Ade McCormack

The e-Skills Manifesto

A Call to Arms

With contributions from leading figures in government, education, policy, research and industry.

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TABLE OF CONTENTS

INTRODUCTION

Europe is at a crossroads. It has a number of choices. The first is denial. Denial that its economic power and social model is under threat from emerging economies that are building huge armies of hungry, digital literate innovators who intend to 'eat our lunch' and more.

The second is we accept our fate as a region 'past its sell by date' and accept that the economic power axis is tilting eastwards. Thus the focus moves to bracing ourselves to become a cultural attraction catering to the needs of an ageing population and seeking to attract skilled workers and tourists from the burgeoning middle classes of the emerging nations.

The third and preferable path is to respond to the economic reality of an increasingly digital planet and carve our rightful place in the value hierarchy. Protectionism or attempts to create a Europe-only economic ecosystem will come to naught. We are conjoined to others across the planet. If we are not an amplifier of value in the global supply chain then reality will surely lead to Europe becoming an economic backwater.

This should be no surprise to anyone who pays attention to global affairs. The challenge is of course not which path we should take, but what we must do to progress along the right path. The title of this book might imply that the combination of human capital and digital technologies (e-skills) is the solution. But new technology like new business models, only delivers value when applied. The focus needs to be on value creation through innovation.

Researchers and technology providers have an important role to play. However a return on information technology (IT) investment, whether from a corporate or public perspective, does not come from technology alone. Nor does it come from technology coupled with technologists. It comes from the users of technology. We must keep our 'eye on the prize'. Our focus is not to be the premier region for everything, but to be the 'go-to destination' for e-talent and high value innovation.

That said, our first job is to recognise that e-skills must sit alongside the 3Rs, namely reading, (w)riting and (a)rithmatic as a basic competence that every European citizen must possess. Thus e-skills is not just a challenge for those that 'consume' technologists, but one that applies to every sector and every element of society.

But technologists and the IT sector remain a critical part of the value chain. IT companies provide technologies, and increasingly training to technologists, to the IT function. The IT function brings their business integration skills to bear to deliver tools to their users, who in turn provide value to their colleagues, customers and society. Work back through the value chain and you can see the role human resources (HR) functions and staffing agencies have to play.

Innovation is not just the output of this value chain, but something we must apply to each link in the chain. Those that recognise this will grow exponentially in terms of economic productivity. Others will invest heavily in one or two links of the chain to the exclusion of the others and wonder why they are sliding down the innovation leader board.

Traditionally education was simply a phase in one's life. Today it has a continuous role to play in our personal and professional lives. It also has a galvanising role for all links in the chain. Thus its value impact can have a similarly exponential effect.

This manifesto is structured to reflect what is important. So you will find chapters covering policy, education, competency, societal challenges, management and of course innovation. It also presents the indispensable global perspective.

Europe remains well placed to address the challenges ahead. This is already happening but we cannot rely on a handful of visionaries and the goodwill of a few high profile stakeholder groups. It needs a synchronised approach. Europe's future is in the hands of its citizens. But this human capital needs development and direction. National initiatives serve as beacons for others but a coordinated panEuropean approach will increase the likelihood that Europe continues to 'punch its weight' globally.

Ultimately the biggest danger may not be a failure to see the issue, or to identify the solution needed, but our incapacity to implement them in time. Worst of all is to agree what must be done, but to be unable to decide to do it. Then history will pass us by.

This manifesto exists to raise both awareness of the challenges we face and to provide actionable advice on what needs to be done. I am deeply grateful to the thought leaders and their organisations for sharing their time, energy and wisdom in contributing to this book. I am sure you will find their perspectives stimulating and insightful. Please note that many of the views expressed in this Manifesto are my own and not those of the contributors.

Ade McCormack

CHAPTER 1: THE BIG PICTURE

The Situation

There is broad consensus among stakeholders that e-skills are crucial to boost competitiveness, productivity and innovation as well as the professionalism and employability of the workforce. There is a need to ensure that the knowledge, skills, competences and inventiveness of managers, IT practitioners and users meet the highest global standards and that they are constantly updated in a process of effective lifelong learning.

The demand for e-skills has been growing rapidly in the last decades. In 2008, the total number of IT practitioners[1] in Europe amounted to roughly 3.95 million according to the core definition, approx. 4.78 million according to a broader definition. Their number has more than doubled since 1995. The four largest countries, Germany, UK, France and Italy account for more than half of Europe's labour force, and the seven largest employer Member States (adding Spain, the Netherlands and Poland) account for around 75%. The workforce has increased between 1998 and 2008 by around 77% for the core category and by around 82% for the broad category (Empirica, IDC, (2009) *Monitoring e-Skills Demand and Supply in Europe*).

Leo Baumann, Director of Public Affairs, and Hara Klasina, Manager Digital Economy Policy, both at DIGITALEUROPE, provide more context: "Alarm bells are ringing. In 2006, 47% of EU enterprises recruiting IT specialists experienced difficulties in filling open positions[2]. The percentage of computing students and graduates in the EU has been in decline since 2005. Recent forecasts indicate the EU labour market will face a shortage of up to 384,000 IT practitioners by 2015[3]. It is tempting to see this as a sectoral issue limited to the IT industry. This would be an incorrect assessment."

Total number of computer science graduates EU27 1998-2007

1998	56,923
1999	71,706
2000	82,936
2001	98,672
2002	109,192
2003	122,815
2004	137,460
2005	154,413
2006	150,951
2007	148,029

■ EU27 Computer science graduates all degrees
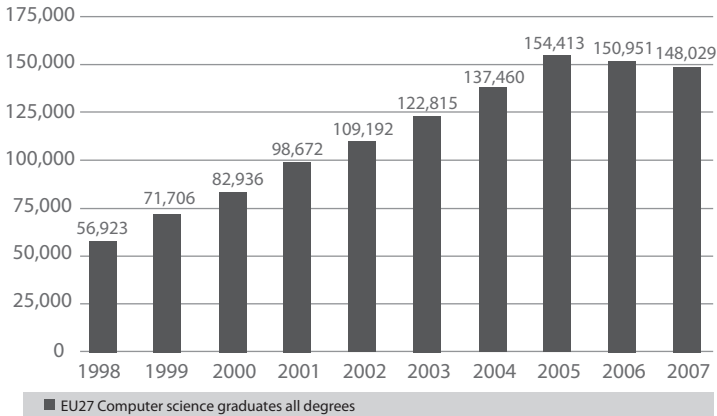
Source: Empirica, IDC, (2009) *Monitoring e-Skills Demand and Supply in Europe*

Spain holds the EU presidency during the first semester of 2010. Francisco Ros Perán, Spanish Secretary of State for Telecommunications and Information Society emphasises the importance of IT: "There is a strong consensus amongst specialists that e-skills are becoming a key component of practitioner skill requirements for new jobs in a global scenario driven by IT. Factors to explain this trend are manifold and mainly related to the role of IT as a general purpose, horizontal impact technology. Actually, IT are pervasive technologies that deliver benefits to organisations both operationally and strategically. They also foster the creation of co-invention loops that lead to complementary assets such as the development of skills to truly enhance the economic potential of the IT investment."

So those organisations, countries and regions that recognise and embrace IT will gain 'compound interest' on their investment. Low and late adopters of IT will thus be severely disadvantaged.

On Competitiveness

DIGITALEUROPE (hereafter referred to as Industry) reinforce this point: "The competitiveness of European Industry as a whole is at stake. Europe's competitiveness depends on two underlying conditions: ongoing productivity growth, and ongoing innovation in products, services, business processes and business models. It is

generally accepted that the application of IT or 'digital technologies' *has become* the primary power driving *both* productivity growth and innovation in every market and sector of the European (and global) economy. Today, the majority of IT practitioners in Europe (55%) do not work in the IT industry itself but in user industries[4] and a large share of the R&D in non-IT industries – up to 25% – actually leads to IT products.[5] Most research today is IT application-based and collaborative. With an 85% correlation between e-skills and competitiveness, Europe must move rapidly to improve the skills of its children, elderly, teachers, practitioners and public administrations."[6]

Francisco Ros Perán adds: "The current context of economic crisis makes e-skills even more valuable, as they make up a very powerful engine for jobs creation. Analysis and foresights on supply and demand of e-skills at European level show that demand will likely outstrip supply in the near future. In relation to this, a recent study[7] has reported that IT will generate 5.8 million new jobs in the next four years, which means that employment growth in IT related jobs will be around three times that of overall job growth for this period.

Jobs and their skills requirements are constantly evolving. Concepts such as critical thinking, multi-tasking, collaboration and team work are increasingly strategically relevant. E-skills can provide the opportunities to meet these fast-changing requirements of the knowledge-based society and achieve a better position to overpass global competitive challenges."

So we need e-skilled people to provide the infrastructure and e-skilled people to use it. An e-skilled society is thus a precursor to a knowledge-based society.

Industry warns, "A substantial shortage of IT workers seriously jeopardises the success of the European economy. It affects the development of high-tech industries and slows down the velocity of innovation, which in turn influences employment and productivity in the related industries. Consequently, the shortage of IT practitioners weakens Europe's ability to compete globally."

Innovation Through Intangible Infrastructure

Francisco Ros Perán reminds us of the benefits of an e-skilled society: "e-skills also play a pivotal role in enabling the design and development of innovative products, processes and services thanks to both users and entrepreneurs. On one side, IT users enhance innovation by displaying their e-capabilities in researching, developing, designing and maintaining IT. On the other hand, entrepreneurs and managers use their e-business skills to ensure a more efficient performance of different types of organisations, to explore possibilities for new ways of conducting business and organisational processes, and to establish new businesses. The ultimate results of all these activities are the enhancement of innovation and the creation of new jobs.

The aforementioned concept of 'complementary asset' is quite related to that of 'intangible infrastructure'. Intangible infrastructures are a type of dynamic, fluid, soft-based infrastructures that develop human capabilities and permit the easy and efficient growth of business activities, permeating many aspects of national capabilities-building. These infrastructures are bound to be crucial in securing progress for our countries in the near future, outstripping the role of tangible infrastructures that were keys to provide platforms for growth in the past.""

Education

Formal education and training systems have not coped with the demand. Computer science graduates constitute obviously the most relevant new labour market supply. But students who drop out of tertiary education computing courses prior to receiving a diploma or other degree have often acquired sufficient informal e-skills to work as IT practitioners, and do so. The number of computing graduates measured as the total of tertiary graduates has risen constantly since 1998 until its peak in 2005. Since then, the total number has slightly decreased by 6,000 to reach a total of around 148,000 computing graduates in 2006. Particularly alarming is the number of female students; less than one in five computer scientists are women.The UK and Spain show a clear drop in the proportion of graduates having taken computing courses since 2003-2004, while other countries, such as Germany, the Netherlands and Poland show an increase in

computing graduates at the same time. In Italy, the share of computing graduates remains more or less stable. Graduates from other fields regularly enter the labour force as IT practitioners, be it from closely-related courses in the field of "science, mathematics or engineering" or "manufacturing and construction" or from other more thematically distant fields, such as in social sciences or the humanities. A rough idea of the importance of non computer-science degree holders might be derived from an available statistic for Denmark where these graduates make up 70% of the workforce in IT occupations.

Two curricula development paths have emerged:

· Industry-led efforts that are driven by IT vendors (e.g. Microsoft Academy and the SAP University Alliance) to develop courses and certification exams that academic institutions can offer – either for free or by paying a membership fee.

· University-led efforts at developing curricula represent efforts that involve universities, industry and government offices to develop curricula that foster e-competences (e.g., IT-Vest in Denmark and the Innovation Value Institute in Ireland).

Finally, curriculum development efforts are part of a broader, more systemic approach at enhancing e-competences. E-skills UK[8] is co-ordinating and leading a number of efforts aimed at building skills throughout the life of learning. Several experts referring also to impressive efforts from Finland (e.g. Aalto University), and Germany (e.g. Karlsruhe University) noted their holistic approach. The types of e-skills required by employers vary constantly. In 2008 a survey addressed more than 3,500 IT managers in nine countries (Australia, Canada, China, France, Germany, India, Italy, Japan, The Netherlands, Poland, Russia, South Africa, U.K and U.S.). The frontrunners were e-skills relating to "security/firewalls/data privacy'" followed by "soft" skills (customer service, sales, project management, communication etc.), "non-specific server technology" and "general networking, network infrastructure". According to a survey[9] by IDC of 533 organisations across Europe conducted in February 2009 , "networking" and "security" skills were the most difficult to find, but systems architects and project managers were also challenging in some countries.

The Future

Industry looks ahead: "As IT and IT-based solutions become increasingly mainstreamed in today's economy, difficulties with the lack of dissemination of IT consequently will affect our future development. Europe's ability to both foster the IT sector and drive the penetration of digital technologies throughout industry and society depend fundamentally on the availability of individuals with the necessary understanding and skills at all levels of the value chain. In view of this objective, the ongoing shortage of IT practitioners is alarming. To harness the opportunities of the digital age, we must change the trend. It is time to give the issue of e-skills the appropriate attention, analyse the underlying problems and act accordingly.

In the next five to ten years Europe will need highly skilled IT practitioners, mainly in the areas of software development and IT services that can contribute to innovation research and development. IT security and data privacy will certainly remain important professional areas. The relevant skills can be acquired through a variety of curricula, from IT degrees to degrees in maths, engineering and other scientific fields. It is important that students receive guidance from top researchers and benefit from early contacts with industry experts. However, it is even more important that people actually decide to pursue such degrees in the first place.

In the context of convincing people to pursue IT degrees, our industry very much welcomes the European Commission's commitment, as laid out in its Digital Agenda, to support European awareness raising activities promoting ICT education, careers and jobs to young people."

