

GLOBAL SOURCING AND ICT SOFTWARE AND SERVICES IN EUROPE

Final report
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1. Executive summary

Global sourcing of activities from Europe to other countries (often referred to as ‘offshoring’) is an integral component in a networked and globalised economy, and companies are to an increasing extent taking advantage of global opportunities by moving activities to countries that provide the best business environment for the specific activity in question. Among the factors that have been driving this development are the evolution of a global transport and communication infrastructure, the diffusion of information and communications technologies (ICTs), and the liberalisation of global trade.

Manufacturing companies have been offshoring activities for many years. However, the ability to digitize and transmit information has made it possible to source a wide range of services that do not require physical presence of the service provider, and offshoring is in fact increasingly used by companies in service sectors to reduce costs and/or get access to human resources, knowledge or new markets.

Companies in the ICT software and services sector as well as ICT using companies have primarily been offshoring standardised low value activities, but this seems to be changing. According to the OECD an increasing flow of foreign direct investments to new growth economies also in relation to high value activities is likely to reflect a next wave of ICT globalisation, and competitive pressure in the area of high value activities will most likely increase as developing countries move up the value chain. In the medium to long term these changes could fundamentally change the demand for e-skills in Europe – quantitatively as well as qualitatively, as ICT firms will look to new sources of innovation and competitiveness to fully harvest the impact and benefits of globalisation. Thus, global sourcing of ICT activities adds an additional dimension to the debate on e-skills in Europe.

Though numerous studies and analyses have been conducted on offshoring sourcing phenomena in ICT and the services sector, the lack of reliable and comparable data have led to that much of the evidence has been anecdotal. Hitherto, the focus of several studies has been the risks of employment losses, whereas offshoring and its potential to spur innovation and competitiveness have been less explored - including likely changes in skills demand as down to the specific occupational level.

On the basis of this, the European Commission launched a study on the impact of global sourcing of ICT software and services on the demand and changes in demand of ICT practitioners in Europe in 2008.

1.1. Europe’s position in the global market for ICT software and services

Data from Eurostat shows that the EU is currently a net-exporter of computer and information services. Since 2004, there has been a growth in the trade surplus of ICT services in Europe cf. Table 1 below:

Table 1. Net trade in computer and information services between EU27 and the world (2004-2006), Mio EUR

	2004	2005	2006
Computer and information services	24184	23705	26279
Computer services	19910	19272	21241
Information services	4274	4432	5037

Source: Eurostat (2008)

In 2006, net trade in computer and information services between the EU27 and the world reached €26279 million. The net extra EU27 trade in services in computer and information services reached €11290 million. In 2006, EU recorded its largest trade surplus in computer and information services to Switzerland (€2446 million) while the trade surplus to the USA was €1594 million. The only trade deficits in this service category were recorded for India (€-433 million), Israel (€-25 million), and Uruguay (€2 million).

The figures illustrate that more global activities are being moved to Europe rather than being dislocated to destinations outside Europe. This suggests that Europe so far had a net gain from a globalised market for computer and information services. However, this pattern could change in the years to come due to changes in global sourcing trends and the emergence of new global ICT players. For instance, China's software industry is expanding. Although China's computer and exports of information services are still relatively low, the annual growth rates indicate that they are rapidly catching up.

1.2. Key facts and trends

European companies increasingly offshore ICT software and services to countries outside Europe. India is one of the main offshoring destinations, but other countries in Asia and South America also provide offshoring opportunities to companies that wish to locate activities to destinations with the right business environment. However, although many European companies increasingly relocate activities to destinations outside Europe, European companies still to a large extent prefer to source activities to other European countries – mostly due to factors of proximity and the quality of the workforce.

The nature and quality of the knowledge base increasingly form global sourcing decisions, including multi-location strategies. These changes situate the quality and the availability of the ICT practitioners as a key location factor for high value activities in the ICT services sector. In fact, there is evidence that offshoring of high value activities is increasingly used as a part of companies' innovation strategies.

Innovation capacity and the quality of the human resource base are closely intertwined - and therefore the access to highly skilled ICT practitioners. India, China and other growth economies are often portrayed as countries with indefinite human resources. However, the strength of these countries in terms of human resources is according to some sources first and foremost numerical. The Asian Development Bank finds that many countries in Asia are currently experiencing a "skills crisis" due to a perceived low quality of the workforce. This may hamper the future development of the ICT industries in the new growth economies and

could be a severe constraint to moving up the value chain. In addition, wage levels in India are increasing and this is driving Indian ICT companies to focus more on innovation and high value activities as their competitiveness vis-à-vis other low cost destinations is decreasing.

Finally, offshoring of R&D activities is increasing. However, the level of offshoring is still relatively limited, and when it occurs it seems most often to be part of a multi-location strategy. The potential innovation gains and growth opportunities to be made from offshoring of R&D to globally recognised hubs with a high level of R&D intensity are still topics to be explored further.

1.3. Impact of global sourcing - myths and realities

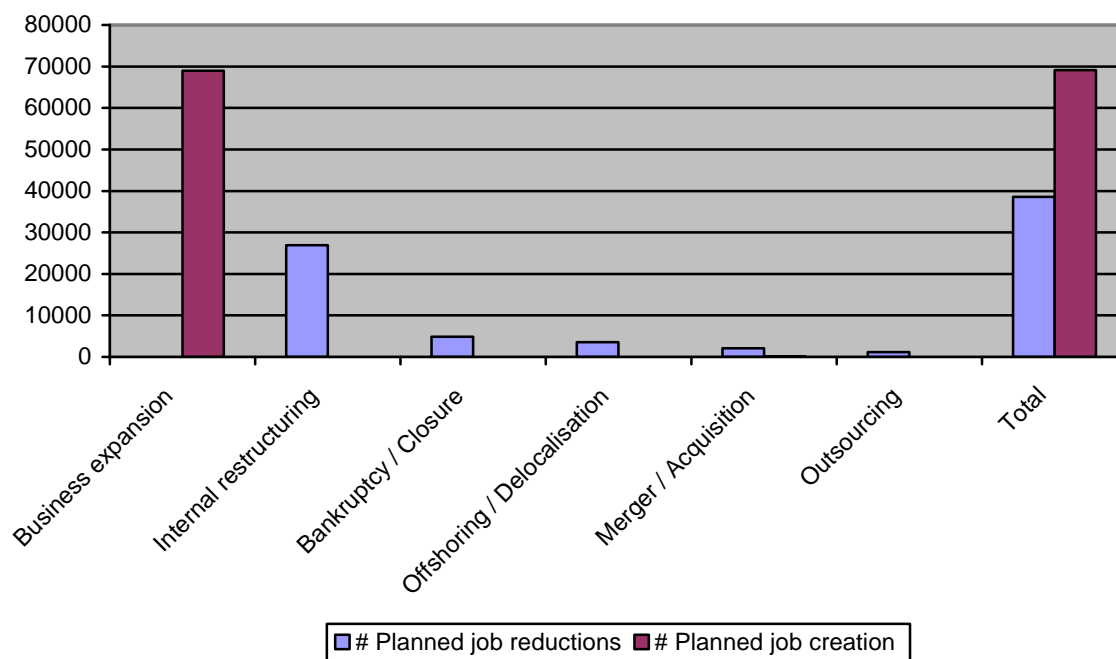
There is a plethora of myths concerning the impact of global sourcing of ICT software and services to countries outside Europe. One of the most persistent debates that only builds on anecdotal evidence is that global sourcing results in structural job losses in Europe with views that seriously could lead to massive welfare losses. However, statistical data and a range of in-depth interviews fundamentally challenge these assumptions.

Employment of ICT practitioners in Europe

Current evidence shows that global sourcing is a two way street where activities are both being located to destinations outside and inside Europe. Data from the European Restructuring Monitor show that net job losses are primarily results of internal restructuring and automation in Europe – and not results of global sourcing of ICT and services.

The figures on ICT from the European Restructuring Monitor for the period 2002-2008 reveal that the total job creation outweighs the total job loss, and that the impact of offshoring on employment is minimal compared to the employment impact from internal restructuring and bankruptcy/closure, cf. Figure 1 below. Overall, introduction of new technologies (e.g. process technologies and automation) and organisational change seem to have a more significant impact on employment levels in the sector than offshoring.

Figure 1. Planned job reduction and job creation (2002-2008)



Source: European Restructuring Monitor

Main challenges for the ICT sector are currently not structural job losses, though the dynamics of the ICT sector show some fluctuations in overall employment levels of ICT practitioners. The key challenge for the ICT sector is rather associated with shortages of persons with the right mixes of skills. In this perspective, there are particularly three broad areas pertaining to the future competitiveness of the ICT industry and to the employability of ICT practitioners in Europe:

Policies which can spur the innovation capacity as a whole within the ICT sector are vital for the sector to stay abreast in a changing order of competition. Efficient and coherent lifelong learning policies play a central role in retaining a highly skilled workforce in a dynamic sector such as the ICT sector. Public- private partnerships to deepen the understanding of sector dynamics that could impact changes in skills demands are central to forward looking and targeted education and training policies and practices.- and thus to ensure the employability of ICT practitioners as occupation profiles change.

Future skills needs in Europe

The main impact of global sourcing is most likely to result in a qualitative change in the demand for ICT practitioners, rather than primarily a quantitative change. As routine ICT job functions are most prone to off-shoring, increased levels of specialisation in high value activities could be one of the gains to be made from offshoring, not only resulting in increased demands for employees with higher skills levels, but also with changing skills profiles. Employees with solid technological skills combined with a deep understanding of business processes and how ICT can enable a reconfiguration of business models are in demand. As some markets become saturated, the need for employees which can combine the knowledge about specific technologies, and how they creatively may be exploited in applications for

emerging new markets become of high value to drive growth through market innovation strategies. However, highly specialised technological skills are at the same time still at high premium in R&D intensive innovation processes.

Training and education

Skills shortages and skills mismatches have been shaped both by global sourcing, and the dynamics and disruptive changes in the technological base of ICT companies in Europe. It is a challenge to education and training institutions in terms of updating their curricula and ensuring that the education programmes provide graduates with skills needs by European companies.

Certification is another issue that needs to be addressed to ensure a high level of educational and occupational mobility of the ICT workforce.

Competitiveness of European companies

We don't see a global division of labour with high end activities located in Europe and the US and low value adding manufacturing tasks being located in developing countries. Rather, European companies are being exposed to increasing global competition in all parts of the value chain. The competitive pressure implies that Europe needs to focus on identifying strengths and stimulate innovation and nurturing talent in areas where Europe can compete. The development of strong clusters in Europe may increase the competitiveness of European companies and make Europe more attractive to foreign companies.

The main myths and the reality are summarised below:

Table 2. Myths about global sourcing and the reality

Myth	Reality
Globalisation is a driver of relocation of jobs from Europe to other regions in the world.	Some job functions are offshored but global sourcing is a two way street with a European positive trade balance.
Global sourcing is resulting in massive structural job losses in Europe.	Global sourcing may lead to short term job losses – but overall the impact is minimal compared to structural changes in the labour markets due to factors such as automation. In fact, one of the main challenges for the growth of the ICT sector seems to be associated with the lack of ICT practitioners with the right mix of both technological and business skills.
Global sourcing is a threat to the employability of European ICT practitioners.	Global sourcing is changing the demand for skills in Europe and this may pose a threat to the employability of current and future ICT practitioners if their skills sets do not meet the demand. Global sourcing can also benefit ICT practitioners in so far that it can drive specialisation and innovation where there is a high premium on ICT practitioner skills.
Global sourcing is a threat to the competitiveness and growth of the European ICT and services sectors.	Global sourcing may enable higher levels of specialisation and is likely to favour the innovative capacity of ICT firms which overall will be of benefit to the economic development, prosperity and employability of the ICT practitioners in Europe.

1.4. Key challenges

Global sourcing is transforming the global market for ICT software and services and resulting in changes in global value chains. These developments are presenting ICT practitioners, companies, policy makers and stakeholders with new challenges that need to be addressed at both policy level, sector level, and at company level.

Shortages

A shortage of ICT practitioners in Europe could pose a serious threat to the growth and competitiveness of the European ICT sector. In 2008, the World Economic Forum concluded that leveraging ICT is an essential instrument for countries and national stakeholders to ensure continued prosperity and growth. Therefore, rapid adjustments of education and lifelong learning systems, measures to improve the image of ICT occupations, and efforts to ensure well-functioning and dynamic labour markets, are key priorities that must be addressed to ensure an adequate supply of e-skills in Europe. Policy initiatives focusing on the supply of e-skills in Europe need to take into consideration trends in the global sourcing of ICT activities, as global sourcing trends will have an impact on the future demand for e-skills – quantitatively as well as qualitatively.

Shortages of ICT practitioners have been reported in many European countries. Even though such shortages can be related to business cycles and skills mismatches, there is a need to monitor and address these reported shortages in case they put economic growth and competitiveness at risk.

To avoid shortages of ICT practitioners in Europe, companies, unions and policy makers may consider the following measures:

- Recruiting talented people for ICT education programmes.
- Providing incentives in relation to the upskilling of floor level workers in the ICT sector.
- Retraining non-ICT practitioners for work in ICT software and services, and
- Helping foreign ICT specialists to work in Europe (make Europe more attractive and increase access to labour markets).

Skills mismatches

Ensuring a high quality of the ICT workforce is a challenge for both ICT practitioners and companies. In face of skills mismatches, companies could either relocate to regions where they have access to the required skills or try to attract ICT practitioners from non-European countries. In other words, the employability of European ICT practitioners and the attractiveness of Europe as a location for companies are at risk if the ICT workforce in Europe does not succeed in upgrading its skills base to meet the current and future demand.

Moreover, for companies the access to the right skill sets is a prerequisite for innovation. A 2008 study by Europe Innova has identified some prospective innovation challenges for the European ICT sector, and in addition to a range of structural, technological and market related innovation challenges, the study identifies the following skills related challenges:

- The declining numbers of students in scientific and engineering disciplines in the EU compared to its main competitors

- The shortage of experts with specific skills, such as entrepreneurial skills, and ICT professionals with more managerial skills and vice versa
- A shortage of the absolute numbers of ICT practitioners, the imbalance between supply and demand for specific skills and the number of students studying IT and computer science.

In order to avoid future skills mismatches, Europe needs to improve collaboration between universities and industry in relation to the development of curricula so that graduates have the right skills. It is also important that ICT practitioners and companies are motivated for upskilling. Finally, policy makers and stakeholders need to monitor trends to better anticipate future skills needs.

Competitiveness and attractiveness of Europe as a location

Global sourcing is an opportunity for companies to increase their global competitiveness by locating specific activities in regions that provide the right business conditions such as favorable cost level, access to knowledge, a well educated workforce, and strong protection of intellectual property rights. However, not all companies are able to reap the benefits of global sourcing. Small and medium sized companies (SMEs) in particular do not have the same opportunities to offshore ICT tasks to countries with cheaper labour costs simply due to lack of investment capital up front. Furthermore, most ICT practitioners tend to favour employment in larger companies with highly professional HRM practices and with options to learn from highly qualified peers, factors which limit recruitment options for many SMEs in Europe. Hence, from an SME perspective offshore outsourcing is an area of concern because the SMEs are likely not to be able to exploit offshore outsourcing as a means to improve the competitive base and to get access to new markets to the same extent as the larger companies.

Global specialisation and the development of strong European clusters as a way to promote European innovation and competitiveness is another challenge facing ICT practitioners and companies. Moreover, strong clusters in combination with a highly skilled workforce may attract knowledge intensive companies from other world regions to start up new activities in Europe.

A range of European stakeholders and experts have criticised the European approach to clusters for fostering the development of clusters that are simply too small to be of significance. In this perspective, Europe should direct funds to only a few existing clusters with global potential rather than fostering the development of many small clusters. The current European efforts to identify and assess clusters in Europe is an important step in identifying clusters with global growth potential, and on this basis potentially re-focus support mechanisms to ensure efficient use of public means for innovation. However, in addition to these initiatives, there is a need for measures which aim to open up the local or regional innovation system to input from other regions, and policy instruments that stimulate the integration of clusters in global knowledge networks.

This report is the first of two reports. In the second report we will present a set of policy recommendations on the basis of the evidence presented in this synthesis report and on the key challenges identified.

2. Introduction to global sourcing and e-skills

ICT companies and large enterprises increasingly outsource software development, services and maintenance to countries such as India and China. The reasons for this are manifold: relative wage differences, access to new markets, access to highly skilled specialists, technological change to name a few.

Public perceptions of sourcing often focus on the potentially negative effects on the European labour market for ICT professionals and the European economy as a whole. However, there is currently little evidence of significant job migration due to sourcing from Europe to countries outside Europe, and it is uncertain what the medium term impacts of sourcing will be on the competitiveness of European ICT companies, on changes in their skills demands both in volume and in the composition of skills, and on the developments in labour markets for European ICT professionals.

2.1. *The Impact of global sourcing on e-skills*

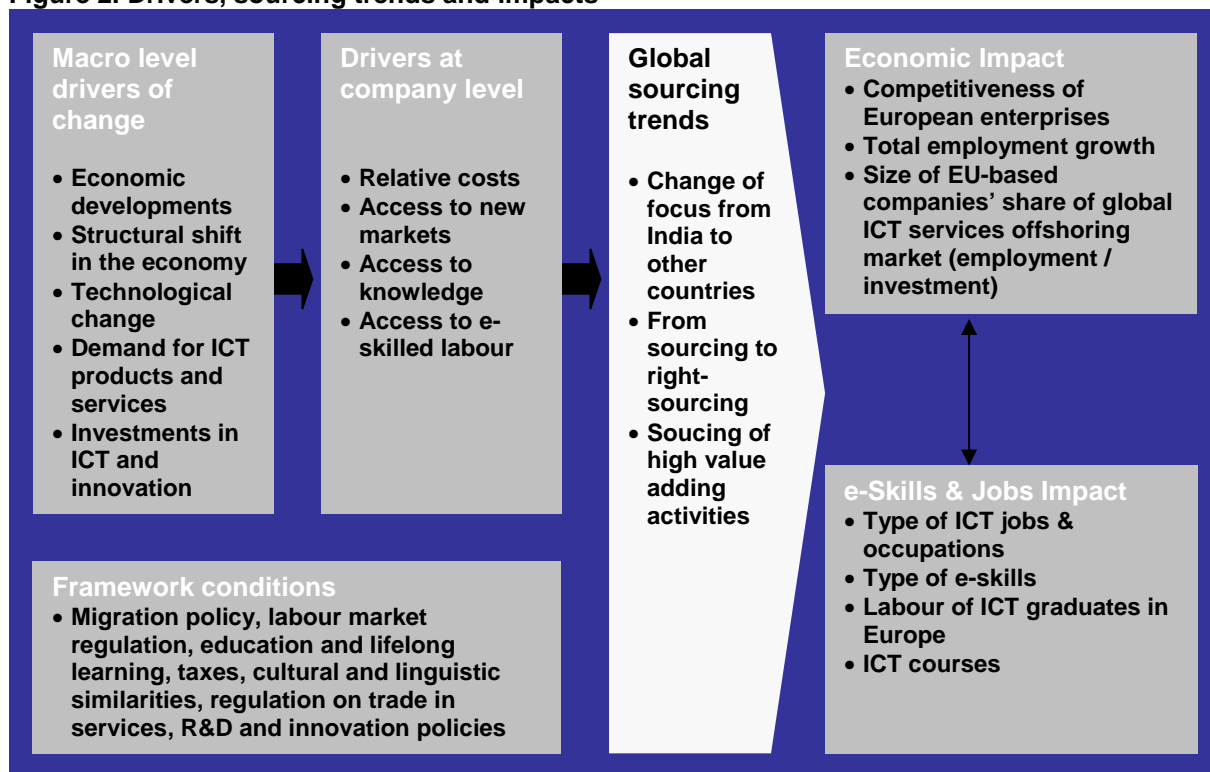
The European Commission – DG Enterprise and Industry has after an open call for tender selected the Danish Technological Institute to analyse the impact of global sourcing of ICT software and services on the future supply and demand for e-skills. The study is entitled ‘The impact of global sourcing on e-skills’.

Objective of the study

The objective of the study is to analyse the impact of global sourcing on e-skills, jobs, and occupations in order to provide a comprehensive knowledge base on which future e-skills policies can be developed aligned with strategies for European competitiveness.

To explore the current and future impacts of global sourcing, the study has identified and assessed the macro-level drivers of change and company motives for outsourcing, as they will influence future sourcing trends and impacts. The relationship between drivers, sourcing trends and impacts is illustrated in Figure 2 below:

Figure 2. Drivers, sourcing trends and impacts



The study provides an overview of the current debate on global sourcing of ICT services and software. It analyses the relationship between macro level drivers of change, sourcing trends and strategies, and the impact of sourcing on the future supply and demand for e-skills in Europe. These topics are all addressed in the current *Synthesis Report*.

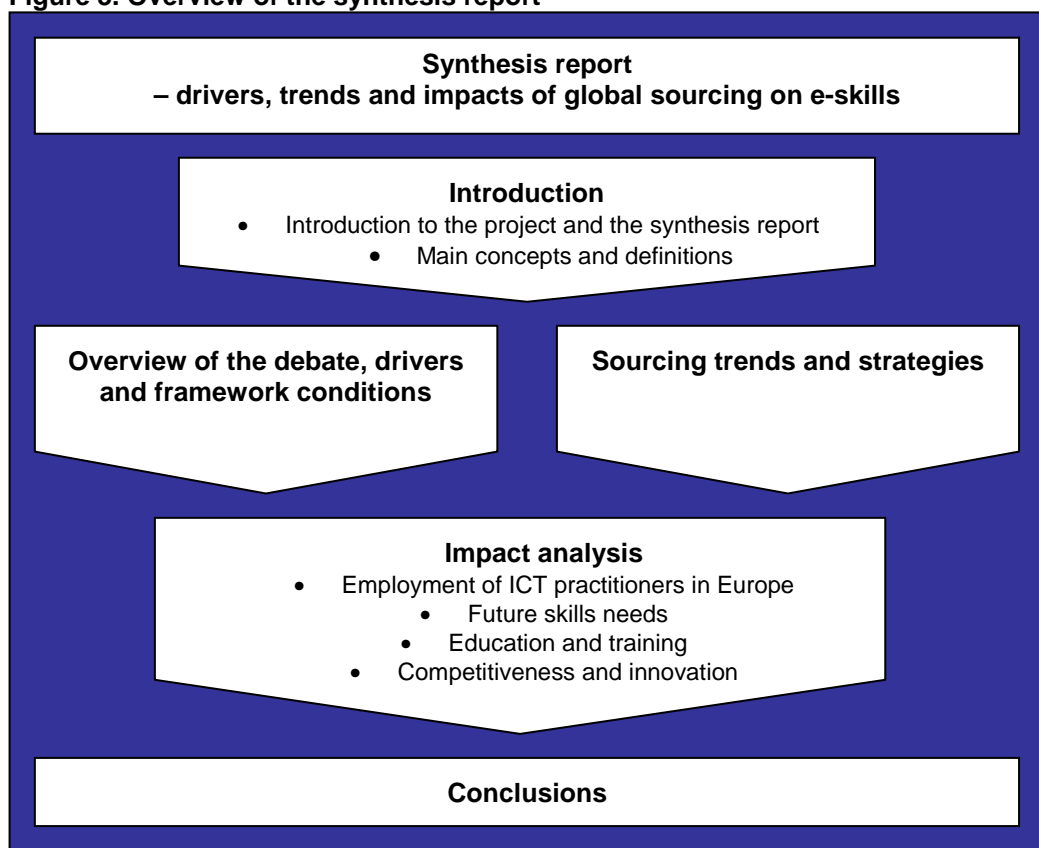
Due to the level of uncertainty and complexity pertaining to the topic of global sourcing, three scenarios have been developed based on the trends identified in the synthesis report. The scenarios are aimed to support policy makers, industry and social partners in developing future oriented robust strategies. The latter are presented in a separate report which also includes a global sourcing impact assessment model. The assessment model has been developed in order to be able to provide forecasts on expected changes in employment of ICT practitioners in each of the three scenarios, making it possible for policy makers to prioritise policy actions and revise strategies as the future starts unfolding.

Introduction to the synthesis report

The purpose of the synthesis report is to provide a thorough analysis of the impact of global sourcing on European ICT practitioners' occupations and e-skills as a basis for policy initiatives at EU level and nationally.

More specifically, the aim of the synthesis report is to provide clear definitions and an analytical framework to address key topics; secondly the aim is to identify and assess the ongoing debate on global sourcing; and thirdly to assess what are the main drivers and framework conditions and strategies linked to the topic of global sourcing in order to draw conclusions on the impact on employment, skills and competitiveness within ICT and services.

Figure 3. Overview of the synthesis report



The synthesis report builds on interviews with a range of stakeholders, a number of case studies have been conducted and a comprehensive literature review has been undertaken.

In the following section, we will provide a brief overview of the ICT software and services sector in Europe.

2.2. The European ICT software and services sector

Services are increasingly important in modern economies and this also holds true for the European Union. In 2006, the share of services in EU-27 gross value added and employment were 69.6% and 68.6% respectively (Eurostat 2008). The European ICT software and service sector consists of slightly more than half a million enterprises, generates €154.3 billion of value added and employs 2.6 million persons.¹ Employment in the sector has increased steadily since 1996, except for a brief stagnation in 2000-2004 (Eurostat 2007).

The location of the ICT software and services sector in Europe

The large and 'old' EU countries dominate the list of EU member states with the most enterprises and employees in the computer services sector. UK has the highest number of enterprises and employees in Europe. However, Sweden has relatively many enterprises considering the size of the country.

¹ EU 27, based on NACE 72 computer services

Table 3. Top 5 European countries in terms of number of enterprises and employees in NACE 72: Computer and related activities (2005)

	Number of enterprises in the sector		Number of employees in the sector
UK	112905	UK	553759
Italy	96388	Germany	395901
France	59514	Italy	366580
Germany	50597	France	339149
Sweden	31436	Spain	195378

Source: Eurostat

Note: Enterprises: Excluding Ireland, Belgium, Bulgaria, Malta and Luxembourg; Employees: Excluding Ireland, Malta and Luxembourg

Germany has the highest share of computer service companies in the national non-financial business economy (NACE C-I and K), followed by the UK, Sweden, Austria and Hungary. In terms of employees, Sweden has the highest share of employees in the computer services sector, followed by Finland, the UK, the Netherlands and Denmark.

Regional differences

The relative importance of the ICT software and services sector in Europe varies considerably. According to Eurostat data, the 10 European regions with the highest number of companies include mainly UK and Italian regions. The region with the highest number of employees in the computer services sector is Île de France, followed by regions in Italy, the UK, Spain, Germany and the Netherlands, cf. Table 4 below.

Table 4. Top 10 regions in terms of number of companies and employees in the computer service sector (NACE k72)

Region (NUTS level 1)	Number of companies in regional computer service sector	Rank	Region (NUTS level 1)	Total number of employees in regional computer service sector
Nord Ovest, Italy	35241	1	Île de France, France	202922
South East, UK	25590	2	Nord Ovest, Italy	146540
Île de France, France	25367	3	South East, UK	141637
Czech Republic	22823	4	London, UK	117854
London, UK	22695	5	Comunidad de Madrid, Spain	102734
Centro, Italy	22219	6	Baden-Württemberg, Germany	93145
Nord Est, Italy	19897	7	Centro, Italy	91351
Közép-Magyarország, Hungary	13893	8	Nordrhein-Westfalen, Germany	89478
Sud, Italy	12772	9	West-Nederland, Netherlands	85200
Eastern, UK	12578	10	Nord Est, Italy	72058

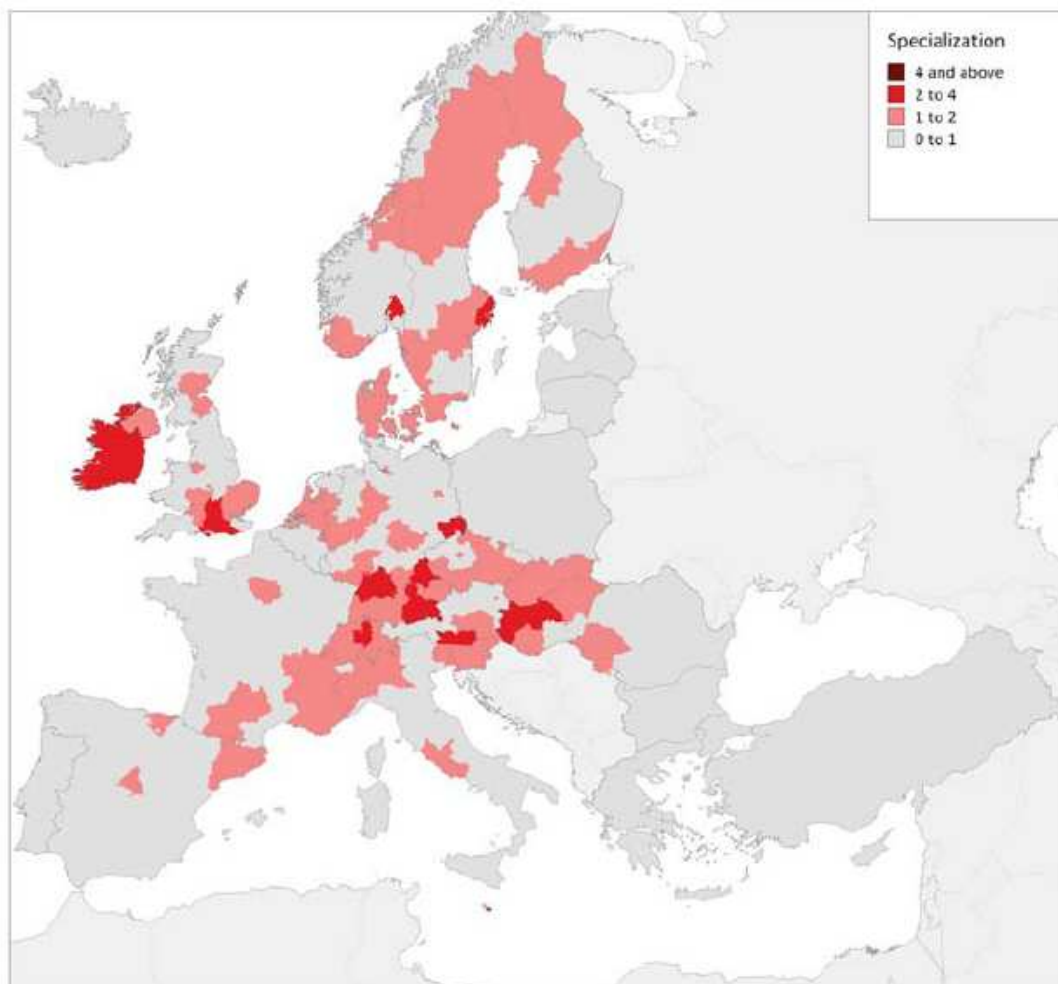
Source: Eurostat database, NUTS 2003

Note: Data is not reported for a range of regions

Regional specialisation

The OECD has mapped European regions with a high degree of specialisation in ICTs.²

Figure 4. Regional specialisation in the EU area



Source: OECD (2007e)

The mapping shows clustering of ICT companies in Ireland, Sweden and United Kingdom as well as in countries in Central and Eastern Europe. Such co-location in a specific geographical space enables companies to benefit from different advantages such as a qualified labour market, access to specialised services, and research (OECD 2007e).

2.3. Definitions and key issues

The core concepts used in this study are widely discussed and often applied without clear definitions. To ensure the validity and clarity of the report the following concepts are defined:

- Global sourcing

² Specialisation is not explicitly defined in the report, but according to the OECD specialisation is commonly measured by the Balassa-Hoover index. This index relates an industry's share of employment in a region to its share in the country as a whole. A region is specialised in an industry when the index is above 1 and it is not specialised when the index is below 1. The higher this value, the more specialised the region (OECD 2007f).

- ICT practitioners and e-skills
- ICT students
- ICT software and services
- Impact on labour market, e-skills and competitiveness of European enterprises

Global sourcing

In the study we follow the OECD typology and defining sourcing by control and location aspects:

Table 5. Sourcing typology

Control	Outsourced	Onshore outsourcing	Nearshore outsourcing	Offshore outsourcing
	Insourced	Internal Domestic supply	Internal nearshoring	Internal offshoring
		National	Within EU	Global - outside EU
		Location		

As to the locational dimension, outsourcing refers to the relocation of activities to external service providers within a country, while nearshoring and offshoring both refer to the relocation of activities across national borders. For European companies nearshoring refers to the outsourcing of activities to service providers in other European countries and offshoring refers to outsourcing to non-European countries.

In this study we do not distinguish between offshore outsourcing (contracting out to independent parties outside the EU) and internal offshoring (insourcing to affiliates outside the EU). Furthermore, we include sourcing (or ‘onshoring’) of activities to Europe in this study. By analysing onshoring of activities to Europe it is possible to uncover those factors and framework conditions which make the EU an attractive location for companies.

‘Global sourcing’ thus refers to offshoring to affiliates or independent subcontractors located outside Europe as well as onshoring of activities to Europe.

ICT practitioners and e-skills

The European e-Skills Forum (2004) has defined three main types of e-Skills: ICT practitioner skills (or ICT specialist skills), ICT user skills, and E-business skills. In the study, we focus on ICT practitioner skills.

Table 6. Typology of e-skills

ICT practitioner skills	The capabilities required for researching, developing, designing, managing, producing, consulting, marketing, selling, integrating, installing, administering, maintaining, supporting and servicing ICT systems.
ICT user skills	The capabilities required for the effective application of ICT systems and devices by the individual. ICT users apply systems as tools in support of their own work, which is, in most cases, not ICT. User skills cover the utilisation of common software tools and the use of specialised tools supporting business functions within industries other than the ICT industry.

E-business skills	The capabilities needed to exploit opportunities provided by ICT, notably the Internet; to ensure more efficient and effective performance of different types of organisations (private or public); to explore possibilities for new ways of conducting business/administrative and organisational processes; and/or to establish new businesses. They are strategic and related in particular to innovation management, rather than pure technology management skills, which are part of ICT practitioner skills.
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Source: *European e-skills Forum 2004*

As ICT becomes the backbone of many businesses, not only e-skills should be taken into consideration, but also other complementary skills needed to match existing and emerging occupations within ICT functions and services. A mixture of skills is required in the European ICT occupations, due to the role ICT plays in business processes (e-skills UK 2008). Therefore, ICT practitioners' skills are no longer sufficient, but need to be supplemented by more skills in management, business, and communications to be of real value to a specific company.

