technology-enabled learning (eLearning) can significantly contribute to lifelong learning and make it a reality – if it is effectively and consistently promoted and can build on the necessary ICT user skills of learners.

AN ENABLING ENVIRONMENT FOR ICT PRACTITIONERS

Demand for ICT practitioners reached a peak in Europe in 2001, but the burst of the financial bubble and the recession of 2001 considerably affected investment in ICT. The bottom of the cycle was reached in 2003. The situation is now improving, although statistics from various sources indicate that possible skills shortages in certain segments of ICT practitioner, especially advanced practitioner skills, could pose a very serious challenge to the European economy if nothing is done to remedy the situation.

Micro-level statistics cannot hope to provide a comprehensive picture of the supply and demand for e-skills. Nonetheless, they do provide important glimpses of specific needs and support the case for concerted action to address the resulting challenges to the European economy. The data currently available needs to be urgently supplemented by macro-level data covering the wider e-skills situation if a comprehensive view of e-skills needs is to be drawn up. To date, there has been relatively little consistent cross-country analysis of e-skills and employment owing to differences in definitions, classifications, and data sources as well as their rapid evolution. e-skills statistics and predictive studies require further improvement and increased co-operation especially between statistics offices and private sector analysts.

Another factor to be taken into consideration in planning future e-skills needs is the emergence of new technologies and business models, which will give rise to new high-level specialisations. New trends, including software delivered through network services and dual core technologies, are likely to shape evolving skills needs in ways that we are not yet able to predict. Close collaboration will be needed to ensure that evolving skills needs are monitored and addressed on a highly dynamic basis by all stakeholders.

STIMULATING THE INTEREST OF FUTURE GENERATIONS IN ICT

Europe's comparative productivity and competitiveness will increasingly depend on how effectively and efficiently technologies are developed and used by present and future employees and managers, particularly given the rapid ageing of the European population and the resulting loss of workforce.

The volume of students in Computer Sciences and Electronic Engineering disciplines is generally judged insufficient to satisfy projected labour market demand: Eurostat figures indicate a shortfall of at least 100,000 graduates for the year 2004-5, although this figure is probably a significant underestimation. Moreover, data from the UK, Sweden and Germany shows that the number of students starting ICT/Informatics education is significantly decreasing, implying a future decrease in new supply from the formal education system in these countries. These shortages must be resolved by attracting a relevant number of students to learn ICT practitioner skills.

Moreover, today's European pupils and students – tomorrow's workforce – do not sufficiently acquire both ICT user and business skills, and the wider set of employability skills that European employers and enterprises need for future competitiveness, i.e. teamwork, collaboration, and analytical problem-solving skills.

The education system needs to deliver these 21st century skills and improve the motivation of students to acquire these skills. It is a first step in the right direction that in the 2006 Lisbon Progress Report on Jobs and Growth, e-skills and eLiteracy programmes were proposed in the majority of member states to address perceived shortcomings in the integration of ICT knowledge into school curricula. However, employers, academia, and governments must articulate much more clearly the need for 'real-life' employability skills and the role of ICT tools and learning in gaining these skills.

For Europe to realise its full potential as a knowledge-based economy, it needs a knowledge economy workforce – one in which all citizens have the necessary ICT user skills and future generations gain these skills as part of their education.

While there is consensus that Europe needs greater numbers of people with more advanced ICT practitioner skills who provide the infrastructure and innovation needed for the knowledge economy, it is often forgotten that a region's competitiveness is strengthened if technology skills are embedded throughout the population. This includes those with very basic skills.

It is because of considerations around Europe's competitiveness basis, and not only because of the need for social and digital inclusion, that Europe urgently needs to increase the employability skills and opportunities for millions of low skilled people. This is especially about the 6 million early school leavers, the 20 million long-term unemployed in the EU, and those in low-skilled jobs where international competition is increasing the risk of wide spread long-term unemployment.

COMMUNICATION ON POLICY

For the reasons outlined above, the ICT Taskforce calls upon the European Commission to present a policy communication in the near future addressed to EU Member States and designing a long-term e-skills strategy, and a corresponding e-skills action plan proposing targeted actions for the years ahead, which take into account the recommendations outlined below.

RECOMMENDATIONS TO DEVELOP SKILLS AND EMPLOYABILITY

1. Encourage the ICT industry to create an Industry Leadership Group to facilitate e-skills information and co-operation and pool resources and establish closer collaboration between all stakeholders to develop reliable statistics and forecasting scenarios regarding e-skills requirements at the EU level and the impact of global sourcing to provide a reliable basis for policy decisions and to help labour market participants to take informed career decisions.
2. Increase investment in the professional development of teachers and ongoing teacher support mechanisms. Member States and industry should work together to improve career advice in and around schools and provide better and more frequent training of career consultants. The content of consultations should be based on a more realistic understanding of future opportunities based on robust statistics and foresight scenarios and up-to-date job profiles and career paths. The transparency regarding different qualifications and ICT career paths should be increased by establishing and maintaining an e-skills and career portal to set out European job profiles, map industry-based ICT training and certifications to specific job roles, and integrate existing national ICT career portals.
3. Increase collaboration between industry, governments, employers, and education institutions via multi-stakeholder partnerships to address e-skills issues and with a view to reconciling the "parallel universes" between formal and non-formal education channels.
    - Consider how to develop enhanced e-skills curricula, including via the integration of industry ICT curricula and certifications into formal education. Initiate further research and evaluate good practice in order to promote the development of European quality criteria for e-skills training and certificates in close co-operation with relevant stakeholders.
    - CEN-ISSS should accelerate work towards the EU-wide eCompetence framework and maintain close cooperation with industry (user industries and certification providers) with a view to ensuring eventual compatibility of the framework with formal and non-formal ICT practitioner education and certifications, and to foster increased workforce mobility by facilitating Europe-wide recognition of qualifications.
    - Establish multi-stakeholder partnerships to train the workforce, especially disadvantaged groups (e.g. young underemployed and unemployed workers, older at-risk workers, and people with disabilities) and to help connect trainees to new jobs. These partnerships should also promote access for training participants to internships and work experience in local SMEs and larger businesses. Review how existing EU programmes might be used to fund and support actions related to skills & employability.
4. Continue the efforts already started in incorporating entrepreneurship in educational curricula at all levels. Document best practices on multi-stakeholder partnerships that deliver entrepreneurial skills to individuals and SMEs. Together, governments, industry, and universities must enable the creation of a new academic discipline on Services sciences, Management and Engineering to bring together ongoing work in computer science, operations research, industrial engineering, business strategy, management sciences, social and cognitive sciences, and legal sciences to develop the skills required in a services-led economy. Schools should also be involved in this process.
5. To reduce the e-skills gap between larger organisations and SMEs, notably the smaller SMEs and the less IT-oriented SMEs, and prepare them for increasing use of eLearning, provide the resources to educate and coach SMEs in partnership with IT-SMEs and local support centres, and reinforce European best practice exchange on this.