Fostering Competitiveness, Growth and Jobs

The European Commission adopted a Communication on "e-Skills for the 21st Century: Fostering Competitiveness, Growth and Jobs" in September 2007 which include a long term EU e-skills strategy following extensive consultation and discussions with stakeholders and Member States in the context of the European e-Skills Forum. The long term e-skills strategy has been welcomed by Member States in the Competitiveness Council Conclusions in November

2007. Stakeholders also welcomed a long term e-skills agenda. The industry has established the e-Skills Industry Leadership Board to contribute to the implementation of the strategy. A related study found that national IT policies tend to focus on developing basic IT user skills. The development of IT practitioner skills is often considered to be part of continuing vocational training policy. They found that nine countries have policies which are aimed at development of e-business skills. Twenty six countries have policies designed for e-skills for users, while eleven countries: Denmark, France, Germany, Hungary, Ireland, Malta, Spain, Portugal, Romania, United Kingdom and Turkey have policies that are specifically aimed at the development of e-skills of practitioners. The study identified a total of 45 initiatives that are specifically targeted at the development of IT practitioner skills.

Good progress has been made on the implementation of the EU e-skills strategy. A European e-Competence Framework has been developed and a European e-skills and careers portal has been launched together with several high-level multi-stakeholder partnerships. New activities have been launched in 2009. These includes actions related to supply and demand (including the development of foresight scenarios) to better anticipate change, the development of European e-competence curriculum development guidelines; the promotion of relevant financial and fiscal incentives. In this vein, the European e-Skills Week was a major awareness raising campaign in Europe to promote e-skills, share experiences, foster cooperation and mobilise stakeholders.

Global Sourcing

A major trend affecting the demand for e-skills is global sourcing. A look at trade balance sheets show that Europe imports more IT goods and exports more IT services and it exports more expensive IT products and services and imports less expensive goods and services. Therefore it is clear that Europe needs highly e-skilled practitioners that can contribute to innovation especially in services. A major factor influencing the evolution of the demand and supply of e-skills will be the effects of the current economic crisis.

There has been a long term trend that is visible since the 1960s beyond all business cycle developments. In the middle of the 1980s

we saw a deceleration and a severe downturn in 2001. Although IT growth rates have in the past followed general economic trends, IT growth rates have until now been performing better than the overall economy in these times (the exception was the Internet bubble burst). In its most recent assessment, the OECD indicates that although IT growth slowed down rapidly in 2008, first signs of a recovery could be detected in mid-2009. For the IT sector it seems that employment in IT manufacturing is experiencing a clear decline, while IT services employment is less vulnerable. IT specific unemployment has stayed way below total unemployment rate at all times.

On average, during the last ten years the IT workforce unemployment rate was around 36% of total unemployment. Since the current crisis is not related in particular to the IT sector it seems reasonable to assume that the unemployment of IT practitioners will most probably not increase above the threshold of around 40-50% of the general unemployment rate (Empirica, IDC, (2009) *Monitoring e-Skills Demand and Supply in Europe*).

Foreign Talent

Industry recognises that Europe needs to look outwards. "Compared to the United States (which issued up to 58,000 new visas for IT occupations in 2006), Europe has been largely unsuccessful in attracting foreign IT talent over the past few years. Out-sourcing and off-shoring are not future-proof solutions to the European e-Skills shortage. If overused, such methods jeopardise the quality of new innovative products and services. Additionally, there are clear indications that countries so far supplementing the IT practitioner shortage in Europe – for instance China and India – will face themselves a severe shortage in the coming years[10].

In addition to securing sufficient professional e-skills in Europe, it will also be important to find ways to upgrade the e-skills of the current workforce. By 2015 90% of all jobs in Europe will require some set of e-skills whatever the industry or service sector[11]."

Weaknesses

Raising our game is a priority, Industry states: "Europe needs to address its current weaknesses, which extend to the three types of skills needed to achieve a competitive and inclusive society: (1) literacy

and basic skills including e-skills, maths and science; (2) occupational skills required for the job market and acquired in formal education, but also increasingly 'on the job'; (3) global knowledge economy (GKE) talents which are less tangible, but involve leading teams and anticipating change, and which are critical for innovation. Although Europe fares better than many of its competitors with regard to basic and occupational skills, it excels in none of the three[12].

Europe's Skills Pyramid: Definitions

C

GKE talents

Global Knowledge Economy Talents, including capacity to generate innovation, ability to lead incross-cultural environments, ability to manager virtual teams, collective and individual capacity to address new issues (e.g. climate change).

B-

Occupational skills

Skills related to specific needs from the job market, including sector specific skills (e.g. software architects, chemical engineers) and Horizontal/cross- sectoral skills (e.g. accountants, legal/HR).

B

Literacy & basic skills (Math, Science, IT Literacy)

Skills required for social integration, including literacy (writing/reading, basic scientific and mathematical knowledge, IT literacy) and minimal knowledge in cross discipline domains such as communications (languages).

Source: "Who Cares? Who Dares? Providing the skills for an innovative and sustainable Europe" INSEAD eLab, March 2009.

INSEAD ranks Europe with a B for basic skills, B minus for occupation skills and C for GKE talents. But there is no reason why Europe cannot excel; Finland, Denmark and Sweden take the top three rankings. While 'on the job' training will be an essential part of the solution, education systems hold the key. Europe's education systems, from primary to university level, are in need of a systematic transformation in order to better integrate digital literacy into the curriculum. Such a transformation will require close collaboration between education and business, an understanding of the need for fundamental reforms, and significantly more investment[13].

Europe spends much less on higher education than the United States and Japan[14]. A recent Economist Intelligence Unit (EIU) study identified the United States, Singapore, the UK, Ireland and South Korea as the best-performing countries in developing the right IT talent[15].

The EIU suggests that the key to these countries' success lies in vigorously expanding enrolments in higher education courses, including science and engineering. They also maintain world-class universities or technology institutes, which equip technologists with business and management skills, not just technical skills."

Plan Avanza

Francisco Ros Perán shares Spain's approach, "e-skills remains a crucial issue in the case of Spain. Plan Avanza (literally, 'Move Forward'), is the most determined strategic bet of the Spanish government on accomplishing a full and effective development of the Information Society in our country, thus assuring the convergence in social and economic growth across Spanish regions and that of the country when compared with European levels.

Five years after its implementation, Plan Avanza achievements are starting to flourish, even though it is still – to traditional standards - a very short time to assess it. Plan Avanza has been the driving force in moving mindsets and fostering a cultural change among Spanish citizens and businesses. Moreover, it has enabled the achievement of a critical mass, not only in terms of IT market and subscribers, but also in terms of the gradual acceptance of IT and the global repercussion of IT services.

Despite these achievements, there are still many remaining challenges to be addressed in the near future, most of which are in fact related to the development of e-skills. In fact, the challenges Spain has to deal with are threefold:

· **Slow take-up**: Though the impulse to the "supply side" in the IT sector has produced visible results, the "demand side" has not yet reacted in such a way. An example for this is the use of the e-ID card: more than 15 million citizens have it, but still only a fraction of them are current e-ID service related users.

· **Reluctance to change**: Specific economic sectors and SMEs are still lagging in terms of an intensive, productive adoption of IT. E-commerce has grown as well, but not as much as desired.

· **Elderly e-inclusion**: Internet use by youths ranks among highest in Europe, but the elderly population is still lagging. Uptake, use

and acceptance of IT amongst people over 55 years in Spain are still below European standards.

The development of an appropriate set of e-skills is crucial to tackle the aforementioned challenges in Spain. Actually, the "supply side" gap hinges on different factors, one of which is the lack of skills to interpret and make use of the wide array of "demand side" measures implemented so far. The reluctance to change is closely related to a lack of knowledge about the opportunities and advantages that IT represent, which shows a clear driver for public policies in the future. Finally, a reinforced elderly e-inclusion strategy has been set, starting by improving IT competences and digital literacy amongst the older population.

As a matter of fact, the new phase of Plan Avanza (Plan Avanza2), started in late 2009, is entirely devoting one of its five pillars to consolidate technological skills amongst citizens and enterprises. As such, a relevant amount of resources will be spent on actions focused on providing funding on projects aimed at fostering workforce e-skills, especially in SMEs (which are the ones reporting biggest difficulties in acquiring advanced and professional e-skills profiles), but also, from a global point of view, on creating the appropriate conditions so that more and more citizens use the Internet as a natural element of their daily life.

Nevertheless, it is worth emphasizing that the promotion of e-skills is a horizontal subject demanding horizontal answers. As far as the Public Administration is concerned, e-skills creation must be necessarily included in a long-term agenda, and efforts to coordinate needs and priorities amongst different bodies and the private sector are essential."

The Granada Strategy

Francisco Ros Perán adds, "The Spanish Presidency of the EU during the first semester of 2010 is facing the challenges that Europe has in this area. One of the top priorities in the IT field is the adoption of a common, new strategy to strengthen the role of IT as driving forces for productivity and competitiveness, known as the 'Granada Strategy'.

The Granada Strategy will stress innovation and quality of life as the drivers behind our efforts to develop the information Society and maximize the impact of IT on National and European competitiveness and, ultimately, the benefit for our citizens. In this context, the

development of e-skills and digital literacy is a precondition for the successful integration of all citizens and the reduction of digital divide risks. What's more important, a full involvement in the information society requires not only access, but also the necessary skills to use available services, whether they are public services, e-commerce or social networking. All of us, with no exclusion, are welcomed to participate in such a challenging task."

The European Digital Agenda

On 19 May, the European Commission adopted a European Digital Agenda for the next five years which outlines seven priority areas for action.

Examples of benefits include easier electronic payments and invoicing, rapid deployment of telemedicine and energy efficient lighting. In the field of e-skills and digital inclusion the Commission will:

· Propose digital literacy and competences as a priority for European Social Fund regulation (2014-2020);

· By 2012, develop tools to identify and recognise the competencies of ICT practitioners and users, linked to the European Qualifications Framework[16] and to EUROPASS[17] and develop a European Framework for ICT Professionalism to increase the competences and the mobility of ICT practitioners across Europe;

· Make digital literacy and skills a priority of the "New skills for new jobs" Flagship to be launched in 2010[18][19], including the launch of a multi-stakeholder sectoral council for ICT skills and employment to address demand and supply aspects;

· Promote a higher participation of young women and women 'returners' in the ICT workforce through support for web-based training resources, game based eLearning and social networking;

· Develop in 2011 an online consumer education tool on new media technologies (e.g. consumer rights on the internet, eCommerce, data protection, media literacy and social networks). This tool will provide customised information and education materials for consumers, teachers and other multipliers in the 27 Member States;

· By 2013 propose EU-wide indicators of digital competences and media literacy;

· Systematically evaluate accessibility in revisions of legislation undertaken under the Digital Agenda, e.g. eCommerce, eIdentity and eSignature, following the UN Convention on the Rights of Persons with Disabilities;

· Based on a review of options, make proposals by 2011 that will ensure that public sector websites (and websites providing basic services to citizens) are fully accessible by 2015;

· By 2012, facilitate, in cooperation with Member States and relevant stakeholders, a Memorandum of Understanding on Digital Access for persons with disabilities in compliance with the UN Convention.

Member States should:

· Implement by 2011 long-term e-skills and digital literacy policies and promote relevant incentives for SMEs and disadvantaged groups;

· Implement by 2011 the provisions on disability in the Telecoms Framework and the Audiovisual Media Services Directive;

· Mainstream eLearning in national policies for the modernisation of education and training, including curricula, assessment of learning outcomes and the professional development of teachers and trainers.

Take Action

Industry provides further recommendations, as follows:

Immediate steps should be taken to reverse the tide:

· At EU and Member State level, the authorities should launch awareness campaigns - run by public/private partnerships - which highlight the career opportunities available to those studying maths, science or technology. Such campaigns should also highlight the shortage of e-skills that the EU is currently facing and the implications of the growing gap between supply and demand.

- All primary and secondary schools should be provided with high speed internet connections by 2015 and all students should be trained to use the internet in a responsible and secure manner. Extra-curricular activities such as visits to laboratories, open days at companies, visits by researchers should be increased.

- Internship opportunities to give students an orientation towards "marketable knowledge" should be expanded at two key moments: when teenagers decide what to study once they finish secondary school and at the start of university degrees, when students decide on their career orientation.

In the medium term, the following should be considered:

- Thorough statistical work on IT skill shortages should be carried out to pinpoint the specific skill gaps. Annual Eurobarometer reports should be developed, mapping employer perceptions with regard to the e-skills needed in the next three to five years.

- Incentives for teachers to update their own IT training and modernise their teaching methods so as to mainstream digital teaching/learning should be introduced. Certifications for teachers attesting to their e-skills could be introduced.

- The European Commission should set up and fund inter-school maths and science competitions across Europe to reward excellence.

An initiative should be launched to use the EU structural funds to improve IT training, particularly in key areas such as green IT, cloud computing, trust and security."

To add to these key actions:

It is likely that the e-skills challenge will be qualitative as well as quantitative. We need a highly skilled pool of IT practitioners that meet the needs of employers. The traditional 'educate then work' model is increasingly less relevant as market volatility naturally increases. Employers and educators must work closely to provide a more agile skill acquisition framework.

An EU-driven e-skills strategy cannot simply be a short term theme. There is a clear supply and demand issue in respect of e-skills that will become increasingly acute. The demand will increase for tra-
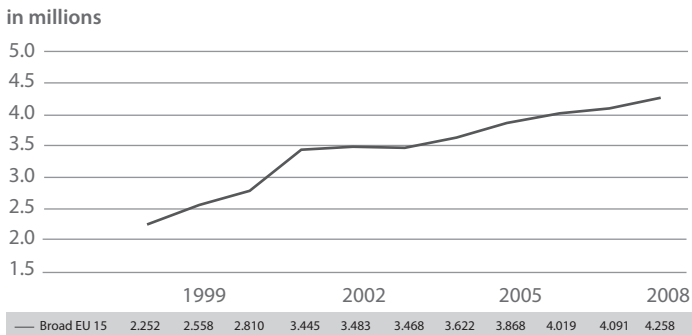
ditional technology infrastructure skills plus the skills needed by a knowledge-based collaborative workforce.