One of the key challenges as regards current and future supply of e-skills is how to estimate the number of ICT practitioners in Europe. OECD has defined ICT skilled employment on the basis of the following occupations:

Table 7. ISCO codes

ISCO 88	
121	Directors and chief executives
122	Production and operations managers
123	Other specialist managers
211	Physicists, chemists, and related professionals
212	Mathematicians, statisticians and related professionals
213	Computing professionals
214	Architects, engineers, and related professionals
241	Business professionals
242	Legal professionals
243	Archivists, librarians, and related information professionals
312	Computer associate professionals
313	Optical and electronic equipment operators
341	Finance and sales associate professionals
342	Business services agents and trade brokers
343	Administrative associate professionals
411	Secretaries and keyboard-operating clerks
412	Numerical clerks
724	Electrical and electronic equipment mechanics and fitters

Source: *OECD 2005*

These occupations constitute a broad definition of ICT skilled employment. The OECD also operates with a narrow definition consisting of only four occupations (ISCO 88: 213, 312, 313 and 724). This narrow definition can be used to estimate the number of ICT practitioners in Europe. However, at the four-digit level some of the sub groups of the different occupations included in the narrow definition has been excluded, because they do not relate to ICT software and services. One example is ISCO 88: 313 Optical and electronic equipment operators that includes the following occupations:

Table 8. ISCO 88 codes four digit level

ISCO 88	
3131	Photographers and image and sound recording equipment operators
3132	Broadcasting and telecommunications equipment operators
3133	Medical equipment operators
3139	Optical and electronic equipment operators not elsewhere classified

Source: Eurostat

The narrow definition is at the same time also too limited. For instance, the narrow definition does not include ISCO 88: 1236 Computing services managers. With these reservations in mind, we use OECD's narrow definition to estimate the pool of ICT practitioners in Europe.

ICT students

In order to estimate the future supply of ICT practitioners, the number of students currently enrolled in ICT programmes in Europe is included. In the current ICT employment base, some ICT practitioners have a formal ICT degree; some are autodidact ICT specialists with no formal ICT degree, while others hold various forms of industry certifications. While it is difficult to assess the number of persons who participate in various forms of ICT training which will not result in a formal ICT qualification, it is possible to identify the number of computer science students and graduates by using the Eurostat education database.

Among the main tertiary qualifications that should be included in the analysis of future supply is EF48 Computing in the Eurostat education database. However, computing is not the only education programme supplying Europe with ICT practitioners: mathematicians, engineers and physicists can to a large extent carry out the same tasks as computing scientists – particularly physicists who excel in *applied* programming for numeric calculations.³

Nevertheless, these programmes and qualifications are employed across several sectors and occupations. It is therefore difficult to anticipate the share of for instance a physicist cohort ending up in ICT specialist occupations. In addition, a range of business degree programmes have an information technology component that could qualify the students for ICT practitioner positions in the ICT sector and ICT intensive sectors. Students enrolled in such programmes could therefore also be considered a part of the potential supply of ICT practitioners and included in estimates of supply.

The study mainly focuses on those education programmes that could be considered 'core' ICT education programmes: Computing, information systems, software engineering and artificial intelligence, bearing in mind that such a narrow approach will tend to underestimate the potential pool of ICT practitioners in Europe – particularly in the interface between design, content creation and ICT.

ICT software and services

The focus of this study is the ICT software and services sector *and* the ICT intensive sectors. ICT services can be found in all sectors due to the generic character of ICT. Based on NACE

³ The statistical codes for physical science is EF44, mathematics and statistics EF46, and engineering and engineering trades EF52.

Rev. 1, the OECD countries have agreed on a definition of ICT service sector vis-à-vis the ICT manufacturing sector.

Table 9. ICT Manufacturing vs. ICT service

Manufacturing	Services
<ul style="list-style-type: none"> ▪ Office, accounting and computing machinery (NACE 30.01 and 30.02); ▪ Insulated wire and cable (NACE 31.3); ▪ Electronic valves and tubes and other electronic components (NACE 32.1); ▪ Television and radio transmitters and apparatus for line telephony and line telegraphy (NACE 32.2); ▪ Television and radio receivers, sound or video recording or reproducing apparatus and associated goods (NACE 32.3); ▪ Instruments and appliances for measuring, checking, testing, navigating, and other purposes, except industrial process equipment (NACE 33.2); ▪ Industrial process equipment (NACE 33.3). 	<ul style="list-style-type: none"> ▪ Wholesale of electrical household appliances (NACE 51.43); ▪ Wholesale of machinery, equipment and supplies (NACE 51.64); ▪ Wholesale of other machinery used in industry, trade and navigation (NACE 51.65); ▪ Telecommunications (NACE 64.2); ▪ Renting of office machinery and equipment including computers (NACE 71.33); ▪ Computer and related activities (NACE 72)

Out of the six ICT service sub sectors, NACE 72 computer and related activities is the most relevant sub sector to consider in relation to this study and we will thus focus on this specific sub sector when providing figures on the developments in the ICT software and services sector.

While many ICT practitioners work in the ICT manufacturing sector or the ICT services sector, there are also ICT practitioners who work outside these sectors (for example in the financial sector). To explore the full impact of sourcing on the employment of ICT practitioners in Europe, ICT practitioners in ICT-intensive sectors are therefore included (sectors characterised by a high share of ICT practitioners in total sector employment). In this study we will therefore also include sectors characterised by a share of over 50% ICT skilled employment in total sector employment (OECD 2005). NACE 30 manufacturer of office machinery and computers are excluded as the focus of the study is software and services and not manufacturing.

Table 10. Industries ranked according to share of ICT skilled employment (broadly defined), EU-15 (2003)

Sectors	% ICT-skilled in total sector employment
Computer and related activities (NACE 72)	84,1
Insurance and pension funding, except compulsory social security (NACE 66)	75,1
Activities auxiliary to financial intermediation (NACE 67)	71,6
Financial intermediation, except insurance and pension funding (NACE 65)	70,2
Manufacture of office machinery and computers (NACE 30)	61,7

Sectors	% ICT-skilled in total sector employment
Other business activities (NACE 74)	50,5

Source: OECD (2005): *New Perspectives on ICT skills and employment*

Thus, the ICT intensive sectors included in this study are NACE 66 insurance and pension funding, NACE 67 activities auxiliary to financial intermediation, NACE 65 financial intermediation, and NACE 74 other business activities.

Impact on labour market, e-skills and competitiveness

In order to understand the quantitative and qualitative impacts of global sourcing on the labour market for ICT practitioners and e-skills, as well as the impact of global sourcing on competitiveness, the current study analyses the following dimensions:

- Impact on the overall employment of ICT practitioners in the European ICT software and service sector and ICT intensive sectors.
- Impact on certain ICT occupations
- Impact on skills needs
- Impact on supply of ICT courses and educational programmes
- Impact on the competitiveness of European-based enterprises

This study comprises enterprises in the ICT software and services sector that have their headquarters located in a European country. However, a number of qualitative case studies on multinational corporations with core offices in Europe have been undertaken. In terms of small and medium sized companies (SMEs)⁴, the focus is mainly on start ups/gazelle companies.

2.4. Data sources and methodology

As a part of the study a statistical overview of sourcing trends and estimates of developments and impacts based on available quantitative data is provided. Unfortunately, it is difficult to estimate the extent of global sourcing of ICT software and services, as none of the available macro-economic indicators are able to reveal whether a specific transaction is based on a strategic decision to source an activity or simply a matter of a company buying or selling a service in global markets. Moreover, internal offshoring is often hard to measure as such decisions are typically embedded within the internal accounts of a multinational enterprise.

Most information on the impact of sourcing on the labour market is based on surveys of companies (e.g. Ovum 2006) or data based collected through the monitoring of media reports on restructuring events in specific industries (e.g. European Restructuring Monitor).⁵ However, Eurostat has included a module on offshoring/outourcing in its Enterprise survey 2007, and a joint European project has recently provided data on international sourcing (Statistics Denmark 2008b).

⁴ SMEs can be defined as ‘enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding 50 million euro, and/or an annual balance sheet total not exceeding 43 million euro’, source: http://ec.europa.eu/enterprise/enterprise_policy/sme_definition/sme_user_guide.pdf.

⁵ The content of this will be discussed in a separate section.

The table below summarises the available statistical data relevant for this project:

Table 11. Potential data sources (statistical data)

Data source	Description	Methodology
European Restructuring Monitor, http://www.eurofound.europa.eu/emcc/erm/	Provides data on the extent of offshoring of activities from Europe to non-European countries	Restructuring cases and employment effects are identified through a press review of daily newspapers and business press in the 27 EU Member States and Norway.
Eurostat enterprise survey 2007	Data on sourcing trends and skills shortages	Survey
Eurostat education database	Number of computer science students and graduates at tertiary level (ISCED97, 5-6; EF48 Computing).	National data
Labour force survey	The EU LFS is a large household sample survey providing quarterly results on labour participation of people aged 15 and over as well as on persons outside the labour force. The EU-LFS covers all industries and occupations.	Large Sample survey. The Labour Force Surveys are conducted by the National Statistical Institutes across Europe and are centrally processed by Eurostat.
OECD STAN database, www.oecd.org/sti/stan	The STAN database for industrial analysis makes it possible to analyse industrial performance at a relatively detailed level of activity across countries.	STAN is primarily based on Member countries' annual national accounts by activity tables and uses data from other sources, such as national industrial surveys/censuses, to estimate any missing detail.
Eurostat http://epp.eurostat.ec.europa.eu	Data on European enterprises: Number, size and revenues	National data
EU KLEMS www.euklems.net	Data on productivity in Europe. Includes modules on relationship between ICT and productivity.	National data tables and meta-data.
World Trade Organisation www.wto.org	Trade in services	National data

Methodology

The study is based on desk research and interviews with policymakers, stakeholders – both union and employer representatives, and academia. In addition a range of company and cluster studies have been conducted.

The desk research includes academic literature, think tanks, public media sources in the US and Europe, consultancy reports and reports from interest organisations, policy bodies, public institutions and enterprises. Some of these sources may have vested interests, or may be presenting a particular view from one side of the range of stakeholders. The validity and reliability of these data sources will be further addressed and assessed in chapter 3 on the global sourcing debate, drivers and framework conditions.

The purpose of the interviews with policymakers, stakeholders and academia has been to test, expand, and to qualify conclusions, taking into account that some respondents may represent particular interests. The interviews have mainly been conducted by telephone and structured after a semi-open interview guide developed in cooperation with the Steering Committee and

the Commission. The interview guide contains general questions related to the study and specific questions in relation to the specialist knowledge of a given respondent.

The company studies include in depth studies of how individual companies approach global sourcing (both nearshoring and offshoring), their future demands for ICT practitioners, and the companies' main future challenges in terms of e-skills and competitiveness. Each case contributes with a thorough knowledge of which sourcing trends and strategies exist for different types of companies, and how the pressure from global markets is perceived and acted upon. The selection of companies for the case studies has been based on the following criteria:

- Geographical spread
- Different company sizes (SMEs and multinational corporations)
- Industry leaders (good practice)
- Different parts of the value chain (suppliers and buyers)
- Different ICT using sectors (consultancies, software companies etc.)

The cluster studies focus on the network dynamics between companies and institutions in a cluster, the role and different models of global sourcing, and the ways in which innovative cluster strategies enable the survival and competitiveness of a cluster. These primary studies include onsite visits and telephone interviews with selected companies and stakeholders in the Cambridge cluster (UK) and Hungary. In addition desk research has been conducted on the three well-known ICT clusters of Kista (Sweden), Oulu (Finland) and Ireland.

Table 12. List of interviewees and case studies

Interview categories	Country and characteristics
Polymakers	<ul style="list-style-type: none"> • Portugal, prime ministers office • Finland, ministry of education
Stakeholders	<ul style="list-style-type: none"> • Global ICT trade union • European SME organisation • Danish ICT organisation • German ICT organisation • Global IT consultancy • Indian ICT organisation • British e-skills organisation • European CIO organisation • Hungarian outsourcing association • UNCTAD
Academia	<ul style="list-style-type: none"> • American economist (MIT) • British economist (LSE) • British economist (Oxford)
Companies	<ul style="list-style-type: none"> • German/global software services • Global oil and energy company • American/global software services • British creative software SME • French open source SME consultancy • Danish ICT offshoring SME
Clusters (primary data collection)	<ul style="list-style-type: none"> • United Kingdom, Cambridge • Hungary
Clusters (secondary data collection)	<ul style="list-style-type: none"> • Ireland • Sweden, Kista • Finland, Oulu

A detailed list of interviewees and case studies is provided in annex 1 and 2.

Quality assurance

The quality and validity of the findings of the study has been assured by internal experts of the team from Danish Technological Institute, external experts of a Steering Committee and the extensive range of interviews with experts from academia, and interest organisations.

The study has guided by a steering committee consisting of five experts on key issues in relation to sourcing and e-skills:

- Graham Vickery, OECD
- Elena Bonfiglioli, Microsoft Europe
- Bruno Lanvin, Insead
- Jacob Funk Kirkegaard, Peter G. Peterson Institute For International Economics
- Caroline Jacobsson, European Metalworkers' Federation

We thank the external experts for the valuable comments and suggestions they have provided.

Danish Technological Institute is solely responsible for the conclusions of the study.

3. Overview of the debate, key drivers and framework conditions

In this chapter we provide an overview of the debate in different countries, identify key drivers and framework conditions affecting global sourcing and the impact of global sourcing on employment, skills needs and competitiveness.

3.1. Strategic sourcing

Information and Communication Technologies (ICTs) play a growing importance in the European economy (OECD 2006c; Friedewald et al 2005). Access to a sufficient pool of skilled ICT labour is therefore vital to ensure that companies on a continuing basis can improve ICT enabled processes, products and services (European Commission 2007; i2010 High Level Group 2006; IDC 2007; WITSA 2006). This holds true for the ICT sector as well as many other sectors of the economy such as banking, finance, insurance and the public sector (WITSA 2006).

The strategic use of ICTs can lead to efficiency, productivity and innovation gains, and also enables offshoring of both core business activities and support activities to affiliates or subcontractors in other European or non-European countries.

Company motives for sourcing

Companies in Europe are nearshoring or offshoring activities for different strategic purposes. According to Shapiro and Millard (2004), the three basic motives are:

1. Cost-driven innovation and competition – based on improvement of profitability by increased sales of existing products/services, lower costs per production/delivery per unit, cheaper labour and other factor inputs. This can result, for example, from keen price differentiation, maximising the efficiency of supply chain delivery and logistics, automation through the application of ICT, often associated with highly explicit (or codified) knowledge activities which are locationally rather ‘footloose’ i.e. not tied to a specific location.
2. Value-added (R&D) driven innovation and competition – based on identifying and commercially exploiting R&D taking place within the firm, research institutions and laboratories or cluster in a particular location. This may result in the patenting of new products, incubation, but also in innovations in processes, organisation or new delivery mechanisms and services. Such innovation is often associated with highly tacit knowledge activities (i.e. experiential and highly social, often requiring a large degree of face-to-face contact) which are locationally quite ‘sticky’.
3. Market and user-driven innovation and competition – by differentiating from main competitors through a combination of new products, individualised services, product adaptation, and testing, marketing, customer relationship management, etc. Strategic knowledge about new or existing markets and relationships with lead users drive innovation, often with direct input from customers or employees with their own particular understanding of market developments.

In most instances business strategies rely on different combinations of the above three main strategies, with different implications on the demands for e-skills. These trends are not solely European phenomena, but also occur in other OECD countries (OECD 2006c, Kierkegaard 2007a).

3.2. Debate among policymakers and stakeholders

The implications of global sourcing are heavily debated – both among policy makers, stakeholders, and in academia. Some of the main topics in the European and US policy debate regarding offshoring of e-skills are summarised below. The US policy debate is of particular interest simply because of the unique level of offshoring that occurs from the US to other countries (Shapiro and Millard 2004; OECD 2006b).

Delineation of the policy debate and methodology

The European policy debate has been analysed by scanning policy documents and websites of the European Union, national governments, and to some extent even regional/local agencies. Other sources stem from consultancies or think tanks that have carried out public policy analysis. The number of sources are vast and the methodological soundness quite diverse. The desk research has strived to be selective by distinguishing between different type of actors that have contributed to the policy debate on sourcing in order to better understand the policy field and underlying motives behind different types of discourse.

The project team has conducted interviews with selected European and American stakeholders, academics and companies to identify key issues and test and validate our findings (see Appendix 2 for the list of interviewees).

General sourcing debate

The public debate on global sourcing has tended to be split between those who are concerned that it will lead to major jobs-losses and race-to-the-bottom of working conditions whilst others have seen global sourcing as an advantage leading to higher levels of specialisation and therefore more and better jobs (Shapiro and Millard 2004; Trade Union Advisory Committee to the OECD 2004; Jensen et al 2006).⁶

One side of the policy debate focuses on how global sourcing leads to lower costs, greater efficiencies and thereby opportunities to invest in new skills and jobs in growing sectors (see for instance Mann 2003). It recognises that there may be short-term structural problems in some sectors and locations, but that these problems can be alleviated by active and integrated labour market policies (European Commission 2007a; Danish Globalisation Strategy 2006; e-skills UK 2008).⁷

On the other hand, some trade unions maintain that there is no empirical documentation that demonstrates the creation of better paid and higher skilled jobs in place of jobs lost to offshore outsourcing (UNI IBITS May 2004). In fact, they argue that offshoring could lead to a lower paid, low-skills service industry. Therefore governments are called on to intervene to ensure that the value created through outsourcing of activities is re-invested in the countries of origin (Brainard et al 2004).

⁶ Interviews with David Autor, Gerhard Rohde, and Carlos Zorrinho

⁷ Interview Carlos Zorrinho

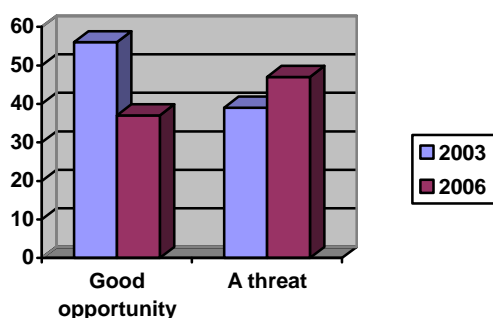
The perception that offshore outsourcing of ICT activities could lead to job losses in Europe and the US, has been evoked by a range of particularly consultancy studies showing that offshore outsourcing of jobs is increasing. For instance, Forrester Research has estimated that 150,000 IT jobs will move offshore from Europe by 2015, and a study by Evalueserve and NASSCOM suggests that 60,000 IT and software development jobs will be offshored from the UK between 2006 and 2010 (Evalueserve & NASSCOM 2003; Swedish Institute of Growth Policy Studies 2006; British Computer Society 2004).

There are also positive views of the impacts of global sourcing. For instance, the sourcing of activities could help mitigating the shortfall in the labour force resulting from demographic developments (low birth rates, ageing population) in Europe (British Computer Society 2004). Labour shortages can lead to welfare losses when companies are not able to produce goods or provide services, but they will also put upward pressure on salary structures. If companies source activities to locations with a sufficient supply of qualified labour, such possible effects are avoided. Furthermore, sourcing of activities to developing countries can support socio-economic developments in these countries if carried out in a responsible and ethical way.⁸ In turn, economic growth and increasing welfare in developing countries could increase demand for European products and thus increase European exports.

Public perception of globalisation⁹

Recent data from a Eurobarometer survey suggest that there is a growing concern about the effects of globalisation among Europeans. In a Eurobarometer survey from 2006, 47 % of the interviewees considered globalisation as a threat to employment and companies in their country, whilst 37 % saw globalisation as an opportunity for companies in their country (Eurobarometer 2006). In 2003, 56% of Europeans (in the 15 old member states) considered globalisation as an opportunity for home business, while 39 % of Europeans perceived globalisation as a threat to employment and domestic companies, cf. Figure 5 below.

Figure 5. European's perception of globalisation



Sources: Eurobarometer 2003; Eurobarometer 2006

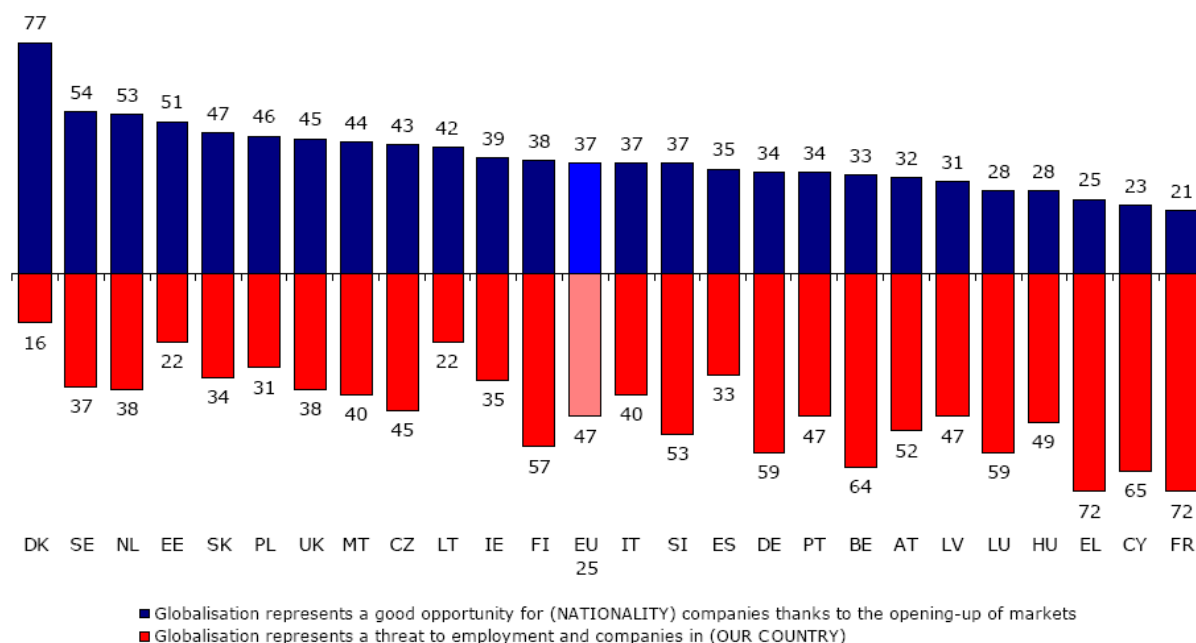
⁸ Interview with Gerhard Rohde, UNI-IBITS

⁹ Eurobarometer provides data on the public perception of globalisation, but does not address explicitly the public perception of offshoring. However, offshoring of activities is often considered an intrinsic part of the globalisation process – for instance, 35% of Europeans associate globalisation with relocation of companies to countries where labour is cheaper, compared to 22% who associate globalisation with market opportunities for companies (Eurobarometer 2007). On this basis, the public perception of globalisation can serve as an indication of the public perception of offshoring (for like method see Auer et al 2005).

42 % of the citizens in the New Member States have a positive perception of globalisation (EU 25 average is 37%), and in five of the New Member States the majority of citizens have a positive perception of globalisation. A comparison of the same geographical base (EU 15) in the two surveys shows that the percentage of Europeans who are positive towards globalisation has fallen by 20 points since 2003 (Eurobarometer 2006).

Within EU 25, the countries with the most positive perceptions of globalisation are Denmark, Sweden, the Netherlands and Estonia, whilst the most sceptical population in Europe are found in France, Greece, Cyprus and Belgium:

Figure 6. Perception of globalisation in different EU member states



Source: Eurobarometer 2006

In Sweden and Denmark, the governments have initiated strategic processes aimed at situating and preparing the countries for a globalised society, and in both instances these processes have been coupled with active media strategies targeting the broader public.

Debate amongst European policymakers

The Lisbon agenda and the follow up policy measures have evolved around a socio-economic agenda aimed more and better jobs intertwined with an agenda of social inclusion and equity. E-skills have been identified as paramount to the achievement of the Lisbon agenda because the ability to exploit, develop and work with ICTs is imperative to growth, competitiveness, and employment (UNCTAD 2004; European Commission 2005b).

The e-skills summit in Copenhagen in 2002 and the following establishment of the European e-skills forum also addressed the issue of global sourcing and the recommendations stated that:

“All stakeholders should promote the importance of the ICT sector and the e-Skills issue in Europe taking also into account important developments in other countries such as the United States, China and India, in order to ensure that global sourcing is

able to reconcile the competitiveness and flexibility essential to businesses with promising career perspectives needed by European citizens”

The European e-skills forum including stakeholders, OECD, policymakers, enterprises and unions is an example of the policy debate at a European level (The European E-skills Forum 2004). The recommendations called for a long term approach to e-skills and global sourcing and hence changed the focus to global sourcing of e-skills as a measure that can contribute to growth and innovation of European enterprises. The European discourse increasingly emphasises that global sourcing is a measure which could spur more and better jobs, because the ICT jobs which remain in Europe tend to move up the value chain.

In 2007 the European Commission adopted the Communication “ *e-Skills for the 21st Century: Fostering Competitiveness, Growth and Jobs*” (European Commission 2007a). In the communication, the Commission points out the main challenges for Europe in the field of e-Skills in Europe:

- E-Skills still not seen as a long-term policy issue
- Lack of EU-wide approach: fragmented approach prevails
- Image problem and decline of supply of highly-skilled ICT practitioners
- Rise of “parallel universes” between formal and industry-based certifications
- Persistence of digital illiteracy

On this basis, a long-term agenda is proposed consisting of 5 key elements:

Table 13. Long term e-Skills agenda

Longer term cooperation	Strengthening cooperation between public authorities and the private sector, academia, unions and associations through the promotion of multi-stakeholder partnerships and joint initiatives including monitoring supply and demand, anticipating change, adapting curricula, attracting foreign students and highly-skilled ICT workers and promoting ICT education on a long-term basis
Human resources investment	Ensuring sufficient public and private investment in human resources and e-Skills and appropriate financial support and fiscal incentives, in full respect of State aid rules, as well as developing an e-competence framework and tools facilitating mobility, transparency of qualifications, and promoting recognition and credit transfer between formal, non-formal and industry ICT education and certifications
Attractiveness	Promoting science, maths, ICT, e-Skills, job profiles, role models, and career perspectives with a particular focus on young people, especially girls, and providing parents, teachers and pupils, with an accurate understanding of opportunities arising from an ICT education and an ICT career to counter the alarming decline in young people’s interest for science and technology careers in Europe
Employability and e-inclusion	Developing digital literacy and e-competence actions tailored to the needs of the workforce both in the public and the private sector, with a particular emphasis on SMEs and also to the needs of the unemployed, elderly people, people with low education levels,

	people with disabilities and marginalised young people
Lifelong acquisition of e-Skills	Ensuring that workers can regularly update their e-Skills and encouraging better and more user-centric ICT-enhanced learning and training approaches (e-Learning). Government should promote good practices for the training of employees using e-Learning, with a particular emphasis on SMEs, and should publicise successful solutions and business models

The objective of this long-term agenda is to improve framework conditions in Europe for the provision of a world-class e-skilled workforce capable of achieving increased productivity, economic and social benefits, and reducing the digital divide. Education, training and upskilling of the European labour is seen as paramount by the Council Resolution of November 2007 “*New Skills – New Jobs*” (European Council 2007).

The e-skills policy framework is also closely intertwined with a flexicurity agenda combining measures to provide security for the individual worker whilst improving flexibility in labour markets to enhance overall mobility. The Employment Policy Guideline 21 within the European Employment Strategy 2005-2008 underpins the need to pursue flexibility in combination with employment security and strong involvement of the Social Partners (European Council 2005). At the European Council in March 2006 the Presidency concludes that:

“The European Council stresses the need to develop more systematically in the National Reform Programmes comprehensive policy strategies to improve the adaptability of workers and enterprises. In this context, the European Council asks Member States to direct special attention to the key challenge of “flexicurity” (balancing flexibility and security): Europe has to exploit the positive interdependencies between competitiveness, employment and social security” (European Council 2006, conclusion no 41).

In the 2007 EC Communication ‘*Towards Common Principles of Flexicurity*’ refers to ICT and globalisation as some of the main changes affecting the need for labour market reforms including both flexibility and security (European Commission 2007c). In many instances, policies have a dual purpose to on one hand meet the firm needs to adapt to fluctuating market conditions, whilst on the other hand to balance these with individual employees’ rights. Policies are therefore at times comprehensive and integrative with a mixture of legislative, counselling, and training instruments in order to address the complexities of global sourcing.

Though flexicurity has come to the forefront of the European policy agenda, the actual composition of security and flexibility is still contested in some countries (European Commission 2007c). This is partially a reflection of existing labour market policies, but is also a reflection on the current unemployment levels, the extent of lifelong learning frameworks and other measures which can ease mobility in labour markets as structural changes in the economies occur (Danish Technological Institute 2008). The European Council and the European Commission stress that pursuing flexicurity policies should not imply institutional mimicking of the Danish model, but take into account the historical traditions of the Social Dialogue and employment and social policy in each Member State (European Commission 2007c). Similarly the European Commission formed an Expert Group on

Flexicurity. The group has pointed to at least 4 different pathways of flexicurity given the institutional diversity in Europe (European Expert Group on Flexicurity 2007).

In some countries restrictive Employment Policy Legislation (EPL) has resulted in an increase of temporary employees because businesses perceive it as being too risky to hire permanent labour (Danish Technological Institute 2008). In the long run measures to create flexibility through temporal contracts may have a negative effect on the employability and mobility of the workforce. Contracting enterprises are likely not to invest in keeping temporal employees skills up to date through formal training arrangements to the same level as with employees on regular contracts (Leeney et al 2005; OECD2006d; OECD 2007). This may in turn have a negative effect on the competitiveness of European enterprises. Therefore, the debate on offshoring of ICT labour in Europe is closely associated with the debate and policy developments in the European employment field.

In conclusion, the policy debate in Europe reflects the complex nature of the global sourcing of e-skills, and how policies and the level of interconnectedness of these intertwine with global sourcing debates. On the one hand global sourcing of e-skills could be a solution to the European shortages of ICT practitioners, and it is one of the effects of global specialisation, yet, likely to be complemented by Green Card/Blue Card Schemes as one form of company flexibilisation measure. On the other hand it could also be argued that the problem stems from insufficient instruments to capture skills requirements at an early stage combined with insufficient company investment in workforce development. Finally, global offshoring and insourcing of skilled personnel could be means to put pressure on wage developments. Sectors such as ICT are likely to be in a constant situation of skills challenges simply brought about by the innovation dynamics of the sector.

Sector dynamics highlight the challenges in terms of what should rightly be the role of public policy, and what type of responsibilities should remain within the sector itself – given the diversity of the sector in terms of company size and investment power. Potential competitive strengths and innovation advantages gained by increasing levels of ICT uptake could be hampered by a lack of a common perceptions and priorities of what constitutes the particular strengths of the European ICT sector and by compartmentalised policies on ICT innovation – in which the issue of skills is just one part of the picture.

National perspectives on global sourcing

Despite the general endorsement of flexicurity and a ‘high skills – more and better jobs’ agenda there are still cross country variations in how global sourcing and e-skills are approached. National framework conditions such as labour market policies, the role of the Social Dialogue, the comprehensiveness of national lifelong learning policies and the role of ICT in national innovation and entrepreneurial policies are all influential factors. The debate on delocalisation at regional and national levels often takes its point of departure in specific instances of delocalisation of ICT service activities followed by layoffs of workers and a range of regional and national challenges related to this - examples of this are particularly predominant in the UK, French and the German discourse (Shapiro and Millard 2004). At this level, the debate therefore often concentrates on the short-term negative socio-economic effects of delocalisation because the time horizon of policymakers is closely related to that of the next election.

There are differences between national policy debates on global sourcing and ICT. Below we will shortly outline some examples on national perspectives on the debate.

United Kingdom

United Kingdom has a longer history of offshore outsourcing than other European countries. The country also has higher levels of offshoring of ICT software and services than its European counterparts (OECD 2006c; Finextra November 2006; British Computer Society 2004).¹⁰ Lately, public perceptions on offshoring are beginning to change, and according to Bibby (2007) there seems to be a growing fear of job-losses. Bibby (2007) argues that there is not sufficient evidence that the volume in migration corresponds to actual labour market needs. However, the British ICT sector is currently growing – both in terms of employment and economic growth (e-skills UK 2008).¹¹ The debate in fact is illustrative of the different views of employers and unions.

To understand these apparently contradictory developments it can be useful to distinguish between different ICT practitioners' occupations. The demand for IT managers has experienced a growth of approximately 40% while demand for software developers has stagnated and demand for database assistants has declined (e-skills UK 2008, Interview with Margaret Sambell). Hence, the British ICT sector is characterised by a complex process of restructuring where demands for some professions are rising fast while others – often low-value added service positions – are being offshored and demand is falling (British Computer Society 2004; e-skills UK 2008).¹²

United States

Compared to many European countries, the US also has a long history of offshoring. One reason for this could be a matter of company size and available capital in the US firm base, as delocalisation in the initial phase is likely to require considerable investment. Other lines of arguments are that the US labour market is much more deregulated than in Europe, so that European enterprises could face higher initial costs when delocalising, and language may also play a central role.

An uncertain economic climate combined with limited public policy measures to alleviate the structural effects of global sourcing has led to a more fierce debate in which both Democrats and Republicans are advocating more protectionism (Marginson 2004)¹³ For instance the Forrester Research report contending that 3.3 million US jobs will be offshored by 2015 caused a public stir (Blinder 2005; Swedish Institute of Growth Policy Studies 2006).

The recent change in the American policy debate is also likely to be situated in the upcoming presidential elections. In the fight for votes policy makers will try to position themselves towards particular groupings of traditional workers most affected by structural changes. On the other hand it is noteworthy that the change in the American debate has come to the forefront more or less at the same time as the British debate has become more aggressive. A likely explanation is the relatively large share of American and British low-skilled workers competing on low wages, in a highly deregulated labour market, and with limited public

¹⁰ Interview with Marianne Kolding, IDC

¹¹ Interview with Margaret Sambell, e-skills UK

¹² Interview with Margaret Sambell, e-skills UK

¹³ Interviews with David Autor, John Sarborg Pedersen, and Marianne Kolding

investment in retraining (Zysman & Schulze-Cleven 2006; Bibby 2007). Another explaining factor is a more recent concern about a coming economic recession- currently most visible in the USA. The US and the UK have both had much higher levels of offshoring and use of migrant ICT specialists than other countries.

One of the key questions as regards the immigration of skilled labour is to which extent domestic and foreign workers complement or substitute each other. In this study, we have found support for both hypotheses (see also Bauer & Kunze 2004).