A European agenda for economic recovery and growth cannot disregard the important role of e-skills in respect of innovation. The EU's e-skills strategy must embrace innovation in respect of competitiveness, social inclusion and economic sustainability.

The empirica/IDC report on monitoring e-skills[20] reinforces this point. The e-skills workforce in Europe has grown steadily with a slight respite as a result of the 'dotcom shakeout'. Thus we can infer that e-skills demand is not cyclic.

ICT workforce development in Europe (EU15) 1995-2008

in millions

	1999		2002		2005		2008
Broad EU 15	2.252	2.558	2.810	3.445	3.483	3.468	3.622	3.868	4.019	4.091	4.258

Source: Empirica, IDC, (2009) *Monitoring e-Skills Demand and Supply in Europe*

This trend is likely to continue. Given the need for e-skills in the user community it is likely that the rate of growth will increase dramatically.

In setting policy, it is important that the context is understood. There are three levels: national, EU and global. Each policy action must be clearly tailored for each level and all stakeholders must take full responsibility for contributing to the agenda at their level.

Progress has been made since the "e-Skills for the 21st Century" Communication in 2007 (when the agenda was defined and concrete actions started). Now it is time to bring them to scale and better structure and coordinate the efforts of all relevant stakeholders.

CHAPTER 2: INNOVATIVE EDUCATION

The Situation

Europe's transition to a knowledge-based society needs a similar transformation in respect of its education infrastructure. Upgrading the curricula here and there is simply not enough. Our education system must support Europe's aspiration of being an innovation powerhouse. Before that can happen we need to take an innovative approach to overhauling our education system.

Dr Bruno Lanvin, Director of e-Lab at INSEAD, states this clearly, "Ten years after its launching, the Lisbon Agenda remains largely unfulfilled. Yet, much has been accomplished in changing the ways in which Europe looks at itself. Becoming a leading power in the global knowledge economy is a worthy and attainable destination. Similarly, building a competitive and inclusive information society has become one of the lenses through which Europe wants to be seen in the world.

What knowledge was to Europe for the last ten years, innovation will be for the coming decade. How can the shortcomings of the Lisbon (knowledge) strategy be overcome in designing and implementing its (innovation) successor?

On this complex path, one roadblock will need to be acknowledged and addressed as a matter of urgency: skills. As recent studies have amply underlined[20], Europe's ambitions to become a world leader in knowledge and innovation have been seriously hampered by a lack of appropriate skills, i.e. e-skills. Far from being an 'IT sector issue', Europe's growing e-skills crunch is affecting the productivity and the competitiveness of all types of organizations (large and small) across all types of sectors[22]."

Tertiary education has an important role to play here. But if we are going to address this issue properly, we need to go back to the source.

Alexa Joyce, Senior Communications and Business Development Manager, at European Schoolnet states, "IT has revolutionized every day life in Europe, and has become fundamental to our ability to compete economically on the world stage. Young people are particularly engaged IT users; 16-24 year olds use the internet between five and seven times a week. Despite this, less than 30% of boys, and 15% of girls plan to study IT-related subjects at tertiary level. This poses an imminent threat to Europe's leading position in IT; CEPIS forecasts a shortfall of 70,000 skilled IT workers during 2010. The representation of women in the industry is also worrying at only 24%.

At the same time, good e-skills will become more and more important for all European citizens; to effectively benefit from e-government, e-learning and e-health services, and participate actively in the knowledge society as co-creators, and not simply consumers – as highlighted by the European e-skills strategy[23]."

Paradox 1

As we will see there are a number of paradoxical challenges to address. According to Alexa Joyce, "Engaging young people – and particularly girls – is critical to address this skills and knowledge gap. Key to this is tackling the paradox we currently observe: young people have a falling interest in IT studies, but are very keen users of IT tools such as smart phones, laptops and MP3 players. The majority of young people play console or computer games, and spend more time on YouTube than watching traditional TV broadcasts."

· **The kids just don't get IT**

There is much talk about 'generation Y' and how they will drive the use of IT as they enter the employment market. The ability to query Google for research purposes or having the confidence to configure one's social networking homepage are indeed skills, but not enough to fuel a knowledge-based society. Alexa Joyce warns, "When asking young people what they get from IT, they do not fully recognize its benefit. For instance, via direct questions they report that they learn 'nothing' from playing computer games, while numerous studies[24] show that games can have tangible impact on learning. They also have patchy knowledge of IT: although they may be skilled in creating web pages on social networks, young people often lack the

knowledge to critically assess information sources or respect copyright. IT careers are submerged in stereotypes of the male 'nerd' who works alone, with little opportunities for creativity or travel in his job, as was highlighted by the European Schoolnet[25] and Cisco white paper, 'Women and IT: why are girls still not attracted to IT studies and careers?'
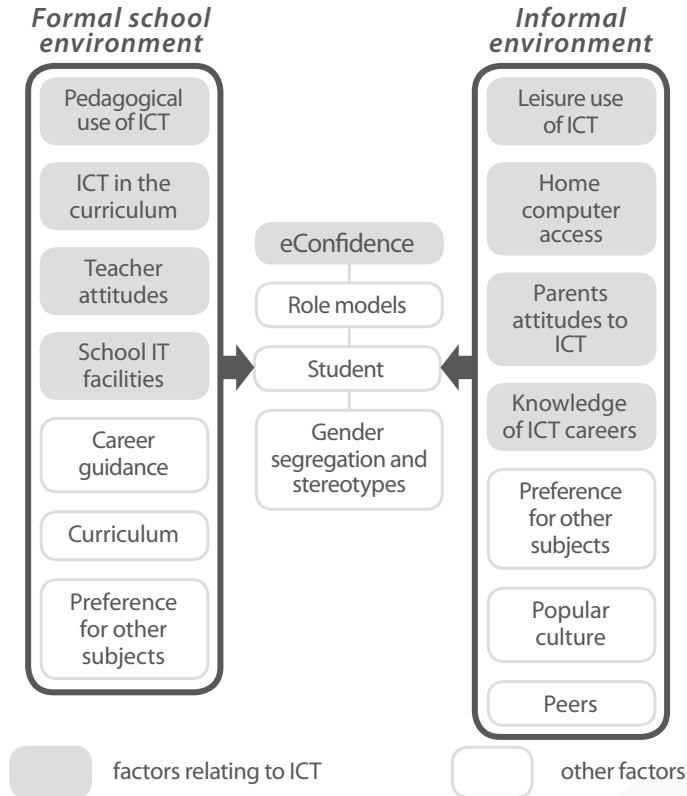
· **IT's so dull**

Unfortunately the educational system does little to address these issues, and rarely does it tackle all of them simultaneously. Young people are often 'turned off' by IT at school and often perceive it as difficult and boring. Some systems in Europe focus on IT in terms of programming; although this increases IT literacy, it can demotivate girls, who perceive IT as 'only about code' and dissuades all students who lack the maths skills necessary to effectively program. Indeed, IT is affected by a wider disaffection with maths and physics in general among young people – often 'gateway' subjects to studying IT at tertiary level.

Other school curricula cover basic e-skills such as computer operating, word processing and using spreadsheets – again, this can often be demotivating as it is perceived as dull and too simplistic. Another issue is confidence: although girls are often as competent as boys in IT, they perceive themselves in a more negative light and lack confidence.

Since the inception of the EU Safer Internet programme and the Insafe network, many countries ensure children are educated about safety issues such as critical skills, privacy and responsible behaviour on social networks. However there is a risk of focusing on the negative impacts of the web. Very few school systems introduce positive, creative approaches to IT on a widespread basis, and indeed, many lack the appropriate infrastructure to effectively do so.

If this weren't enough, role models compound the negative perception of IT, particularly in terms of careers. Most parents don't consider IT a good career path, and many consider it a job 'only for men'. Most teenagers rely greatly on parents in career decisions. Careers advisors and teachers are also relatively negative about IT careers, which is reinforced by popular culture, where 'geeks' are rarely heroes.

The diagram below indicates the main factors impacting on young people's interest."

Formal school environment

- Pedagogical use of ICT
- ICT in the curriculum
- Teacher attitudes
- School IT facilities
- Career guidance
- Curriculum
- Preference for other subjects

- eConfidence
- Role models
- Student
- Gender segregation and stereotypes

Informal environment

- Leisure use of ICT
- Home computer access
- Parents attitudes to ICT
- Knowledge of ICT careers
- Preference for other subjects
- Popular culture
- Peers

factors relating to ICT   other factors

Source: European Schoolnet, Special Insight report, "Women in IT", June 2009

It wasn't so long ago that parents gushed over the tech-savviness of their children, based on their video recorder management skills. Today parents marvel over the hi-tech way in which their children engage with the world. Neither of these actually constitutes tech-savviness. As a society we need to ensure our schooling prepares our young people to extend their e-skills beyond consumer devices and communication media into the application of new technologies for the benefit of business and society. Let us explore if the situation is any better in the tertiary education sector.

Paradox 2

Dr Bruno Lanvin reveals, "A paradox emerges from the remarkably high level of unemployment that prevails across the Union (which reached the symbolic milestone of 10 per cent unemployment at the end of 2009) on one hand, and the existence of unsatisfied demands from potential employers on the other.

This paradox can only be solved through strong and widely supported policies to consider e-skills deficiencies as a structural (as opposed to cyclical) issue. The current crisis has somehow muddled this debate, since lower demand levels have led to misleading indications that the e-skills gap might be narrowing. As has been mentioned earlier[26], this is largely an optical illusion: if European businesses, government and academia do not react quickly, this gap will come back with a vengeance once recovery gathers momentum. Those economies that will not take advantage of the crisis to strengthen their ability to produce more e-skilled workers and managers will find themselves marginalized in the race for knowledge-based and innovation-driven global competitiveness."

Europe's Skills Gap
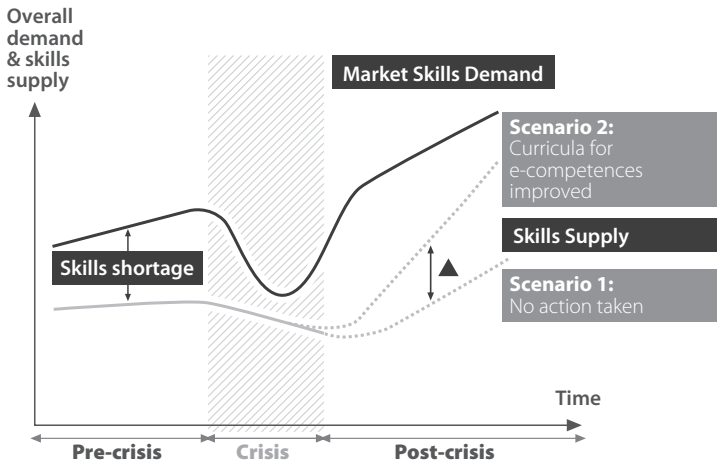
Source: "Strengthening e-Skills for Innovation in Europe", INSEAD eLAb, 2010.

Paradox 3

But there's a further paradox, Dr Bruno Lanvin reveals, "Another paradox emerges from the level of expectations which European businesses and society as a whole have vis-à-vis their schools and universities, versus the growing recognition that what one learns at school is farther and farther away from what the knowledge, skills and competences which one will need in his/her professional life.

This paradox is gaining in importance as the pace of technological change continues to accelerate. Employers in all sectors have increasingly reduced expectations that new recruits will join the workforce with 'applicable knowledge'. In an increasing number of occupations – and especially in knowledge-intensive professions – learning has become a life-long experience, out of which time spent on school benches and in university amphitheatres is only a portion. So the paradox is that, at a time when the contribution of tertiary education to generating the required e-skills is seen as critically important, the perceived relative importance of formal education versus on-the-job training is diminishing."

Tertiary Entwinement

Dr Bruno Lanvin recognises that the solutions associated with these education paradoxes need to be entwined. He recommends:

· "Upgrading existing curricula to allow tertiary education to attract more students to the relevant fields of knowledge and innovation, i.e. those with the highest anticipated levels of employability, and the highest potential contribution to fulfilling Europe's objectives of competitiveness and inclusion.

· Pursuing the above objective through an innovative, open-minded and engaging strategy of multi-stakeholder partnerships. This would aim at reaching two main objectives: on one hand it would increase the relevance of new curricula for potential employers (public and private), and on the other, it would contribute to the sustainability of this effort by enhancing the support it would receive from civil society as a whole.

· Taking the largest advantage possible of identified best practices (in Europe and beyond) to build such curricula."

Curriculum Development Guidelines

INSEAD recently produced a set of guidelines[27] for the European Commission to address the issues described:

1. Create an appetite for potential students by making curricula career-related (rather than job-specific), and future-oriented (i.e. linked to competitiveness and innovation).

2. Create relevance for industry and potential employers generally by engaging industry and practitioners in the design and delivery of curricula.

3. Design curricula as a set of modules, making them easy to update and combine with other curricula, fostering multi-disciplinary approaches to e-competences.

4. Design curricula in a way that allow graduates to maximize their ability to keep their knowledge up-to-date throughout their professional lives, combining them with relevant life-long learning opportunities in particular.

5. Monitor the curricula design/delivery process with a view to constantly improve on them, while maintaining their consistency across European universities and education institutions (e.g. vis-à-vis the Bologna process).

6. Ensure that curriculum delivery makes optimal use of the most advanced and relevant IT-based delivery tools, including those labelled 'web 2.0' for example.

Take Action – Schools

Whilst there may be temptation to impose e-skills on our youth for the greater good, it is more likely to create an innovation backlash. A more inclusive approach is recommended by Alexa Joyce, "Despite all of these problems, young people themselves demonstrate there are numerous approaches to IT that can encourage them to learn more, and get excited about the topic. These approaches have been tested by pioneering teachers, companies working with schools and teachers, and through informal education such as computer clubs.

It is crucial to use young people's interest as a starting point for IT education and to enable them to be creative with technology. The following types of actions should be considered:

· Embed IT in other topics: combining IT with other topics is highly effective and motivating. A successful example is eTwinning, Europe's largest online community of teachers and pupils, where students engage in international projects based on IT tools. The topic of study is often foreign languages, and IT enables the students to get in touch with their colleagues in other countries. Students acquire e-skills such as video conferencing, creating web pages and multimedia presentations and blogging as part of a collaborative project.

· Show a balanced view of IT: when teaching about IT, particularly safety issues, it is important not to focus only on the negative. It is key to recognize many young people use IT in a mostly beneficial way, while also highlighting risks, rights and responsibilities of IT tools.

· Encourage informal engagement with IT: clubs, competitions and similar informal activities are often highly motivating. Microsoft's Imagine Cup, where young people compete to develop games or technical solutions to global problems (e.g. addressing environmental issues) is a particular example, along with more traditional computer or robotics clubs.

· Improve access to role models and getting more realistic views of IT careers: students who are exposed to relevant role models tend to be more positive about IT than those who are not. Programs such as Cisco's shadowing program, where girls enter the work place and follow professionals during their working day have a positive effect. Similar approaches can also engage boys but are particularly key to building girls' confidence.

Many of the approaches mentioned above rely strongly on cooperation between the IT industry and the public sector, as well as key networks such as the pan-EU group of IT associations, DIGITALEUROPE. Indeed, the education system cannot address this issue without such cooperation, as this sector is particularly susceptible to the challenge of fast technological change. Initiatives such as the European e-Skills Week and the new European e-Skills Association, involving

actors from all areas of IT are essential to having a wide-scale impact across Europe.

IT issues should also be tackled as part of wider strategies for increasing attractiveness of maths, science and technology in general such as the European Coordinating Body proposed by the European Round Table of Industrialists and European Schoolnet, engaging companies, national and European authorities in a long term dialogue and implementation strategy. Such long term, multi-stakeholder partnerships are fundamental to successfully engaging young people with IT, and ensuring Europe's future economic success as part of a coherent, sustainable vision for our future."

Take Action – Tertiary Education

Dr Bruno Lanvin highlights the scale of the challenge, "As far as Europe's e-skills are concerned, tertiary education is a central component in an edifice that remains largely to be built. This architectural and construction effort will only succeed if it involves and engages all major stakeholders around a strong business-education partnership."

However he provides us with a way forward that needs the action from all major stakeholders, including, universities, businesses, governments and citizens:

· "Develop new curricula that generate e-competences, not just skills.

· Make life-long learning an incentive and a basis for performance rating.

· Encourage academia and business to co-operate, giving due consideration to the short-term concerns of firms on one hand, and the longer-term objectives of education institutions on the other.

· Extend the life expectancy of the new curricula by making them both stable and flexible.

· Make the new curricula a vivid illustration of what they are about: use advanced knowledge tools expertise.

· Make all of the above a true inter-industry, Europe-wide joint effort, while considering possible best practices and experiences from the world at large."

He concludes, "Europe's future will be innovation-intensive. To make it successful, Europe needs to address its e-skills gaps in a determined, imaginative and ambitious fashion. Tertiary education is the right place to start, because it is the right context to think of generating not only the brains that Europe needs, but also the minds that it deserves."

A major decision for Europe's education policy makers is whether attention is focused on tertiary education to address the short term needs of business and society, or to take the longer view and address this at the start of the education lifecycle.

Clearly both are needed. But if you chase two rabbits you are unlikely to catch either.

CHAPTER 3: MINING FOR TALENT

The Situation

e-talent is in short supply globally. This shortage will become increasingly acute over time. What if Europe had access to over 300 million additional people, who are currently excluded, but with a little investment and some bold pan-European policy making, could step forward to address that shortage?

These people include:
• Women
• Seniors
• Disabled people
• The digitally excluded.

Women NOT in IT

According to MEP, Edit Herczog, "The lack of women in the fields of science and research has been a known fact for quite some time. The number of people giving voice to their concerns on the matter and urging the need to take immediate actions is growing by the minute. As pressing as this issue is, another, somewhat related (or more specific) matter has been neglected for the most part. The lack of women in the IT field got little to no attention. EU-relevant literature and research on this specific topic is limited.

The EU and the Barroso presidency have put great emphasis on the digital agenda, including initiatives aimed at 100% broadband coverage by 2013. Which is good and necessary, but we shouldn't forget that creating hardware infrastructure on its own is nothing but an expensive cluster. If half of the 500 million Europeans don't get included and don't benefit from it, then it is gender and age imbalance as well as social injustice on the largest scale. We, as policy makers must take every measure to tackle this."

Disconnected From Society

Gabi Barna, Co-Chair of the Steering Committee at Telecentre Europe, similarly voices concern for the digitally excluded, "Digital inclusion is a serious issue that affects us all. We all know someone who is not connected to our information society. Yet, without strong action, we seemingly accept this situation, since it is not 'life-threatening' and doesn't impact on their life in any noticeable, negative way. They may even be happy to be disconnected, and relish the freedom from the modern world that their disjuncture from technology provides for them. In today's knowledge based society however, digital technologies represent a gateway to economic and social development. Across wider Europe, almost 300 million people live in digital exclusion.

A failure to act strongly is a failure to take the problem seriously. In today's knowledge economy, people without access to new technologies and the skills to use them risk being excluded from a world of opportunity. In Europe, it is estimated that nearly half of all citizens currently do not have the necessary skills to use new technologies with confidence in everyday life."

Gender Matters

Let us first focus on the obstacles facing women. Edit Herczog states: "There is no significant difference between men and women when it comes to actual web-use skills. If it's a test of using specific internet related services or tasks both gender performs basically the same.

However, the gender effects appear to be significant with respect to self-perceived skill levels, as women are less likely to perceive themselves as skilled in these domains. While men over-rate their online skills, women typically under-rate themselves - something that may significantly affect the extent of their online behaviour and possibly discourage them to take advantage of the myriad of services available through the web. This, as well as the general assumption that technology and science-related fields are men's preserve, is a key element strongly responsible for the many stereotypes still existing, and thus leading to the situation we are now facing. The IT industry, the economy and the balance of society are all affected, but in my opinion we should also focus on the op-

portunities the individuals, each person is deprived of, including their participation in the labour market.

Women are underrepresented in the leadership of SMEs and in respect of entrepreneurship. Cross referencing these facts with the percentage of women utilizing e-skills, the severity of the problem becomes clear: women founding IT-oriented small businesses are practically non-existent. The duty of policy makers is to tackle each phenomenon."

Good intentions

But might this be an issue of motivation rather than exclusion? Edit Herczog continues, "Girls have responded well to Web 2.0 services such as social networking, blogging, creative activities and more recently online gaming and in certain massively multiplayer online games.

Surveys shows a high percentage of them are interested in IT, 50% at worst, but this interest does not always seem to transmit into career ambitions. Only 2 out of 5 female students, previously interested, start tertiary studies on some related course. The general consensus remains that men are better suited for IT jobs, plus women are still in the dark on what career choices they have and what activities IT jobs entail.

There are some significant discrepancies between what workers in the field describe and what girls (as well as their parents and teachers) think. They imagine IT jobs as sitting in a poorly lit basement looking at program code, with no prospect of autonomy and independent work. On the other hand they would like career opportunities that involve travelling, interacting with people and helping others, and improving the world in some way. Yet IT workers state that a good portion of their work is spent meeting customers and helping people. The conclusion can be drawn that there's a dire need for us to act as coordinators and bring employees with first hand experience and young people together. Proper, accurate information must be provided for them. Policy makers and the private sector must work hand in hand, so that young people can focus on making the responsible decisions."

Underperforming Parents and Teachers

Edit Herczog has flagged surprising culprits in parents and teachers. She goes on to explain, "Parents and teachers have similar if not worse misperceptions about a career in IT than their children. Many of the girls look up to their role models such as female relatives and teachers, who can really encourage or discourage them to choose certain career paths. This could be a good connecting point to work on policies to involve other generations and age groups as well, but in this particular case, instead of e-skills, a positive attitude and enthusiasm towards technology and the sector are all that's needed."

Women appear to be the victim of misinformation and an industry that has made no effort to make itself attractive to a large and capable talent pool.

e-elderly

On the subject of seniors, Edit Herczog refers to digital immigrants, ie those of us who were not born into a web-enabled world. She points out: "IT is usually the subject of over-mystification among adults and seniors, aka the digital immigrants. Programmes and workshops should be continued to support them to understand that it's only a tool to acquire and exchange information, not all that much different from radio or television. The main difference is that it's faster and richer than anything before in human history. It holds opportunities for every age group: from trivial things like reading the news, looking up a recipe or booking tickets to the theatre, to keeping in contact with loved ones, sharing photos, or organizing a family holiday in a matter of minutes.

Now, I understand the resistance we're facing. "I lived my whole life without these fancy gadgets, why should I use them now?" is a typical retort. And I'd like to be clear that we don't envision every grandmother having her own blog and Facebook profile. However, as people back then didn't ask why they should start using the wheel (though there might have been skeptics), right now the question to ask is "why shouldn't we use it". Why shouldn't people use it if it can make their lives better? If together we manage to change the way people think of IT and e-skills, then we can have no doubt of the resulting benefits.

Telecentres

Encouragingly the solution is clear. Gabi Barna adds, "For these groups and communities, models of non-formal education are often the answer. In the past few years, IT-based Community Telecentres (TCs) have become a channel across Europe for digital literacy/adult education of disadvantaged target groups, contributing through training and guidance to personal development, active citizenship, social inclusion, and – due to the increasing economic recession - employability. Characteristics such as free, openness, proximity, informal learning and networking opportunities make telecentres attractive. They are now proving their true potential in supporting the digital inclusion of citizens and therefore making a significant contribution to social inclusion."

To reinforce Gabi Barna's message, employability is a critical construct. The basic skills needed to be a candidate for employment, will increasingly embrace e-skills. Over time, if this is ignored, a growing digital underclass will permanently scar society.

Gabi Barna expands on telecentres, "Local telecentres provide access, skills training and skills certification to people who are otherwise hard to reach through formal learning channels. Telecentres are typically located in public libraries, schools and community centres, and often run by voluntary or community organisations. Telecentre (also known as Community Technology and Learning Centre - CTLC, eCentre, iCentre, IT Training Centre, etc) can be described as a publicly accessible place where people can get help to access computers, the internet and other digital technologies that enable them to gather information, create, learn, and communicate with others. In doing so they develop essential 21st-century digital skills to enable them to find better employment opportunities, to participate meaningfully in society and so improve and even transform their lives.

The European region contains an estimated 100,000 telecentres with more than 250,000 staff and 100,000 volunteers. Average usage numbers suggest that these telecentres work directly with at least 25 million digitally excluded citizens per year across the European region. "

Telecentres make eminent sense and as we have heard it is a mature concept. However national initiatives need to be synchronised across

Europe. With that in mind Telecentre-Europe was formed. It has a key role to play in co-ordinating the national initiatives. It has found that those nations that have coordinated their efforts are more successful in harnessing resources from their governments. Telecentre-Europe also has a role to play as a broker for information-sharing between nations, thus enabling Europe as a whole to respond to the evolving IT needs of Europe.

Take Action

So what action is required? According to Gabi Barna, "There are hundreds of thousands of what might be called 'digital empower-ment workers' across Europe empowering the disadvantaged to use and exploit new technology. Telecentre-Europe believes that the role they play needs to be formally recognised as a profession in its own right. It also believes that it is best placed to develop a relevant qualification and provide a professional association for such practi-tioners."

Returning to women and seniors, Edit Herczog advises," We need to:

· Organize programs to show that women are competent and are in no way inferior in their e-skills.

· Educate young people, their parents, teachers and even career ad-visers with proper, first hand information from IT sector employees about their academic and career options. Close cooperation with the industry is required. One-off conferences won't make a differ-ence. We need to create an ongoing campaign to raise awareness and engage all concerned.

· Integrate e-skills into other courses like foreign language studies and create IT-related exchange programs. Also, where needed, a joint effort with the member states must be made to promote e-competence and focus on topics that are attractive to girls, eg creative pursuits such as graphic design or multimedia, or demon-strating the role of IT in serving society's wider needs (green IT).

· Harnessing web 2.0 social technologies to promote discussion and to increase awareness. In conjunction service providers need to di-versify their messaging to appeal to both female and senior users.

It is warming to learn that the telecentre concept is relatively mature and highly effective. If Europe is going to tackle digital exclusion head on then Telecentre-Europe must be given the support it needs. Addressing the issues of female and senior e-inclusion on the one hand looks straightforward. No infrastructure investment is required and there is no need to build a profession dedicated to tackle the challenge. However the attitudes that are holding both women and the elderly back are woven into the fabric of our society and thus this requires a cultural revolution. One in which we all have a role to play.

CHAPTER 4: HARNESSING THE TALENT

The Situation

"Effective utilization of skilled workers is a perennial managerial problem. They are expensive to hire, usually require additional training and care to fit in to a specific corporate environment, and pose organisational problems especially when their work does not conform well to hierarchical structures. Nevertheless, just about every business needs to use e-skills; most companies expect to be able to harness high-level capabilities in order to compete and ensure efficient operations", says Dr Jonathan Liebenau, reader in technology management at the London School of Economics.

Productivity Matters

He warns, "Despite this acute awareness of the need for skills in the workplace, there are a number of indicators that within Europe their capabilities are less effectively harnessed for productivity than they could be. Some of that evidence is circumstantial, in that pay differentials associated with e-skills that are found in other countries are not as pronounced in Europe, indicating that despite claims of a scarcity of those skills within the market there are not the normal incentives on offer.

The direct evidence is even more convincing because the productivity of U.S. based firms in Europe are apparently more successful in achieving information technology generated productivity gains than their local competitors[28]. As this finding is the case for all firms whether or not they source their labor locally, the clear implication is that the difference is explained by organisational, and in particular managerial, practices and capabilities."