France

The public debate in France on globalisation of employment and offshoring is at best sceptical. A public opinion poll from May 2005 reveals that 73 percent of the informants perceived globalisation as a threat to jobs (Auer et al 2005) and Moreau supports these results by noting that offshoring is mainly addressed in terms of job-losses (Moreau 2005). Offshoring was also brought to the forefront of the European constitution referendum campaign and at the presidential elections (Auer et al 2005).

The tense debate in France contrasts a limited level of offshoring from France compared to countries like the US, UK and Germany. The explanation for the tense debate is possibly linked to the announced structural reforms in the election campaign of Nicolas Sarkozy, a traditional model of conflict and use of strikes in the French social dialogue, a still highly regulated labour market with a limited level of job mobility and challenges of creating new jobs for jobseekers and unemployed, and also to new graduate entrants into the labour market (Danish Technological Institute 2008). Hence, a Eurobarometer Survey showed that French workers report their chances of being re-employed to be low while Danish workers report their chances as high (European Commission 2007c). According to the European Commission communication on flexicurity the French anxiety of being re-employed is likely to be related to the stricter Employment Policy Legislation of France because this impede on employers willingness to hire (permanent) labour.

Denmark

In Denmark the debate regarding global sourcing and e-skills has not been marked by a high level of conflict between unions and employer organisations. Generally speaking, globalisation and offshoring is seen as an opportunity rather than a threat (Danish Globalisation Strategy 2006).¹⁴ Furthermore, offshoring is handled within a historically strong Social Dialogue, and therefore timely involvement of union representatives.¹⁵ The Danish debate is currently marked by a concern for acute shortages of ICT specialist with offshore outsourcing seen as one solution to meeting current labour market needs (Løcke 2007; Gardel 2007; Larsen 2007).

Global sourcing is not a new phenomenon in Denmark, but originated back in the early 70s- particularly in the textile sector. Since then, other sectors have also undergone major restructuring from production to farming and food industries, electronics, and most recently the ICT and services sector resulting both in automation to cut labour costs as well as to offshoring. In Denmark 270,000 jobs are created annually and 260,000 disappear and the

¹⁴ Interview John Sarborg Pedersen, DI-ITEK

¹⁵ See for example the Handbook on pro-active global sourcing of ICT and services- from the Union for Commerce and Trade

country has one of the highest levels of job mobility in Europe (Finansministeriet 2006; Jensen et al 2006; Danish Technological Institute 2008).

A study from the Confederation of Danish Engineers (IDA) from 2005 has analysed the short term impact of offshoring on employment in Denmark. In 2003-2004, a total of 158 companies (16%) out of the 1017 companies included in the survey had offshored activities. The survey suggests that offshoring may not necessarily have any employment effects, as more than one third of the companies involved in offshoring had experienced no impact of offshoring on employment, while two thirds of the companies involved in offshoring had experienced either a positive or a negative effect of offshoring on employment (IDA 2005).

There are several possible explanations for offshoring not leading to job losses:

- Offshoring is focused on activities that have already been outsourced to domestic suppliers
- Offshoring improves competitiveness and thus increases production
- Offshoring can lead to regional specialisation as companies decide to co-locate specific activities in a specific location. Further, specialisation may make it possible for regions to attract new activities within their field of specialisation, thus compensating for the offshoring of other types of activities.
- Offshoring can increase production and R&D capacity that may result in domestic business expansion

Overall, the *isolated* impact of offshoring on employment in the 158 companies included in the survey was a net loss of 1814 jobs in 2003 and 2004 (or 900 jobs lost every year due to offshoring). Interestingly, the 158 companies involved in offshoring experienced an overall increase in employment even though 1) the isolated effect of offshoring on employment was negative and 2) the Danish economy as a whole experienced a drop in employment.

The study also compares job-loss due to global offshoring with measures to increase productivity, and concludes that offshoring so far has played only a limited role in terms of employment changes compared to phenomena like automation.

The notion of limited negative employment effects of offshoring has been confirmed by a recent survey of all medium sized and large companies in Denmark covering the years 2001 to 2006. According to the survey, Denmark experienced an annual net loss of 3400 jobs in 2001-2006 due to sourcing (offshoring from Denmark resulted in an annual loss of 6300 jobs, while onshoring to Denmark created 2.900 jobs each year). The study also shows that manufacturing companies involved in offshoring experiences above average value added per employee compared to manufacturing companies not involved in offshoring. On the other hand, there is no difference in terms of value added when it comes to service companies involved in offshoring and service companies not involved in offshoring (Statistics Denmark 2008b).

The limited impact of offshoring on employment in Denmark points to several important structural factors in dealing with the challenges of globalisation. Given the evidence of major restructuring measures resulting in mass lay-off, for example in the food industries, an important point to consider is the relative ease with which the labour force has been reemployed in other sectors of occupation. Favourable is also that Denmark has a very

comprehensive supply of training opportunities for particularly semi skilled and skilled workers and is in the absolute top of the OECD countries when it comes to the uptake of continuing education and training of the workforce. As a follow up on the Danish Globalisation Strategy and the Welfare Accord from 2006 an accord was made between the government and its coalition parties to invest an additional 2 billion DKK (approx €267 millions) in training and counselling activities particularly aimed at the low skilled in addition to the approximately 15 billion DKK (approx €2 billion) annual expenditure on continuing training.¹⁶ Finally, the low level of unemployment in Denmark currently is also an influential factor - 1.9% in March 2008 according to Statistics Denmark (2008).

Hungary

Hungary has been, and still is an offshoring destination for American, Japanese, and recently also Russian and Chinese enterprises (Ulbrich et al 2007; Embassy of Hungary in the US 2008). Several West European enterprises have also nearshored to Hungary.¹⁷ Indeed Hungary is fast growing in IT business activities. Therefore, policy makers are keen to exploit the opportunities offered as West European enterprises look for offshoring/nearshoring destinations with a stable policy climate (see for instance Embassy of Hungary in the US 2008).

Some of the State incentives to support Foreign Investment are:

- Low corporate tax rates for international enterprises and the rates decreases further in the case of large investments as well as a further allowance in case of retraining employees or employing jobless people.
- Large allocations to large scale investors depending on the number of created jobs.
- A one-stop system. The governmental agency, ITDH serves as the contact institution between the investors and all government offices in for the sake of more effective services.

The estimated number of jobs created as a result of onshoring to Hungary between 2000-2004 is low - between 4000 and 6000 persons. The policy debates on sourcing have become more intense in Hungary, driven by rising wages and shortage of ICT practitioners and thus concern that this could be a factor in losing ground to India. In order to better exploit opportunities as a sourcing destination, policy makers are discussing which measures can enable Hungary to move up in the value chain in the type of services provided (Kajzinger 2005).

Portugal

In Portugal policymakers have begun to recognise the potential benefits of globalisation. According to Professor Carlos Zorrinho, responsible for the Technological Plan of the Portuguese government, Portugal is not entering the 'globalisation game' as a winner or a loser, but as a country with a potential which can be exploited.¹⁸ According to Carlos Zorrinho an open attitude towards 'globalisation' is common among policymakers and younger generations, whilst older generations still fear offshoring. According to "*Employment in Europe 2007*" by the European Commission (2007d), the employment rate among older

¹⁶ Estimate for 2004 by the Danish Ministry of Finance - Total figure comprising both public and private investment

¹⁷ Interviews with Attila Suhadja and Tamas Klotz

¹⁸ Interview with Carlos Zorrinho

generations in Portugal is declining despite an overall growth in employment, which is likely an explanatory factor for the negative attitude among the elderly labour market active population. Almost 20% of the 55-64 inactive Portuguese have indicated dismissals and redundancies as the main reason for being out of job (European Commission 2007d). 80% of older workers in Portugal are low-skilled compared to an EU-25 average of 43%, since low-skilled workers are prone to be negatively affected by restructuring, this might add to the concerns.

The diversity in attitudes towards global sourcing and globalisation in Portugal is also likely linked to the marked differences in skills composition between the population in Northern and Southern Portugal. The South of Portugal still has a prevalence of low-skilled jobs, many of which are also seasonal linked to the tourism sector. Across all of Portugal 60% of the clerical occupations in Portugal could potentially be affected by offshoring.

Germany

Relatively rigid labour markets and numerous conflicts both at an enterprise level and between employers and union representatives have been characteristics of the German policy climate. Union representatives have been concerned with both potential job-losses and the risk of reduction in working and payment conditions.¹⁹ To meet growing demands for ICT practitioners the German policymakers have initiated re-training programmes, some in collaboration with the social partners, and immigration schemes for ICT practitioners (see for instance Kolb 2005), though the success of the latter has been disputed..

Contributions to the debate from stakeholders

The European policy debate on offshoring and e-skills is influenced by the difference in viewpoints – shaped by the interests of ‘stakeholders’. Stakeholders refer to entities with a particular interest in a given topic such as the Social Partners (trade unions and employers’ organisations), other types of interest organisations and communities (the open source community, SME interest organisation, CIOs). Interest organisations representing employers and enterprises are referred to as business associations. Education and training institutions are also stakeholders insofar they are central to the supply of ICT practitioners, and there may be particular and different interests at play given the structure of the national education and training markets for ICT practitioners e.g. the relative importance of certifications. Finally, Governments of the Member States and the European Commission are considered stakeholders in the policy debate.

Though the debate on offshoring is complex, the debate can to some extent be simplified in two opposing attitudes towards offshoring. One side represents employers, employer representatives, and to some extent economists arguing that offshoring is an indispensable component of the international division of labour leading to more specialisation and improved competitiveness of the enterprises involved (Mann 2003). Similar arguments have also been brought forward by governments with active labour market – and skills policies, such as the Danish government (Danish Globalisation Strategy 2006).

The opposing argument represented by some unions with various levels of intensity emphasise the risk of prospective mass layoffs and rising unemployment in countries with

¹⁹ Interview with Stephan Phisterer, BITKOM

relatively high wages - particularly in Northern Europe and in North America (European Metalworkers' Federation 2008; Trade Union Advisory Committee to the OECD 2004). The arguments have particularly been brought forward by trade unions representing skilled and semi-skilled workers. Trade union representatives representing high skilled labour have been less present in the debate on offshoring.

A third line of arguments take a mixed position, in that offshoring in itself is neither perceived as negative nor positive, but highly dependant on framework policies - such as labour market policies, lifelong learning measures, and the quality of the social dialogue (Danish Globalisation Strategy 2006; e-skills UK 2008; Swedish Institute of Growth Policy Studies 2006).²⁰

Currently the offshoring of e-skills debate has somewhat diminished because many enterprises across Europe are short of ICT practitioners and experience severe recruitment difficulties.²¹ This brings the topic of lifelong learning strategies to the forefront of the long term e-skills agenda – and furthermore as a common point of agreement in the Social Dialogue (European Commission 2007; European Commission 2005b). The different groups of stakeholders differ considerably in their viewpoints on the effects and impacts of global sourcing, and different sources have been used to bring forward a particular line of argument. This has made it more complex to come to grasps with the actual impact of global sourcing. Some of the arguments brought forward by key stakeholders are listed in the following sections.

Trade Unions: UNIT-IBITS & European Metalworkers' Federation

The global union for industry, business services and information technology, UNI-IBITS argues that economist and business arguments about the positive impact of offshoring on the overall economy ignore the fact that some workers are indeed adversely affected. Both UNIT-IBITS and the European Metalworkers' Federation state that education and retraining is the only way forward for workers adversely affected by offshoring. They also emphasise that retraining of workers should be organised through the Social Dialogue for instance by incorporating retraining and e-skills in collective agreements (Marginson 2004).²² The incorporation of lifelong learning in the Social Dialogue will ensure that training and retraining becomes a more structural feature in collective agreements, and that companies which do not pursue training as a strategic priority are conditioned to offer training as a part of the collective agreements.

According to UNI-IBITS one of the main challenges is that the European ICT industry is still in a process of developing Social Dialogue instruments and may as such be reluctant to take the discussion on global offshoring on board. Some trade unions in Europe and at a global level have also expressed a concern that offshoring could have a negative effect on employment standards (cf. European Metalworkers Federation 2008; Trade Union Advisory Committee to the OECD 2004) and thus the quality of domestic jobs as well as the jobs created in offshoring destinations. They have therefore argued for a 'whole government' or a global governance framework that encompasses all the relevant international organisations, that is, the ILO and the WTO (Danish Technological Institute 2004; UNI News 2004; Bibby

²⁰ Interviews with Carlos Zorrinho and Gerhard Rohde

²¹ Case study of ARM; interview with Stephan Phisterer

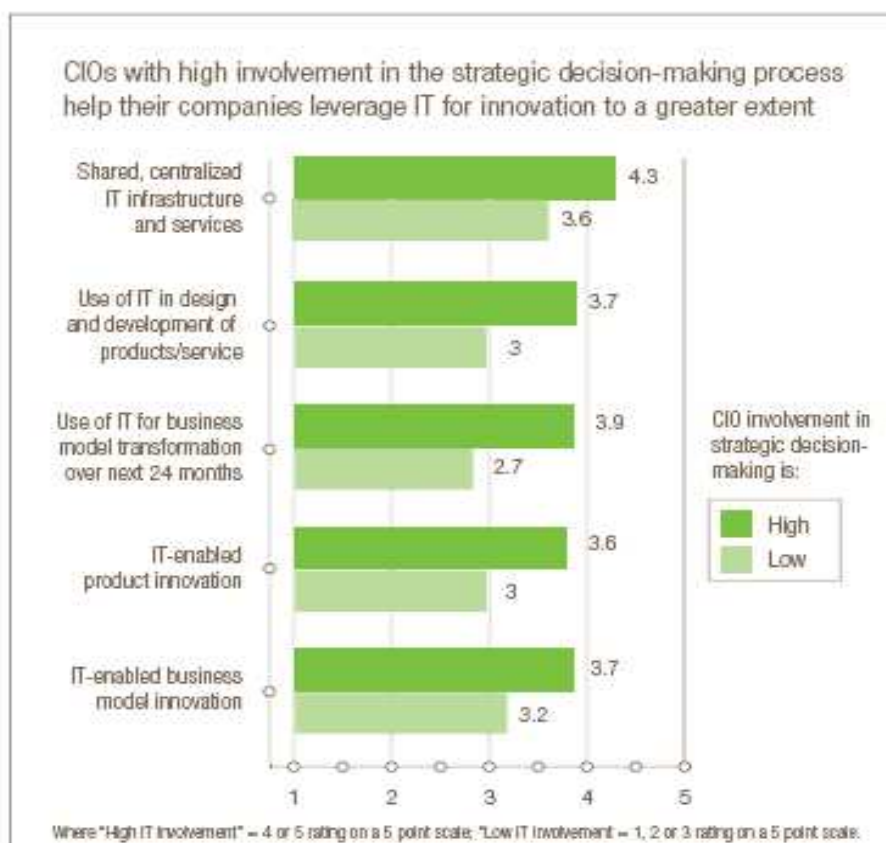
²² Interview with Gerhard Rohde, UNI-IBITS; Statement by Caroline Jacobsson, EMF.

2004; Trade Advisory Committee to the OECD 2004; European Metalworkers' Federation 2008). The basic aim would be to ensure workers rights on a global basis. Barriers identified by the Trade Union Advisory Committee to the OECD (TUAC) to such a global governance framework include a lack of coherence in the existing modes of collaboration between, for example the WTO and ILO (Shapiro & Millard 2004). From a trade union perspective Corporate Social Responsibility is an insufficient response as it is a voluntary measure. Instead, enterprises should comply with the ILO labour code.

Chief Information Officers (CIOs)

CIOs are close to the core of ICT intensive enterprises' business. The 2007 CIO Leadership Survey by MIT and Harvard Business School finds that *"Companies with a strategic CIO use IT more extensively to innovate new products and services. They also share technology more effectively across the enterprise"* (MIT & Harvard Business School 2007: 4). It is therefore vital that enterprises are able to hire talented persons for these positions (MIT & Harvard Business School 2007).²³

Figure 7. The role of CIOs in strategic decision-making



Source: MIT & Harvard Business School 2007

European enterprises are highly dependent on high skilled CIOs with a profound knowledge and skills relating to the management of an offshoring process. But currently European CIOs are confronted with recruitment difficulties for CIOs and similar high level positions (MIT & Harvard Business School 2007).²⁴

²³ Interview with Peter Hagedoorn

²⁴ Interview with Peter Hagedoorn

Trade union representatives, business associations and CIOs share a common view that global sourcing necessitates reforms of tertiary level programmes to combine technological skills with business and management skills as well as comprehensive retraining measures.²⁵

SMEs

For SMEs it is particular challenge to recruit and retain a sufficient number of ICT practitioners with the right mix of skills. SMEs do not have the same opportunities to offshore ICT tasks to countries with cheaper labour costs simply due to lack of investment capital up front (Løcke 2007; Dosanjh 2008).²⁶ Furthermore, most ICT practitioners tend to favour employment in larger companies with highly professional HRM practices and with options to learn from highly qualified peers, factors which limit recruitment options for many SMEs in Europe. Hence, from an SME perspective offshore outsourcing is an area of concern because the SMEs are likely not to be able to exploit offshore outsourcing as a means to improve the competitive base and to get access to new markets to the same extent as the larger companies.

However, there are multiple examples of SMEs that compensate for their lack of size through specialisation strategies through which they manage to become advanced sub-suppliers internationally. For those types of SMEs, successful public policy measures are likely to differ from those targeting larger and more mature firms. When it comes to retraining of workers, The Pan European ICT & eBusiness Network for SMEs (PIN-SME) shares the view of unions that larger companies should invest more in systematic retraining of workers to compensate for that larger companies will typically more easily attract ICT specialist labour than the SMEs.²⁷ OECD data show that the percentage of employees participating in continuing vocational training tends to increase with firm size (OECD 2006b: 226).

Open Source

From an open source perspective global sourcing is not a priority topic because enterprises and ICT practitioners that work in open source environments often are organised in loose networks through which it is possible to find specialists for a particular project or to address a particular problem (Ulbrich et al 2007).²⁸ Hence, open source enterprises tend to focus less on the specific location of an ICT practitioner than on the specific composition of skills and competences of the person sought for.

From an open source community perspective the most acute issue for improving and ensuring the competitiveness and innovation of Europe in the field of ICTs is software patents and licenses because rigid IPR can inhibit innovation.

Assessment of the policy debate on offshoring and e-skills

The policy debate in Europe is influenced by an increasing demand for ICT practitioners as evidence grows that the current supply cannot meet demand. Policy makers, trade unions and business associations state that the competitiveness and innovation capability of the European ICT industry is dependent upon that the skills of the current and future ICT practitioners are improved and renewed as changes in technologies and business processes occur – and thus the

²⁵ Interviews with Peter Hagedoorn and Gerhard Rohde; on the importance of business skills see MIT & Harvard Business School 2007 and European Metalworkers' Federation 2008.

²⁶ Interviews with Sebastiano Toffaletti and Peter Hagedoorn

²⁷ Interview with Sebastiano Toffaletti, PIN-SME

²⁸ Interview with Xavier Dutoit, Sydesy

demands for e-skills. In spite the common concern about the quality of the skills base as central to the competitiveness of the European ICT industry, there is disagreement as to which extent lifelong learning should be an integrated part of the Social Dialogue in the ICT sector.

The British and American publics have become more reluctant towards offshoring. As pointed out by Kirkegaard (2007) one reason can be the standard matrix illustrating offshoring and outsourcing as a one-way street by which Western jobs are lost to low-wage countries. The perception of a one-way movement of jobs ignores – intentionally or not – that jobs are also being sourced into Europe and the US (Kirkegaard 2007). The effects of global sourcing are not similar across labour markets, and this will influence the public view. Particularly in the UK and in the USA global sourcing has been followed by a mass creation of new jobs - but in low skilled, low paid service industries.

In Europe and in the US debates on competitiveness have focus on that businesses need to move up the value chain as a prerequisite to global competitiveness – so that high-skilled, high-wage jobs remain in the West.

The differences in views on the effects of global sourcing reflect that offshoring most often includes distributed gains and concentrated losses. The arguments of policy makers and the Social Partners relating to global sourcing are summarised below:

Table 14. Overview of the policy debate

	Assessment of global sourcing	Proposed measures
Policy makers in the EU	<ul style="list-style-type: none"> ▪ Opportunity rather than a threat if policy measures are taken ▪ UK and France mainly sceptic 	<ul style="list-style-type: none"> ▪ Labour market de-regulation/job mobility ▪ Upgrading skills
Policy makers in the US	<ul style="list-style-type: none"> ▪ Negative impact on labour market (wages and number of jobs) 	<ul style="list-style-type: none"> ▪ Control migration
Business	<ul style="list-style-type: none"> ▪ Positive impact on competitiveness and innovation ▪ SMEs find it difficult to compete with large enterprises on recruitment of ICT practitioners 	<ul style="list-style-type: none"> ▪ Labour market de-regulation ▪ Reduce administrative burdens ▪ Upgrading skills
Trade Unions	<ul style="list-style-type: none"> ▪ Positive impact on developing countries ▪ Negative impact on wages and working conditions ▪ Business should comply with ILO labour code 	<ul style="list-style-type: none"> ▪ Upgrading skills through the Social Dialogue and collective agreements ▪ Good practise measures for restructuring processes ▪ Need to develop the Social Dialogue further in the ICT sector

3.3. Assessment of existing studies

Studies on the impact of global sourcing on e-skills can be grouped according to their nature and their author, as studies may have an ideological role to play in a particular discourse. Roughly, it is possible to distinguish between the following types of studies:

- *Academic studies*: Studies published in academic journals and/or authored by individuals working at universities, business schools and equivalent institutions
- *Consultancy reports*: Reports published by consultancies such as Gartner Group, McKinsey and think tanks such as RAND.
- *Public institutions studies and statistics*: National statistics and studies from governmental institutions, European and international studies and statistics from sources like CEDEFOP, European Commission (DG Information Society, DG Enterprise, and Employment), EMCC (European Foundation for Monitoring of Living and Working Conditions), OECD, UNCTAD, ILO.

The literature review has however shown that the boundaries of academic studies, consultancy reports, stakeholder contributions and public institution studies can be blurred. .

Academic studies

In the academic literature there are few studies on global sourcing and e-skills, particularly from Europe (Huws et al. 2004) compared to the overwhelming amount of consultancy reports on the subject. Furthermore, the absence of reliable statistics (OECD 2006a, Ashish et al 2006) illustrate that global sourcing of ICT in policy terms is still a relatively new phenomenon.

To get an overview of the academic debate and research related to global sourcing and e-skills a thorough search has been conducted in databases and libraries. The applied database is Blackwell Synergy containing more than 1 million articles from more than 850 journals including areas of economics, political economy, anthropology, management, geography and politics. The total number of articles is less than the numbers in the table since a lot of the articles from the search procedure are recurring.

Furthermore, literature lists of publications pertaining to global sourcing have been scanned. All abstracts of the articles have been scanned and the most relevant have been included in the total list of data sources.

Based on the articles, we have identified a range of key issues in the academic debate, cf. below:

Offshoring as trade in ICT software and services

According to economic theory offshore outsourcing of ICT software and service jobs is basically just trade in services and trade will eventually benefit the countries involved as known from Ricardo's theory of comparative advantages (Ulbrich et al 2007). As the economist Gregory Mankiw expresses it:

“Outsourcing is a particular type of international trade. We are used to trade in goods, but trade in services has expanded recently, made possible in large part by advances in telecommunications. Like all forms of international trade, outsourcing benefits an economy overall, though there are also short-term costs as workers are displaced” (quote from Kirkegaard 2007: 2).

The changing aspect of offshoring is the increasing trade in specialised services like research, accounting, ICT software development, ICT services etc. (OECD 2005; Kirkegaard 2007a).

Increased specialisation in high-value added services

Offshoring is correlated with an increase of GDP in the home country. Some economists explain this phenomenon with the specialisation associated with offshoring. The process of offshoring ICT occupations in the lower part of the value chain enables the onshore part of an enterprise to specialise in innovative, competitive and high value added services requiring a combination of high-skills and tacit knowledge (Mann 2003).²⁹ Economists like Samuelson, Baumol and Gomory have argued that offshoring could also stimulate innovation and productivity in growth countries like India, Russia, China and Israel in goods and services where the developed countries would normally have a comparative advantage. Insofar as this does take place it could spur conflicts between trading partners, the authors however emphasise that there is no current evidence that this has yet occurred (Ashish et al 2006: 74, Swedish Institute of Growth Policy Studies 2006).

Offshoring with short-term costs

The basic argument of economists is that offshoring is an expression of the international division of labour and improved competitiveness of the involved enterprises, does not exclude the sociological-arguments that workers may be adversely affected by such processes. As Mankiw points out in the quote above, outsourcing can have *short-term costs as workers are displaced*. Likewise Sako (2005) has argued that offshoring results in “(...) a repackaging of tasks, skills and knowledge into a job, occupation or profession” (Sako 2005: 4). What is economically profitable for the enterprises and the overall economy is not necessarily a beneficial for the individual who is laid off. This is well illustrated by the fact that macro-economists do not ignore job loss, but often refer to total job loss due to offshoring as a marginal phenomena compared to the total job turnover (Swedish Institute of Growth Policy Studies 2006; Danish Technological Institute 2004; Blinder 2005).

However, it is important to note that total job turnover is considerably higher in Northern Europe, UK and the US than in most Southern European countries with more regulated labour markets (Danish Technological Institute 2008). The effects might therefore be more substantial in the Southern economies than in Northern Europe, UK and the US due to different levels of overall job turnover and labour market dynamics.

Labour market policies – the concept of flexicurity

Some academics have – like policy makers - argued that the *flexicurity* labour market approach is the solution to changing global dynamics such as offshoring (cf. Zysman & Schulze-Cleven 2006). In a research paper from BRIE, it is argued that flexibility and security complement and strengthen each other, and that the competitive advantage for Europe through proactive labour market policies could be leveraged to a unique advantage in the emerging digital era (Schulze-Cleven 2007; Zysman & Schulze-Cleven 2006). The researchers state that to assist people in meeting new labour market demands, social protection systems have a central role to play in helping societies reorganize existing economic structures in support of successful adaptation to new competitive conditions.

²⁹ Case study of ARM; interview with Jack Lang

Flexicurity is seen as advantageous because it combines flexibility and security with active labour market policy and lifelong learning and thereby facilitating job mobility and continuing upskilling (Wilthagen & Tros 2003; Larsen 2004; Danish Technological Institute 2008; Zysman & Schulze-Cleven 2006). Lately, academics and policy makers have advocated a *pathways approach* to flexicurity in which the institutional diversity of EU member states is recognised and taken into consideration in the implementation of flexicurity (European Expert Group on Flexicurity 2007; European Commission 2007c; Wilthagen 2008; Larsen 2004).

Migration

Andrew Bibby, Jane Millar and John Salt have recently contributed to the debate on global sourcing of ICT labour with a particular focus on the working conditions for the short-term ICT specialists working in Western countries. Based on evidence from the UK, the authors have found that work permits for ICT specialists tend to be tied to the individual company and this effectively obliges the individual ICT specialist to stay with their employer despite better offers and poor working conditions (Bibby 2007, Millar & Salt 2007).³⁰

Consultancy reports

A range of consultancy reports on offshoring and outsourcing have been produced the last couple of years. Some of the most quoted reports are listed below:

Consultancy reports on offshoring and outsourcing related to ICT

- Evalueserve-Nasscom Report (2003): *Impact of Global Sourcing on the UK Economy 2003 – 2010*
- Gartner (2003): *US Offshore Outsourcing: Structural Changes, Big Impact*, by Diane Morello
- McKinsey Global Institute (2003): *Offshoring: Is It a Win-Win Game?* McKinsey Global Institute Perspective
- Forrester Research (2004): *Two-Speed Europe: Why 1 Million Jobs Will Move Offshore*. Cambridge, MA (August 18)
- Gartner Group (2004): *IT insights - Trends and UK skills Implications*, a joint publication by e-Skills UK and Gartner Consulting
- RAND Europe (2005): *The supply and demand of e-Skills in Europe*, by Erik Frinking, Andreas Ligtoet and Pernilla Lundin, Interim Report prepared for the EU-Commission, DG Enterprise and Industry.
- Ovum (2006): *The impact of global sourcing on the UK software and IT services sector*. A study by Ovum for the Department of Trade & Industry.
- CEPIS (2007): *Thinking Ahead on e-Skills for the ICT Industry in Europe*, February 2007

The scope of this study has not permitted a full review of the total volume of consultancy reports. The literature review has found that the methodology applied is seldom presented, and if company data are used the sample is most often small (Kirkegaard 2007; Ashish et al 2006). Particularly the quantitative projections of future job losses can be questioned. Firstly, academic studies have shown that the data available for such projections are limited, and this fact is rarely mentioned.

³⁰ The work of Andrew Bibby is not academic but a consultancy study for a stakeholder in the debate, UNI. However, Jane Millar and John Salt are both researchers affiliated with academic institutions, and since their arguments are all alike we have chosen to list Andrew Bibby along with them.

Furthermore, the quantitative estimates of these reports vary so much that it is difficult to make one, reliable conclusion from the projections – particularly since the methodological base is not presented (for a similar conclusion see Kirkegaard 2007a, Ashish et al 2006).

Nevertheless, consultancy studies are often the only available data sources, and if they are used, they must be used with caution.

Public institutions studies and statistics

Studies from public institutions largely suffer similar problems as those of consultancies and academia: lack of reliable data (Huws et al 2004; Ashish et al 2006; Vickery 2004; OECD 2006a). There are some attempts by public institutions either at governmental level or European level to collect data on offshoring:

- **The European Restructuring Monitor (ERM).** The ERM is basically a press monitoring estimate where media reports on layoffs related to offshoring is collected and the figures of the media reports are counted and a total number is presented. The data collection method is transparent but the collection process is rather sketchy as it depends on which papers are selected and whether the journalists will cover all stories of restructuring. As pointed out by Kirkegaard (2007a) one could expect a story of 100+ jobs lost in a small country being more of a news story than a 100+ jobs lost in a large country because of the different sizes of the countries. Furthermore, the ERM only includes cases with announced or actual job reduction of at least 100 jobs, involve sites employing at least 250 workers (which exclude all SMEs) or create at least 100 jobs. For these reasons the ERM should be expected to underestimate the total number of jobs offshored. The offshoring/delocalisation data from ERM also includes sourcing between European countries which makes it difficult to trace offshoring from Europe to third-countries.
(<http://www.eurofound.europa.eu/emcc/erm/info.htm>).
- **The US Bureau of Labor Statistics (BLS)** collects mass layoff statistics based on administrative unemployment records and employer interviews on the reasons for major production relocations (Kirkegaard 2007a; Ashish et al 2006). Like the ERM the data only includes larger restructuring cases (50+ jobs).
- **Eurostat** provides data on trade in computer and information services which makes it possible to detect the export and import levels between European and non-European countries. The data is reliable but not the best measure for global sourcing of e-skills as trade statistics include all services traded – including the purchase of services without an element of sourcing (i.e. no sub-contracting). Furthermore, there are serious data discrepancies between India and Europe (OECD 2006).
- **Eurostat Labour Force Survey** provides data on European employment and classifies persons by occupations (ISCO88) and this can be used to trace the number of persons employed in the ICT software and services sector and ICT-intensive sectors in accordance with the discussion of occupations presented in chapter 1. The data is collected by national statistical offices in national languages as household surveys.³¹

³¹ For more information on the data collection and methodological considerations see:
http://circa.europa.eu/irc/dsis/employment/info/data/eu_lfs/index.htm

Despite the questions of validity in relation to the ERM and the BLS statistics, it is noteworthy that they show the same overall results as regards the relative importance of offshoring vis-à-vis other drivers for restructuring – the data shows that restructuring due to automation and other internal organisational changes is resulting in relatively more job losses than offshoring.

3.4. Key drivers of global sourcing of e-skills

Global sourcing of e-skills is pushed by several drivers. Among the key drivers are technological change, globalisation of the world economy, structural changes in the economy, relative wage costs, access to new markets and access to skilled labour. Some of the drivers directly push enterprises to relocate ICT jobs – for instance the relative wages costs and shortage of European ICT practitioners impel enterprises to look for employees outside Europe to remain competitive. Other factors are more indirect as they facilitate and enable the relocation of jobs. Technological developments and framework conditions are such drivers. The different drivers are also characterised by operating on different levels ranging from costs incentives of the individual enterprise to world wide economic developments. Furthermore drivers are often mutually reinforcing, making the picture even more complex.

Economic developments

The ongoing development and economic fluctuations of the world economy can have a reinforcing impact on offshoring decisions because an economic slowdown could spur a re-consideration of wage-costs among enterprises in the affected economy. This could either result in decisions to move ICT jobs offshore or re-locate existing offshore activities to an even cheaper location. The latter trend has been observed in the US where companies are moving activities from Europe to Asia in order to save costs (Dosanjh 2008). This in turn affects the competitiveness of European enterprises vis-à-vis their American competitors and this could force European enterprises to follow suit. It is still too early to say if and how the current pressure on the global financial markets and a growing concern about a coming recession could influence the scope of global offshoring.

Finally, the exchange rates between main trading partners are likely to contribute to offshoring decisions since falling exchange rates can alter the relative costs of labour and other costs of doing business abroad.

Technological change

Technological changes have facilitated and spurred offshoring and outsourcing by eliminating the need for geographical proximity between service providers and clients (or employers and employees) for a wide range of tasks (Sako 2005; OECD 2006c). The development of telecoms, the Internet and free social networking applications like Skype and Messenger has made it possible for enterprises to have employees across several countries and continents. The dominant argument here is that developments in ICT infrastructure have created the foundation for robust and seamless systems of collaboration and communication across large geographical distances (Kenney & Dossani 2006). Such advances have reduced the risks related to the technology factor of outsourcing significantly over a short period of years. The multi-location strategy of global ICT players such as Nokia or Microsoft seems to confirm this. Another example is the Danish outsourcing company Ciklum which uses Skype,

Messenger and video conferences to hold meetings between Ukrainian software developers and Danish clients to enable a dialogue between the client and the software developers.³²

The rapid development of ICT infrastructure supports the trend of offshoring. The development of ICT infrastructure in countries like India, China, Russia and Ukraine enables offshoring to these countries.³³

Structural shift in the economy

The European economy is increasingly a service economy and this further enables global sourcing (Sako 2005; for a similar argument for the US see Blinder 2005 and UNCTAD 2004). ICTs are vital components in the service economy and for some types of services location is less important than finding specialists with updated and relevant knowledge and skills.³⁴ Software development illustrates the point as a code can be written anywhere and sent across endless distances. Furthermore, IT languages are universal languages which can be written by anyone, anywhere.