Dr Jonathan Liebenau sets the scene: "Large corporations across Europe consistently report increasing need for e-skills among newly

hired employees, and while small businesses are often unaware of their medium-term requirements, much research demonstrates the benefits they can accrue from effective use of IT[29]. Almost all areas of the public sector also now demand e-skills and there is a general perception that the European pool is inadequate to meet the top social and economic priorities of the European Union. Business leaders, government personnel managers and market analysts continue to warn of an impending e-skills shortage, with between 41% and 56% of firms in all sectors reporting that they are regularly recruiting IT specialists, with the implication that many of these positions are "hard to fill" vacancies."

Dr Jonathan Liebenau highlights that there are two straightforward responses to this increasing deficit, "to enhance vocational training (or bolster the workforce through immigration, or to outsource) and to improve the utilization of trained or train-able personnel. Almost all of the focus to date has been upon the markets within Europe for e-skilled workers, supported by extensive empirical research, especially from the OECD and the European e-Skills Forum."

In short Europe's current focus is on growing the talent pool. Dr Jonathan Liebenau is strongly of the view that more is needed in respect of harnessing that talent. This is a significant revelation.

Weak Management

He continues, "There is, within the research literature, some indication of the problems about effective utilization of e-skills in the workplace. Some of this is apparent buried deep within the survey data about the types of tasks undertaken at work by e-skilled personnel. Some of it can be discerned from the large number of complaints about prospective employees expecting too high a salary level (a greater problem within the EU than the USA). The prevalence of self-instruction by employees and indicators of the extent of in-house training also points to a perceived need that extends beyond the normal scope of educational institutions and training bodies.

Recent econometric research from the Centre for Economic Performance of the London School of Economics has indicated that managerial practices differ significantly with regard to the use of IT, with European firms performing more poorly than their US competitors

even within the exact same markets. For the most part these firms use identical technologies and source their manpower from the same pool. As these are aggregated studies using panel data from large numbers of firms, the correlations are highly significant but the explanation for these differences is vague. However, further recent research at the LSE into the managerial practices of both small and large firms within the aerospace industry gives us a better indication of which managerial practices these are that differ, and allows us to come closer to an understanding of how e-skilled employees are managed. We can see, for example, that the wages and other incentives are greater in the USA for both high- and medium-level e-skills users and we can hypothesise that the kinds of tasks they routinely undertake make better use of those skills."

This is quite sobering. Europe's e-skills challenges are both quantitative and qualitative. This revelation puts a spotlight squarely on a hitherto unknown fracture in Europe's value chain. Dr Jonathan Liebenau provides some related management insights.

"First of all, good management practices can be found in every country, but the best performing countries have a much smaller proportion of poorly managed firms. In those countries with the largest proportions of poorly managed firms, there is a general perception that the quality of management is not a very high priority. Improving management practices is associated with increased performance, independent of available skill levels in the labour force.

A feature of this challenge is that the self-perception of managers about the managerial qualities of their organisations is not closely correlated with independent scores of those qualities. In other words, there is a striking lack of self-awareness among managers, indicating that they do not attempt to compare their managerial practices with other firms, even in their own sector. While the overall skills level in the economy needs to be improved, especially in those EU countries with low skills levels such as the UK, Greece and Portugal, the difference that is most significant is in the ways in which IT is used. Wage levels and productivity are related more directly to the number of tasks a computer at work is used for than the mere presence of computers in the workplace or the basic skill level of employees[30]."

So Europe's e-skills challenge appears to be an e-skills management challenge. Maybe our focus should move away from the IT faculty

and towards the management school. Policy makers would do well to reflect on this to avoid a misallocation of resources."

Innovation Needs Management

This management challenge is exacerbated by the cultural impact of weaving innovation into the business processes. Dr Jonathan Liebenau expands, "Whereas skills are embodied in individuals, they make sense only in their application to business functions. Indeed, aside from routine tasks associated with commoditised information handling, innovative activities are frequent and common in the use of IT and they require flexibility on the part of the organisation as much as by the individual.

As one highly respected group of analysts of the economics and management of IT put it: "Firms do not simply plug in computers or telecommunications equipment and achieve service quality or efficiency gains. Instead they go through a sometimes lengthy and difficult process of co-invention. IT sellers invent technologies; they do not imply, but only enable, their application; IT users must co-invent applications. Co-invention, like all invention, has both process and product elements. On the process co-invention side, the effective use of IT often involves changes to organisations.""

Best Talent Seeks Best Organisations

It appears that the best talent seeks the best organisations. As Dr Jonathan Liebenau puts it, "The incentive that individuals feel to acquire skills, is also a function of the opportunities to work within the sorts of flexible organisations that value those skills. This relationship between the capabilities of organisations and the incentives of individuals stands behind the more superficial phenomena that get measured: numbers of skilled people in the force and hiring practices of firms. This implies that not only will people wish to acquire more appropriate, and higher level, skills if they have reasonable prospects of working in such an organisation, but firms that can better exploit those skills should be able to offer higher salaries and better incentives for innovative work. This is something that emerges quite clearly from data on comparative wage levels."

In an increasingly global market, European e-talent will pursue organisations that provide the greatest opportunities. There is a real danger that these opportunities will increasingly lie beyond the confines of Europe. Thus as Europe refines its e-skills development processes, it becomes a net exporter of e-skills rather than a regional centre for high value innovation; an unfortunate outcome. However it is a realistic one.

Take Action

Dr Jonathan Liebenau provides us with a course of action, as follows:

· "There needs to be more of a focus on technology management and upon self-conscious awareness of good general managerial practices. Managers need to be better educated to achieve this awareness and to apply their knowledge systematically, and governments should encourage poorly managed firms to acquire better skills. This entails two elements: more managers need higher education, and management education should include instruction on the character of technology and the ways in which e-skilled employees can best be utilized.

· Employees with skills should be encouraged to see themselves as engaged in the organisation, sharing its goals and able to participate in its operations. Too often skilled personnel are limited in their activities to narrowly technical functions and not given the opportunity to apply their abilities broadly in innovative ways that would enhance productivity.

· Pay and compensation, and in particular the unfavourable differential between those with skills and those with seniority but fewer skills, provide disincentives for younger workers to strive to enhance their skill level. While firms claim that they face unmet supply, there is little evidence of demand increasing wage levels in Europe for e-skilled workers in general. If more people are to be encouraged to acquire these skills then they will need to be able to see that their employment conditions are commensurately improved.

· Information and communication technologies are deeply integrated into most successful organisations. However, e-skilled per-

sonnel are rarely capable of, and even more rarely encouraged to embark on the most attractive corporate careers in European firms. Changing the ways that organisations use e-skills entails changing the career prospects of many of those individuals, too.

· Governments can do much more to ensure that their usage of e-skills is exemplary, that their e-government functions are of top quality, and that they invest in experiments and best practice models that can be of influence to organisational practices more broadly in the economy.

· Labour mobility has long been a mainstay of the European Union, however, there remain restrictive practices and conventions that limit opportunities for both employees and employers. More can be done to ensure that basic skills are of comparable quality across labour markets so that employers can know better what the capabilities of applicants are. Employees will also benefit from a clearer understanding of what the work expectations are through coordinated credentials and job descriptions.

· Productivity growth through e-skills comes in two basic forms: through flexibility to adapt to new practices rapidly and cheaply, and through innovation. The future e-skills agenda should focus on these capabilities and instil an enthusiasm for these capabilities in education, in government service, and in public awareness programs.

Dr Jonathan Liebenau has provided us with the facts, the implications and actionable advice. Policy makers, academics, human resource specialists and organisational leaders are strongly encouraged to take heed.

CHAPTER 5: TOWARDS A VALUE-DRIVEN IT FUNCTION

The Situation

The IT function is the most critical link in the value chain. This is where people and technologies are combined to produce solutions that enable users to perform both efficiently and innovatively. Thus the IT function is the link between the IT industry and the users.

Ultimately the role of the IT function is to convert IT investment, again in the form of people and technologies, into business value, with the help of e-literate users. A euro spent on the IT function should yield more than a euro in business value. But does it? Or do we even know how to measure it?

Broadly speaking the IT industry is struggling to answer these questions. This frustrates the business leaders and creates distrust between the boardroom and the IT function. In most cases this leads to the IT function being an operational supplier to the business rather than a strategic partner.

We are well aware of the e-skills challenges that lie ahead. From an IT department perspective this is exacerbated. Who really wants to work for a function that in many cases is not strategically relevant? Europe is destined to under perform in terms of IT-driven business value if this situation continues.

Does IT Matter?

Martin Curley, Director at the Innovation Value Institute[31] (IVI) recognises this too, "Information Technology is emerging as one of the most dominant forces changing business and indeed society today. Increasingly we are seeing the collision of Moore's law with all types of business, producing great entrepreneurial and business opportunities[32]. Although technology, driven by Moore's law, is advancing

at a very fast rate, the practices used to manage and apply IT appear to be lagging significantly. Despite the growing sense that 'IT doesn't matter'[33], many firms are increasingly using IT to create and sustain competitive advantage. However the challenges of technology complexity, demand growth, security, budget and governance make the use and conversion of technology into value unpredictable and risky."

A Downward Spiral

IVI continue, "The IT profession is in a Catch 22 scenario at present. IT departments are under performing and company management is unwilling to fund innovation. In fact reduced funding is the dominant strategy these days. CEO's invest in those areas of the business that contribute to the core objectives of the business, typically looking for growth and margin, or new successful products and services. IT departments consume so much of their available resource just keeping the lights on (and not always succeeding), that there is little capacity for investment in innovation. This can set the IT department off into a tailspin, unless IT can somehow migrate from a reactive to proactive service provider."

Misperception

Michael Gorriz, co-chairman of EuroCIO, a network of Europe's top CIOs, highlights the challenge facing the IT function in respect of prospective e-talent: "Amongst young people there is sometimes the misunderstanding that IT people work in IT companies. The fact is that at least 50% of all IT workers are not working in the IT industry, but within the IT functions of end-user organisations. Another misunderstanding is that a career in IT will be technology-oriented. When we look at IT in a broad sense, fewer and fewer people are pure technologists. The trend is towards a blend of technology and business competence. And within that trend the technology focus is diminishing."

Importance of IT

Michael goes on to explain, "Within larger organisations Information Technology, as well as Information Management, play an increasingly important role, which is perhaps not that well understood by the out-

side world. Large organisations would cease to function if their IT systems failed. Prolonged failure would invariably lead to business failure. In large organisations the stakeholder ramifications would be seismic."

Michael Gorriz paints a positive view of how IT can be used in an innovative manner, at Daimler where he is CIO: "Daimler is no different in this respect. IT is an integral part of the whole organisation structure and is involved in all primary and secondary business processes. Even before the first piece of metal is used, a new Mercedes-Benz has already driven millions of test kilometres on the computer. Our cars are 100% three dimensionally designed, constructed and developed on the computer. This includes crash and endurance tests as well as driver simulations. Only through these simulations can we predict the behaviour of a new model.

It is the same story for the production. The whole production line is modelled in 3D. As a consequence unplanned changes in the construction became rare.

IT is involved in delivery, recycling, spare parts management, trade, marketing, customer care and in the repair business. In fact IT is a driver of business efficiency. Increasingly customers configure their cars, request quotes and arrange test drives via the web.

So e-skills are critical to operational efficiency. Increasingly e-skills will be critical to innovation, given that IT is becoming a key differentiator in respect of our new products and services.

Daimler offers a good example of IT as an enabler for business innovation. With car2go, individual transportation in urban areas is redefined. For the first time customers can rent 'Smart Fortwo' cars from anywhere in town, at every time of the day and for attractive per minute rates. Via cell phone or internet, available cars can be localized, spontaneously rented – even for a 'one-way trip', or booked in advance. Innovative telematics technology supplemented with state of the art information technology allows a unique and simple rental process. The innovative IT solutions were the driver for the whole mobility concept and corresponding business case."

It is both heart-warming and inspiring to read of such innovative uses of IT. We need more such case studies to light the fire of those considering a career in IT.

e-Skills in End-User Companies

So how does an IT-centric organisation such as Daimler view e-skills? Michael Gorriz explains, "We roughly have three categories of people working with IT. Firstly we have what are traditionally called IT professionals, who work for the IT department. In the case of Daimler these comprise 2% of the workforce. In other organisations we see higher figures, up to and over 10% in financial services. Secondly there is a wider group who are heavy users of the IT systems. These are people working in for example engineering, logistics, finance and administration. They all use IT as an essential part of their occupation. The final group comprises all other people who are using standard IT systems like intranet, e-mail or process support and information systems. They need general skills or special training for the systems they use.

For IT professionals, common e-skills definitions that form the basis for systematic workforce development were developed by multi-stakeholder partnerships around Europe. Master programs are presently being drafted. But to further establish this skill model more firms and educational institutions need to support it.

Unfortunately in all three categories, we observe a lack of people or more accurately a lack of the right e-skills. Of course all young people are able to play computer games or use social networking tools. However, many young people are challenged when they have to operate a standard IT system once they join the workforce.

At this level the promotion and the use of the European Computer Drivers Licence (ECDL) model would be a huge step forward. It would be advantageous to students, organisations and society at large, if all people acquired these basic skills. Beyond word processing and spread sheeting, we should envision the inclusion of basic knowledge on the use of administrative business systems. This would help improve both professionalism and job mobility.

For IT professionals we notice a number of problems. Not only do we have a shortage in people studying information science, information management and related studies (we expect a shortage of 2-10 %, depending on the economic scenario in 2015). Also in other subjects we notice too little attention is paid to information technology. In all traditional subjects, IT knowledge is required in order to work professionally, particularly where innovation is involved. This points

to a mismatch between what educational institutes deliver and what is needed by employers.

Even though the universities foster e-skills in a variety of ways, we need to ensure that the curricula keep pace with the fast changing IT environment. Social networks and cloud computing have been around for only a short time but are already impacting our lives in a significant way. We need to include e-skills in our plan for lifelong learning.

At a large organisation such as Daimler, we have the advantage to co-operate directly with universities. We are also able to set up training or courses for our employees. But we believe that this is not enough. We need society to provide workers with the requisite skills whether they be power users or IT professionals.

This is not just a large company requirement, but a prerequisite to migrating towards a knowledge-based society."

e-Competency

IVI pick up on the theme of e-skills definitions introduced by Michael Gorriz, "The core issue is that IT management processes are fundamentally undefined at an international, inter-company and profession level. IT departments have developed their own processes to deliver their service. They sporadically use best practice, e.g. CMMI and ITIL, but mostly depend on the intelligence, background experience and heroic deeds of their management and best people.

This is unsustainable. As the industry matures it needs to standardise on what is expected of IT executives, professionals and indeed users of IT. The absence of a clear European wide e-skills competency framework is leading to inefficiencies in the growth and utilisation of both the potential of Information Technology AND the IT talent pool. Given that there is a global shortage of such talent, Europe cannot afford to allow this inefficiency to continue. Thus a competency framework coupled to a maturity framework is required. This will enable schools, tertiary education establishments, employers, training companies and recruitment agencies to operate in a more joined up manner."

We need to address this as a priority. As more people enter the world of work they are more likely to resemble headless chickens than

knowledge workers if the competencies associated with their roles are ill defined.

Innovation and Value

Value and cost are of course two different concepts. As Oscar Wilde stated, "A cynic is a man who knows the price of everything and the value of nothing." Many CIOs will have someone in mind in this respect. There is an overwhelming focus on cost in respect to IT. It is not correlated to the economy. It is as it always has been. The focus needs to move more towards value in order to unleash the business benefits of IT-fuelled innovation.

But before the IT function can move from operator to business transformer, it needs to get its house in order. IVI comment," For any IT organisation to demonstrate its capacity to deliver business value and use IT to build innovative business wide creativity, it must establish a foundation of solid compliance and effective delivery. An agreed level of service must be delivered constantly before IT can move up the value ladder within the organisation. The diagram below captures this model. For IT to truly add value to the business, and earn its seat at the top table, it must operate at the highest levels of performance. Both IT professionals and IT departments can capitalize on the available knowledge provided through the IVI's IT – CMF (Capability Management Framework)."

The IT Value Proposition
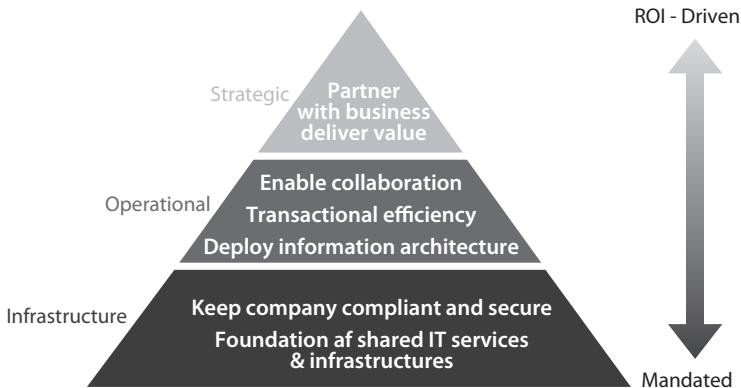
Source: Cooney. European e-Skills Conference Brussels, 2009[34]

IT-Capability Management Framework

IVI shine light on this framework, "IT-CMF was created to help organisations systematically manage IT for business value and innovate more predictably and profitably with IT. IVI is targeting a key current gap in the IT profession landscape, through building an open body of knowledge.

Using an open innovative approach, the IVI is building a unifying body of knowledge, to help IT organisations and professionals move from being reactive to proactive. It facilitates the use of IT as an innovation resource and enables the CIO to be perceived as the Chief Innovation Officer. It helps improve the probability, predictability and profitability of IT enabled innovations."

The CIO

IVI see the role of the CIO as pivotal, "Both the business community and the company's internal IT community look for the leadership to direct IT to that elusive high performance contribution. The absence of an acknowledged educational and experiential progression path makes the capability development for senior IT managers somewhat ad-hoc. Other professions are so much better supported, with consistent role and responsibility definitions, and well engineered educational and certification programmes. This situation has greatly contributed to an industry wide under achievement report for IT. The key for longer term sustained and industry wide improvement is in the maturing of e-skills."

This would explain why CIO's are typically the victims rather than the co-creators of business strategy. In many cases CIOs focus their attention exclusively on technology management, ignoring business strategy, process engineering, service and value management[35].

The IT industry permeates every element of business and society. The extent to which the IT industry delivers value is very much in the hands of the CIO. Thus their development has to be a key priority. Chief Innovation Officer is to be preferred to Career Is Over.

Take Action

IVI recommend the following:

· "Train IT leaders to be business leaders. This means that IT leaders need to learn, acquire and demonstrate business acumen, so that IT investments deliver real value to the end user and customers. The IVI has developed several professional diplomas around managing and measuring the business value of IT.

· Apply a maturity model approach (such as the IT-CMF) to stabilize and control the processes needed to deliver and operate leading edge IT solutions. Thus migrating the IT function from a disorganised gang of browbeaten fire fighters to skilled IT professionals who operate in a rigorous, disciplined and professional way.

· The HR function and the boardroom need to synchronise their activities to build a boardroom-ready CIO.

· The EU, and the IT profession, needs greater structure and organisation to deliver the increased capability needed. The EU can be a leader and innovator in playing a significant coordinating and brokering role, including a push for standardization.

· The IT professional needs specific capability development. Ideally this dovetails with the company's need for competency development. Recognised academic achievement is needed to motivate people to invest in personal development. The tertiary education infrastructure needs to be a component of our EU IT professionalism solution design.

· This competency challenge for IT is world wide. For the EU we need a coordinated solution. This starts with defining a clear mandate from the Directorate."

We cannot expect Europe's boardrooms to soften their cost oriented stance. As Michael Gorriz, himself a CIO at Daimler, points out: "Ultimately the lowest possible IT budget is not the optimal budget. Nonetheless the cost of running the systems has to be as low as possible. Thus the CIO has to work on operations, system maintenance

and the efficiency of his own shop 'day and night'. CIOs need to make the business leaders aware of the service implications of 'overboard' cost cutting. If they are comfortable with the concomitant reduction in service levels then all parties should be happy. In any case all IT spend decisions need to be discussed with the same rigour that would be applied to the development of a new product or the modernisation of a production plant."

In my opinion, IT is too important to be left to the IT function. Today's boardrooms have a fiduciary duty to maximise the value they obtain from their IT investment. The absence of IT representation at board level is tantamount to abdication of responsibility. Stakeholders take note.

We should also consider breaking down the barriers that separate the IT function from its customers. Help desks and other such 'service management' tools simply serve to create an air of mistrust.

In addressing Europe's e-skills challenges, we must keep in mind that an army of sheep led by a lion will always defeat an army of lions led by a sheep. IT leadership must be our priority.

CHAPTER 6: GREEN MATTERS

The Situation

The environment is a hot topic in every sense. However many of us are suffering from green-fatigue as companies disingenuously put a green-spin on their offerings. The inertia of the world's governments to take bold and concerted action is a source of frustration. The IT industry appears to be quick to capitalise on the green theme. Though in the IT department, economic pressures have moved away from strategic environmental led initiatives (where they existed), towards more tactical cost management. Many outside the industry are quick to accuse the IT industry of being a major contributor to the problem.

Who's To Blame?

So is the IT industry the protagonist in what could unfold into a global tragedy? And what can we do in respect of e-skills to ameliorate the situation? Luis Neves, Chair of GeSI, the Global eSustainability Initiative sets the scene, "The planet needs IT solutions. Contrary to some reports – the IT sector is not a major contributor to greenhouse gas emissions (2% of CO_2 emissions). The reality is that the IT sector has the capability to reverse the environmental trend, but only if this is recognized by policy makers and other stakeholders. The IT industry has already begun to re-invent itself from only producing equipment and providing services to incorporating emissions reductions along the entire life cycle." Policy makers take note.

Luis Neves adds, "Recent observations show that greenhouse gas emissions (GHG) and many aspects of the climate are changing near the upper boundary of the Inter- governmental Panel Climate Change (IPCC) projected ranges. The indicators include: global mean surface temperature, rise of sea-levels and the extent to which the

Arctic sea ice is melting, the global ocean temperature, ocean acidification, and extreme climatic events. As is well understood by now, the more we continue on a business as usual path, the more difficult and costly it will be to manage the result. Business as usual applies to energy sourcing, utilization, management and treatment of end-of-life of products and services for all sectors."

A Global Perspective

In terms of global policy, Luis Neves states," At the recent climate change negotiations in Copenhagen, the conference of the parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) met for the 15th round of negotiations for the Conference of the Parties.   While the result was the "Copenhagen Accord" and not the agreement envisioned, the doors remain open as a call to action. Negotiations will continue and incremental agreements are better than deadlock – otherwise, we have no chance. The IT sector can help meet emissions targets.

The recent World Economic Forum in Davos, highlighted an IT trade association report "SMART 2020: Enabling a Low Carbon Economy" by the Global eSustainability Initiative (GeSI)[36]. The vision of GeSI is about sustainable solutions through innovation. And, in response to recent stimulus packages of the EU and the US, GeSI notes that investment in broadband infrastructure is fundamental to realizing green solutions. At present, many of the actors in society remain hesitant. Such hesitation seems unsustainable as well as short term oriented, and could even be considered irresponsible. Every day lost in the effort towards stabilizing global warming will cost us years of hard work later." Let us all take note.

Looking Forward

Luis Neves points out, "The main challenge we face is a collective sense of responsibility and a motivation to develop new business models. GeSI and its members are firmly convinced that only by engaging to develop these new business models, will it be possible to address the challenges ahead of us."

To me this is a call to arms for the IT industry to extend its remit into the world of business process engineering. Nobody knows how

business processes work better than IT practitioners. Green-process engineering is thus an opportunity and a duty of the IT industry. Effective support will of course require the development of the associated e-skills competencies.

Super Highways

But the infrastructure needs to be in place to make this a reality. Luis Neves adds, "GeSI firmly believes that modern high speed networks are a crucial enabler for almost all industries and essential for leading the way to a low carbon society. The GeSI flagship report, "SMART 2020: enabling a low-carbon society" shows that IT has a significant and growing impact on the world's climate. The report's supporting analysis, conducted independently by consulting firm McKinsey & Co.[37], indicates that while IT's own sector CO_2 emissions will nearly double by 2020, the application and diffusion of IT in other business sectors can reduce total global CO_2 emissions by 15%. These savings are five times larger than the total expected emissions from the entire IT industry. In addition to these reductions, potential energy savings can be achieved from the capacity of IT to enable dematerialisation – replacing high carbon physical products and services with virtual low carbon equivalents.

To be able to fully utilize the positive impact of IT, reliable and capable high-speed broadband networks are of the utmost importance. Without a world class state-of-the art telecommunications infrastructure, we will not be able to realize the IT related CO_2 emissions' reduction potential. We need the framework to encourage the necessary additional investment, necessary to roll-out of high-speed Next Generation Access Networks. It is a pressing issue. And unfortunately, the proposals for current policy measures will not enable the greatly needed Next Generation Access Networks. Without building such network super highways, we will not be able to foster social inclusion and enhance the competitiveness in the information age. These investments are also a prerequisite for effectively tackling climate change and achieving the necessary CO_2 emissions' reduction targets."

The development, management and exploitation of such networks will in turn have a bearing on Europe's e-talent management policies.

So Where Do We Go From Here?

Luis Neves states, "On a strategic level, our campaign to inform and educate others has only just begun. Initiatives involving UNFCCC[38], the ITU and GeSI have promoted the crucial role that information and communication technologies play in providing solutions to climate change. In addition, providers aim to secure an understanding on reasonable carbon reporting, measuring and monitoring emissions for IT products and services.

The challenge is to educate stakeholders and policy decision makers that IT is part of the solution. Again, according to the Stern report[39], timing is critical – the longer we wait to concur on long-term strategies of how to meet global targets and timetables, the more difficult and costly solutions will be."
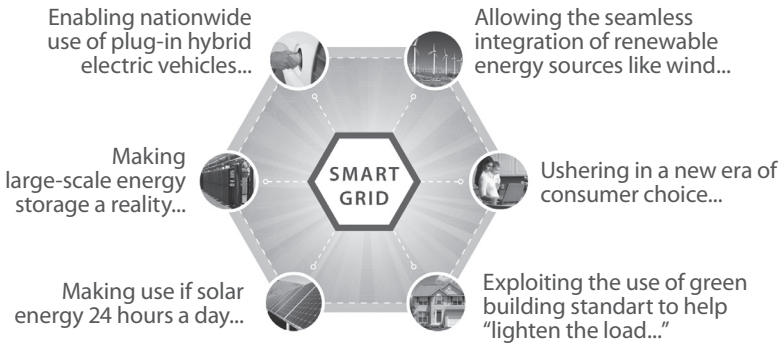
Specifically Luis Neves highlights where the IT industry is playing its part. "IT leaders are promoting energy efficiency, leading to lower carbon emissions. They are developing smart grids, optimizing power supply, demand, management, security and resilience. More stable supply chains are emerging with emphasis on ethical sourcing, sustainable environmental standards and overall reduction of carbon emissions – across the entire lifecycle of the associated products and services. Forward thinking IT companies are incorporating eco-efficiency in all aspects of business planning and operations; especially how IT companies can enable other sectors such as transport, buildings and automotive."

As an industry there is clearly much we can do. E-skills development must embrace energy management, whether it be in the data centre or the desktop. This presents an opportunity for the CIO, and thus the IT industry, to become the Chief Energy Officer of the organisation.

Smart Grids

Smart grids and their role in supporting a sustainable planet are perhaps not so well known. Luis Neves, explains: "The SMART 2020 Report notes the key areas where IT can enable other sectors to reduce emissions include: power grids, transport logistics, motor systems, and buildings and across all areas, dematerialization (replacing physical products and services with virtual equivalents).

Illustrating the opportunities : the smart grid as enabling engine

Enabling nationwide use of plug-in hybrid electric vehicles...

Allowing the seamless integration of renewable energy sources like wind...