A structural shift in the economy is also taking place in India where the ICT sector is growing rapid and Indian ICT companies are moving up the value chain fast. This has an influence on global sourcing because Indian ICT companies also become integrated in high-value added parts of the Western enterprises' products and services.

Relative wage costs

Regardless of strategy all companies constantly need to consider their cost/quality frontier to remain competitive. Wage costs constitute a relatively high share of European ICT and services industry' costs in ICT intensive industries there may be larger variations depending upon the level of automation (Webster et al. 2002) Offshoring jobs to locations with lower labour costs is one way of moving the cost/quality frontier.³⁵ As soon as a few competitors have done this more and more enterprises are likely to be forced to follow, and the offshoring of jobs becomes self-reinforcing (OECD 2006c: 234; Ovum 2006). Increasing globalisation and competition on ICT services also contribute to this by increasing demands of productivity.

The extent to which this is possible and profitable depends on the supply of skilled labour at the offshoring location the local costs of labour, and the level of labour market regulation aimed to protect workers in a situation of mass lay-off, which will impose raised initial costs for the outsourcing company. Increasing offshoring is followed by increasing wages – a trend which has been seen in a number of typical offshoring destinations the last years (for instance Eastern European countries).

The importance of relative wage costs as a driver is mitigated by the reports on ICT labour shortages in Europe, and the European demand for persons to fill high value added positions. For high value added jobs such as CIOs, the right mix of competences typically overrule

³² Case study of Ciklum

³³ India, see <http://www.american.edu/initeb/sm1238a/telecom.shtml>; China, see

<http://www.cnnic.net.cn/uploadfiles/pdf/2008/2/29/104126.pdf>

http://www.theregister.co.uk/2006/10/05/ict_growth_report/; Russia, see

http://www.pmrpublications.com/index.php?pr_id=61; Ukraine, see http://devdata.worldbank.org/ict/ukr_ict.pdf

³⁴ Interview Xavier Dutoit.

³⁵ OECD (2004): OECD Information Technology Outlook, OECD: Paris, chapter 6

salary costs. Research has confirmed that high value added jobs are relocated to high cost destinations (Vickery & van Welsum 2004b).

ARM – a global pool of talent

The multinational enterprise chip processor company ARM with head offices in Cambridge, also has offices in India. Currently, the ICT specialists working with innovation in the company are located in Cambridge, UK. However, ARM expects this to change in the future when Indians develop their social and innovative competences further – including a better understanding of Western working practices.

For global companies like ARM the potential pool of labour is global, and the company will hire the best ICT practitioners irrespective of their location.

Access to new markets

In a business culture and a competitive environment that is increasingly globalised, more companies look for new markets to increase sales and profits (Swedish Institute of Growth Policy Studies 2006). The underlying rationale is that successful market entries depends on knowledge of and close relationships with local markets. Thus, some companies choose a multi-location strategy in order to enter different markets and in doing so jobs may be offshored high-growth countries or selected markets of particular interest. For instance Scandinavian countries have managed to become insourcing destinations for enterprises like Google, Microsoft and an Indian wind energy company because they had a particular interest in the Scandinavian markets and knowledge hubs, also to get access to advanced lead users.

Access to e-skilled labour

Adequate and up to date e-skills are essential not only for the competitiveness of European ICT enterprises, but also to the growing number of ICT-intensive enterprises given the generic nature of ICT. Shortages of ICT specialists could lead European enterprises to look for ICT labour abroad (the quantitative dimension).

Enterprises also need ICT labour with skills sufficiently broad and robust to meet new demands as businesses transform (the qualitative dimension). The qualitative dimension of access to skilled labour is not solely related to the issue of high-skilled versus low-skilled labour, but also to the combination of different skills. The distinction is particularly acute in relation to the much debated ICT labour shortage, because there might be large differences in the demand for occupational profiles within the group of ICT specialists. Moreover, the composition of skills demanded by enterprises can have an effect on whether ICT specialist's jobs are offshorable.

An R&D based innovation strategy may be complemented by the 'import' of a highly specialised workforce for short- or long-term contracts. Tax policy, immigration policy and the general geo-political context may encourage or discourage this.

3.5. Framework conditions affecting global sourcing of e-skills

A range of European and national policies affect European countries' ability to supply the ICT sector with ICT practitioners – either through education or by attracting employees from other countries – and/or stimulating innovation in the ICT sector or ICT intensive sectors. Important policy domains are fiscal policies, labour market policies, immigration policies,

enterprise regulation, the education and lifelong learning system, and research and innovation policy and support.

Migration policy

One example is immigration policy that regulates the entry of foreign ICT practitioners into the national labour markets. To ensure sufficient supply of ICT practitioners several Member States have already taken Green Card measures in selected sectors and the EU has started a Blue Card initiative for high skilled workers (European Commission 2007e; Kolb 2007; Danish Globalisation Strategy 2006). Given the diversity in policy frameworks across Europe, differences in national policies between the EU Member States could affect the countries' respective ability to respond effectively to changes in demand for e-Skills.

Labour market regulation

Restrictive Employment Protection Legislation (EPL) does not seem to contribute to offshoring decisions as the countries most actively applying offshoring are also the countries with most liberal EPL (Kirkegaard 2007a). However, the absence of mandatory social benefit schemes for companies and less restrictive EPL makes it attractive for enterprises to relocate business to Ukraine, India etc.³⁶ Hence, it seems that EPL is more important for the choice of offshore *destination* than for the actual offshoring decision. The decisive factors for the latter is closer related to relative costs, access to new markets, access to e-skilled labour etc. (i.e. the key drivers listed above).

Furthermore, liberal EPL, a well-functioning Social Dialogue and modern social benefit systems contribute to the ability of Western countries (along with other dimensions) to attract foreign ICT practitioners. The importance of labour market policies for delocalisation is closely related to other drivers of global sourcing – i.e. whether the main driver is a shortage of ICT labour or cost savings. As pointed out by the Cambridge based business angel and ICT entrepreneur Jack Lang, high-skilled and high-talented labour is attracted by factors such as high standard of living and a well-functioning infrastructure.³⁷

Education and lifelong learning

A rapid and continuous development of ICT and the convergence between ICT and other technologies still remains a challenge for enterprises, education and training providers, and national and EU policy makers - a concern also brought forward by the industry experts interviewed in this study. Local and regional supply of education programmes and lifelong learning provision are important factors for localisation decisions of companies. This includes the supply of master programmes but also lower level supplies of continuing training and education.

There seems to be a common recognition that the supply of ICT practitioners with technical competences has improved through policy initiatives at both Member State and EU level. But recruitment of persons with the right mix of technical skills does no longer seem to be the prime problem, but rather that of finding potential job candidates with a mix of skills and competences so as to turn the development and deployment of ICT into business advantage and gains in productivity and innovative capability (MIT & Harvard Business School 2007; e-skills UK 2008). One study suggests that comprehensive continuing training measures which

³⁶ Case study of Ciklum and interview with Gerhard Rohde, UNI-IBITS

³⁷ Interview with Jack Lang

include technical topics, and situate these within a business and innovation context could be the way forward. The study also suggest that continuing training measures in order to be successful should situate ICT training for managers and middle management within a broader context of stimulating firm innovation capacity (The Economist Intelligence Unit 2004). Such approaches will most likely call for much broader and integrated policy frameworks than those we have seen so far aiming to address the ICT skills challenge.

Foreign pool of skilled labour

An important pre-condition for offshoring of labour is the availability of labour in third countries. India is experiencing an increasing shortage of qualified ICT labour which has contributed to rising wages and this might put India's position as offshoring destination at risk or at least present alternative offshoring destinations with an opportunity to win some market shares.

Taxes

In theory, countries with low income and corporate tax should find it easier to attract foreign business than countries with higher tax levels. On the one hand this has indisputably contributed to location decisions where countries such as Ireland and Ukraine have been chosen. Likewise the Indian tax exemption for the ICT sector is very likely to have contributed to the attractiveness of carrying out ICT related business with and in India.

On the other hand the Scandinavian countries infamous for high taxes are yet to experience mass layoffs. Therefore it cannot be concluded that high taxes alone will *cause* offshoring – rather it seems that taxes contribute to sourcing decisions, but that this is highly dependent on the other institutional traits of the country. For instance it seems that the Scandinavian countries have been able to offset the negative effects of high taxes by offering a labour market with high flexibility and security, favourable framework innovation policies, well functioning infrastructures (ICT and transport), and a well educated workforce (Malmberg & Maskell 2006).

Cultural and linguistic similarities

Comparative studies of North America and EU 15, as well as of the UK, France, and Germany, indicate that the composition of jobs in the ICT service industry and a number of particular cultural features may play important roles as drivers. In terms of culture a key success factor and motivator for delocalisation is any cultural affinity between the two countries involved in a transaction (Gartner 2003; OECD 2004). Europe and the US are quite close to the Asian culture when it comes to doing business and pursuing efficiency, productivity and growth.

Related to this is linguistic similarities which implies that companies in English speaking countries find it easier to outsource to one of the many destinations in Asia where English language proficiencies are high, and where there are historical links to the Anglo-Saxon culture (India being the most obvious example).

Cultural and linguistic dissimilarities can also be limitations to offshoring because enterprises need employees with cultural and linguistic insight of the main business countries. Some Indian countries have been forced to hire Europeans to facilitate business with European

enterprises and customers simply because the Indian enterprises need to understand the European way of doing things.

Regulation on trade in services

In terms of global sourcing, the central international agencies are the World Trade Organization (WTO) and the International Labour Organization (ILO). Questions in relation to the international liberalisation of services are dealt with in the WTO (Mode 3 and 4) and the topic has experienced increasing global attention since the 2001 Doha Development Agenda (OECD 2006c).

Liberalisation of trade in services is particularly relevant as a part of the debate on global sourcing as there is reason to believe that the agenda on international liberalisation of trade in services could further spur offshore outsourcing and internal offshoring (Swedish Institute of Growth Policy Studies 2006). In theory, the General Agreement on Trade and Services also applies to cross-border electronic delivery of services but at the time of the last agreement (1993), offshoring was not on the agenda and hence final agreements are yet to be made (OECD 2006c). Currently the WTO is working on further liberalisation of cross-border delivery of computer and related services (i.e. United Nations Central Product Qualifications, CPC 84). These negotiations and the current policy debate in the EU reflect the growing importance of international trade in service (van Welsum and Reif 2006).

R&D and innovation policies

The EU spends only about half as much on R&D in ICT as the US. This holds true both in absolute amounts and relative to the size of the economy. Indeed, the ICT sector alone is responsible for as much of the overall R&D investment gap as all the other sectors combined. From the current data analysis, there are no signs of the ICT R&D investment gap closing. At ICT sector level, the R&D investment gap exists partly because the ICT sector is smaller in the EU than in the US and partly because of the lower R&D intensity of the sector in the EU. The lower R&D intensity is, in turn, primarily due to two sub-sectors: computer services and software on the one hand, and electronic measurement instruments on the other hand. On the positive side, and contrary to the rest of the ICT sector, these two sub-sectors also show a strong R&D growth in the EU.

Company data indicate that EU companies have R&D intensities similar to their US counterparts in every sub-sector, but that they are concentrated in less R&D intensive sub-sectors (e.g. telecom services). The US companies are also larger and more numerous in most sub-sectors. These data suggest that the ICT R&D gap between the US and the EU reflects, more than anything, a lack of European firms in the ICT sector. Among the member states, Finland and Sweden make the highest R&D effort in this sector, relative to their size. In general, Northern member states invest more than Southern member states, and the Western member states invest much more than the Eastern ones, which display very low levels of ICT R&D (Swedish Institute of Growth Policy Studies 2008).

A report from ISTAG on the future of ICT research from 2006 concludes that European research also needs to take advantage of the new opportunities offered by technology convergence between ICT and other technologies and disciplines (bio-/nano-/cogno-sciences), from where radical innovations are likely to come (ISTAG 2006).³⁸ The report

³⁸ Our interview with Jack Lang, business angel in Cambridge supports this.

points to four main trajectories which would likely require research strategies that exploit open methods of innovation are multi-disciplinary, and which have a strong involvement of lead users. Within these four trajectories Europe could be in a unique position as advanced test laboratory for new user-friendly applications (ISTAG 2006).

The four areas pointed to in the paper by ISTAG are systems and services that are:

- 1) Networked, mobile, seamless and scalable, offering the capability to be always best connected any time, anywhere and to anything;
- 2) Embedded into the things of everyday life in a way that is either invisible to the user or brings new form-fitting solutions;
- 3) Intelligent and personalised, and therefore more centred on the user and their needs;
- 4) Rich in content and experiences and in visual and multimodal interaction.

The R&D and innovation policies are important framework conditions for the competitiveness of the European ICT sector and ICT using companies and for the localisation decisions of European and multinational corporations. For larger companies the labour pool is global and hence decisions of where to recruit labour is also taken on the basis of where the most talented and innovative labour is.

Business and enterprise policies

A study from IPTS from 2007 shows that the ICT industry tends to be concentrated geographically around the ‘blue banana’ of Europe, i.e. the area going from the South of the UK, the Benelux and Denmark, the French region of Ile de France, the Western regions of Germany and the North of Italy, and that the industry seems to play a very important role in regional specialisation (Barrios et al 2007).

The regional dimension is particularly important with regard to structural employment changes – particular for ICT services. The strong expansion in the Computer Services sub-sector has contributed to the concentration of high-skilled employment in the largest EU ICT clusters, mainly located in the richest EU regions and cities (see van Winden et al 2004 on this; Barrios et al 2007).

Factors such as the level of regional GDP measuring local market access, the degree of industrial specialisation, the level of education, the density of SMEs, the regional economy and proximity to other markets are vital factors for location decisions for multinational enterprises (van Winden et al 2004).³⁹

The level of industrial specialisation appears to be especially important in the case of the computer services industry. The growth of the Computer Services sub-sector has tended to occur in regions already highly specialised, thereby reinforcing existing clusters. A study suggests that the economic benefits of ICT are more likely to take place in countries and regions which are highly specialised in ICT-producing industries (Barrios et al 2007). Given the predominance in the Spanish ICT industry of the Madrid region and, to some extent the Catalonia region, one would therefore expect a much more pronounced impact of ICT diffusion on economic growth in these regions. Providing an example from Spain, the ICT investments, despite being still low, especially compared to its main trading partners, appears

³⁹ Case study of ARM; interview with Jack Lang

to have contributed more to regional convergence and growth than other types of capital investment, labour force qualifications, or infrastructures.

The conclusions of the IPTS study are also relevant to this particular study on global offshoring in some respects. First, it points to the need to understand how the regional context contributes to setting appropriate framework conditions for the diffusion of ICT and their interaction with regional innovative and localised learning capability. In particular future research should consider the way ICT is being used.

Secondly the study concludes that from a regional policy perspective, more is needed to be known on the way the availability and use of ICT infrastructure and, in particular, broadband penetration, can favour the emergence of new types of activities or contribute to innovation and modernisation of existing activities (Barrios et al 2007).

Thirdly, the study points to a need to understand how ICT is changing the nature of the determinants of a regions' attractiveness for business location for instance through clusters, networks and spill-over effects (Barrios et al 2007). The cluster studies conducted by the for the purposes of this study have shown positive cluster effects such as access to high-skilled labour, a knowledge intensive environment and extensive, informal networking.⁴⁰

Fourthly, the authors call for future research in order to understand what the best framework conditions are for promoting positive effects of ICT on regional convergence.

3.6. Conclusion on key drivers and framework conditions

The drivers of sourcing are manifold and mutually reinforcing. They are generated at many levels, from macro-level comparative differences in cost structures and global knowledge specialisation to micro-level strategies of particular companies. Some of the main drivers of sourcing at the macro level are internationalisation of services, technological change, economic dynamics and differences, and inadequacy of skills supply. At the company level, the key drivers are the opportunity to cut costs and get access to new knowledge or markets.

In addition to these drivers, the national and European policies and regulatory settings could affect the impact and policy response to changes in the demand for e-skills.

Table 15. Overview of drivers of global sourcing and framework conditions

Key drivers of global sourcing	Framework conditions
<ul style="list-style-type: none"> • Globalisation • Economic developments • Technological change • Structural shift in the economy • Demand for advanced ICT products and services • Cost structures • Relative wage costs • Access to new markets • Access to skilled labour 	<ul style="list-style-type: none"> • Labour market • Education and lifelong learning • Regulation of trade in services • Immigration regulation • Taxes • Cultural and linguistic similarities • R&D and innovation policies • Business and regional development policies

⁴⁰ Case studies of ARM and Moviestorm; interview with Jack Lang

3.7. Initiatives and responses by governments and stakeholders

This section presents key policy areas and good practice examples concerning initiatives and responses directed at the ICT sector, ICT practitioners and ICT graduates/students.

Recruiting students for ICT and computer science

Ashish et al 2006 argues that there are two decisive factors for the ability of the US to remain the locus of software innovation: 1) access to talented designers, software engineers and programmers and 2) access to an advanced market (i.e. users). Several sources argue that this also counts for Europe (see for instance e-skills UK 2008; Swedish Institute of Growth Policy Studies 2006). While Europe benefits from the presence of advanced users in home markets (private as well as enterprises), policy makers and industry are concerned about current and future skills shortages due to demographic developments and problems with recruiting young people for ICT educational programmes (The Council of Professors and Heads of Computing 2007).⁴¹ The number of computer science students has risen in most EU countries - also as a share of total number of students. However, since institutions keep mentioning problems concerning recruitment it can be concluded that *recruitment does not reflect the demand of the market*.

Educational institutions, stakeholders and governments have responded to recruitment problems by reforming educational programmes so that they are more in line with the interests of potential students and/or by improving the image and knowledge of ICT educational programmes. Some examples are mentioned below.

Future Employees and 'IT natten'/'IT night' Denmark

The Danish initiative IT Night (IT natten) is a business initiative giving Danish high school students the opportunity to get to know IT enterprises and IT practitioners. The high schools students are invited to visit different IT enterprises and talk to their employees. It is difficult to assess the success of the initiative but the number of students attending doubled from the first to the second year the IT Night has been running. There were more than 1,200 registered student participants and 104 companies acting as hosts in 2008. According to the Danish ICT and electronics federation, ITEK, the concept of the IT Night has inspired EICTA to see whether something similar could be developed at a European level.

Source: *it-natten.dk* and interview with John Sarborg Pedersen, DI-ITEK.

Computer Laboratory of Cambridge University launches publicity campaign

The Computer Laboratory of the University of Cambridge has been experiencing recruitment difficulties and in 2007 the number of applicants dropped to 200 which is less than half of earlier applicant numbers. Therefore the Computer Laboratory launched a campaign to improve the image and knowledge of the courses of the lab – including a conference in April 2008 with participants of large companies like Google. The success of the publicity campaign will be vital for the future of the Cambridge ICT cluster which has been dependant on the large pool of high-talented graduates from the University of Cambridge.

Source: Interview with Jack Lang; *Guardian* 2007; case studies of ARM and Moviestorm

Education in Management of Technology

In 2006 the Dublin Institute of Technology introduced a new Post-Graduate Diploma (and MSc) in the Management of Technology to attract more students and ensure that the future e-skills of

⁴¹ Case study of ARM; interviews with Stephan Phisterer and Jack Lang

Education in Management of Technology

Irish graduates match the demand. The aim of the education is to fill the important human resources gaps in the Irish ICT sector by providing opportunities for technical and engineering graduates to develop a broad set of business, management and interpersonal tools. The programme is 60 % funded by the Government and the EU under the Accel initiative. The program last one year and has the option of a second year where students can obtain an MSc in Management of Technology and Innovation.

Source: Dublin Institute of Technology 2007

ICT practitioners can be recruited from a number of sources:

- Persons coming from non-ICT occupations but who can be retrained as ICT practitioners
- Shop floor level workers
- New ICT graduates (at different levels)
- ICT practitioners outside the workforce or employed in non-ICT occupations (i.e. people on leave, early retirement, other occupations)
- Migrants and students from abroad

A broad recruitment strategy requires public and industry-led training initiatives and improved access to the European labour market (e.g. ‘blue card’ arrangement).

Women in ICT education and ICT jobs

The recruitment of female ICT students constitutes a distinct policy challenge as women are generally underrepresented in ICT related employment (OECD 2007a). The English speaking countries (except the United States) have higher rates of women choosing computer science than other OECD countries. This is interesting in a global sourcing perspective since the English speaking countries also have higher levels of offshoring and therefore it appears that offshoring levels do not seem to be the primary reason for women deterring computer science.

The share of women in ICT specialist occupations is less than 20% in most EU countries. If this number is to improve, more women need to be enrolled in computer science and other ICT educations.

Female employment rates in the narrow definition of ICT-skilled employment is low, between 10% and 20% except for Hungary and the US where it is just over 25%, and in Austria, Greece and Luxembourg where it is less than 10%. ICT specialist occupations tend to have a rather negative image. Relatively few women choose to study computing sciences, so there are not many women in “the pipeline” to ICT specialist occupations. However, it has also been suggested that the pipeline may be “leaking” and that even those who do graduate with computing degrees choose to work in other sectors and occupations. In fact data from the OECD study on ICT and gender shows that female employment rates in the ICT specialist labour market has been stagnating or even declining in 1994-2004 in spite of numerous country initiatives – also in private public partnerships.

In the Czech Republic, for example, IBM has in partnership with the Association for Progressive Communications Women's Programme (APC WNSP) started an initiative aimed to attract more women into the information technology field through a project focused at high school girls and women. “Women into IT” features gender and IT awareness sessions, training, as well as public round table discussions, in the cities of Prague and Brno. Another

example is Google that has announced the Google Europe Anita Borg Memorial Scholarship 2008. Through the scholarship, the aim is to encourage women to excel in computing and technology, and become active role models and leaders. Scholarships will be awarded based on the strength of candidates' academic background and demonstrated leadership. A group of female Bachelor's, Master's, and PhD student finalists will be chosen from the applicant pool.⁴²

Digital literacy, eLearning and ICT user skills

The focus of this study is ICT practitioners and therefore we will not address digital literacy in the population as such. However, teaching ICT in primary and secondary schools and high schools is a prerequisite for recruiting ICT students later on as there needs to be a pool of potential ICT students to recruit from. Also, familiarity with ICT and the vast career possibilities related to ICTs enhances the chance that pupils will consider to enrol for an ICT education. The UK e-skills sector council has addressed this issue by initiating several measures aimed at children and youth – for instance the Computer Clubs for Girls (CC4G) initiatives in which various ICT subjects are introduced for girls in the age of 14-19.⁴³ The Portuguese government also finds it vital to enhance digital literacy and ICT infrastructure and thereby facilitating eLearning.⁴⁴

A second reason to enhance the population's digital literacy and ICT user skills is that advanced users are likely to require and feel at ease with innovative ICT software and services. Several studies points out that the advanced user levels of the US and Scandinavia (Demunter 2006) has contributed to the development of more innovative ICT software and services in these countries (Swedish Institute of Growth Policy Studies 2006; Ashish et al 2006).

Retraining of ICT and computer professionals

Some European governments and stakeholders have launched initiatives for retraining of ICT practitioners or potential ICT practitioners. One way to accommodate offshoring of jobs is by retraining the potentially affected workers. Furthermore, retraining could balance out the European mismatch between supply and demand of *specific* e-skills. In Finland the Ministry of Education has launched a new re-training initiative for adults. The initiative combines apprenticeship with theoretical training at educational institutions and each programme is flexible and tailored for the specific needs of the individual and the company.

Cases on retraining and continuing education

- In Germany for example an initiative has been taken with close involvement with the social partners whereby which persons already in the ICT labour force can move to a higher specialist level bridging the vocational and the academic level.
- In Denmark a number of Master's programmes have been developed particularly targeting an adult workforce, who can remain in work while completing a tertiary qualification in ICT.
- The E-Skills Forum report from December 2007 provides a number of examples of promising practices, also based on multi-partner arrangements.

⁴² Google website, <http://www.google.com/anitaborg-europe/> and GenARDIS website, <http://dev.apcwomen.org/node/177>

⁴³ See www.e-skills.com

⁴⁴ Interview with Carlos Zorrinho

Source: Empirica 2007; European Commission website, <http://ec.europa.eu/enterprise/ict/policy/ict-skills/e-skillsmpfinalreport.pdf>

Labour market policies

The analysis of the European and American policy debates on offshoring of ICT jobs showed that the general labour market environment might have an effect on the public attitudes towards offshoring. For instance the French public and policymakers are more sceptical towards offshoring than their Scandinavian counterparts and this could very well be explained by the rigid French labour market which makes it more difficult for laid off workers to be re-employed.

A study by McKinsey Global Institute (2005) argues that more efficient labour market policies targeting specific profiles most affected (software programmers, call centre agents, back-office service workers) could result in raising the reemployment rate and reducing the social impact of offshoring. Such programs could include government job-retraining efforts, incentives for companies to hire and retrain displaced workers, and relocation help for them when needed.

The offshoring of IT jobs may aggravate overcapacity in the transition to labour markets for youth cohorts, but engineers can focus on higher-value, less commoditized activities that are significantly less prone to offshoring. A study of the US labour market from 1999 to 2003 suggests that although offshoring probably did reduce demand for lower-end computer programmers, the number of software engineers and network systems analysts working on higher-end activities actually increased greatly over the same time period.

As discussed previously flexicurity principles could be one of the measures to create sustain more dynamics in the ICT labour markets. However, there does not seem to be very many labour market initiatives aimed at the ICT sector and ICT intensive sectors are yet to be seen.

Migration initiatives

Migration is closely related to global sourcing since the inflow of third-country nationals is one way of countering the increasing shortage of ICT practitioners. Still more industrialised countries are now deploying migration policies by which high skilled labour – such as ICT practitioners – are granted work permits (Millar & Salt 2007). The EU has stated that legal migration make up a vital part of the Lisbon strategy of creating a knowledge-based economy and in October 2007 a proposal for a legal framework “*on the conditions of entry and residence of third-country nationals for the purposes of highly qualified employment*” was proposed by the European Commission (European Commission 2007e). The purpose of this proposal is to ensure that the EU is provided with the efficiency potentials of encompassing skills gaps – particularly for high skilled labour.

In 2000 the German parliament passed the “Green Card” scheme for software and hardware engineers from non-EU countries (Bundesanstalt für Arbeit 2000). In contrast to the American Green Card, only a single occupational group was awarded temporary working and residence permits for five years. Similar programmes were implemented in the Netherlands, UK, Denmark, France and other countries of the European Union (Rand 2006; Kolb 2006; Danish Globalisation Strategy 2006). Surprisingly, the majority of computer specialists are employed by small and medium enterprises which had hardly had any experience with foreign

employees previously. From August 2000 to July 2003, 14,876 work permits were issued on the basis of the Green Card regulation. Thus, the initial desired quota of 20,000 experts, as well as the considerably higher estimates within economic circles, went greatly unmet. The success of the Green Card has been disputed and critics have argued that the German government has been a laggard in ensuring appropriate measures to overcome skills needs (Kolb 2005).

The effect of the various migration schemes is far from evident. According to David Autor the US immigration policy aimed at high-skilled foreigners has been a vital contributor to the success of the technological development of the US.⁴⁵ A supplementing approach is that of business itself such as the Danish example of Novozymes using the organisation IASTE to recruit trainees.

Multi-stakeholder and partnership approaches

Responses and initiatives aimed at improving the employability of European ICT practitioners include numerous multi-stakeholder partnerships. Multi-stakeholder partnerships facilitate and nurture cooperation between educational or training establishments, enterprises, the Social Partners and other key stakeholders (Empirica 2007). Hence, the partnerships can include private and public institutions and be more or less formal in their cooperation. Multi-stakeholder partnerships on e-skills vary from regular gathering of information, creation and delivery of training, matching workers with jobs, supporting lifelong learning and e-skills frameworks and definitions (Empirica 2007).

A salient example of this is the British e-skills sector council led by employers' and licensed by the government to ensure that the UK has the e-skills needed:

e-skills UK

'E-skills UK' is the British Sector Skills Council for IT and Telecoms working to ensure that the UK has the necessary e-skills to ensure a competitive and thriving economy. Employers, educators and the Government work together in the Council on how best to address skills needs related to IT and Telecoms. E-skills UK deals with all levels of education and skills development varying from primary education to higher educational levels and retraining of employed IT and Telecom professionals. The companies represented in the board of e-skills UK are both multinational ICT corporations like IBM, British ICT intensive using enterprises and SME representatives. E-skills UK cooperates with business on a range of issues and specific initiatives:

- Revitalise IT: A joint employer, government, university initiative aiming to get more students into technology-related studies.
- CC4G: Computer Clubs for Girls is a programme aspiring girls in the age of 14-19 to be more interested in computers by facilitating computers activities related to music, design and fashion.
- Prof IT: Professionalism in IT is an initiative coined with British Computer Society, Intellect and National Computer Centre working to support UK leadership on the global IT markets.
- SFIA Framework: Skills Framework for the Information Age is a common reference model which can be used to identify the skills needed to develop effective Information Systems.

Source: www.e-skills.com

⁴⁵ Interview with David Autor

The Finish government has co-financed the development of scenarios for future skills needs of Finish enterprises in cooperation with the Finish Federation of Technology Industries. The initiative includes a survey among the members of the federation and the questionnaire also contains questions on which type of jobs, qualifications and skills are expected to be in demand in the future. This initiative is not a response to increasing offshoring of ICT jobs but a general initiative towards more, flexible and tailored retraining in accordance to business demands.

Another kind of stakeholder response is aimed at addressing specific industry needs – such as that of the ICT SMEs. The SMEs are particularly vulnerable to ICT specialist shortages because they do not have the same opportunities of large scale offshoring and outsourcing can be a complex and resource demand task for smaller companies (Løcke 2007).⁴⁶ In the light of this, a number of national ICT SME interest organisations have initiated a PAN European ICT SME interest organisation, PIN-SME:

PIN-SME – the voices of SMEs in the European ICT sector

In December 2007 national sector SME organisations and ICT clusters from 8 European countries launched a European interest organisation for the SMEs in the European ICT sector. The Pan European ICT and eBusiness Network for SMEs, PIN-SME, will focus on improving the competitiveness of the European ICT SMEs and call on European policymakers to have an SME perspective on policy issues like software patents, ICT standardisation and e-skills. Some of the founding members include:

- The Best Practice IT practice guide is a German industry initiative with the objective to assist German and European SMEs in understanding and exploiting the possibilities of ICT application. This is done by providing numerous examples on how to apply ICT across numerous sectors, industries and company size. The initiative is launched by G+F Verlags- and Beratungs-GmbH in cooperation with various organisations, federations and business enterprises across Europe.
- BASSCOM is a Bulgarian industry organisation of more than 40 advanced software development companies.
- GPNI is a French organisation for informatics engineering, Internet and multimedia.

Source: Interview with Sebastiano Toffaletti, PIN-SME, www.pin-sme.org, http://www.itforum.dk/downloads/071207_PIN-SME_pressrelease.doc

Another type of education programmes which focus on specific industry needs is that of Hewlett-Packard Bulgaria cooperating with three Bulgarian universities on promoting the IT skills of IT and engineering students in Bulgaria.

Hewlett-Packard and Bulgarian Universities partner on boosting IT skills

Hewlett-Packard (HP) Bulgaria has partnered with the University of Sofia, the Technical University and the New Bulgarian University on programmes to boosting IT skills of IT and engineering graduates. Together the universities and HP Bulgaria has offered specially designed teaching modules to help IT and engineering students to acquire some specific and updated skills in line with market demand. One of the advantages of the programme is that it combines lectures with lab exercises.

The initiative has improved the employability of the IT students and HP Bulgaria has benefited from the programme by establishing contacts with potential employees. HP Bulgaria received the Bulgarian Business Leaders Forum Investor in Knowledge Award in 2006 for starting the

⁴⁶ Interview with Sebastiano Toffaletti, PIN-SME

programme.

Source: HP Bulgaria 2008

Regional specialisation and strategic areas of excellence

Some EU countries have started to prioritise areas of excellence in specific areas of ICT rather than betting on them all. Small EU countries like Denmark and Portugal have chosen to prioritise their initiatives to get sufficient scale:

- **Denmark** has prioritised eHealth, energy and ICT, transport and ICT and the experience economy/games economy
- **Portugal** has prioritised applied ICT in industries like automotive, energy and transport and eHealth

The prioritisation can ensure more scaling and focus of initiatives particularly in small countries, but there is an inherent risk that the selection of priorities may copy general international trends rather than building on genuine latent innovation potentials of the country in question. Another and complementary way of prioritisation is to select strategic areas of excellence in certain regions, clusters, or cities. As noted by several interviewees, Europe needs to focus on areas where Europe could be a global leader – this could be areas like mobile applications, green IT, social networking and gaming.⁴⁷ Programme measures to stimulate R&D and innovation as well as the improvement of general framework conditions through education and training and deregulation of labour markets are perceived as essential to the competitiveness of the ICT industry, whereas there is some concern if government policies aim to identify strategic areas of excellence which according to some interviewees should occur on an open competitive basis.

Clusters

The development of regional clusters is also a way of increasing competitiveness and promoting innovation through regional specialisation (Porter 1990; Porter 1998). Some prominent examples of European ICT clusters are:

- **Finland** is nurturing mobile communications and has deployed an ambitious and offensive cluster development plan for the area of Oulu. The government and City Council has played an active role in the development of the cluster by building higher educational institutions, developing infrastructure and supporting the Technology Park (Collis et al 2005, van Winden et al 2003). However, the majority of these activities were not conducted with the clear aim of developing a leading mobile software cluster but rather to facilitate the general development of Northern Finland (Collis et al 2005). Domestic companies have been vital players in the development of the cluster and it could be argued that the cluster is dependent on the continuing presence of Nokia.
- In **Sweden** the Kista Science City has chosen to focus on wireless systems, broadband systems and mobile services as three strategic growth areas which could also mutually reinforce each other (School of Information and Communication Technology 2007). Access to a high skilled workforce is the key to the success of the Kista cluster.
- **Ireland** focuses on software development and is now one of the largest software exporters in the world (KMPG). According to the Green the clustering effects of the areas around Dublin and Cork are very important for this: *'The cluster dynamic is supplied in each case by a mix of inter-firm collaboration, interaction and rivalry, by*

⁴⁷ Interviews with Marianne Kolding and John Sarborg Pedersen

the development and constant replenishment of common pools of skilled labour, by the localised support of research and educational institutions and by the strategies of national and regional development agencies.' (Green 2000:3). The development of the Irish cluster (mainly located in Dublin) has been supported by low corporate taxes, high levels of FDI and support by EU's Structural Funds (Van Winden et al 2003). Furthermore, the Irish Software Association is actively trying to nurture and develop networking (Ibid.).