Making large-scale energy storage a reality...

SMART GRID

Ushering in a new era of consumer choice...

Making use if solar energy 24 hours a day...

Exploiting the use of green building standart to help "lighten the load..."

Source: US department of Energy. The SMART Grid, an introduction.

A critical area is modernizing our electrical power grids, from an antiquated supply driven, centralized and emission producing infrastructures to modern, decentralized demand driven, using renewable energy, cleaner technologies and as a result of this transformation, having a better effect on our environment.

Smart grids are actually a collection of technologies that enable simultaneous exchange of information between the user and the provider using smart meters. This transformation can turn the existing power grid into a communications forum – delivering on demand. According to a Booz & Co. report prepared for the World Economic Forum (WEF) in Davos, the smart grid market is expected to grow from $69.3 billion in 2009 to $171.4 billion in 2014.

The search for best practices and corresponding e-skills to achieve interoperability for smart grids has been underway for several years. Concrete results and estimation of what is now needed are just now becoming available." The IT industry has the opportunity here to be a major force for good, if our talent pools are managed accordingly.

Dublin – Home of the Data Centre

Returning to the data centre, Luis Neves cites an example of good practice. "Microsoft has a data center in Dublin, Ireland. To respond to the demands for increased capacity for cloud computing (provisioning of software plus services over the internet); Microsoft developed a new strategic design of energy efficient data centres. Within less than a year, the new data centre consumes 50 percent less energy than similar data centres elsewhere. A major part of this is due to location – Dublin has an average daily temperature that is very compatible with servers." A feature perhaps not promoted by Dublin's tourist board.

At the consumer level, we are told, "Deutsche Telekom has launched a new, on demand, electronic counter, that the home or business user can use to control the energy demands of their appliance, gas, electricity and water. Smart meters play a key role here, sending the data over a DSL or a mobile line which enables the planning for a smart digital electricity grid. It is necessary for the electricity market to be liberalized to implement and roll out this system. DT's T-Systems has already launched a pilot project."

Take Action

Luis Neves identifies the following skills that we need to develop in Europe:

· "Those that support an IT infrastructure that embraces energy management, including the management of the associated data, including its handling interoperability, reliability, security.

· Energy management from a forecasting and distribution perspective.

· Demand side management and demand response skills, including smart metering, smart appliances and tariffs information management

· Management of associated service level agreements."

I would add:

· Business process management skills to support the migration to more environmentally friendly business models

· Leadership skills to ensure CIOs have the competencies needed to make the energy management case to their leaders and to then take ownership of energy management across the organisation.

Luis Neves concludes, "In the US, $11 billion has been allocated to develop smart grids, which will include initiatives that have the potential to create 370,000 jobs, mostly IT related. It is expected that e-skills will be developed within the curriculum to reflect this."

We have seen the convergence of IT and telecommunications. We now appear to be on the cusp of the convergence of IT with energy. This is a monumental opportunity for the IT industry. It is similarly so for Europe in respect of our economic productivity and employment ambitions. Given what is at stake from an environmental perspective, we have to grasp this opportunity with both hands, in a coordinated fashion.

CHAPTER 7: RELEVANT SKILLS

The Situation

The ICT profession is very young in comparison to for example the domains of law, architecture and medicine. These professions have had hundreds if not thousands of year to evolve; though we must keep in mind that ICT is increasingly core to these and many other professions. Given how core ICT has become to both business and society, it is imperative that the industry accelerates its maturation. This is not just a challenge for the ICT Sector. It equally applies to all sectors that utilise e-skilled workers.

Business and society need practitioners with both relevant and marketable skills. A concerted effort is needed from all stakeholders to address this. Education is at the heart of the solution.

The European e-Skills Association[40] (EeSA, formerly known as the ILB), is a multi-stakeholder partnership representing leading organisations from the ICT sector, ICT user communities as well as other bodies involved in e-skills professionalism. It recognises that as a driver of long-term growth, ICT's potential lies precariously in the hands of those who have the skills and proficiency needed to apply these skills in an innovative manner.

Specifically, EeSA is the reference European platform to develop e-skills across all sectors and professions, including ICT practitioners and professionals, citizens and users with a view to build a more inclusive, efficient and competitive innovative society in Europe.

Through its members, the EeSA will:

· Act as a forum to actively promote the exchange of ideas, awareness raising and good practices amongst organizations active in this field at EU and Member State levels.

· Be the reference voice of the broader community of organizations devoted to the development and the implementation of the long term strategy on e-skills, including industry and stakeholders.

· Support the development of tools and methodology for the governance of e-skills.

· Lead the implementation of concrete e-skills activities, investments and partnerships in cooperation with other stakeholders at EU and national level.

As Jan Muehlfeit, co-chairman of EeSA states: "Skills and workforce development are the currency of Europe's economic future. On the global platform, policymakers have identified technology innovation as crucial to unlocking human potential. They also see new technologies as key to advancing national priorities from healthcare and education to energy independence and climate change.

In fact, according to the latest IDC findings, in the next five years one in five employees will be expected to have advanced ICT skills. The question is, are we fostering the kind of talent pipeline that will match this critical market demand for advanced ICT practitioners? Or conversely if we do not address this are we abdicating our duty in respect of ensuring Europe's continued economic growth?"

Michael Gorriz, also co-chair of EeSA remarks: "The possibility to acquire and further develop the right e-skills for ICT professionals and also for the structured task workers, should become the normal pattern in our society. This is not only needed within the larger organisations, it is also needed to build and develop Europe step by step towards an innovative society or to what is sometimes called a 'knowledge society'.

Be Warned

There are compelling economic reasons to address this. Jan Muehlfeit warns, "A highly skilled and IT literate workforce is a challenge inspired in part by global competitive forces arising from countries like India and South Korea where education has become the mantra. Public sector reforms in respect of Europe's education have led to a decline in sciences and information communication technologies. These in turn have had a direct impact on the talent pipeline. The

current quantity and quality of vocational skills puts European economic prosperity on the line. The future is indeed skills dependant."

Jan Muehlfeit concurs that standards are key: "At a time when national spending is being retracted, Europe has a pressing need for targeted investment in key areas of growth e.g. the ICT sector. Access to smarter pools of funding might be easier if the return on training in ICT was easier to measure. In other words standardised ICT certification is needed. It is this very issue of due recognition of ICT practitioners within the labour force that the EeSA will bring to the fore."

Both Michael Gorriz and Jan Muehlfeit agree that quality is thus an issue. And so is quantity. Jan Muehlfeit adds, "The stumbling block remains that developing advanced ICT know-how in respect of both users and practitioners is not seen as a particularly attractive career path. This is very much the case in respect of women. As technology is deployed to a greater extent across business, organizations and the government in addition to the demographic changes in Europe, we cannot afford to have substantial proportions of the workforce excluded or subject to stereotypes that prevent their acquisition of higher level ICT practitioner and professional skills."

We must of course be mindful that the 'business' value levered from ICT does not come from the technology, or even the technologists. It comes from the many users in large corporations and SMEs, in both the private and public sectors.

Increasingly e-skills are at the core of many sectors; not only for day to day work, but in particular for the innovation of almost all organisations. As you will read elsewhere in this manifesto, the automotive industry is a good example of how ICT is used both for operational efficiency and innovation. In both cases one needs highly skilled users.

Europe's policy makers must keep this in mind.

Take Action

EeSA proposes a number of concrete actions to address the pipeline of ICT practitioners, which in turn will help rejuvenate and sustain both a healthy ICT sector and a broader e-skilled workforce:

Increased collaboration between academia and industry - From the experience of EeSA members, emphasis should be placed on e-skills education programmes that run in concert with both the ICT industry and all ICT-intensive end-user industries. The missing link is where academic and training bodies work in isolation to develop ICT curricula and promote e-competences that are out of synch with the business application. For reference we look to the multi-stakeholder partnership 'IT fitness'[41] led by the Skills for Employability Alliance in Germany. In collaboration with training and educational bodies, students have been encouraged to test their ICT competencies or market 'fitness' and be put forward for further training and completion of industry certification to improve their ICT knowledge. This tracked ability and level of ICT professionalism is in turn made visible to employers. The scale of this project has reached 2 million in Germany to date! For vocational skills this business/academic synergy is ever more important in order for qualifications to hold their value outside the sphere of the academic environment.

An example of success in this respect is with the UK National Qualifications Framework, where non-formal certifications are woven into formal academic qualifications. Employers thus get what they need. Students obtain two qualifications through one route of learning. Europe gets qualifications that are recognised in many EU Member States. This multi-stakeholder solution approach is already practised in many other EU Member States. However greater awareness and public support on a much larger scale across Europe is needed.

Start early - The acquisition of e-competences at the outset of a student's academic career has the power to transform the individual. Students become more adept at managing and capitalising on information. This cultivates an innovative mindset, which will increasingly be an important asset when entering the world of work. The Imagine Cup illustrates this point as the world's largest technology competition aimed at students from all over the world that encourages young people to apply their imagination, passion and creativity to technology innovations that can make a difference in the world. More than 300,000 students from 142 countries entered the 2009-2010 Imagine Cup competition.

Increase attractiveness - Integral to and building on from the action to transform education is the attractiveness of ICT as a career path.

More transparent mapping of the vast opportunities and career progression within the field of ICT needs to be put to effect in order for European citizens to feel a sense of readiness to build e-skills into their career. One such measure was the launch of the European e-Skills Career Portal[42] to help facilitate the match of the right skills to the right jobs in addition to breaking down some of the stigma around the potential of a career as an ICT professional. In this vein, a step change needs to happen in regard to the perception of IT and e-skills among youth, women and the aging workforce. One particular method would be to engage and raise the profile of digital ambassadors in Europe through active role models in the ICT sector as well as those from the user communities, such as Chief Information Officers. Otherwise our best talent will surely be lost to alternative sectors or other world regions. The existing ICT practitioner stereotypes, if not addressed, will hinder the growth of the ICT service sector, while hampering business innovation in almost all organisations. Steps forward must take into consideration the active role that women can play in ICT. A good illustration of this is the best practice code of conduct led by Commissioner Viviane Reding for Women in ICT. It provides the first set of practical initiatives to enhance women's experience in ICT careers. Many academic and ICT industry partners have signed up to this.

Promote Certification - Raising the profile of ICT professionalism adds a new stimulus and dynamism to acquiring advanced ICT competences. When considering the investment of learning skills in a particular sector, accreditation is a very important benchmark because it fosters mobility of professionals and provides the foundation for developing attractive career structures. The ongoing work of the EeSA towards the professionalism of ICT is a pivotal action to establish a comparative advantage for Europe in the global ICT market. This embraces quality of service, ethical practice, and a commitment to continuous development through acquiring new skills and knowledge. Recognition of ICT practitioners through certification provides a measurable platform for the aforementioned skills investment upon which innovation can be driven.

The development of the e-Competence Framework (eCF) uniquely provides a European multi-stakeholder agreed neutral reference for ICT practitioner competencies across member states and all industry sectors. The framework has the potential to become a major European asset. The eCF provides a basic, clear and sound orientation for

companies that need to take decisions on talent management matters such as recruitment, career path planning, training and staff assessment. It articulates knowledge, skills and competence as needed and applied in the ICT workplace across both public and private sectors.

The ambitious work behind INSEAD's launch of the European e-competence Curriculum guidelines, aligned with eCF, recognises ICT practitioners through a standardized curriculum and strengthens the role of European universities in supplying ICT practitioners and e-competent managers in Europe. Indeed this is a step in the right direction. Within this report, Microsoft eHealth IT Academy is featured as a best practice, where essential IT training to NHS health professionals in the UK is delivered. This is an example of members of the public sector evolving their career in line with IT industry developments!

Align supply with demand - Governments, industry and academia alike should work closely to ensure that Europe has the advanced ICT skills needed in emerging areas such as Cloud computing, Green IT, Cyber-security, Interoperability and eHealth. Skills for success in the ICT industry will have to evolve and align to new streams of growth. The impact of e-skills upon sectors such as health will have the capacity to change and improve the way we address some of society's biggest challenges.
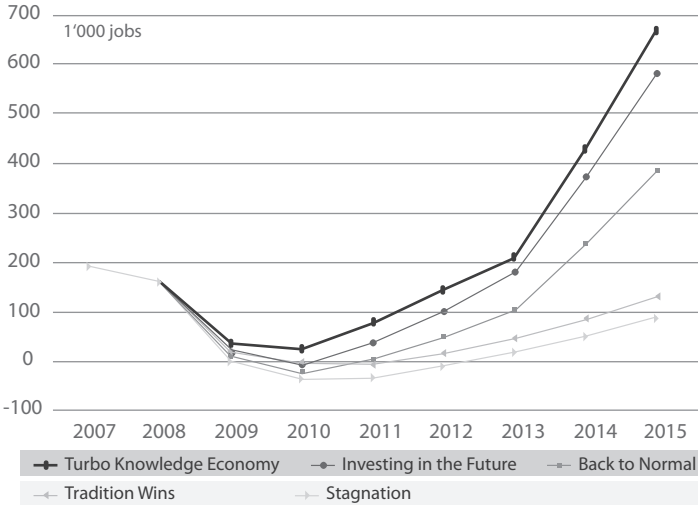
Obama's administration leads by example. By 2014 all healthcare provider facilities, from the smallest single doctor practice to the largest medical centres, must have an Electronic Medical Record system installed and operational in their facility. This will generate many new IT jobs to install and manage these systems and keep them sustainable over time. Beyond the US, many IT Health development programmes are taking place. These are heavily reliant on e-skills.

Another stream of demand for IT practitioners is within the emerging field of Green IT. A lot of Green ICT is about cutting industry's own ICT footprint. However technological innovation is being applied to cut the CO_2 footprint across sectors. There is yet again a skills shortfall in Europe for this sector. We need to re-skill Europe's workforce through ICT qualifications and certification.

EeSA has an important role to play in ensuring that Europe can produce e-talent of sufficient quality and quantity to meet the current and anticipated needs of the market.