- **Cambridge** is a large, knowledge intensive cluster with special advantages in Health Care & Life Sciences, IT and Communications and a number of sub-sectors. The University of Cambridge is the main driver of the cluster effects of Cambridge and has spurred the Cambridge Phenomena referring to several high-tech companies spun out from the university (Library House 2007a, 2007b).

The examples above illustrate that there are several and often even diverse factors which may lead to a successful cluster formation, and that only some of these factors can be enabled through public policy measures. One of the returning questions is if a development of local/regional knowledge clusters can spur innovation and growth. The advantage of a cluster is that the central actors are located in proximity to each other and this facilitates face-to-face networking (Van Winden et al 2003). Therefore clusters are particularly advantageous for nurturing and exchanging tacit knowledge because tacit knowledge is much more dependant on proximity.

Insofar as jobs and tasks with high levels of tacit knowledge are more difficult to offshore the existence and development of clusters with actors exchanging tacit knowledge pose an interesting perspective for accommodating offshoring trends and improving the competitiveness of European enterprises, insofar that the formation of clusters can be spurred by public policy measures.

Governments cannot control the development of clusters and strategic networking as they are highly dependent upon firm strategies. However indirectly governments can spur cluster formation through policy measures which address access to skilled labour, risk capital, R&D and interactions with a competent knowledge and business services system (Van Winden et al 2003).

3.8. Conclusion – the European debate on global sourcing

A reported shortage of ICT practitioners is currently influencing the policy debate on global sourcing in Europe. As a result, European policy makers are mainly focusing on deregulation of labour markets to increase job mobility, recruitment of ICT practitioners, and upgrading the skills of the European ICT workforce. In contrast, policy makers in the US are currently focusing on the potential negative impact of global sourcing on wages and employment. Migration is thus a key issue in the US debate as the access of foreign ICT practitioners to the national labour market could be considered a threat to the employment of US ICT practitioners.

The approach to global sourcing also differs among the European Social Partners. On one hand, the European ICT industry considers global sourcing an opportunity for companies to increase competitiveness in global markets, and a key issue for the industry is the need to move up the value chain as a prerequisite to global competitiveness. Trade Unions on the

other hand are concerned about the potential negative impact of global sourcing for employment levels and working conditions, in particular for low skilled workers. They point to the compliance with international labour standards, improved Social Dialogue in the ICT sector and upskilling of the European ICT workforce as key priorities for Europe.

Overall, the mapping of the European debate on global sourcing shows that the employability of European ICT practitioners and the competitiveness of European companies are key concerns that need to be addressed proactively by policy makers and stakeholders. For instance, labour market policies are vital for the ability of the European workforce to remain employable and be re-employed in the case of major lay offs or structural changes, and a number of measures have already been implemented to retrain the existing ICT workforce or to upskill workforce to meet new demands in growth sectors such as ICT. However, the impact of many of these initiatives has not been thoroughly assessed in terms of medium term employment and employability effect. To ensure efficiency in investments in continuing education and training initiatives, thorough impact analyses should be encouraged at all levels.

The competitiveness of European ICT enterprises and ICT-intensive enterprises remains a challenge given changing global orders of competition. Policies which aim at improving general framework conditions, and policies which aim to nurture regional specialisation building on actual regional strengths are central to the future competitiveness of the European ICT sector. From a European perspective one of the key challenges is to ensure a better connectivity of different policy realms within an overall competitiveness policy building on the particular strengths of the institutional traits of innovation systems in Europe.

4. Sourcing trends and strategies

Global sourcing of ICT activities affects the demand for ICT practitioners and skills in Europe and is likely to change the demand to European educational and lifelong learning systems. In the following sections we provide an overview of global sourcing trends and estimates concerning future developments. This includes providing evidence of the type of ICT work that has been relocated and indications on future developments.

4.1. *Increasing tradability of services*

According to Millard (2006), *tradable goods and services* are those likely to be subject to inter-regional, large scale or globalised competition. These tend to be goods and services which can be automated and/or subject to large productivity increases by using new technology, including ICT. They thus tend to be in manufacturing, in the more routine aspects of services using codified knowledge (e.g. back-office functions like information sorting and mediation), and in highly creative but, at the same time, information/knowledge-rich, digitisable services (like web-design, software development, etc.). Because of massive productivity increases and intense competition in these goods and services, prices tend to fall and employment is often reduced. So, although these are important for global trading and competitiveness, their value (as measured by their falling prices) and their employment levels tend to remain static or even fall, certainly in relative terms (Turner 2001; Herzenberg et al 1999).

Conversely, *non-tradable goods and services* are those not likely to be subject to globalised competition, but which tend instead to be anchored more closely within local or regional competitive milieu. These goods and services tend to rely on face-to-face contacts which are difficult to automate or to subject to significant, sustained productivity increases. They are thus mainly in the human services sectors, both those which are more routine and relatively low value, like hairdressing and retail, and those which are more complex, high skilled and high value, like counselling, teaching, medical services.

These services tend not to be traded outside the locality/region and are often seen, compared to the tradable sector, to be increasing in relative value (as prices do not fall) and in relative employment (as the quality of service can often be improved by more manpower, not less). Some aspects of these services can be automated using ICT where access to codified knowledge can improve efficiency and decision-making, as for example offshoring of radiology and lab services, which brings the advantage of swifter response due to the difference in working hour time zones. Even so, value and quality is essentially enhanced, not by ICT substituting for people, but by using ICT to support human capital quality improvements.

However, these distinctions between tradable and non-tradable, on the one hand, and between goods and services on the other, are starting to break down in the context of the twin drivers of globalisation and of ICT application. For example, many manufactured goods (particularly in the ICT sector) are starting to be customised and subject to ICT controlled production only when an order is received, and for example in the car industry decomposed within a geographically distributed value chain. In this sense, manufactured products are starting to behave more like services which have typically been distinct from physical goods by being

created only at the point of demand, and thus tailored to the specific needs of the individual customer, and therefore also with a greater service content. When warehousing is no longer necessary, because all goods and services are only created when the customer wants them, then one of the main differences between goods and services starts to vanish.

Another driver of change is the ‘productizing’ of services. The provision of services is being turned into a manufacturing process as processes for service delivery can be standardized, and the infrastructure and assets (e.g. software platforms) that enable such service delivery benefit from economies of scale. Thus, ‘information today can be standardized, built to order, assembled from components, picked, packed, stored and shipped, all using processes resembling manufacturing’s’ (Karmarkar 2004). Services, including ICT services, are also subject to more open trade agreements, as is now happening in the WTO context as well as in the EU through the Services Directive agreed at the end of 2006.⁴⁸ Further, the use of migrant workers in onshore destinations is testifying to the increasing tradability of services.

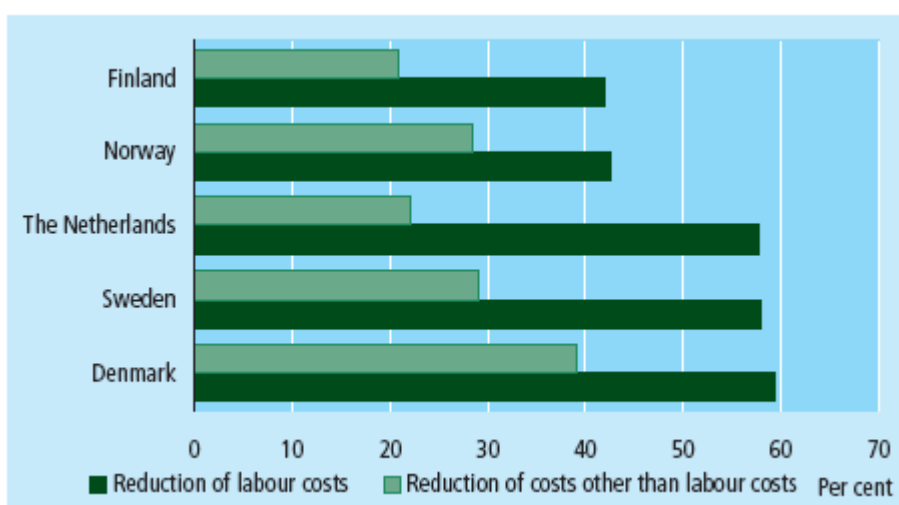
As a result of these factors promoting the tradability of services, the composition of the services sector has changed over time with tradable types of services growing more rapidly than non-tradable types (Sako 2005).

4.2. Global sourcing decisions

There are many reasons for sourcing activities, including achieving cost reductions, getting access to a larger pool of talents, reducing time to market, taking advantage of time zones to perform tasks 24/7; and increasing productivity (Hamilton 2008).

In a recent survey of companies in the non-financial business economy (includes manufacturing) in different countries, labour cost reductions were among the main motivations for international sourcing cited by the respondents (Statistics Denmark 2008b):

Figure 8. Importance of cost reductions as a driver for international sourcing. Share of enterprises with international sourcing reporting the factor as very important



Source: Statistics Denmark 2008b

⁴⁸ European Commission website, http://ec.europa.eu/internal_market/services/services-dir/index_en.htm

Although there are differences between the five countries, the three motivations most often considered to have the least importance are ‘tax or other financial incentives’, ‘improved quality or introduction of new products’, and ‘access to specialised knowledge/ technologies’.

The importance of ‘talent’ (e.g. personnel with appropriate skills and qualifications) for offshoring seems to be increasing. A survey carried out in 2006 out by the Offshore Research Network finds that companies increasingly go where the talent is. According to the survey, access to qualified personnel was cited as an important or very important driver in approximately 70 per cent of all offshoring projects. Moreover, the importance of this driver has grown significantly from a similar survey carried out in 2004. Especially companies in high technology industries and companies offshoring product development functions consider access to talent a key driver for offshoring (Manning et al 2008). The main reason for companies deciding to search for talent in countries such as India and China is the (real or experienced) shortage of science and engineering talent in the U.S. and Europe in combination with the rise of science and engineering clusters in emerging economies (Manning et al 2008).

4.3. *Measuring global sourcing*

Academics and international organisations like OECD and UNCTAD are not in agreement on how to measure global sourcing, and few attempts have been made at systematically measuring net employment effects (Kierkegaard 2007a, Blinder 2005). This is partly explained by the numerous difficulties encountered in quantifying the impact of offshoring on employment, and by the lack of direct measurements (OECD 2007d).

In terms of global sourcing, we can use some existing data sources to identify and assess sourcing:

- Analyses of trade in services
- Analyses of foreign direct investments (FDI) flows
- Surveys (e.g. Eurostat Enterprise survey)

Trade in services

- Trade in services can be defined as service transactions between residents and non-residents of an economy, with exports referring to service sales of residents to non-residents and imports referring to service purchases by residents from non-residents (OECD 2007g). Statistics on trade in services do not show whether a country or region had previously been purchasing the same services from domestic supplier, and do not make it possible to distinguish between goods and services used by producers as intermediate inputs and those sold directly to costumers. Due to this,, the inclusion of the latter in imports leads to exaggerating the extent of offshoring as a sourcing decision (Sako 2005).

Foreign direct investment

- The scale of offshoring can be estimated by analysing foreign direct investments (FDI). Offshoring involves a capital flow to the destination country where a new affiliate is established or the capacity of an existing affiliate is expanded. However, FDI does not take account of offshoring in the broad sense, i.e. involving subcontracting, and not all direct investments in a country are necessarily the result of offshoring as “investments do not imply the cessation of the same activity in the

compiling country” (OECD 2007d). FDI will also include purely financial transactions such as the exchange of shares.

Surveys

- There are a limited number of reliable surveys focusing on global sourcing. The Eurostat Enterprise Survey 2007 included a range of questions relating to outsourcing and offshoring of ICT functions and business functions requiring the use of ICT. Moreover, Eurostat and a number of statistical agencies in the EU member states have launched a joint survey on international sourcing by European companies. This survey makes it possible to compare sourcing trends of companies in different European countries and also makes it possible to distinguish between sourcing of different business functions such as IT support function, marketing, research etc. (Statistics Denmark 2008b). Results from this study are highly relevant and probably represents the best available European data on sourcing. The study also makes it possible to compare sourcing trends of manufacturing and service companies, but unfortunately a more detailed sector breakdown is currently not available.

It is important to keep in mind the limitations and weaknesses of the different types of indicators when drawing conclusions on global sourcing trends.

4.4. Sourcing trends

Offshore outsourcing is a relatively recent phenomenon, but in the last decade the level of offshore outsourcing of IT software and services has increased dramatically. For instance, India’s exports of software and IT-enabled services didn’t breach the \$1 billion mark until 1996, but exports have since risen to more than \$12 billion (Kirkegaard 2004b).

The following sections provide an overview of developments in global sourcing, focusing on trade in services. Statistics on international trade in services should be treated with caution due to the various national definitions and approaches to compiling trade data. Moreover, trade statistics may include cross-border transactions that have nothing to do with sourcing. However, the data does provide an indication of developments in global sourcing.⁴⁹

Trade in services

Compared to trade in goods, the international trade in services has been limited. This difference can for some part be explained by difficulties in measuring trade in services – services are more difficult to identify and describe. But perhaps more importantly, services tend to be less tradable than goods as the provision of services often require face to face interaction or a physical presence of the service provider. For instance, the cleaning of rooms require the presence of cleaning staff, while computer systems can be monitored from a distance and a range of ICT related tasks such as programming, processing and validation of data can be carried out anywhere in the world if there is an internet connection and the right people to carry out the task.

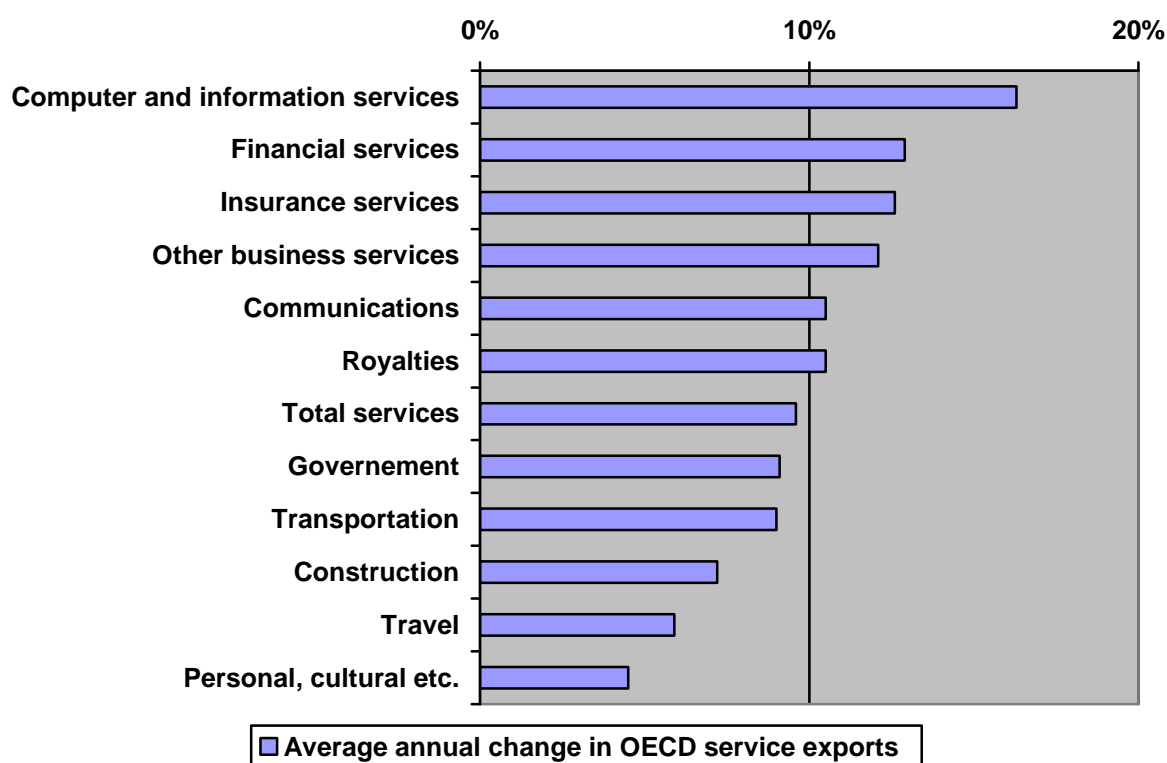
However, the growing deregulation of trade and the evolution of a global information and communication infrastructure have increased the tradability of large parts of the service

⁴⁹ Trade in services as indicator of global sourcing will be discussed in a separate section.

economy, and facilitated the decomposition of services (Zysman et al 2007), and the trade in services is now growing at a similar rate to trade in goods (Eurostat 2008).

According to the OECD's statistics on international trade in services, computer and information services is the service sector with the fastest growing exports (2000-2005) followed by financial and insurance services, communications and other business services, cf. figure x below:

Figure 9. Average annual change in OECD service exports (2000-2005)



Source: OECD (2007g)

The European Union (EU 27) is the world's largest exporter and importer of services (26.9% of global exports and 23.4% of imports), followed by the USA, Japan, China and Canada. In 2006, the EU-27 recorded a surplus of €68.5bn, compared to €52.9bn in 2005. This increase was mainly due to positive developments in insurance services, financial services and computer and information services (Eurostat 2008).

European trade in computer and information services

WTO has published figures for trade in computer and information services (2005) showing that the European Union is the worlds major exporter of such services followed by India and the US. The European Union is also the world's largest importer of computer and information services followed by the US and Japan.

Table 16. Major exporters and importers of computer and information services (2005)

	Exporters	Value (\$mio)	Share (%)	Change (%)		Importers	Value (\$mio)	Share (%)	Change (%)
1	EU 25	60233	60,3	3	1	EU 25	31580	58,4	12

	Exporters	Value (\$mio)	Share (%)	Change (%)		Importers	Value (\$mio)	Share (%)	Change (%)
	<i>Extra-EU</i>	21285	21,3	4		<i>Extra EU</i>	10745	19,9	6
2	India	16091	16,1	3	2	US	8969	16,6	34
3	US	8239	8,2	4	3	Japan	2432	4,5	11
4	Israel	4529	4,5	...	4	Canada	1792	3,3	-6
5	Canada	3925	3,9	-8	5	Brazil	1713	3,2	34
6	China	1840	1,8	3	6	China	1623	3,0	30
7	Japan	1126	1,1	19	7	India	1498	2,8	...
8	Norway	899	0,9	12	8	Norway	1131	2,1	97
9	Australia	886	0,9	8	9	Australia	802	1,5	3
10	Singapore	476	0,5	59	10	Indonesia	561	1,0	20
11	Malaysia	435	0,4	-6	11	Russ. Fed.	482	0,9	51
12	Russ. Fed.	422	0,4	6	12	Hong Kong,	427	0,8	8
13	Romania	332	0,3	25	13	Malaysia	379	0,7	21
14	Hong Kong	265	0,3	65	14	Romania	351	0,6	323
15	Costa Rica	255	0,3	132	15	Singapore	334	0,6	6
	Above 15	99950	100,0	8		Above 15	54075	100,0	-

Source: WTO, http://www.wto.org/english/res_e/statis_e/its2007_e/section3_e/iii26.xls

The data shows that most of Europe's trade in computer and information services takes place between EU member states rather than between EU member states and non-EU member states. There are significant national differences in terms of trade in computer and information services. Eurostat data (2008) show that the top European exporters in 2006 were Ireland (€16.7 million), Germany (€7.7 million), the Netherlands (€3.1 million), Sweden (€2.8 million) and Belgium (€2.3 million).⁵⁰

The EU is currently a net-exporter of computer and information services, and the European Union has experienced an increase in its trade surplus since 2004, cf. table below:

Table 17. Net trade in computer and information services between EU27 and the world (2004-2006), Mio EUR

	2004	2005	2006
Computer and information services	24184	23705	26279
Computer services	19910	19272	21241
Information services	4274	4432	5037

Source: Eurostat (2008)

In 2006, net trade in computer and information services between EU27 and the world reached €26279 million and net extra EU27 trade in services in computer and information services reached €11290 million. According to Eurostat (2008), the EU's largest trade surpluses in computer and information services in 2006 were recorded for Switzerland (€2446 million) and the USA (€1594 million), while the only traded deficits in this service category were recorded for India (€-433 million), Israel (€-25 million), and Uruguay (€-2 million).

Trade in computer and information services - EU and India

India is the leading offshoring destination across a range of manufacturing and service sectors, including telecommunications, financial services etc. It is therefore relevant to focus specifically on trade in services between EU and India.

⁵⁰ Figures for the UK and Finland are not reported

The service sector is the key driver of economic growth in India - between 2002/03 and 2006/07 the sector contributed with 68.6% of the overall average annual growth in GDP. In terms of international trade in services, India's exports of services have increased by 27.4% during the period 2000/01 to 2005/06, mainly due to increased exports of software services, while imports of services increased by 24.2%.

Table 18. India's trade in services with rest of the world, in million Euro

	2004			2005			2006		
	credit	debit	net	credit	debit	net	credit	debit	net
Total Services	30 775	28 652	2 122	44 877	38 573	6 303	60 014	39 321	20 693
Transportation	3 515	10 638	-7 123	4 597	16 188	-11 591	6 076	9 915	-3 839
Travel	4 960	3 872	1 088	6 023	4 833	1 190	7 115	5 855	1 260
Other services	22 299	14 143	8 159	34 257	17 551	16 704	46 823	23 551	23 272
Communications services	897	465	414	1 586	536	1 049	1 745	716	1 029
Construction services	415	666	-251	811	535	276	321	721	-400
Insurance services	677	1 405	-728	747	1 798	-1 052	889	994	-105
Financial services	274	636	-361	1 181	919	261	1 649	1 048	601
Computer and information services	13 140	749	12 390	17 688	1 259	16 429	23 245	1 751	21 494
Royalties and license fees	42	492	-449	105	616	-511	89	756	-667
Other business services	6 554	9 401	-2 846	11 762	11 439	324	18 475	17 086	1 389
Personal cultural and recreational services	37	49	-12	117	92	25	173	94	80
Government services, n.i.e.	281	280	2	260	357	-97	237	385	-149

Source: Eurostat (2008)

India's surplus in trade in services has increased significantly from €2.1 billion in 2004 to €20.7 billion in 2006. In terms of computer and information services, the trade surplus has increased continuously since 2004, and computer and information services are currently the biggest single item in India's exports, reaching €23.2 billion in 2006,

Overall, the volume of EU-India trade and investment is still very limited. In 2006, India's share of EU's total trade in services accounted for just 1.5%, which is a relatively modest share considering that Switzerland's share of EU's total trade in services was 11.1%. Furthermore, the EU has surpluses with India in most service categories except computer and information services.⁵¹ Ireland and Sweden are the only EU member states that record a trade surplus in computer and information services vis-à-vis India (Eurostat 2008).⁵²

Eurostat data shows that the EU's trade deficit vis-à-vis India in computer and information services has been continuously increasing (€-207 million to €-433 million during the period 2004 to 2006). European exports of computer and information services to India have been increasing, but the imports from India have increased at a higher growth rate. This supports other findings that India importance as a destination for European sourcing is growing.

In terms of other key economic actors, the EU-27 recorded a trade surplus in computer and information services vis-à-vis Brazil (€158 million), the Russian Federation (€692 million),

⁵¹ Interestingly, the EU also records a trade deficit vis-à-vis India (and a range of other countries) in research and development (€-184 million in 2006).

⁵² Figures for a range of European countries (the UK, Finland, Estonia etc.) are not reported.

and China (€75 million). While the EU's trade surplus vis-à-vis Brazil and the Russian Federation has been increasing in 2004-2006, the EU's trade surplus vis-à-vis China has been continuously decreasing due to decreasing exports and increasing imports of computer and information services (Eurostat 2008).

The possibility of making in-depth international comparisons is limited due to the limited availability of high quality and standardised data. However, WTO data on exports shows that contrary to the EU, the US in 2003-2005 has experienced a decline in world exports of communication and information services (WTO 2007). Furthermore, while the EU in 2003-2005 has experienced reduced growth rates in exports of these services to India, the US exports to India have declined. On the other hand, the US has experienced reduced growth rates in exports of communication and information services to China, while EU's exports of these services to China in 2004-2005 started to decline.

It is difficult to draw any solid conclusions on trends in the international trade in services due to the short time span covered by the available WTO and Eurostat data. However, the data does suggest that China's global importance in computer and information services is increasing.

Type of activities being sourced

Analyses of the drivers of sourcing tend to focus on where a given activity and job function is situated within the value chain. The underlying argument is that the level of value-added and the content of tacit knowledge in an activity define the outsourcing potential. The lower the level of value added and the less tacit the knowledge activity is, the more it is likely that outsourcing will take place. Consequently, low value-adding activities are most likely to be outsourced even though they may require high skills levels to perform (Shapiro & Millard 2004). It should in this context be noted that routinised low value activities may not necessarily correspond to low levels of skills in the particular job function.

However, according to Shapiro & Millard (2004) high value-adding activities are also increasingly being outsourced and price may not be the only reason which location is chosen. For instance, outsourcing strategies can be based on R&D driven innovation, which may again be combined with options to get access to new markets or skills, or to specific clusters or networks which have economic and political importance to the outsourcer. This may lead to the offshore outsourcing or internal offshoring of highly specialised R&D or testing functions in order to get access to specialised and highly tacit knowledge and knowledge infrastructures within regional science based innovation systems (Shapiro & Millard 2004).

It is important to acknowledge the element of learning in relation to global sourcing. Empirical findings indicate that companies' offshore sourcing is best described as a learning-by-doing process rather than a discrete choice among a set of strategic sourcing options. In this learning process the offshore outsourcing of a company goes through a sequence of stages – from outsourcing driven by a desire for cost minimization towards sourcing for innovation, as the company gradually realises that offshore locations may also offer an opportunity for quality improvements and in turn innovation, when (or if) “the quality improvements that offshore outsourcing may bring about evoke a realization in the corporation that even innovative processes can be outsourced” (Maskell et al 2005). The learning element implies that companies' reasons for offshoring and the type of business functions being outsourced

may change over time as they gain more experience with offshoring activities (Hamilton 2008).

Structural and cultural differences between countries or regions may also result in differences in sourcing practices. For instance, a survey of the sourcing practices of US and European companies conducted in 2001 suggests that US companies pursue value adding strategies, while European companies are more focused on gaining economies of scale (Kakabadse & Kakabadse 2002). A factor explaining such differences in sourcing practices could be lack of size and capital in European companies compared to their US competitors (Shapiro & Millard 2004). Furthermore, language similarities may explain why the US and the UK have been in front in terms of offshoring to India. The regulated labour market in many European countries might also pose a challenge to offshoring by making it more costly for European companies to lay off workers.

There are also differences in sourcing practices between manufacturing companies and companies involved in services. According to Statistics Denmark (2008b), the following general conclusions can be drawn:

- Core business functions are the most frequently sourced function by manufacturing companies, and services companies source their core functions to a much lesser extent than manufacturing companies.
- ICT support functions are the most frequently sourced support function, and services companies source their ICT support functions abroad to a larger extent than manufacturing companies
- Manufacturing companies source support functions to a lesser extent than services companies
- Services companies have sourced administrative functions frequently and to a larger extent than manufacturing companies

From manufacturing to knowledge process offshoring

Manufacturing activities in the US and Europe have been moved to nearshore or offshore locations for years in order to improve cost-efficiency. In some cases, companies decide to change location when for instance more competitive locations emerge - a recent example is the Finnish phone maker Nokia which in 2008 announced its decision to close a manufacturing plant in Bochum, Germany in order to shift manufacturing to a cheaper location in Europe. Nokia's decision means that 2,300 workers will lose their jobs. In a statement, Nokia said the decision was based "on the lack of competitiveness of the location" According to Veli Sundbaeck, executive vice president of Nokia and the chairman of Nokia GmbH's supervisory board, the production of mobile devices in Germany is no longer feasible for Nokia due to market changes and increasing requirements for cost-effectiveness.⁵³

The global sourcing of ICT activities has not been limited to ICT manufacturing, but also concerns a growing range of activities in the European ICT software and services sector. The global sourcing of software and services has evolved over time – from standardised low value activities such as call centres and back-end business process operations (incl. data entry and handling, coding, and medical and legal transcriptions)⁵⁴ to knowledge work and algorithms

⁵³ Nokia website, <http://www.nokia.com/A4136001?newsid=1182125>

⁵⁴ Known as 'business process outsourcing' (BPO)

embodied in software programming, design and development (Sako 2005). The offshoring of such knowledge intensive activities⁵⁵ is a relatively recent phenomenon, but it is estimated that this type of offshoring will take off in the coming years (Rajan 2006).

According to TPI (2008b), the offshoring of complex knowledge activities will require a significant degree of partnership and global collaboration beyond the process standardization and compliance seen in the initial waves of outsourcing. Furthermore, the importance of protecting Intellectual Property Rights (IPR) increases and so does the demands for skills, domain knowledge and intellectual capability.

Offshoring of business processes and knowledge processes spans all economic sectors using ICT in their business operations. For instance, the financial services sector has a plethora of IT-based back office processes and thus stands to gain large cost-savings by offshoring to low cost destinations (Pujals 2004).

Increasing sourcing of R&D

Research and development activities (for instance software development) are to an increasing extent being offshored to countries such as India and China. The development has mostly been driven by multinational companies operating in India and companies offshoring R&D in software to India. Telelogic, a Swedish company providing solutions for advanced systems and software development for a range of sectors including the defence and aerospace sector, set up a product development lab in Bangalore in 2004 (Swedish Institute for Growth Policy Studies 2007).

The offshoring of R&D is part of the broader process of internationalisation of R&D and innovation. According to the OECD, internationalisation of R&D is taking place at a much faster pace and to a wider range of countries than previously. Moreover, this trend involves more than adapting technology to local conditions (OECD 2008).

Companies may choose to locate R&D activities across multiple sites, such as Microsoft's internationalisation strategy to pool and build alliances with highly specialised local, regional as well as globally oriented science based innovation systems or "hot spots". Case studies show that these internationalisation strategies are driven by access both to highly specialised codified skills and to highly tacit functions within an R&D environment, such as in design, testing and business incubation expertise (Shapiro & Millard 2004).

In general, global corporations source R&D internationally for three main reasons:

- 1) the cost and complexity of technology development means that skilled partners have to be sourced from a wider area;
- 2) there are innovation hot-spots related to particular new technologies that are very location specific, and to be involved firms need a local presence; and
- 3) national R&D and innovation systems can be limited in scope and present "lock in" characteristics

The offshoring of core R&D functions indicates the emergence of a business model based on innovation offshoring. This model emphasises the need to tap into market signals from

⁵⁵ Known as 'knowledge process outsourcing' (KPO)

emerging markets and develop products that respond to these high growth markets. There is evidence that R&D has been internationalised within the OECD area, and that the share of national manufacturing R&D expenditure accounted for by foreign-owned companies can be high, even in countries that have strong business R&D systems such as the United Kingdom and Sweden (OECD 2007e).

However, according to Pro Inno Europe (2007) the level of offshoring of R&D activities from Europe is still limited and a recent analysis of patent applications (Ulbrich & Turlea 2007) suggests that strategic R&D is still located in Europe, while offshored R&D is mostly 'market-driven' and focusing on local markets. Moreover, the analysis suggests that R&D is moved to Europe from mainly the US and to a lesser extent Japan. An analysis of the wireless telecommunications industry supports the notion of 'homebound' strategic R&D and points to organizational inertia, maturation and learning curve effects as well as IPR management issue as barriers to R&D internationalisation (Di Minin & Palmberg 2007).

Increasing competition from emerging economies

ICT companies in countries outside Europe are increasingly moving up the value chain thus providing a full range of services (technical, managerial) to European companies (OECD 2007c; UNCTAD 2005). This has put European ICT companies under more competitive pressure, and in some cases even forced the enterprises to change sourcing strategy, cf. box below:

Capgemini

Capgemini is a global ICT consultancy company headquartered in France. The company operates in more than 36 countries, and employs more than 86,000 people. By using a global supply system, Capgemini has been able to develop a strong market position in the ICT consultancy industry. This has involved massive up-scaling in India. Until now, the strategy has involved using Indian workers as 'internal sub-suppliers' in projects managed by onshore western project managers.

However, due to the prospects of increased competition in the important Northern European market from fast growing 'pure play' Indian ICT consultancy companies, such as Infosys and Tata Consultancy Services, Capgemini has initiated a transformation process, involving a shift from using Indian workers as sub-suppliers to putting them in lead positions of activities. This strategy is based on the acknowledgment that customers will turn to the 'pure' Indian players, if European based companies continue to demand western prices for project management and activities in the higher end of the value chain. Thus, the solution is to use more Indian competencies at more levels, and as a consequence this will result in a decrease in people working 'onshore' in Europe.

Source: Capgemini website, www.capgemini.com; Børsen (18-9-2007).

India and China have been performing well in global markets. For instance, China overtook the United States as the world's leading ICT exporter in 2004, and China has continued strong ICT exports since. China imports electronic components – now increasingly from other Asian countries – while exporting computer and related equipment. Technically more complex activities, such as design and testing and R&D, are also increasingly shifted to China. Chinese ICT firms are rapidly developing their production and export capacities despite their relatively limited size and technological know-how, and they are investing overseas (including in Eastern Europe) to obtain technology, brands and distribution channels.

However, according to the OECD most Chinese ICT firms remain small compared to the largest global ICT firms. Furthermore, technological and management gaps between Chinese and foreign firms, weak innovative capabilities and too great reliance on foreign technology are contributing factors, and R&D capacities will have to be boosted many-fold to catch up with global leaders from the US, Europe, Japan and Korea (OECD 2006c).

4.5. The global outsourcing/offshoring market

In 2008, TPI published its annual survey on trends in offshore outsourcing based on analyses of reported outsourcing contracts. According to TPI, the global market for outsourcing was just over \$80bn (measured as total contract value) in 2007 – a 5% drop compared to 2006. The absolute number of contracts awarded declined from 556 contracts in 2006 to 487 contracts in 2007 - a 12.4% drop. On the other hand, when looking at annualized revenue (the amount of dollars that go into the pockets of service providers from all active contracts), TPI identified about 2,700 active contracts delivering almost \$79 billion in revenue to providers, marking a growth rate of about 7%.

The TPI survey showed that Europe, the Middle East and Africa (EMEA) for the first time ever outpaced the Americas in outsourcing activity, both in total contract value and in the number of contracts awarded. Now, the EMEA countries account for more than half the global outsourcing contract value tracked by TPI.⁵⁶ Gartner has predicted that offshore spending in the U.S. will grow 40% in 2008. In Europe, where companies have been slower to use overseas labour as part of their IT strategies, offshore spending could grow 60% in 2008, as European countries embrace outsourcing.⁵⁷

Europe's role in the global ICT offshoring market

In 2004, UNCTAD estimated that 90% of global services output do not cross national borders, and even though international trade in services is growing, most of the outsourcing services for European companies are currently being delivered by service providers in Europe (WTO 2007; Sako 2005). In other words, European companies mainly source their activities to other European countries, in particular countries in Central and Eastern Europe, making nearshoring and not offshoring the dominant sourcing strategy in Europe.

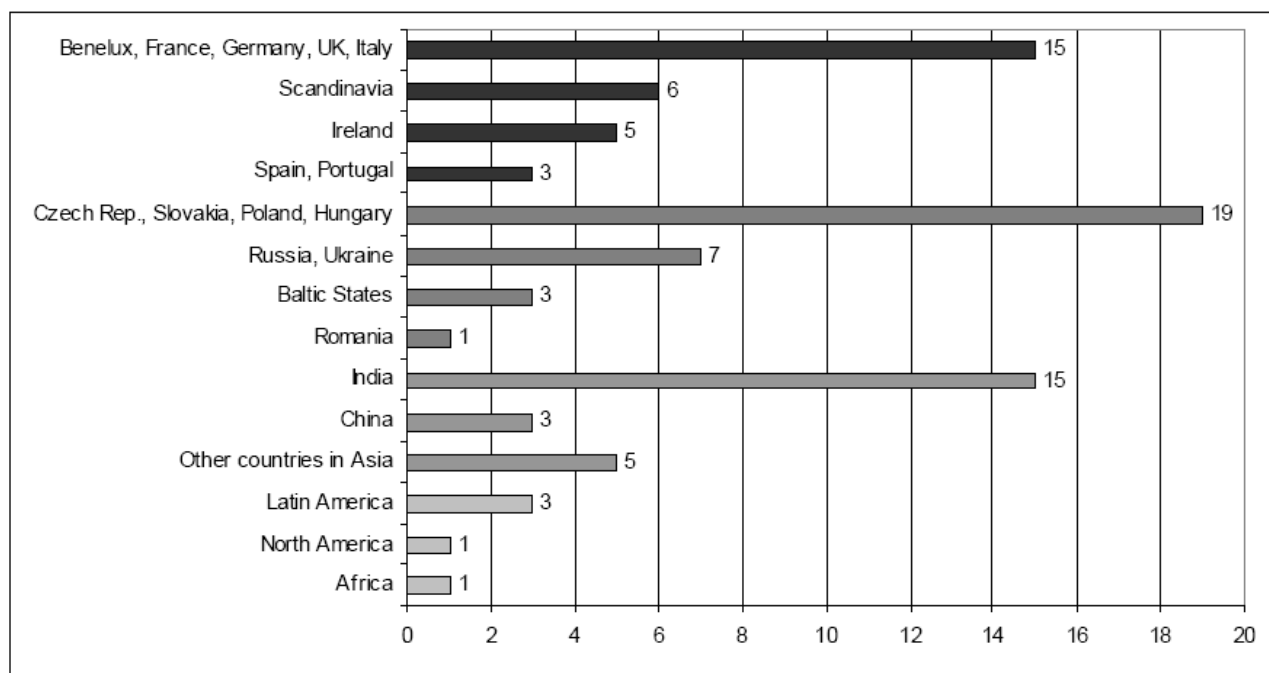
In 2005-2006, a range of relocation events in the European IT sector were identified and mapped as part of the MOOS project (Making Offshore Outsourcing Sustainable).⁵⁸ According to the findings, the main offshore destinations were Czech Republic, Slovakia, Poland and Hungary (a total of 19 events) followed by India (15 events) and Benelux, France, Germany, UK, Italy (15 events). Furthermore, the mapping showed that IT services were most prone to outsourcing, followed by software development.

⁵⁶ In its 2007 report, TPI includes contracts of \$25 million or more, as opposed to its previous cut-off of \$50 million.

⁵⁷ SearchCIO website, Outsourcing EMEA outpaces Americas, 22 Jan 2008, http://searchcio.techtarget.com/news/article/0,289142,sid182_gci1295443,00.html?asrc=SS_CLA_309009&psrc=CLT_182

⁵⁸ A two year project co-ordinated by the UNI-Europe IBITS initiated in 2004, Source: UNI-IBITS website, <http://www.union-network.org/unisite/sectors/ibits/moos/>

Figure 10. Main sourcing destinations for European companies



Source: UNI-IBITS (2006)

The factors explaining the attractiveness of these nearshoring destinations include their geographical and cultural proximity, relatively low wages, good language skills and high standards of education (Deutsche Bank Research 2006).

Europe is also a destination country for non-European ICT companies. Ireland is a good example of this, but IT activities are also being moved from outside the EU to the UK, Denmark and countries in Eastern Europe. In 2007, Google announced that it would start up activities in Europe that would require hiring several thousands of technicians and ICT specialists.⁵⁹ Also, Indian IT consultancy TATA has opened an office in Germany for managing contact to German companies and handling the work process. This facilitates further offshoring, but the presence of the companies also constitutes an opportunity for European ICT practitioners to work for those companies.

Main sourcing destinations – where do activities go?

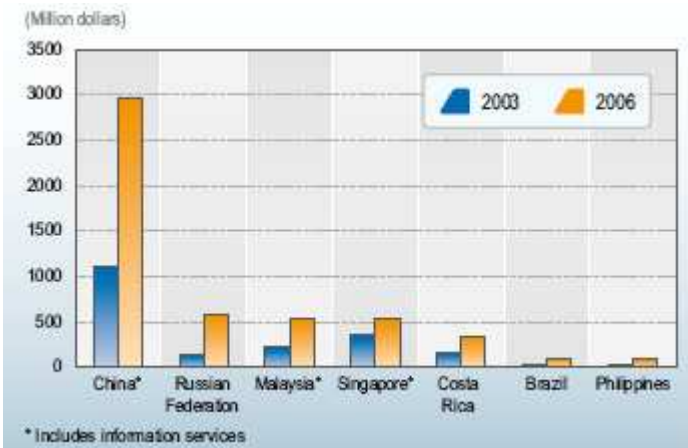
Most offshored services to date are concentrated in a relatively small number of countries. In software development and other IT services, four countries – namely Ireland, India, Canada and Israel – accounted for over 70% of the total market for offshored services in 2001 (Sako 2005).

India is the leading country for information technology (IT) services offshoring. According to recent estimates by NASSCOM, India accounted for 65 % of the global market in offshore IT software and 46 % of the global BPO market in 2004 (Swedish Institute for Growth Policy Studies 2007). Furthermore, WTO estimates that India accounts for around 70 per cent of Asia's exports of computer and information services (WTO 2007).

⁵⁹ ComOn website, <http://epn.dk/teknologi/internet/article1106996.ece>

Other economies within the region are emerging as alternative outsourcing destinations. For instance, China's software industry is rapidly expanding, cf. figure below:

Figure 11. Exports in computer services in selected countries (2003-2006)



Source: WTO (2007)

By the end of 2005, there were 12,000 Chinese software development companies employing nearly one million persons. China's computer and information services exports are still relatively low, but with annual growth rates around 40%, they are rapidly catching up. Other developments also point towards the increasing importance, and potentials of China's ICT industry. For instance, the Chinese government has launched a project aimed at doubling its computer services exports by 2010, and in 2006, China became Japan's biggest software outsourcing site.

According to WTO data, Malaysia is now considered, after India and China, as the third most attractive destination for low-cost IT services outsourcing. The Malaysian ICT hub created in 1996 now hosts more than 1,100 international companies, and the country's computer services exports have more than doubled in 3 years. Singapore has embarked on a similar hub project, which is expected to be operational by 2012.

Countries outside Asia are also moving into the offshoring market. One example is the Russian Federation which serves as an offshoring destination for many European companies. In fact, the Russian Federation has seen its computer services exports rise annually by over 60 per cent on average since 2003. Furthermore, in South and Central America, Brazil and Costa Rica are becoming important outsourcing locations for North American firms (WTO 2007). Finally, a range of initiatives have been launched in Kenya aiming at building up an ICT industry capable of providing services to countries in and outside Africa.

Changes in the nature of sourcing contracts

The size of sourcing contracts seems to be changing. According to TPI, there are a growing number of contracts falling in the \$25 million to \$49 million bracket. Despite a small decline in the number of mega-deals - contracts of \$100 million or greater, the total value of the mega-deal contracts remains stable (\$6.6bn in 2007).

Shell

In 2008, Shell signed a 4 billion dollar IT outsourcing deal with a consortium consisting of three ICT services companies, AT&T, EDS and T-Systems. As a part of this deal, Shell is to transfer almost 3,000 of its IT staff. According to Shell, there will be "20-30 redundancies at worst".

EDS will be the operational integrator for the contracts, with approximately 1,500 Shell IT staff and contractors to join EDS, spread throughout 65 countries. About 900 Shell staff will transfer to T-Systems and 560 to AT&T, with employees mainly coming from Malaysia, the Netherlands, the UK and the US. From July the companies will serve Shell and its subsidiaries in more than 100 countries, with AT&T looking after network and telecommunications, T-Systems hosting and storage, and EDS end-user computing services and operational integration of the infrastructure services.

Shell expects significant improvements in efficiency and productivity and important financial benefits from the deal. In the long term, the sourcing deal will also reduce Shells social and financial commitments, since the transferred staff will not retain their existing rights and redundancy packages under their new employers. According to Shell, staff will be able to choose "as much as possible" whether they were transferred to a new employer, and most transferred staff will retain their rights as Shell employees for about 24 months.

Source: Silicon website on Monday 31 March 2008, Shell signs \$4bn IT outsourcing contract, <http://services.silicon.com/itoutsourcing/0,3800004871,39179633,00.htm>

Also, the type of activities being sourced seems to be changing – the number of Business process outsourcing (BPO) contracts has decreased since 2006, but the average total contract value of BPO contracts has increased. That was in contrast to IT outsourcing contracts, which remained stable and of shorter in duration. In terms of total contract value of BPO contracts, financial services accounted for the largest increase, while human resources outsourcing demand fell 34% compared to 2006, a decline attributed by the TPI to the current immaturity of service offerings. TPI also sees a continuing trend among companies of splitting their application-related contracts from their infrastructure work (TPI 2008).⁶⁰

4.6. Company sourcing strategies

Companies' sourcing decisions entail an assessment of the potential benefits and risks associated with relocating activities or subcontracting ICT activities or ICT enabled activities as well as a choice of sourcing strategy. The key issues that companies need to consider include the type of activities that could be sourced (e.g. low value adding or high value adding activities), the most appropriate institutional set-up (e.g. sourcing to an affiliate or a subcontractor), and the most appropriate sourcing destination (e.g. Eastern Europe, India, China etc).

In relation to ICT software and services, the choice of sourcing strategy depends on a number of factors, including the type of activity in question, the domestic supply of ICT practitioners, the supply of ICT practitioners in the sourcing destination, macroeconomic conditions and investment climate, relative wages and prices, culture, language, and stability in the political climate.

⁶⁰ SearchCIO website, Outsourcing EMEA outpaces Americas, 22 Jan 2008, http://searchcio.techtarget.com/news/article/0,289142,sid182_gc1295443,00.html?asrc=SS_CLA_309009&psrc=CLT_182

These different considerations give rise to different sourcing strategies. For instance, Ovum (2006) identifies three types of global sourcing strategies solely on the basis of differences in terms of institutional set-up:

- The ‘Do It Yourself’ (DIY) model: companies create their own offshore capability
- The acquisition path: companies develop an offshore capability through acquisition
- The partnership approach: Companies develop a partnership with an established company in a country where the appropriate technical and commercial skills are available.

In the following sections we will present some examples of current sourcing strategies.

From outsourcing to rightsourcing

ICT-based activities can relatively easily be relocated from one country to another, transforming sourcing decisions into a constantly developing process in which ICT companies will search for where they can get the most output from the least input. Changes in the sourcing destination depend on changes in the company’s needs and changes in the relative advantages and capabilities of potential host countries (the relative cost/benefit ratio).

By breaking up the value chain into ever smaller segments, the company is able to locate activities in those locations that offer the best cost/benefit ratio for the specific activity in question. The strategic assessment and use of multiple locations is sometimes called rightsourcing.⁶¹ The rightsourcing strategy is also being applied by Indian service providers. For instance, Satyam Computer Services – an Indian company providing outsourcing solutions to other companies - is offshoring all or some of the outsourced activities to other countries:

Satyam Computer Services

Satyam is an Indian global business and information technology company, delivering consulting, systems integration, and outsourcing solutions to clients in over 20 industries. Satyam has been offshoring activities for many years, but now increasingly complex transactions and functions are being offshored.

Satyam follows a strategy of locating their activities and providing their services from multiple locations, and currently has development centres located in Bangalore, Basingstoke, Beijing, Bhubaneswar, Budapest, California, Chennai, Chicago, Dalian, Georgia, Guangzhou, Gurgaon, Hartford, Hyderabad, Kuala Lumpur, Melbourne, Mumbai, Munich, Mississauga, New Jersey, Ontario, Pune, Sao Paulo, Shanghai, Singapore, Sydney, Tokyo, and Wiesbaden.

Source: Satyam website, www.satyam.com

At the same time, the geographical locations of offshored services suppliers are becoming increasingly specialised (e.g. Israel for high-end software and learning systems, China for embedded software, hardware services, localisation and application development, Eastern Europe for software engineering and applications development, BPO and contact centres).⁶²

⁶¹ See also Zysman 2007 for a further debate of this model.

⁶² OECD, Panel session on ICT-enabled services offshoring: country and business perspectives, 2005, <http://www.oecd.org/dataoecd/37/20/35036650.pdf>

Offshoring versus nearshoring

European companies often choose to outsource to suppliers in Eastern Europe or recruit ICT practitioners in nearshoring destinations due to cultural similarities, business mentality and geographical proximity. Companies such as Ciklum assist other companies, in particular SMEs, with offshoring activities or recruiting foreign ICT practitioners to work onshore.

Ciklum

Ciklum is an IT offshore outsourcing company of Danish origin providing services related to software development projects to companies. The company mainly employs Ukrainian and Russian software developers and Danish managers. Ciklum combines a low-cost competitive Ukrainian workforce with a Northern European working environment with informal and non-hierarchical relations between management and employees.

The customers of Ciklum are mainly Danish SME ICT companies but there are also a few Scandinavian, American and British companies among. Ciklum has more than 600 employees and are currently hiring more than 40 ICT specialists a month.

The head office of Ciklum is located in Kiev, Ukraine, but the company has offices in Scandinavia, the UK, the US and the three largest regional cities in Ukraine.

Country manager, Arne Hansen, points to the following reasons for choosing Ukraine as main location:

- Ukraine is cheap in terms of labour costs and the city is much cheaper to live in than in a place like Moscow and St. Petersburg. The Ukrainian employees only pay 70 dollars a month in taxes and this implies that labour costs are kept even further down. By outsourcing software development to Ciklum a company can save between 40 and 80% of the labour costs.
- Geographical proximity to Central Europe makes it cheap for customers to fly to the offices and easy to make telephone contact.
- Ukraine is only 1 time zone away from Scandinavia and this means that the employees in Ukraine can have the same working hours as the clients in Scandinavia and most of Western Europe as well.
- The ICT infrastructure in Ukraine has improved a lot during the last couple of years and that improves the outsourcing potential
- The invention of communication applications like Skype and MSN has improved the offshore outsourcing potential too because it is possible to communicate directly and free of costs across large distances.
- A high skills level of Ukrainian computer scientists, physicists, mathematicians and engineers. Graduates from Taras Shevchenko University of Kiev are of the same quality as those of MIT.

The social skills of the Ukrainian employees still need to be further developed. However, the Ukrainian ICT practitioners are slightly more loyal than their West European peers because the dynamics of the ICT sector has created a very high level of staff turnover amongst West European ICT companies.

According to the CEO of Ciklum, over time destinations like Ukraine and India will become too expensive like the development seen in the Czech Republic. A few African countries are starting to receive offshore jobs but it will probably take some time before Africa will be able to offer competitive offshoring solutions because of undeveloped infrastructure and unstable political climate.

Source: Case study of Ciklum; Ciklum website, www.ciklum.dk

Backsourcing

In some cases, the perceived cost benefit ratio turns out not to match reality. This will lead to either a change of sourcing strategy (i.e. new business model, new sourcing destination) or a complete ‘backsourcing’ of all activities. For instance, in 2006 KANA Software Inc. decided to bring all outsourced activities in-house to Kana headquarters in the US, cf. box below:

KANA Software

KANA Software is a US based company that provides interaction-centric customer service management software. In 2002, KANA offshored a large chunk of its software development to save money and to allow for a quicker product development cycle.

At the peak of its offshoring initiatives, Kana had more than 350 software developers based in India and China. However, in 2005 the new CEO realised that for every four or five engineers working offshore, there was someone in the US whose responsibility was to manage that group and insure they were doing what the company wanted. Not because the offshore engineers lacked skills, but in order to track the processes that KANA thought were necessary to successfully deliver a product.

Furthermore, the offshore development process was taking more time, not less. Software technology is a collaborative process among designers, architects, and programmers, if the team is not closely bonded, the company will experience more rewrites, more time and performance issues. In other words, in software development, the architectural decisions made may evolve based on what the programmers learn.

Finally, KANA used subcontractors for their offshore operations, because the company simply wasn't large enough to set up its own operations in India or China. This setup implied that the company's core intellectual property was essentially owned by individuals of another company.

On this basis, the decision was made to bring software development ‘back home’.

Source: Infoworld, Bringing software development back in-house, February 2006

http://www.infoworld.com/article/06/02/07/74958_07OPreality_1.html

Use of migrant ICT practitioners in Europe

Companies do not necessarily need to source their activities to other countries to get the job done – they may also invite ICT practitioners from foreign countries to live and work in Europe. The increasing number of non-European ICT practitioners that work in Europe is seen by the industry as a way to counter labour shortages. According to the European e-skills Forum (2004), the hard-to-fill vacancies in the late 1990s resulted in employers seeking support from European governments to ease the access to the European labour markets for non-European employees. As a result, a number of policy responses were implemented which aimed at streamlining arrangements for visa and/or work permit approvals for ICT practitioners. The initiatives include the German “green card”, the “official shortage occupation” work permits processes in the United Kingdom, and the H1-B visa arrangements in the United States (European e-Skills Forum 2004).

The UK provides anecdotal evidence on the importance of migrant workers in the ICT sector. In the UK the number of ICT work permits shot up to 34,000 last year at a time of a general decline in ICT job numbers and 80% of those issued in computer services were intra-company transfers.⁶³

⁶³ UNI IBITS website,

[http://www.uniglobalunion.org/UNIIBITSN.nsf/\\$webDocuments/229768FD15FA28BDC125736300641445?Opendocument](http://www.uniglobalunion.org/UNIIBITSN.nsf/$webDocuments/229768FD15FA28BDC125736300641445?Opendocument)

Companies that employ migrant workers are dependent on authorities and are affected by delays in Visa/Work Permit processes. In face of shortages of ICT practitioners in national labour markets, such delays can have a negative impact on operations of European companies. Furthermore, cultural and linguistic characteristics in Europe may play a part in the demand for ICT practitioners from non-European countries.

The social integration of non-European ICT practitioners who move to Europe – sometimes bringing their families - is also important. If regulations are tight and the culture – at the working place as well as in society as a whole – is not geared to globalisation, it can be difficult to keep talented ICT practitioners and /or ICT graduates in Europe with a risk that they will return to their home country or look for opportunities in countries with a multicultural social environment which often is seen as a strength in the USA and Canada.

The justification that migrant workers are necessary because there is a shortage of ICT professionals in domestic labour markets has been disputed as work permit numbers increase - particularly in the UK and the USA. A study published in 2007 has looked at the use of specialist migrant ICT workers in the USA, Denmark, Sweden, Ireland and Belgium. It analyses the employment effects of western companies which develop Indian subsidiaries, and Indian IT companies opening up subsidiaries in Europe and North America. The study mentions that for example 40% of Capgemini's employees will be Indian in 2010, double the number of staff in post in France. A company like Accenture anticipates that by summer 2008 it will have more Indian than US employees. Dell plans to increase its Indian workforce from 10,000 at the end of 2007 to 20,000 by the end of 2010. Reports of abuses of the intra-company transfer system led the Irish government recently to ban this form of worker movement into Ireland altogether (Bibby 2007).⁶⁴

The majority of employees are transferred within the same company. In 2005, 30,000 ICT professionals came into the UK, 75% of who were being transferred within their companies (Webster 2007). According to the study by Webster (2007), up to 66% of migrant ICT workers in the UK are paid less than the industry average. The lack of transparency in the use of work permit systems for intra-company transfers has been brought forward particularly within union research as a topic for policy attention. It is however acknowledged that there are companies located in areas with small pools of local labour, who turn to migrant labour to fill skills shortages.

The model discussed above has been described as *dry-foot offshoring*- solving the tension between needs for proximity and the attempts to cut costs. From the point of UNI it is not the use of IT migrant workers per say, but the potential risk UNI sees in that this business model can undermine the working conditions and pay of the domestic labour force. In most countries this should not be possible under work permit rules. Migrant IT professionals themselves could be at risk from the way in which dry-foot offshoring is currently developing. By tying the granting of work permits to particular companies, individuals could be obliged to remain

⁶⁴ Michael Cunniffe, Department of Enterprise, Trade and Employment, in 'What is the Relationship between Trade and Migration', IOM seminar, 2004, http://www.iom.int/jahia/webdav/site/myjahiasite/shared/shared/mainsite/microsites/IDM/workshops/Trade_2004_04051004/related%20docs/report2_seminar_EN.pdf

with their sponsoring employer. Depending upon how the Green cards schemes are developing, the new model of dryfoot offshoring could fundamentally affect demands for ICT professionals.⁶⁵

Situation of SMEs

Companies' sourcing strategies are affected by the size of the company and their position in the value chain. SMEs are facing considerable challenges in exploiting the benefits of the sourcing of activities compared to their larger competitors. Lack of resources, capital, management skills and know-how limit most SMEs in taking advantage of global sourcing (OVUM 2006).⁶⁶ At the same time, SMEs are finding it difficult to recruit and retain ICT practitioners in Europe (ITEK Denmark 2005)⁶⁷, and even though some countries have opened up national ICT labour markets to increase the pool of labour, these measures tend to favour larger companies with professional HRM functions.

Recruitment problems may differ depending on the sector. While SMEs in digital games development may have difficulty in recruiting ICT practitioners due to shortages, an SME in the transport sector may also have to deal with low attractiveness of the sector and difficulties in offering an environment with similarly minded colleagues/other ICT practitioners (professional sustainability). In effect, global sourcing could result in increased demand for business services by SMEs they simply do not have the capability to manage themselves.

4.7. Risks and barriers to global sourcing

Risks and barriers associated with global sourcing may influence the choice of sourcing strategy and destination or even keep companies from sourcing activities to nearshoring or offshoring destinations. Risks and barriers include external factors (political stability in sourcing destinations, increasing wage levels, limitations in the access to human resources) as well as internal factors such as management capacity.

A survey by the Offshoring Research Network at Duke University shows that concerns about offshoring are shifting from external factors to internal factors, such as loss of managerial control and the impact on operating efficiency. Again, there are differences between US companies and European companies: European firms perceive cultural differences as an offshoring risk, while U.S. firms are primarily concerned about service quality.⁶⁸ Not surprisingly, a company's experience with offshoring determines the company's primary concerns: While companies with little outsourcing experience mainly focus on loss of managerial control and operational efficiency, the more experienced companies mainly focus on wage inflation and the turnover rate of offshore employees.

In a recent company survey in five European countries, the respondents were asked to assess the importance of the following potential barriers to sourcing:

- Legal or administrative barriers
- Taxation issues

⁶⁶ Interview with Sebastiano Toffaletti, PIN_SME

⁶⁷ Interviews with Sebastiano Toffaletti and Peter Hagedoorn

⁶⁸ Offshoring Research Network website, https://offshoring.fuqua.duke.edu/mediarelease_oct06.jsp

- Trade Tariffs
- Uncertainty of international standards
- Concerns of the employees (including the Trade Unions)
- Concern of violation of patents and/or Intellectual Property Rights
- Conflicting with social values of the company
- Problems with the distance to producer(s)
- Proximity to existing clients needed
- Linguistic or cultural barriers
- Difficulties in identifying potential/suitable providers abroad
- Overall concerns of the sourcing operation exceeding expected benefits

The respondents identified ‘legal and administrative barriers’, ‘Proximity to existing clients needed’ and ‘Overall concerns of the sourcing operation exceeding expected benefits’ as the most important barriers to international sourcing (Statistics Denmark 2008b).

One of the factors not included in the survey is the availability of skills in sourcing destinations. This question is addressed in the following section.

4.8. The importance of supply for global sourcing strategies

A range of factors including the supply of e-skills have been identified as influencing global sourcing decisions (cf. chapter 2) – not least in services where the number and quality of human resources are vital (compared to goods). Skills needs affect global sourcing strategies of companies – and on the other hand global sourcing strategies changes the demand for skills, which questions to which degree governments and industry can take proactive measures to meet emerging needs within the ICT sector.

Pool of ICT practitioners in Europe

The industry has voiced concerns over the shortage of ICT practitioners in Europe, the challenge is not just numerical – current ICT practitioners in Europe do not have the appropriate skills to ensure business growth. For instance, in February 2008, Gartner warned of a looming IT talent shortage in developed countries. According to Gartner, the intersection of business models and IT requires people with varied experience, professional versatility, multidiscipline knowledge and technology understanding – a hybrid professional.

This skills shortfall is very different from the shortage experienced during the dot-com squeeze of the late 1990s and early 2000s. Then there were shortages of specific, technical skills and domain-specific expertise. Today, by contrast, there are shortages of people with more general qualifications, experience and business insight combined with knowledge and skills in ICT.

Outsourcing is by many CEOs considered as a way of making up for the lack of talent but that is not a solution, Gartner says. Suppliers are suffering from the same shortages of skills and talent. This is mainly a result of young people in the West seeing IT as an unattractive career option, and demographics are aggravating this. Whereas science, technology, engineering and mathematics are attracting students in developing economies (for instance, Chinese

universities graduate about 500,000 IT and high-tech students every year), Europe is struggling to get young people interested in ICT and natural sciences in general.⁶⁹

Changes in the pool of non-European ICT practitioners

The large number of low-cost ICT practitioners in the developing growth economies and the shortages of ICT practitioners in Europe are often quoted by company managers and stakeholders as one of the primary reasons that companies decide to offshore their activities.⁷⁰ In fact, the current and future sourcing opportunities are sometimes portrayed as unlimited due to comparatively large cohorts of engineers, computer scientists and information technology specialists in countries such as China and India.

However, while the supply of labour in low-wage countries exceeds that of high wage countries, a number of factors reduce the potential talent supply for global resourcing in low-wage nations: language abilities, overall quality of the education system and its ability to convey practical skills, and soft competences such as communication confidence and work ethics. As Zysman (2007) argues, the break-up and recomposition of value-chains calls for new sets of competences related to the management of tacit interactions which are a prerequisite to effective implementation of the knowledge and understanding embedded in each competency domain in a value chain, and to combine or recombine these competency domains in new and innovative ways.

In 2005, a study by Duke University indicated that the number of ICT practitioners and the quality of degrees being awarded in India and China are overestimated (Duke University 2005), and the Asian Development Bank (ADB) recently uses the term 'Asian skills crisis' to describe the current skills situation. In its 'Asian Development Outlook 2008' the ADB concludes that growth in Asia is hampered by a shortage of qualified workers which is driving up wages. The scarcity is more pronounced for higher-skills levels, emphasizing that it is the skills that are in short supply, not workers (Asian Development Outlook 2008).

According to the ADB this skills gap is not limited to a few hot spots, but is prevalent enough to present a genuine risk to the region's long-term growth in a number of ways: productivity losses; rising wage costs; increased turnover of sought-after workers; and higher placement and training costs for new workers (Asian Development Outlook 2008).

Skills shortages appear across developing Asia, and feature certain common drivers, such as globalization and technological progress. Nevertheless, there are also differences. China's skills crisis is both a demand and a supply problem – the economic growth rates has resulted in a leap in demand for skills, and at the same time the education system has failed to keep pace. According to the ADB, "the system's main problem has been one of failing to produce the right kind of graduates rather than too few of them". For example, 3.1 million students graduated from its universities in China in 2005, compared with only 1.3 million in the US. However, only a small share of this pool of graduates is perceived to have the appropriate skills set. The main shortcomings are poor English skills and a lack of practical problem-solving skills among engineers.

⁶⁹ Gartner website, Gartner Warns of a Looming IT Talent Shortage, February 7, 2008, <http://www.gartner.com/it/page.jsp?id=600009>

⁷⁰ Interview with BITKOM; interview with ITEK

India's skills and labour shortage problems can be traced back to failures in the delivery of adequate primary schooling. In 2005, projections provided by NASSCOM and McKinsey suggested a likely deficit of 500,000 ICT workers in India. Furthermore, according to the study only 25% of engineering graduates and 10–15% of general graduates have the skills and qualifications to work in the ICT and BPO industries.

Wipro Technologies

Wipro is a global IT services company headquartered in Bangalore, India. The company currently employs more than 72,000 employees. In 2006-2007, Wipro's revenue increased from 3.5 Bn USD to 5 Bn USD, and the company's main markets are North America (59%) and Europe (32%).

Wipro provide a comprehensive range of IT services, software solutions, IT consulting, business process outsourcing, or BPO, services and research and development services in the areas of hardware and software design to leading companies worldwide. Wipro covers all phases of the development, beginning with the requirements analysis to the transfer of technology and information to the client. The company is largest independent R&D Services provider in the world with over a half billion USD in revenue from R&D.

In Wipro's annual report 2006-2007, the company has identified a range of skills related risk factors that may negatively affect the company's future growth: shortage of qualified personnel, difficulties for staff in keeping pace with continuing changes in technology, evolving standards and changing client preferences, high employee attrition rates (in particular in the BPO services business), and restrictions on immigration in the US (for instance by making it more difficult to obtain visas) that reduces the company's ability to compete for and provide services to clients in the United States. Finally, increasing wages costs has been one of India's competitive advantages, but wage increases in India may prevent the company from sustaining this competitive advantage and could affect profit margins.

Source: Wipro Annual Report 2006-2007, http://www.wipro.com/investors/pdf_files/WIT_20F_0607.pdf

The current skills situation in India presents India with a double challenge: The potential loss of global competitiveness due to increasing wages is driving Indian companies to offshore activities to other countries as well as move up the value chain by offering more advanced services to clients or by focusing efforts on innovation and specialisation in for instance software to mobile phones, insurance, logistics, health care and agriculture (Nasscom-BSG 2007).⁷¹ At the same time, the problems relating to the quality of the Indian workforce could slow or even prevent Indian ICT and BPO firms from moving into these higher value-added segments and activities (Asian Development Outlook 2008).

4.9. Outlook

Future company sourcing strategies are likely to be influenced by the extent to which different countries undertake and manage successful system reforms of their education systems. As indicated above, Asian countries face a serious challenge in terms of improving the quality of their graduates. However, the availability of talent in Asian countries could increase significantly in the coming years due to the implementation of a range of policy initiatives aimed at transforming and modernising the national education systems as well as by attracting high skilled which previously left the country back home (Manning et al 2008).

⁷¹ Mandag Morgen (August 11 2008): Indien udfordrer den globale arbejdsdeling [India Challenges the Global Division of Labour]

Raising the quality of the Indian ICT workforce

There are several initiatives in India focusing on raising and documenting the quality of the ICT workforce. One example is the NAC - NASSCOM'S Assessment of Competence, an industry assessment and certification standard in the Indian ITES-BPO sector. The initiative is aimed at creating a robust and continuous pipeline of talent by continuously assessing candidates on key skills through a national standard assessment, thus making it easier for firms to screen candidates and also provide training need analysis to candidates.

In turn, these activities will be tied in to training and development efforts to help more candidates become competent to work in the industry. NASSCOM is aiming to build a base of ITES-BPO manpower which will be certified, in tune with the needs of the industry and geared up for the future requirements of the sector, thus creating an industry standard and ensuring the transformation of a "trainable" workforce into an "employable workforce".

Source: Interview with Rajdeep Sahrawat, NASSCOM; NASSCOM website, <http://nac.nasscom.in/#1>; http://chdit.nic.in/nac_test.pdf

China is often named as the main competitor to India in the offshoring market. Partly building on its advantage of having a large manufacturing base, China is becoming an attractive location for product development activities, and major metropolitan areas, such as Beijing, Shanghai and Dalian, have developed into large science and engineering clusters that are able to attract multinational corporations across industries. In addition, China has improved its telecommunication and transportation infrastructure, and has further developed its education system and academic research potential (Manning et al 2008).

However, the low level of English language capabilities and institutional constraints, such as the weak intellectual property protection, remain serious concerns among foreign investors. Also, the China one-child policy is forecasted to create a shortage in the supply of talent and thus accelerate wage inflation. Over time, local competition for talent in India and China, particularly in hotspot cities such as Bangalore and Shanghai, could lead to further wage inflation and rising employee turnover that will make companies seek alternative options.

A number of emerging economies are currently trying to catch up and position themselves as second-tier offshore locations. These economies specialize in attracting particular business functions from companies based in specific regions of the world (Manning et al 2008). For example, Western European companies regard Eastern European countries such as the Czech Republic or Hungary as key nearshore locations, while the Philippines and Latin America mainly attract call centres and business processes from U.S. and Spanish companies respectively.

4.10. Conclusion – sourcing trends and strategies

European companies increasingly offshore ICT software and services to countries outside Europe. India is one of the main offshoring destinations, but other countries in Asia and South America also provide offshoring opportunities to companies that wish to locate activities to destinations with the right business environment. However, although many European companies increasingly relocate activities to destinations outside Europe, European companies still to a large extent prefer to source activities to other European countries – mostly due to factors of proximity and the quality of the workforce.

The nature and quality of the knowledge base increasingly form global sourcing decisions, including multi-location strategies. These changes situate the quality and the availability of the ICT practitioners as a key location factor for high value activities in the ICT services sector. In fact, there is evidence that offshoring of high value activities is increasingly used as a part of companies' innovation strategies.