The empirica/IDC report on monitoring e-skills[43] identifies a number of future scenarios. Excess demand will become acute if our vision of a knowledge economy becomes a reality.

e-Skills demand and supply gaps (excess demand) in the EU27 from 2007 to 2015 by scenario

1'000 jobs

Legend:
- Turbo Knowledge Economy
- Investing in the Future
- Back to Normal
- Tradition Wins
- Stagnation

Turbo knowledge economy – Take off in Europe, thanks to a virtuous circle of productivity and economic growth driven by widespread diffusion of ICT-based innovation.

Investing in the future – Return to moderate growth, accompanied by acceleration of ICT investments and innovation.

Back to normal - A return to the historical development trajectory experienced before the crisis, in terms of growth rates and IT innovation.

Tradition wins – After the crisis, export-driven recovery favours traditional industries, rather than high-tech and innovative industries, resulting in moderate economic growth with low ICT growth. Relocation of the ICT industry outside Europe accelerates.

Stagnation – Very slow recovery, accompanied by domestic protectionism in most important countries, discouraging innovation investment. The European socio-economic system struggles to keep up with emerging economies and tends to close itself off. Low ICT investments and growth in IT off-shoring lead to reduction in demand for e-skills and potentially over-supply.

Source: Empirica, IDC, (2009) *Monitoring e-Skills Demand and Supply in Europe*

Creating more relevant degrees and certifications is not enough. What is required is an eco-system that allows Europe's stakeholders to fine tune the e-talent engine at short notice to respond to fluctuations in demand.

This needs to be addressed with urgency. Europe's policy makers must not flounder in this matter. Concerted action is required if Europe is to punch its weight globally.

According to Jan Muehlfeit: "In 5 years from now 90% of jobs will require the basic ICT skills, which means that now is the time to start creating higher levels of awareness and preparing for a better skilled population and workforce. Europe is at a crossroads. Emerging economies are investing heavily in talent for the knowledge economy. For Europe to be relevant, Europe needs to fulfill the EU 2020 Vision and put human capital at the centre. As it is rightly recognized in the Digital Agenda, e-skills - innovation skills and digital competencies - are a necessary component to implement this vision of a smarter, greener and more inclusive society. They are also core to creating the future talent pipeline of those who will make this transformation happen."
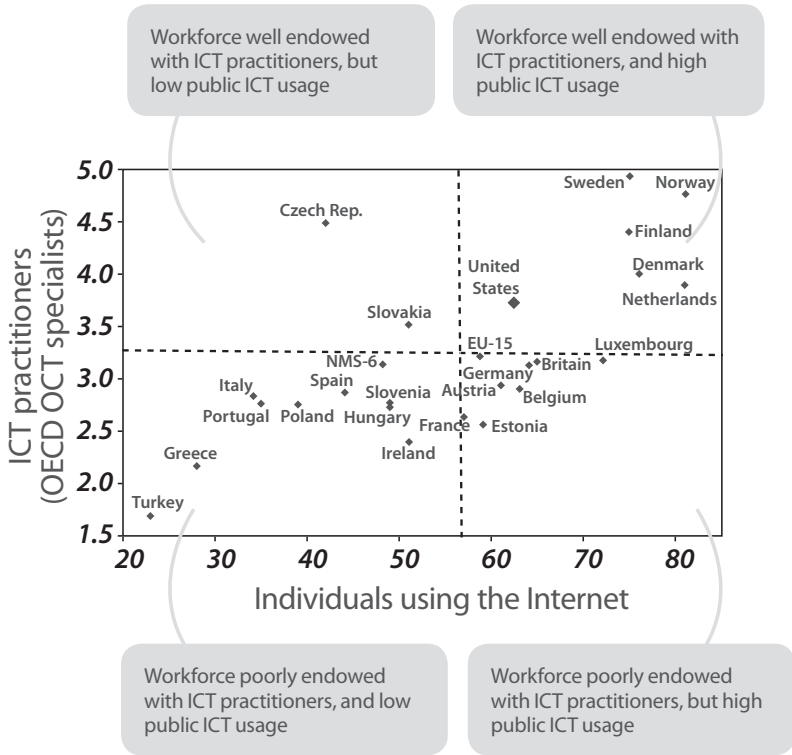
CHAPTER 8: A US PERSPECTIVE

The Situation

The epicentre of the IT industry is the United States. The US economy was built on a foundation of IT innovation, entrepreneurship and a ready-supply of human talent. America thus became the most dynamic and competitive knowledge-based economy in the world. The IT engine fuelled both high productivity and low unemployment rates. Today the United States struggles with an unprecedented employment crisis and its global information leadership is under threat. e-skills lies at the core of the problem and the solution.

Insights into the issues the United States faces, and how it might address them, will be highly valuable to us in Europe. Jacob Kirkegaard, a research fellow at the Peterson Institute for International Economics, based in Washington DC shares his perspectives: "The United States has historically had a population well endowed with e-skills, especially when compared to other large industrialized countries (see figure).

The figure shows the U.S and European countries' relative employment intensity for IT Practitioners (Y-axis) and proxies digital literacy among the broader U.S and European publics with data for the number of individuals actively accessing the internet (X-axis)[44]. It splits included countries into four categories, based upon their relative employment intensity among IT practitioners and digital literacy levels among the public. The United States is in the upper right quadrant, indicating that its workforce remains relatively well endowed with IT practitioners, and that Americans today continue to possess a relative high level of basic e-skills. Only smaller countries in Scandinavia and the Netherlands perform better in Europe."

Workforce well endowed with ICT practitioners, but low public ICT usage

Workforce well endowed with ICT practitioners, and high public ICT usage

Workforce poorly endowed with ICT practitioners, and low public ICT usage

Workforce poorly endowed with ICT practitioners, but high public ICT usage

ICT practitioners (OECD OCT specialists)

Individuals using the Internet

Sweden Norway
Czech Rep.
Finland
United States
Denmark
Netherlands
Slovakia
EU-15
Luxembourg
NMS-6
Germany Britain
Spain
Italy
Slovenia Austria
Belgium
Portugal Poland Hungary France Estonia
Greece
Ireland
Turkey

Source: OECD Key ICT indicators, Eurostat (2009); and U.S. Census (2007)

A Dual Challenge

Again this highlights that we have something to learn from our US counterparts. However Jacob Kirkegaard warns that the US faces a duel challenge in respect of digital literacy and IT practitioner shortages. In respect of digital literacy, he points out, "Meanwhile, survey data from the U.S. Bureau of Labor Statistics indicates that computer and internet use at U.S. workplaces has risen steady by 1-1.5 percentage points of total employment annually since the early 1990s. Some required computer or internet use among American employees can from these data conservatively be estimated at around 55-60 percent of all jobs today, or in other words rapidly approaching the broad level of U.S public digital literacy implied in the graph.

With stable high levels of new investments in IT equipment and software by U.S. businesses and labor productivity accelerating again, computer and internet use at U.S. workplaces is destined to continue increasing in the future. The demand for the basic e-skills and digital literacy required to fill computer and internet using jobs in America will rise concomitantly.

Therefore, as U.S. policymakers struggle to reshape the nation's labour market policies and restart the *U.S. job engine* after a lost decade and bring down today's historically unprecedented long-term unemployment rates, a renewed national focus on e-skills and improved digital literacy in America is imperative.

An Ad-hoc Approach

While the 2009 stimulus package provided $2-3bn in additional federal government funding earmarked for workforce retraining purposes and $650mn in funding for new class-room educational technology, the lack of a broader national policy framework and sustained accompanying funding to expand U.S. digital literacy is highly problematic.

The necessary task of expanding broad e-skills in America today is instead carried forward almost solely by ad-hoc partnerships between quasi-governmental organizations, such as the National Science Foundation, computer and information technology industry associations and stakeholders, and interested private companies. The scope

and innovative execution of many such private U.S. e-skills focused partnerships is impressive and ought to be a source of inspiration for both governments and private stakeholders in Europe.

But private partnerships tend to target relatively resourceful individuals, who will often possess decent basic education and some e-skills in advance. Only a long-term prominent government role in expanding digital literacy in the United States can hope to reach most of the over one third of Americans, typically poor and with low general education levels, do not possess currently basic digital literacy." The message is clear. If we in Europe do not take a coordinated approach to e-skilling its citizens at an inter-governmental level, we are destined to face social inclusion issues at an unprecedented scale.

Positive for Practitioners

Jacob Kirkegaard paints an interesting picture in respect of IT practitioners: "Meanwhile, America's IT practitioners have fared well during the current devastating employment downturn with only a modest increase in unemployment levels to less than half the national levels in early 2010. Similarly the long-term jobs prognosis for this group of U.S workers is bright. In the most recent Bureau of Labor Statistics ten year employment projections, IT practitioners thus make up the largest group of non-healthcare related high growth occupations, estimated to add a total of up to 750,000-1mn additional jobs by 2018[45].

Yet, despite such positives for U.S. IT practitioners, it is for several reasons far from clear that America as a country can maintain its IT practitioner strength; In a period of rising demand and in a striking reversal of the accelerating global trend towards liberalizing immigration rules for high-skilled workers[46], U.S. businesses' access to foreign IT practitioners remains curtailed at levels far below those of the 1990s. With U.S. IT practitioner employment projected to grow rapidly and foreign-born IT entrepreneurs historically establishing up to half of Silicon Valley's new technology firms[47], America's current high-skilled immigration policy is sure to aggravate any future IT practitioner skill shortages and is highly damaging for the nation's broader information technology prospects.

At the same time, the U.S. domestic education system seems increasingly unable to produce the required additional IT practitioners during the next decade, especially considering ongoing state and local government budget cuts in education. U.S. computer sciences degrees at the Bachelor and Master's level has been in general decline in recent years, while only seeing some growth at the much smaller doctoral level.

Foreign human capital (here students) play an important role in the U.S. IT-related education system. While foreign students account for only a relatively minor share of IT-related U.S. bachelor degrees, at the master's and particularly doctoral level, their presence looms large. A substantial part of the growth in the number of doctoral degrees given between 2003 and 2007 is thus related to a continued increase in the presence of foreign IT-related students at U.S. education institutions.

Please Don't Go

The large inflow of foreign graduate level students to the United States is a clear testament to the persistent global attractiveness of its universities and has always been a source of economic strength, as the world's best and brightest came first to study and then remained in the U.S. workforce and contributed to the U.S. economy after graduation. However, with increasing economic growth and opportunities in many of the countries of origin for America's foreign IT-students (over half are from either China or India), it is increasingly uncertain that America can maintain its historical ability to hold on to the foreign students educated at its universities. Any decline in U.S. retention of foreign IT-related students will rapidly worsen any future IT practitioner skill shortages."

We similarly have to face the fact that Europe may not be able to grow its own talent pool at a rate that corresponds to our intended growth. European policy will need to reflect this reality.

Take Action

Jacob Kirkegaard shares his views on what action is needed:

· "American policymakers must act boldly and expeditiously to solve the country's mounting e-skills challenges;

· To expand basic e-skills further among U.S. workers, directly government funded initiatives will be necessary. The traditionally preferred U.S. policy tool in the form of tax breaks in return for desired personal actions will not suffice among typically low income target groups which often pay few taxes and lack access to information technology. Instead, the U.S. government must overcome fiscal concerns to fund and direct the necessary programs to provide needed IT hardware and training opportunities locally in the communities hitherto trapped on the wrong side of America's domestic digital divide.

· To increase the attractiveness of an IT practitioner education, additional federal government education grants and loans should be made available to any American students wishing to pursue these types of studies. Similarly, any foreign student successfully completing an identified IT practitioner Bachelor, Master's or Doctoral degree at an American educational institution should be guaranteed the access to a permanent U.S. work permit (green card).

· Most importantly, however, all America's businesses should – through a "IT Human Capital Tax Credit" – be better incentivized to provide their U.S.-located staff with the certified training required to fulfil IT practitioner jobs. Crucially and to overcome concerns over trained workers' subsequently "joining the competition", the value of this tax credit should be perhaps 110 percent of associated company training cost."

Europe must similarly launch a coordinated two-pronged attack that tackles both social exclusion and practitioner skills shortages. In a knowledge based economy, they are inextricably linked.

CONCLUSION

Europe's future is inextricably linked to innovation. Europe was the cradle of the industrial revolution which structured our societies in the 20th century. Today with the emergence of the knowledge based economy, innovation is increasingly powered by new information and communication technologies. We must adapt ourselves to the new paradigm of the 21st century. Thus our society and tomorrow's workforce must be both e-skilled and innovative.

In respect of recruitment and training we must look beyond people as mere 'extensions to business processes'. We must acquire and develop our people so that their unique capabilities can be harnessed by the organisation. This presents new challenges in terms of change and talent management.

These challenges are not confined to the professional technologist and increasingly e-skilled user. It extends across society to embrace the socially disadvantaged. Similarly an innovative Europe cannot afford to under-utilise the talent of women and those whom today we might consider too old for employment.

The challenges Europe faces both economically and socially are well documented. It is the purpose of this manifesto to highlight the issues and to encourage those with influence to synchronise their initiatives to ensure that we are all working towards the same goal.

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Synopsis

Europe's economic future is highly dependent on having a highly skilled workforce. In order to remain competitive in a global marketplace, Europe's IT functions and technology service providers need to have ready access to an e-skills-proficient labour force. Increasingly the e-skills capability of end users will also determine the sustainability of Europe's collective economy. But we must be careful not to create an underclass of people who are not only unemployed but unemployable. This manifesto provides insight and actionable content from a broad cross section of perspectives. This is an essential guide for those that have influence over the acquisition, development and consumption of 21st century IT professionals and their counterparts in the user community.

Skills Week
http://eskills-week.ec.europa.eu

Ade McCormack advises on e-skills and IT leadership issues. Trained as an astrophysicist, he went on to become a technologist. Today he advises organisations on how to maximise the return on their IT investment. He has written a number of books that embrace e-skills and has a column in the Financial Times advising business leaders on IT issues.

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