Innovation capacity and the quality of the human resource base are closely intertwined - and therefore the access to highly skilled ICT practitioners. India, China and other growth economies are often portrayed as countries with indefinite human resources. However, the strength of these countries in terms of human resources is according to some sources first and foremost numerical. The Asian Development Bank finds that many countries in Asia are currently experiencing a "skills crisis" due to a perceived low quality of the workforce. This may hamper the future development of the ICT industries in the new growth economies and could be a severe constraint to moving up the value chain. In addition, wage levels in India are increasing and this is driving Indian ICT companies to focus more on innovation and high value activities as their competitiveness vis-à-vis other low cost destinations is decreasing.

Finally, offshoring of R&D activities is increasing. However, the level of offshoring is still relatively limited, and when it occurs it seems most often to be part of a multi-location strategy. The potential innovation gains and growth opportunities to be made from offshoring of R&D to globally recognised hubs with a high level of R&D intensity are still topics to be explored further.

5. Impact analysis

The current policy debate on e-skills in the EU reflects increasing concern as regards the competencies and skills needed to retain and develop the ICT sector in Europe in a coherent manner. In Europe global sourcing is considered both an opportunity and a threat. An opportunity because sourcing can help companies increase their global competitiveness and also help companies respond to the current shortage of ICT-practitioners in Europe; a threat because sourcing could result in job losses in Europe and also put Europe's innovation capacity in the field of ICT and ICT services at risk because too many R&D functions are being offshored.

This chapter explores the impact of globalisation on Europe, and more specifically: the impacts of global sourcing on employment, skills needs, and competitiveness.

5.1. *Impact of globalisation on Europe*

There are many dimensions to globalisation, and the social and economic impact of globalisation on societies is widely discussed. Economic theory says that international integration will lead to an increase in welfare in the long term. For instance, globalisation can be considered an important source of EU productivity gains due to “better specialisation, economies of scale, technological content of imports, greater competition, stimulation of innovation” (European Commission 2006b).

A recent study of the impact of globalisation on Europe suggests that globalisation has delivered significant benefits to the region. For instance, European exports, particularly to developing nations, have increased in the past five years, and in Western Europe, the influx of migrants from Eastern Europe and non-European countries has helped to offset declines in the local workforce caused by ageing populations and falling birth rates (Hamilton 2008). An analysis by the European Commission (2006b) suggests that globalisation has been highly beneficial for the EU, with at least 20% of the gains in GDP per capita over the post-war period directly linked to EU's growing integration into the world economy.⁷²

Many citizens are concerned about the short-term negative effects of globalisation such as unemployment (European Foundation for the Improvement of Living and Working Conditions 2007). According to Hamilton (2008), Europeans “worry that a job gained abroad means a job lost at home, that their hard-won prosperity could simply slip away”.⁷³ However, the overall positive developments suggest that there is no solid ground for these concerns. In fact, the study of Hamilton suggests that Europeans should focus their attention on the domestic structural problems that have been exposed – not created - by globalisation (Hamilton 2008).

These structural problems follows from “the EU's relatively high share of low technology, labour intensive, sectors in the EU's overall output compared with that of the US and Japan, and its relative weakness in the production and use of ICT” (European Commission 2006b).

⁷² Evidence over the period 1990-2003 suggests that the EU has not benefited from globalisation, as gains on the consumer side have been offset by losses on the production side. However, the net losses are modest and significant long run gains from globalisation are expected due to increased competition and spill-over effects (European Commission 2006b).

⁷³ See section on the public perception of globalisation

According to the European Commission (2006b), the EU member states would benefit from pro-active economic restructuring, in particular of labour markets (for instance, by ensuring the smooth transition of displaced EU workers from lower skilled activities to higher skilled activities), as labour market flexibility is an essential prerequisite for a beneficial integration process. Hamilton’s study also concludes that Europe “faces an increasingly acute need to facilitate freer movement of high skilled labor” (Hamilton 2008).

5.2. Impact of global sourcing on welfare

Global sourcing is associated with a range of benefits and costs for both developed and developing countries. For developed countries the benefits and costs include:

Table 19. Benefits and costs associated with global sourcing (developed countries)

Benefits	Costs
<ul style="list-style-type: none"> • Consumers face lower prices for services produced offshore • Firms may retain higher profits due to lower costs and economies of scale, particularly if firms avoid passing cost savings onto consumers • Productivity may improve due to greater specialization from outsourcing and offshoring • Workers may move from low wage-low skilled jobs to high wage-high skilled jobs over time, as long as labour markets are flexible. • Country specialisation in innovation in the form of the development of new goods services and processes. 	<p>Costs are mainly distributive, and include:</p> <ul style="list-style-type: none"> • Dislocation and lay-off of workers who had worked for operations that are offshored • Slow pace of adjustment in some economies

Source: Sako (2005)

A changed focus in the debate on global sourcing from the advanced economies to the less advanced is emerging or even in developing economies where the growth is founded in global economic developments. According to different sources (for example Sachs 2008) outsourcing is good for its own sake. The arguments are that that it enables a distribution of benefits and economic prosperity, thereby alleviating poverty, it contributes to the creation of stable political structures, and to a more democratic and just world. Although there may be individuals affected , the advanced countries benefit in two ways, both by becoming more cost competitive, and by creating new consumer markets for their products and services. For instance, McKinsey (2003) argues that offshoring is a win-win game bringing benefits to developed countries in terms of lower consumer prices and lower costs for businesses (McKinsey Global Institute 2003).

These wider policy and developmental considerations provide part of the backdrop to the outsourcing debate, and are sometimes used to justify globalisation without necessarily condoning all its aspects. A 2003 report by the UK Department of Trade and Industry, noted that offshoring of services could be both an innovative business process resulting in improved competitiveness, as well as a process which may lead to short-term job losses (Marginson 2004).

To sustain a competitive position of the ICT software and services sector in Europe, it is vital that more research is undertaken to understand how innovation occurs in different parts of the services sector, what are the barriers and drivers to innovation - are their framework policies that are particularly prone to spur innovation, and which type of skills are needed in management and in the services sector workforce to foster sustainable innovation strategies. Without such knowledge it is difficult to understand how service innovation may differ from innovation in manufacturing and if necessary develop new innovation approaches specific to services.

Different countries; different impacts

Country specific variations in the economic, regulatory and cultural base may affect both sourcing strategies, but also the impacts of global sourcing on the national economies and labour markets. For instance, offshoring in France is a limited phenomenon compared to the USA, the UK, and even Germany (Auer et al 2005).

Research by the McKinsey Global Institute (MGI) assessed the impact on France's overall welfare of offshoring three types of work: software development, call centres, and back-office functions. The study found that for every Euro of spending on corporate services moved offshore, France earns back only €0.86 - higher than the return in neighbouring Germany, which (according to similar MGI research in 2004) earned back only €0.74 for every Euro of costs offshored.

According to MGI three factors seem to explain why France reaps less benefit from offshoring than the United States does.

- First, French companies tend to chose off-shoring destinations to Central Europe and Northern Africa where there are more fluent French speakers, but wages are higher than those in India and China.
- Second, France gains only €0.05 through increased exports to offshore locations and repatriated profits from offshore providers, as compared to 7 to 9 cents for the United States (and €0.03 for Germany). US companies generally export more goods and services to emerging economies, and many US companies own fully or partly Indian outsourcing provider services and are thus able to benefit from their profits.
- Third, for each dollar of work offshored, the US economy gains 57 cents from the rapid reemployment of laid-off workers, while France gains only €0.44 in this way, due to differences in labour market regulations and a lower level of annual job turnover.

The experiences from France suggest that a mix of proactive labour market policies targeting specific profiles most affected (software programmers, call centre agents, back-office service workers) and innovation and entrepreneurial policies to spur job creation in new growth sectors could result in raising the reemployment rate and reducing the social impact of offshoring. In countries affected by relatively high levels of unemployment distributed across skills levels labour market – and lifelong learning policies are likely not to be sufficient unless accompanied by other measures (Leeney et al 2006).⁷⁴

⁷⁴ The Maastricht study - the VET systems contribution to the Lisbon strategy, chapter 17.

5.3. Impact of global sourcing on employment

The specific impact of offshoring on employment levels is much disputed. In 2006, Allan Blinder suggested that as many as 40 million jobs in the US could be at risk of being offshored over the next two decades, and that American workers on this basis should specialise in ‘personal services’ i.e. activities delivered face to face. However, Jensen & Kletzer found little difference in net employment growth rates in the US between tradable and non-tradable services (see Jensen and Kletzer 2006). Similarly, in their 2008 analysis it appears that tradable and non-tradable service activities (both industries and occupations) have similar net employment growth rates and similar median wage growth rates, which suggests that neither offshoring nor exporting has yet had a significant impact on the US labour market (Jensen & Kletzer 2008).

In a commentary to the US debate on the impact of offshoring on the US economy, Dr. Paul Craig Roberts, former Assistant Secretary of the U.S. Treasury in the Reagan administration, has criticised advocates of free trade for their trust in service jobs. According to Dr. Roberts, the wage differentials between the United States and India means that Americans will find employment only in ‘hands-on’ services that are not deliverable electronically, such as janitors and crane operators. Moreover, more and more high value-added U.S. occupations in tradable services will be lost due to offshoring and the only jobs left in the US could be jobs in non-tradable services that do not require any formal qualification, and which do not constitute a basis for exports (Roberts 2007).

An analysis of the impact on domestic employment of the offshoring of services has been carried out by Mary Amity and Shang-Jin Wei (2004). To measure offshoring trends, the authors computed the respective shares of five categories of imported services in manufacturing-sector output in 2000: management services (12%), financial services (2.4%), telecommunications (1.3%), insurance (0.5%) and information technology (0.4%). In their analysis of 450 economic sectors, Amity and Wei observed that the offshoring of services had brought about a roughly 0.4% employment loss in the manufacturing industry. However, when the calculations were made at a higher level of aggregation – using 96 sectors – it would seem that the offshoring of services had no notable effect on employment. In other words, growth in demand in other economic sectors was enough to offset the negative repercussions (OECD 2007d).

According to the OECD (2007d), job creation in the service sector offsets job destruction from all causes combined, including offshoring. Offshoring, therefore, does not emerge as a major cause of job losses. In fact, in the medium term, the effects of offshoring could be positive for a country, since it can benefit from lower prices of imported offshore goods, improved productivity of firms that engage in offshoring, and better control over inflation thanks to the impact of low import prices and enhanced export capacity. Improved company competitiveness thanks to offshoring could allow companies to expand their market shares, profits and capital spending, which could lead to job creation in home countries (OECD 2007d). However the OECD study does not address that the productivity and gain in market shares could lead to a jobless growth – specifically exploiting efficiency gains through improved exploitation of technologies nor does the study address the fact that some markets within ICT and services are beginning to experience market saturation. It is yet too early to say if the recent difficulties in the financial sectors globally could negatively impact potential

positive gains from global sourcing both with regard to changes in demands and with regard to job creation.

According to José Manuel Barroso, President of the European Commission, there is a tendency to see the economics of globalization as a zero-sum game: more jobs in China would mean fewer jobs in Europe. However, offshoring accounted for less than 8% (200 000) of all jobs lost in Europe over the past four years. Furthermore, European debates on the effects of offshoring have tended to ignore that a substantial amount of ‘offshored’ activities actually remains within the EU, as many companies choose to create ‘near-shore’ manufacturing and service centres in central and Eastern Europe as well as in Ireland and Spain to have better control of the offshored activities. For every job that Europe has lost due to economic change in the last two decades at least one new job has so far been created in more competitive parts of the economy (Barosso 2008).

5.4. Impact on overall employment of ICT practitioners

Most OECD countries have seen an increase in the share of ICT specialist (practitioners) in the total workforce since the 1990s. This development holds true both when a narrow (only ICT specialists) and a broad definition (both users and specialists) of ICT employment are applied. However, the overall share of ICT specialists of the total workforce in the EU 15 is smaller than in the US, Canada and Australia (OECD 2005; OECD 2006c).

Recent OECD data covering 1995-2006 shows that the share of ICT specialists in the total workforce in the EU 15 is increasing. The only EU-15 member states that have seen a decrease in the share of ICT specialists are France, Ireland and Greece.

Changes in the number of ICT practitioners in Europe

The period 1997-2001 was marked by a significant growth in the number of practitioners in Europe. After a decline between 2001 and 2003 the number of ICT practitioners started to climb and this trend seems to be accelerating (RAND 2005). The ICT sector is the fastest growth sector in the European economy. According to a study released in 2006 by IDC, the sector will create 1.5 million new jobs from 2006-2010. The study found that 60% of the created jobs will be software-related, and a third will use the Microsoft platform.⁷⁵

In 2008, a report by e-skills UK estimated that employment growth rates in the IT industry in the UK would be 2.5% from 2006 to 2016. This is five times higher than the expected growth rate in the UK workforce for all sectors:

Table 20. Employment growth rates – average per annum (2006-2016)

IT industry	2.5 %
Telecoms industry	0.3 %
Total IT and Telecoms industry combined	1.9 %
IT & Telecoms professional	1.6 %
UK workforce all sectors	0.5 %

ICT-skilled employment is often discussed in terms of a presumed shortage of ICT specialist skills (i.e. ICT practitioners). However, the RAND Europe study from 2005 did not provide

⁷⁵ Vnunet website, Europe to see 1.5m new ICT jobs by 2010 - SMEs key to future growth, June 2006, <http://www.vnunet.com/vnunet/news/2157638/ict-jobs-europe-2010>

any evidence of shortages. Reports from ICT industry players, on the other hand, continue to suggest shortages (CEPIS 2007). For instance, in December 2007 the German ICT industry reported a shortage of 45,000 ICT practitioners in Germany alone. A compelling concern is also the reported decline in the supply of good graduates from programmes which could result in growing e-skills shortages and mismatches in the future.

The mixed messages concerning ICT skills shortages suggests that instruments used to assess the extent of skills shortages should be scrutinized carefully and more robust and coherent methods should be applied across the EU if these surveys are to be used to inform public policy. A previous study carried out by the Danish Technological Institute prior to the establishment of the IT University in Denmark could suggest that employers seem to magnify recruiting needs if asked about future needs for a high skilled ICT practitioners so as to potentially have an ample pool of graduates to select from – and to push educational institutions to a closer industry dialogue.

Increasing 'offshorability' of jobs

The OECD estimates that around 20% of total employment in the OECD member states could be affected by global sourcing of activities. These jobs are offshorable because they could potentially be carried out anywhere in the world. However, some sectors will be more prone to offshoring. Among the sectors analysed in this study, the highest share of potentially offshorable jobs are computer and related activities and insurance, pensions and life insurance (OECD 2006c; OECD 2006c).

As shown in the table below, in the EU15 “Computer and related activities” (NACE 72) is the industry with the highest share of employment potentially affected by offshoring and this tendency has been reinforced lately compared to 1995 (OECD 2006a).

It is worth noticing that the differences between “Computer and related activities” and other industries were considerably larger in 2003 than in 1995. “Manufacture of office machinery and computers” (NACE 30) is also closely related to ICT in terms of ICT producing sectors, and hence two out of the top ten industries with the highest share of employment potentially affected by offshoring are directly connected to ICTs.⁷⁶

Except for “Wholesale trade and commission trade” (NACE 51), all the industries below are also on the top-12 list of industries with the highest share of ICT skilled employment (OECD 2004). Hence, there seems to be a close link between the share of ICT skilled employment in an industry and the share of employment potentially affected by offshoring.

⁷⁶ NACE 32 manufacturing of radio, television and communication equipment and apparatus, NACE 33 manufacturing of medical, precision and optical instruments, watches and clocks and NACE 64 Post and telecommunications could also be considered ICT producing sector.

Table 21. Top 10 industries with highest share of employment potentially affected by offshoring for Europe 2003 and 1995

Industry and NACE	1995			2003		
	Total offshoring	Clerical	Non-clerical	Total offshoring	Clerical	Non-clerical
Computer and related activities, NACE 72	73.9	12.8	61.1	79.4	9.0	70.5
Insurance and pension funding, except compulsory social	73.5	35.2	38.2	71.1	33.8	37.3
Activities auxiliary to financial intermediation, NACE 67	74.5	30.5	44.0	67.7	25.1	42.6
Financial intermediation, except insurance and pension funding, NACE	55.4	37.1	18.3	62.1	38.2	24.0
Manufacture of office machinery and computers, NACE 30	49.5	9.4	40.1	52.0	7.7	44.3
Other business activities, NACE 74	49.1	20.3	28.8	47.7	17.3	30.3
Real estate activities, NACE 70	43.9	16.3	27.6	44.0	14.9	29.1
Extraction of crude petroleum and natural gas, NACE 11	31.5	10.7	20.8	43.5	10.7	32.8
Research and development, NACE 73	36.3	7.9	28.4	41.1	6.1	35.1
Wholesale trade and commission trade, NACE 51	35.7	11.0	24.7	38.1	10.1	28.0

Source: Based on an extraction from table 7, p. 30 in: OECD (2006a)

Note: EU15 except Luxembourg in 2003, and EU15 except Finland and Sweden in 1995.

The table reveals that there are immense differences between clerical and non-clerical employment (engineers, scientists, accountants, economists, statisticians) in NACE 72 computer and related activities as regards offshoring. This implies that clerical jobs (i.e. those where skills are more likely to be codifiable) in this sector are more likely to be affected by offshoring than non-clerical jobs (i.e. those where skills are less likely to be codifiable).

Existing studies of the impact of global sourcing on employment

A significant number of consultancy reports on the impact of sourcing on employment levels and e-skills (cf. chapter 2) have estimated the impacts on employment of ICT employees in Europe – and many of these reports tend to draw negative conclusions. For instance, OVUM (2006) concluded in a report to the UK department for Trade and Industry that the number of UK-based employees in the ICT sector would fall by some 6 %. This fall would be somewhat

offset by an increase in UK-based staff of supplier companies from other countries (OVUM 2006).

As previously mentioned many of the consultancy reports are not reliable sources to inform public policy as methodologies used are often not transparent. Others have published estimates based on detailed official US labour market data (Kirkegaard 2004, Mann 2003, Bardhan and Kroll 2003) and reached more nuanced conclusions, pointing to that many jobs lost are low-wage and that the relative scope of job losses is limited (Kirkegaard 2004b). In fact, a survey conducted by the US Software & Information Industry Association (SIIA) in 2006-2007 shows that even though companies are increasing offshore software development efforts, the offshoring is apparently not causing any reductions in the number of US developer jobs. According to SIIA, software companies cannot build software developer teams fast enough in the US due to a shortage of engineers and a limited quota of visas dedicated to high skilled guest workers in specific occupations (H-1B visas), and these companies thus look to offshoring as “a way to leverage existing developer teams”. If this holds true, the ‘offshoring’ of activities is used by companies as a way to keep up the levels of activities or even expand, not as a means to replace jobs in the US with offshore jobs. According to the survey, 73% of the respondents reported a positive impact of offshoring on profits, and two thirds of the respondents claim that the quality of work is above average compared to the onshore staff.⁷⁷

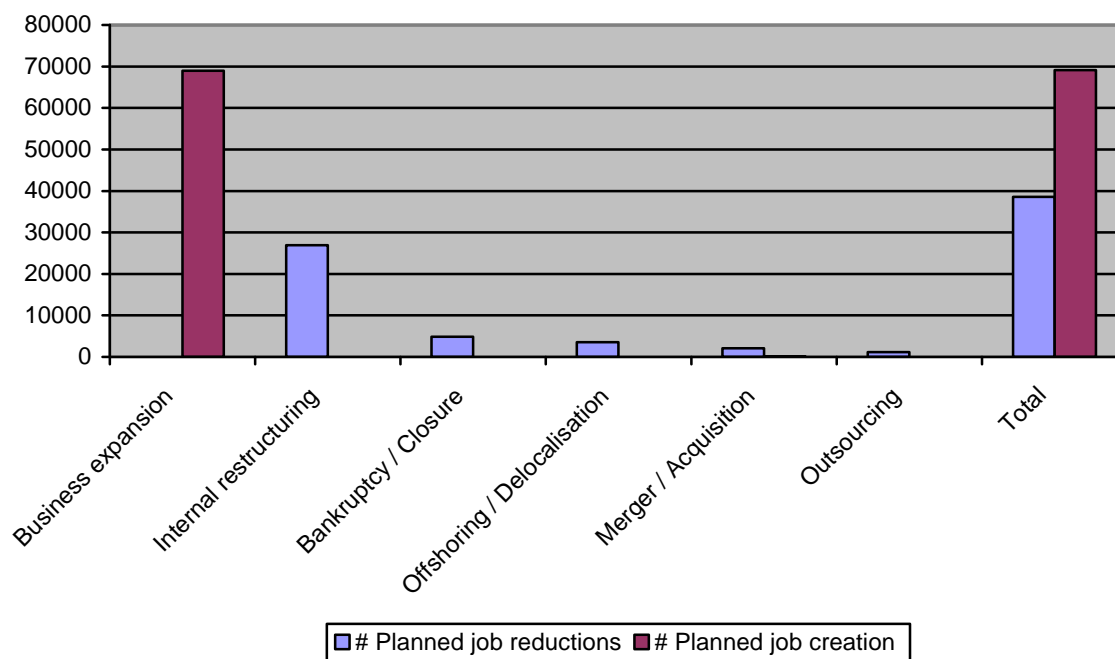
A recent report on offshoring of IT services in Sweden identifies an increase in offshoring of IT services. However, looking at official figures for actual relocation of jobs, the study concludes that the number of jobs affected is negligible (Swedish Institute of Growth Policy Studies 2006).

European Restructuring Monitor

The European Restructuring Monitor has found that the impact of offshoring on employment is relatively limited. The figures for information technology covering 2002-2008 reveal that the total job creation outweighs the total job loss, and that the job impact of offshoring is relatively small compared to the job impact of internal restructuring and bankruptcy/closure, cf. Figure 12 below. In effect, the introduction of new technologies (e.g. process technologies and automation) and organisational change thus appear to have a more significant impact on employment levels in the sector than offshoring.

⁷⁷ Survey: Offshoring does not cost developer jobs (January 11, 2007), http://www.infoworld.com/article/07/01/11/HNsiaa_1.html

Figure 12. Planned job reduction and job creation (2002-2008)



Source: *European Restructuring Monitor*

However, there are some important caveats as to the reliability of the data. The collection of data is based on a survey of the news coverage of industrial change in companies with more than 250 employees and with a job effect of minimum 100 job losses/job gains. Moreover, offshoring could be included in the data as internal restructuring. With these caveats in mind, the offshore phenomenon seems to demand quite a lot of attention in the policy debate, considering the relatively limited job effects of offshoring (Kirkegaard 2004b).

Research by the The European Foundation for the Improvement of Living and Working conditions in Dublin finds that 5.5% of job losses across Europe in the first quarter of 2007 were due to offshoring compared with 3.4% in 2005. They have found that the speed of job loss due to offshoring is not dramatic - especially in Britain, where for instance jobs in local call centres are growing rather than diminishing. According to the study, IT services rank third behind travel and transport as the largest services imported from India to Britain. In contrast, Britain imports four times more IT services and 16 times more business services from Germany. Overall trade in services between Britain and India rose from 0.4% to no more than 1.2% in the 10 years to 2004, which makes it "less of an explosion, more of a slow evolution", according to the study.⁷⁸

These developments are confirmed by e-skills UK. According to e-skills UK, the UK has experienced continued growth in ICT sector in the UK – both economic growth and increases in employment level for ICT practitioners despite the outsourcing of large chunks of work. The growth of employment in the IT sector is five times the average growth in the UK

⁷⁸ The Guardian, Fear of job stampede offshore 'unfounded', July 9 2007, <http://www.guardian.co.uk/money/2007/jul/09/workandcareers.business>

economy as a whole. However, global sourcing is resulting in a restructuring of the workforce and the industry structure.⁷⁹

The different case studies carried out in relation to this study suggest that offshoring is actually part of a dynamic company's global growth strategy rather than a defensive measure resulting in job losses. Positive job impacts of offshoring are also reported by interviewees and other sources.⁸⁰

5.5. Impact on occupations

According to Marianne Kolding, IDC, there is a polarisation of jobs due to sourcing: Jobs requiring face to face interaction and a physical presence, and those functions that can be carried out from anywhere in the world.⁸¹ Up to now the European jobs most at risk of disappearing are those, which are relatively low-skilled and contribute low value-added. This means that there is, more than ever, an urgent imperative to improve the e-skills levels of the population.

There are concerns due to the fact that also jobs at the higher professional occupation levels are prone to be offshored. The jobs involved are at the higher knowledge economy end of the scale: the very part of the occupational spectrum where common aspirations for future economic activity and thus employment growth within the European Union (an area of globally comparatively higher labour costs) lie (European e-Skills Forum 2004). Current efforts to improve the statistical base relating to offshoring can facilitate a better understanding of these changing dynamics and their effects. A study of the US labour market from 1999 to 2003 suggests that although offshoring probably did reduce demand for lower-end computer programmers, the number of software engineers and network systems analysts working on higher-end activities actually increased greatly over the same time period (Auer et al 2005).

Another dimension of global sourcing relates to the leading edge element of e-skills demand. Where an employer company needs quickly to establish a significant core of people with a very specific emerging high-tech expertise, companies – particularly multinationals will seek collaborative arrangements with universities outside the European Union, if they perceive that the quality of graduates from universities outside Europe are better, and if they find that the response by universities within Europe is not sufficiently fast or effective or of adequate scale. Such situations can, particularly given that some Asian countries have a large supply of science and engineering graduates, lead to university industry partnerships beyond the EU at the expense of European e-skills employment (European e-Skills Forum 2004).

An OVUM study from 2006 has looked at the key determinants of the use of global sourcing in different services areas and the feasibility of remote delivery to meet service/quality levels. Whereas the most common areas traditionally considered immune to offshoring are those that need to function close to the client, such as sales, consulting and break-fix support services, the OVUM study has found that a growing number of service areas are affected by global sourcing, and that few areas of the industry remain untouched.

⁷⁹ Interview with Margaret Sambell. e-skills UK

⁸⁰ Infoworld website,

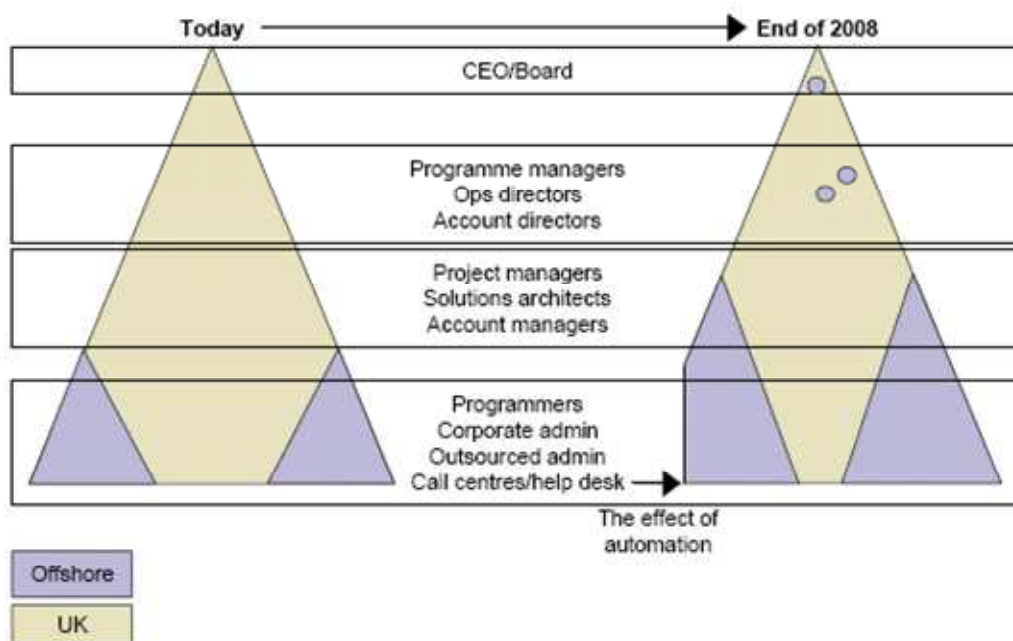
http://www.infoworld.com/archives/emailPrint.jsp?R=printThis&A=/article/07/01/11/HNsiaa_1.html

⁸¹ Interview with Marianne Kolding, IDC

Examples given are infrastructure maintenance and support handled offshore through remote commuting technologies. Another example given is consulting, which is traditionally a service delivered onshore and in close geographical proximity to the client - often, in fact, onsite. However, some of the larger Indian players, for example, are building IT consulting operations to serve UK customers with typically 50% of the work carried out by consultants offshore, with the rest in the UK.

Offshored consulting services typically involve the research or data analysis part of the process - work that can be done in the background while client-facing consultants work directly on client requirements. The result according to OVUM could be a change in the composition of the UK workforce (OVUM 2006):

Figure 13. The changing shape of the IT workforce



Source: Ovum 2006

Little research has been carried out on the impact of global sourcing on specific occupations. e-skills UK are among the key sources for developments at an occupational level. In the UK, the leading outsourcing country in Europe, e-skills UK has forecasted occupational growth rates which provide indications on the type of occupations that are and will continue to be in demand and the type of occupations that are in decline.

The projections for 2016 suggest that the strongest job growth in the UK will take place in the high skill areas of software professionals, ICT managers and IT strategy and planning professionals, while jobs such as database assistance/clerks, telecoms engineers, computer engineers and line repairers will continue to decrease (e-skills UK 2008). In the view of e-skills UK, these developments are indications of a complex restructuring process of the IT workforce towards high end skills and multidisciplinary occupational profiles.⁸²

⁸² Interview with Margaret Sambell. e-skills UK

Table 22. Occupational growth rates in the UK (2007-2016)

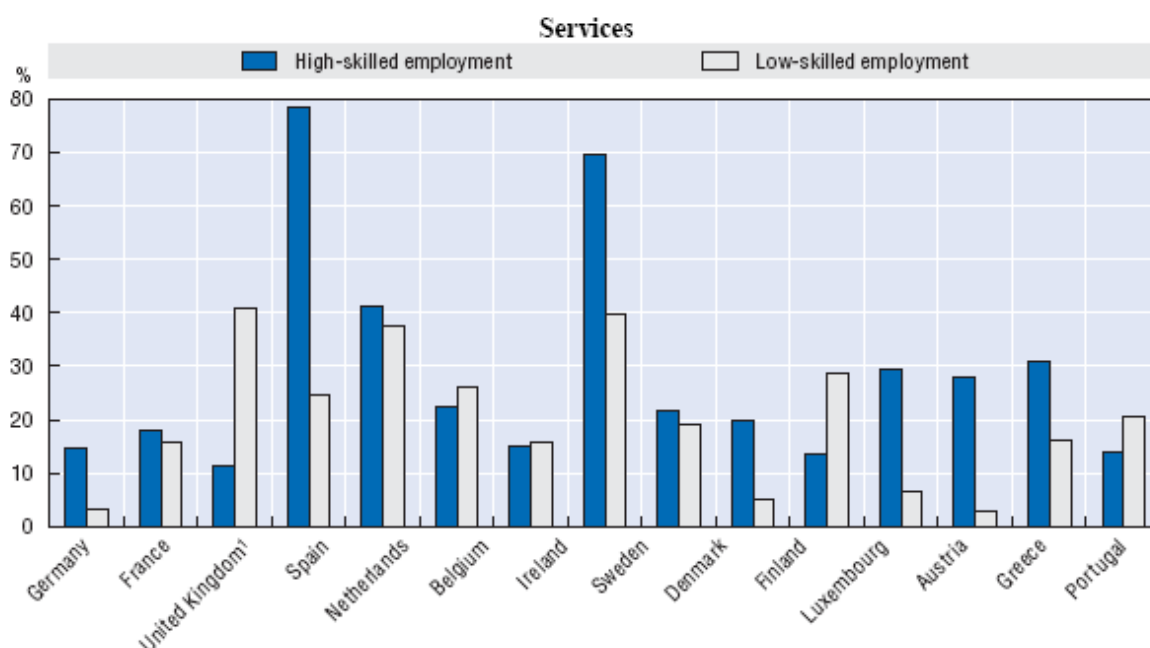
SOC	Description	2007		Average growth p.a.	2016		Growth in population 2007-2016
		Total	%		Total	%	
1136	ICT Managers	286,000	27%	1.4%	324,000	26%	+38,000
2131	IT Strategy & Planning	140,000	13%	2.6%	176,000	14%	+36,000
2132	Software Professionals	317,000	30%	2.7%	403,000	33%	+86,000
3131	IT Operations Technicians	125,000	12%	0.8%	134,000	11%	+9,000
3132	IT User Support	48,000	4%	0.7%	51,000	4%	+3,000
4136	Database Assistants / Clerks	60,000	6%	-0.8%	56,000	5%	-4,000
5242	Telecoms Engineers	39,000	4%	-0.6%	37,000	3%	-2,000
5243	Line Repairers and Cable Jointers	17,000	2%	-0.6%	16,000	1%	-1,000
5245	Computer Engineers	37,000	3%	-0.6%	35,000	3%	-2,000
	Total	1,069,000	100%	1.6%	1,232,000	100%	+163,000

Source: e-skills UK (2008)

Increased need for highly skilled people

In manufacturing, which in most countries has lost jobs overall, skilled jobs are on the rise. In services, in which all countries are net job creators, skilled jobs are growing significantly faster than unskilled ones in the vast majority of countries (OECD 2007d).

Figure 14. Growth of skilled and low-skilled jobs in the European Union (growth 1997-2004 as a percentage)



Source: OECD 2007: Offshoring and Employment

Global sourcing drives a restructuring of the workforce with less need for low skilled employees except for in low paid labour intensive services, so that a higher premium is put on high skilled labour (Swedish Institute of Growth Policy Studies 2006; e-skills UK 2008). According to e-skills UK, the ICT practitioners in the UK are moving into higher value services and roles, and this requires high value skills. In particular, the industry is looking for ICT practitioners with a clear business and client orientation to complement their technological skills.

Developments in the US

In order to contrast the developments in the UK, we have looked at developments within specific ICT occupations in the US. Network systems and data communication analysts account for the largest increase in employment in 2001-2005, followed by computer software engineers. Computer programmers and database administrators on the other hand have experienced a negative growth, cf. table x below.

Table 23. Changes in hourly wages and employment for US computer specialist occupations

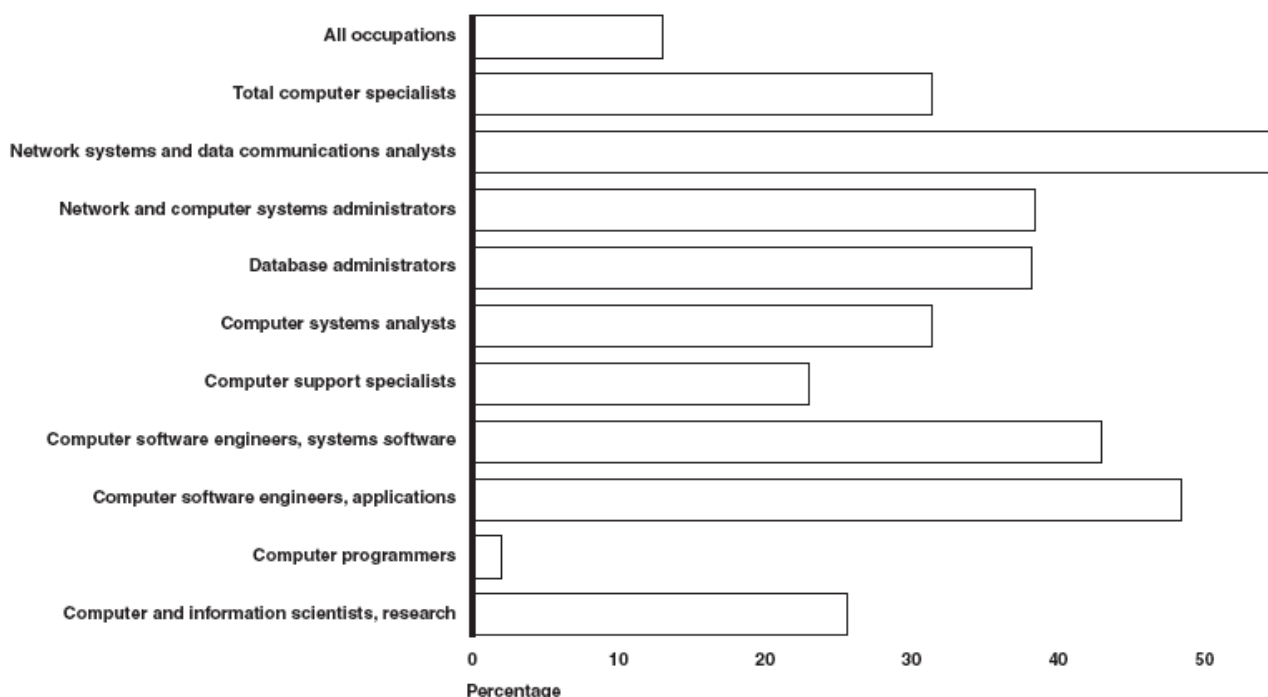
Occupations	Hourly wage (May 2005)	Percentage change in hourly wage (2001-May 2005)	Number of jobs (May 2005)	Percentage change in employment (2001-May 2005)
Computer and information scientists, research	\$45.21	22.2%	25,890	1.1 %
Computer software engineers, systems software	40.54	13.2	320,720	22.6
Computer software engineers, applications	38.24	9.9	455,980	26.1
Computer systems analysts	33.86	10.5	492,120	9.8
Computer programmers	32.40	7.2	389,090	-22.4
Database administrators	31.54	12.3	99,380	-4.7
Network systems and data communications analysts	31.23	7.7	185,190	46.9
Network and computer systems administrators	30.39	12.0	270,330	18.6
Computer support specialists	20.86	3.5	499,860	1.3
All U.S. occupations	\$18.21	11.4%	130,307,850	1.8%

Source: United States Government Accountability Office (2006)

According to the Bureau of Labour Statistics, employment in most computer specialist occupations is projected to grow much faster than overall US employment (31.4% compared to 13%). The demand for computer related jobs is likely to increase as employers adopt and integrate increasingly sophisticated and complex technologies. Growth, however, will not be

as fast as the previous decades as the software industry matures and as routine work is increasingly offshored (United States Government Accountability Office 2006).

Figure 15. Projected rate of job growth for computer specialist occupations (2004-2014)



Source: United States Government Accountability Office (2006)

According to the projections, job growth of computer programmers is expected to lag significantly behind job growth in overall U.S. occupations (2% compared to 13%), likely because it is highly codifiable and thus transferable. Programmers therefore face a higher risk of having their jobs offshored than other computer specialists, unless they for example also have skills enabling them to integrate complex systems or programme in higher order software languages. The progress in programming technology has enabled users to write basic codes without programmer involvement for routine programming (United States Government Accountability Office 2006).

Although the occupations analysed in the US are more technology intensive than the selection of occupations analysed by e-skills UK that includes both technical and managerial ICT occupations, the overall developments in the US largely correspond to developments in the UK.

5.6. Impact on skills

Global sourcing of activities is changing the demand for skills in Europe – for ICT practitioners as well as all other occupations involved in global trade of goods and services.

For instance, global sourcing is leading to a shift in the value logic that remain central to competitiveness of firms and critical to economic growth-creating both policy opportunities

and threats (Zysman 2007). The argument goes that there are two changes that fundamentally shift the competitive base. The two shifts are:

- The decomposition of production, with the corresponding intensification of competition from diverse new entrants; and
- The transformation of service - that is, the expanding importance of services as their nature and delivery radically changes.

As a consequence firms are constantly in a search to position and reposition themselves in the value networks that forms changes in demand of competencies - from creative design to innovative use of existing knowledge, but most importantly is the competency to manage the tacit interactions within a value chain to fully exploit core competences in each segment.

These changes could have significant implications for the character of jobs and jobs growth in the economy as well as for the type of skills sets Europe seek to foster. As more processes are captured in algorithms and thereby codified and offshorable the relative value-creating weight of the tacit interactions - those human activities and competencies that could not be captured in the algorithms - grows. The implication is that at once analytic skills and the management of tacit interactions becomes more critical. Indeed, the skill sets required in leadership of tacit interactions is sharply different from that required for the formalization and optimization of routine codifiable tasks (Zysman 2007). The work of ISTAG has also given indications of the demands for changing occupational profiles exploiting technological convergence in the development of a range of user friendly applications from intelligent transport to the care of sick and elderly (ISTAG 2006).

Emerging skills needs

At the sector level, some overall trends in terms of skills needs in Europe can be identified. According to the OECD, CEDEFOP and e-skills UK there is an increasing demand for a combination of ICT specialist skills and other skills such as managerial, personal, business, sales, marketing and e-business skills (e-skills UK 2008).⁸³ This is supported by interviews conducted by the Danish Technological Institute (OECD 2006c).⁸⁴ Some of these skills needs are related to global sourcing; others to technological and market developments.

In 2005, IBM presented a range of skills areas considered to be ‘hot’ or ‘cold’, cf. table below:

Table 24. Hot and cold skills

Hot skills area	Cold skills areas
<ul style="list-style-type: none"> • Business Analysis • Security Analysis • Vendor Management • Service Management • System Integration • Data Mining • Business Intelligence • Database Administration • Network Engineering • Network Architecture • Internet/Web Architecture • Web Services 	<ul style="list-style-type: none"> • Application Development • Application Maintenance • Packaged Application Tools • Transcription Services • Contact and Call-Centre work • Specialised BPO services

Source: IBM according to CEPIS (2007).

While the demand of some skills areas are due to technological progress, the obsolescence of other skills areas are in many cases resulting from offshoring or automation, for instance transcription services and contact and call centre work. A 2006 article on skills in demand and skills getting obsolete s complements the IBM analysis by arguing that outsourcing processes increases demand for people who are able to manage relations to external suppliers, while programming and activities related to infrastructure will be less in demand.

According to Sako 2005, the movement of service jobs from developed economies to low cost emerging market locations is being accompanied by significant repackaging of tasks, skills, and knowledge into a job, occupation, or profession. This result in changes in occupational and professional identity, and it creates new demands to governments to be able to anticipate and manage systemic reform of the education systems, and to professional associations that seek to upgrade their capabilities (Sako 2005).

At the company level, the need for skills will depend on the sourcing strategy chosen by the company in questions. For instance, companies deciding to hire in highly skilled non-European ICT practitioners will not require the same level of expertise from their domestic workforce, while companies choosing to move out mainly technical activities will require

⁸³ European Commission website, <http://ec.europa.eu/enterprise/ict/policy/ict-skills.htm>

⁸⁴ Interview with Peter Hagedoorn and Xavier Dutoit; case study of ARM

more business-orientated skills in their domestic workforce, and likely also abilities to manage innovation processes involving lead users or partners in a value chain so as to spot new potential application areas of commercial value.

Skills needs resulting from global sourcing

Global sourcing is not the only factor affecting future skills needs of ICT practitioners. Increasing competitive pressures in the global market for ICT products and services, and the growing emphasis of green IT, as well as technological convergence between generic technologies are all factors that shape changing demands concerning the technological know-how of ICT practitioners as well as their ability to innovate. The following section elaborates on the skills needs related to global sourcing.

Need for people who understand business and industry needs

Outsourcing and offshoring, alongside technological change, are having a direct impact on the way jobs and professions are composed. For example, as IT services have been outsourced, IT professionals are expected to have the ‘front-office’ managerial skills in procurement, finance and accounting, as well as their technical IT knowledge (Sako 2005). According to Gartner analyst Diane Morello a changing competitive environment requires that: “If you prefer to stay in the world of technology, such as infrastructure and services, then do whatever you can to be absolutely excellent at that”.⁸⁵

Wipro Technologies, global IT company, Bangalore, India

“The need for more dynamic technology solutions and the increased complexity, cost and risk associated with these technology platforms has created a growing need for specialists with experience in leveraging technology to help drive business strategy. To serve these companies, there is an increasing need for highly skilled technology professionals in the markets in which we operate. IT service providers need cross functional teams of domain experts with deep industry knowledge and process and implementation specialists with technical expertise and application development skills.”

Source: Wipro Annual Report 2006-2007, http://www.wipro.com/investors/pdf_files/WIT_20F_0607.pdf

Business skills and understanding are essential to the occupational profile of ICT practitioners, and this poses a paramount requirement for educational reform to integrate technological and business study disciplines in education programme curricula – including continuing education and training supply.

Experts, including Peter Hagedoorn, stress that the increasing offshoring of ICT tasks have not lowered the demand for European CIOs with technical skills. On the contrary, it implies that CIOs and other management staff need a combination of high technical understanding and knowledge with business and project management skills in order to monitor and supervise development as well as managing offshoring processes and organisational change for clients (e-skills UK 2008; Zengin 2007; Zysman & Schulze-Cleven 2006).

⁸⁵ Computerworld website, <http://www.computerworld.com.au/index.php/id;90173523><http://www.computerworld.com.au/index.php/id;90173523>

Technological skills remain important in Europe

According to UNCTAD 2004, offshoring represents a global shift in production activity, giving rise to a new international division of labour in the production of services' (UNCTAD 2004, Sako 2005)). In the labour market for ICT practitioners we are however not witnessing a clear cut pattern in the location of activities, with purely technical skills located in India and China, whilst employees in Europe primarily perform consultancy work. Nor is there a body of evidence which gives grounds to conclude that we are in the first phases of a process in which all activities will eventually be moved from EU to more competitive destinations outside the EU. In other words: Even though ICT companies now increasingly seek ICT practitioners with extensive business management and development skills these companies still are still looking for ICT practitioners with high technological skills.

Some types of activities are being offshored, but the result is a more complex industry structure at the global level, and an increased competition in global markets. As a result, there will most likely be a mix of high value added activities in both Europe and outside Europe and thus a mix of skills needed, whilst low value added and labour intensive activities are either performed in countries that provide the best mix of low costs and high quality, or are automated. European companies will continue to need in-house people with technological expertise, for instance to manage and to contribute to innovation processes and the development of new applications.

However, there are indications that the technological skills needed in Europe are of a more 'abstract' or complex nature than previously with growing demands for higher order analytical skills.

The future of software languages

The French open source consultant Xavier Dutoit believes that courses in computer science should not focus on learning specific software languages because the language learnt will be outdated when the students graduate. Teaching computer science has focused a lot on learning the syntax which is roughly equivalent to learning the words of a language. Instead, students should excel in understanding and knowing the *algorithm* behind syntax because this makes it easier to switch software languages.

Source: Interview with Xavier Dutoit

Another type of skills in demand is the application of technology which also calls for new forms of hybrid qualifications. For instance, several European countries are specialising in the application of ICT in sectors like automotive, health, music, content production.⁸⁶

Creativity and design

The British company Moviestorm is a good example of a successful combination of advanced technological skills and creativity stemming from a deep interest in gaming and animation.⁸⁷ The Cambridge based business angel Jack Lang believes that a future European stronghold is *augmented reality*.⁸⁸

⁸⁶ Case study of Moviestorm; Interview with Jack Lang

⁸⁷ Case study of Moviestorm

⁸⁸ Interview with Jack Lang

There are different ways of approaching creativity and design. Director of the open source company Sydesy, Xavier Dutoit finds it more important that people have time to experiment and fail than to go on seminars and courses. The learning process takes place when developing new solutions, failing, and then trying to find a new solution for instance by exploring the solutions of other people. In the view of Xavier Dutoit this learning process is much easier in open source because the open codes makes it possible to actually see the work of others – getting inspiration and improving the work others have done for a new solution.⁸⁹

5.7. Impact on supply of ICT courses and educational programmes

Skills requirements are changing radically. Talented IT employees are in short supply everywhere in Europe and outside Europe.⁹⁰ Occupational profiles which combine business, management and design skills in addition to technical skills are shaped by changing demands by industry to their ICT practitioners' profile. Some educational systems have begun to adjust their curriculum.

The global interactive workflow has created a demand for quite diverse profiles of ICT practitioners. In general it has led to a significantly increased supply of ICT programmes and courses worldwide, but also to a beginning transformation of ICT universities. Among ICT universities there is a growing understanding that the ICT practitioners will deploy their competences in globalised businesses. In response to business transformation, the Danish IT-University is now providing business and communication courses to their students.⁹¹

Currently it seems as if demands of educational reform brought about by global sourcing is not on the top of the agenda in the ICT software and services sector. Rather, it is recruitment problems arising from demographic developments and the perceived low attractiveness of the ICT sector.

Recruiting students

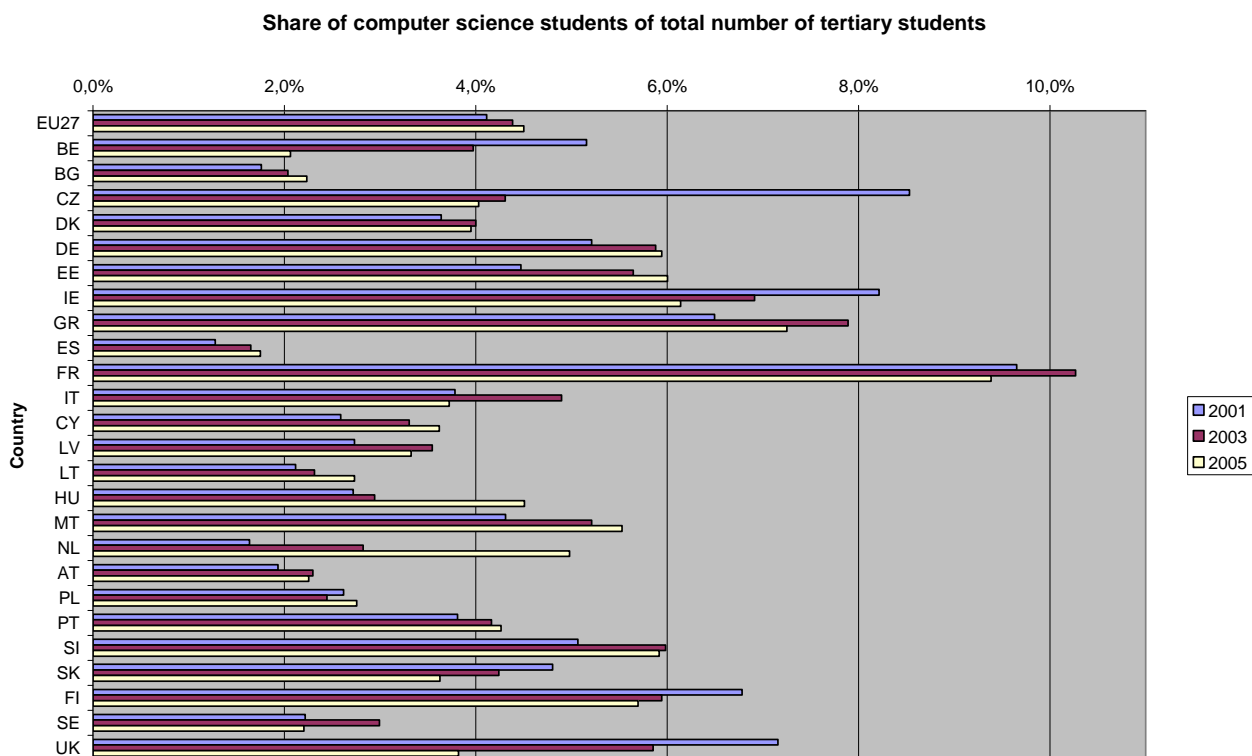
The overall share of students enrolled in ICT relevant education programmes in Europe has increased in the EU27, cf. Figure 16 below.

⁸⁹ Interview with Xavier Dutoit, Sydesy

⁹⁰ In the United States the number of students applying for ICT education has constantly been declining yearly with around 50%, which by many experts is seen as a significant problem for the United States in the future (interview with Michael E. Caspersen).

⁹¹ Interview with Director of the IT-University Mads Tofte in Børsen; interview with Director of IT-Vest Michael E. Caspersen.

Figure 16. Share of computer science students of total number of tertiary students

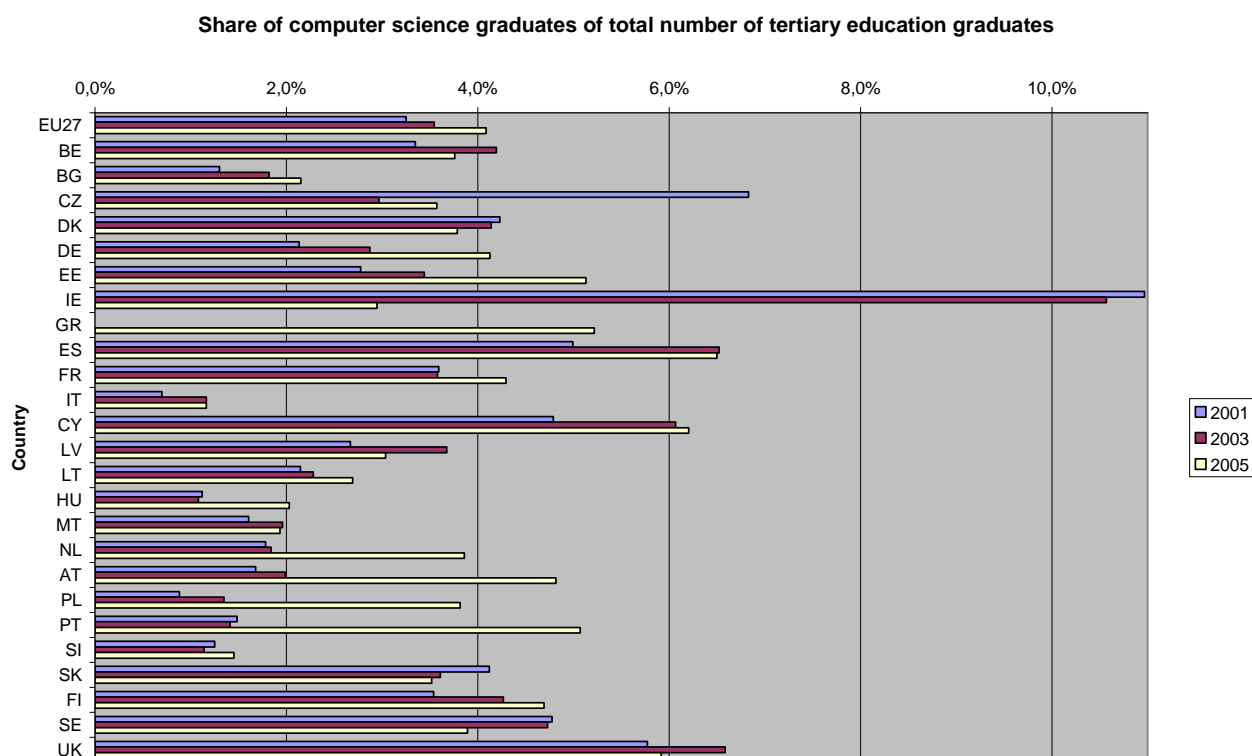


Source: Eurostat (based on tertiary education, EF48 Computer Science)

There are significant differences between the EU member states. While the share of computer science students of the total number of tertiary students has decreased in Belgium, the UK and the Czech Republic, countries such as the Netherlands and Portugal have experienced an increase in the share of computer science students.

In the EU27, the overall share of computer science graduates in Europe has increase, cf. figure below.

Figure 17. Share of computer science graduates of total number of tertiary graduates



Source: Eurostat (based on tertiary education, EF48 Computer Science)

Again, there are significant national differences – for instance, the share of computer science graduates in the UK has decreased, while the share has increased in Germany and France.

In Denmark, the number ICT students has been constantly low - compared with the demands of industry, but in recent years ICT universities in Denmark have succeeded in attracting around 80 more students each year by developing a new type of Master programme which combine computer science, business disciplines and design.⁹² Similar developments have also occurred in countries such as Sweden, Finland, and the Netherlands.

In the UK Queens Mary College of London has partnered with employers and other stakeholders to develop a new type of undergraduate degree programme, to help prepare students for entering IT professional careers, by integrating business and ICT.⁹³

e-skills UK has also launched a range of activities. Similarly to the initiative from Queens Mary College they brought together employers and universities to develop a new type of undergraduate degree programme, to help prepare students for entering IT professional careers.⁹⁴ Furthermore, e-skills UK is also responsible for a partnership that developed the Diploma in IT for 14-19 year olds. The Diploma is a core plank of the government reform strategy for 14-19 education in the UK. Diplomas are being introduced in 17 ‘lines of

⁹² Interview with Michael E. Caspersen

⁹³ www.e-skills.com/itmb. Further information about the curricula at www.e-skills.com/diploma

⁹⁴ www.e-skills.com/itmb

learning', of which IT is one. The unique feature is that employers have come together with Education providers and other stakeholders to create new curricula.⁹⁵

Adjusting curricula to industry needs

Globally, there are a range of examples of educational institutions working closely together with industry to develop educational programmes that are responsive to the changing demands of the industry.

Neumont University, US

Neumont University was founded to attack the problem of dwindling computer science enrolments. A comprehensive Bachelor of Science Degree in Computer Science was designed to help students acquire industry relevant skills and competencies. More recently, an MBA program was added to the curriculum. Neumont distinguishes itself with an integrated, project-based curriculum and graduates complement their resume with a digital portfolio of projects.

In 2005 Neumont University won a CIO 100 award for their innovative approach to educating industry-ready software developers and engineers. The first class graduated in May 2006 with a 91% job placement.

Sources: <http://whitepapers.techrepublic.com.com/abstract.aspx?&kw=Use+a+skills-based+resume+to+highlight+talents&docid=264503>;
http://www.acm.org/ubiquity/interviews/v6i41_mckinley.html

IT-Vest Denmark

IT-Vest in Denmark has according to Director Michael E. Caspersen through a partnership between three universities (Aalborg University, Syddansk University and Aarhus University) and several ICT companies created a new Master programme where software development, product design and business skills are combined through an educational partnership with the business department at Aarhus University and the design School in Aarhus. This allows IT-Vest to constantly be aware of the rapidly changing competence needs of the industries.

But even though more and more ICT companies in Europe (like Cap Gemini Denmark) are looking for ICT practitioners with managerial skills and business development skills, Microsoft Denmark also needs ICT practitioners with specific skills in computer science for its User-Centred Innovation lap. Microsoft has at several conferences stressed the gap between the supply and demand of ICT practitioners with hardcore computer skills even though the company also is open minded towards new types of undergraduate degree programmes

Source: Interview with Michael E. Caspersen, Director of IT-Vest

In Sweden a number of programmes have been developed as tertiary programmes also including elements of design, communication and creativity in close collaboration with local enterprises and in an open curriculum structure, so that curriculum can easily be updated as demands are changing (Shapiro et al. 2006). Upgrading of existing ICT practitioners also require adjusting curricula and providing ICT practitioners as well as employees involved in low value added activities with incentives for entering training.

Karlsruhe Service Research Institute

IBM and The Universität Karlsruhe have founded the interdisciplinary Karlsruhe Service Research Institute. The Institute develops concepts, methods and technologies for innovators and decision makers, to generate and utilize economic value in a more and more 'services-led economy'.

⁹⁵ www.e-skills.com/diploma

The Institute co-operates with IBM both in research and as an integral part of the courses offered to students at the Institute. For instance, following an 'industry-on-campus' model, four researchers from IBM are working closely with scientists from the university. Also, in June 2008 25 students attending the course eServices at the Institute visited the development lab of IBM in Böblingen, the largest center of development of IBM outside the United States, which focuses on hardware, software as well as services technology. During this day the students had the opportunity to speak to experts and they also carried out a case study analysis focusing on the challenges of large outsourcing deals.

Source: Karlsruhe Service Research Institute website, <http://www.ksri.uni-karlsruhe.de/Default.aspx?PageId=273&lang=en>

Focused efforts and investments in ICT education to increase competitiveness

Investment in ICT education and training is a central component in the competitiveness of Europe's ICT industry. During the 1990s the Irish industrial strategy of encouraging Foreign Direct Investment by major global ICT players, mostly North American based, involved significant support of ICT related investment in both Academic and Vocational educational provision. Similarly in Finland, the policy commitment to stimulating and growing a global presence in the mobile telecommunications market included a significant investment in reforming educational provision. In Germany, the development of the Advanced IT Training System showed a concerted effort involving all major stakeholders to develop a more demand-led competence, and work processes -based learning provision. In addition, the UK has developed a wide range of education and training innovations, all generally aimed at strengthening the influence of employers on curriculum and delivery of education and training (CEPIS 2007).

In 2006, the EU ICT Task Force provided a number of recommendations on how to develop skills and the employability of individuals in a context of changing industry demands:

- Support co-operation in the ICT industry through creation of Industry Leadership Group
- Increase investments in professional development of teachers and ongoing teacher support mechanisms
- Increase collaboration between industry, governments, employers, and education institutions via multi-stakeholder partnerships
- Continue the efforts already started in incorporating entrepreneurship in educational curricula at all levels.
- Reduce the e-skills gap between larger organisations and SMEs, notably micro SMEs and the less IT-oriented SMEs

However, given the ongoing changes in the ICT sector there is a balance to be made between constant reforms in the ordinary system which may impede the transparency in qualifications, and the role that comprehensive continuing education and training provision can play in responding to the dynamics of a rapidly changing sector such as ICT and services sector. The current EU education programmes could provide a framework where EU member states could develop a comprehensive continuing training programme, at different qualification levels.

If organised as e-learning it would not only offer flexibility for the individual, but it could also enable involvement of the best teaching resources within different domains of ICT. At present

lifelong learning arrangements in EU in the field of ICT are fragmented and in spite numerous policy initiatives on recognition of prior learning, ICT certifications still play a modest role in the overall provision of ICT education and training.

Promoting innovation

With the increasing economic importance of service sectors, a key concern is that framework conditions (e.g. public funding; R&D infrastructure) are biased towards product innovation, thus not offering optimal conditions for service companies.

There is currently only limited knowledge on service innovation (Salter & Tether 2006) and on how service innovation differs from product innovation. This was highlighted in a document from the European Commission in 2007 (European Commission 2007g). In the document, the European Commission emphasised the need to:

- 1) better understand the specificities of innovation in services
- 2) support all forms of innovation, not only technological innovation
- 3) develop specific support mechanisms for innovative services with high growth potential
- 4) foster trans-national cooperation on “better policies” in support of innovation in services in Europe

5.8. Impact on competitiveness

Europe’s ICT industry is a major economic sector in its own right. The telecommunications, IT, and audio-visual markets make up 6-8% of EU GDP and 4- 6% of employment, and several major breakthroughs in software have been generated in Europe in the last 10-15 years – examples include the Web, mpeg2 and mp3 encoding, and the Linux operating system with its influence on the open source software movement (EU ICT Taskforce 2006).

There are many dimensions to competitiveness, but productivity is considered a key driver of competitiveness and welfare in the long term (European Commission 2007f). There is a considerable body of evidence on the impact of global sourcing on productivity. For instance, Amiti and Wei (2006) have estimate the effects of goods and services outsourcing on productivity in US manufacturing industries between 1992 and 2000 and find that services offshoring accounted for 11% of productivity growth over this period. Furthermore, according to the findings of Amiti and Wei, offshoring material inputs also has a positive effect on productivity, but the magnitude is smaller accounting for approximately 5% of productivity growth (Amiti & Wei 2006). Similarly, a study of the implications of outsourcing and offshoring for the productivity of business services in the UK shows that business-service productivity has grown by over 20 per cent in the last 7 years, at the same time as employment grew by 20 per cent. The study suggests that outsourcing and offshoring play a role in enhancing productivity through greater specialization, standardization, and consolidation of business processes, and a shift to higher value-added services (Sako 2006).

The effects of offshoring are not just confined to productivity. For instance, Feenstra & Hanson (1999) estimate the relative influence of trade versus technology on wages. Trade is measured by the foreign outsourcing of intermediate inputs, while technological change is measured by expenditures on high-technology capital such as computers. According to the analysis, computers explain about 35 percent of the increase in the relative wage of non-production workers, while outsourcing explains 15 percent; both of these effects are higher in

other specifications. This supports the notion of a skill-biased technological change, but also provides evidence that international trade, in the form of foreign outsourcing, contributes to skill upgrading (e.g. increasing share of skilled workers within an industry), and increases in the wage gap between skilled and unskilled workers, as seen in the US (Feenstra & Hanson 2001). Services outsourcing may on average be more skills intensive than the outsourcing of material inputs, therefore the effects of services outsourcing on the wage skills premium could be even greater than suggested by Feenstra & Hanson (European Commission 2006b).

Overall, according to the OECD, the productivity effects of the outsourcing of goods by manufacturing firms are either slight or insignificant. In contrast, the productivity effects of outsourcing services are significant only when the services are outsourced by service companies and not by manufacturing companies (OECD 2007d).

In terms of ICT software and services companies and ICT intensive companies, the experts interviewed, consider the overall effect of global sourcing to contribute positively to companies' competitiveness. They point to both cost reductions and access to a large pool of qualified ICT practitioners in both nearshoring and offshoring destinations as competitiveness enhancing factors that drive outsourcing. However, the experts emphasise that the potential cost savings from offshoring seem to be overestimated by companies (e.g. offshoring is costly and risky due to quality control, communication challenges and cultural misunderstandings). Furthermore, they state that there are also some long term risks to consider - for instance, the potential impact of offshoring on the innovation capacity of European companies if R&D or product development is offshored.

Innovation

Innovation and innovation capacity is another dimension of competitiveness, and industry sees global sourcing as contributing to innovation. For instance, according to John Sarborg, ITEK, outsourcing helps companies to focus on innovation and move up the value chain. In his perspective, companies are not transferring activities to new locations. Instead, they set up new operations in other countries to undertake specific tasks whilst refocusing their domestic activities based on core competences..

Shell, is an example of an ICT using company that uses sourcing to focus efforts on core activities and the strategic use of ICT for innovation and business development, cf. box below.

Shell

In 2008, Shell signed a 4 billion dollar IT outsourcing deal with a consortium consisting of three ICT services companies, AT&T, EDS and T-Systems. Shell expects significant improvements in efficiency and productivity and important financial benefits from the deal.

Other motives are also driving the company's outsourcing of IT infrastructure and maintenance. According to Swee-Chen Goh, Shell VP global IT infrastructure services, Shell wants to look for value out of the sourcing deal, coming from an improved ability to focus on what drives IT in Shell's business and access to know-how and resources in this industry.

Alan Matula, Shell CIO, said in a statement that the outsourcing deal allows Shell IT to focus on information technology that drives competitive position in the oil and gas market, whilst suppliers focus on improving essential IT capability.

Source: Silicon website on Monday 31 March 2008, Shell signs \$4bn IT outsourcing contract, <http://services.silicon.com/itoutsourcing/0,3800004871,39179633,00.htm>

Global sourcing can be driven by skills needs, as previously discussed. Considering the shortages of ICT practitioners in Europe, as reported by industry organisations and company managers in Europe, global sourcing can be viewed as a way of freeing up human resources in Europe to carry out high value added tasks.

Impact of R&D offshoring on innovation capacity

It may not be appropriate to offshore all type of business functions, particularly the value added, R&D intensive functions.

A 2007 study by Pro Inno analysed the implications of R&D off-shoring on the innovation capacity of EU firms (Pro Inno Europe 2007). According to the report, the possible negative effects of R&D off-shoring consist of lost spill-over effects, lost skilled labour following the off-shored R&D, lost jobs in R&D leading to decreased levels of innovations, decreased productivity, and slow economic growth. The positive effects of R&D off-shoring include spill over of new innovations potentially streaming back to the EU area, increased innovation capacity (depending on the home country's adaptability), and the benefits EU firms may achieve from locating their R&D operations where they are most efficiently performed, and where the largest pool of high skilled ICT practitioners may be found. Recent discussions of the benefits of 'open innovation' could imply that global sourcing of R&D functions are vital part of companies' innovation strategies, in a "fundamental transition from the importance paid to the internal knowledge base of firms to more open and globally distributed knowledge networks" as the key source of innovation (Herstad et al. 2008).

Compared to the USA, the innovation performance of the EU lags behind. The European Innovation Scoreboard 2007 survey shows a significant innovation gap between the EU25 and the USA, and between EU25 and Japan. Although the gap is decreasing, the US maintains the lead in 11 out of 15 indicators.⁹⁶ There are large variations in the innovation performance between the EU countries. For instance, Sweden, Denmark, Germany and the UK are according to the Innovation Scoreboard the most innovative EU countries, and these countries

⁹⁶ The EU is experiencing an increasing lead over the US in S&E graduates, employment in medium-high and high tech manufacturing and Community trademarks, and a stable lead in Community Designs. However, the gap with the US is increasing in public R&D expenditures and high-tech exports (Pro Inno Europe 2008)

are also ahead of the US, but overall the EU is behind its main competitors (Pro Inno Europe 2008).

In face of this persistent innovation gap, the Pro Inno Europe study (2007) suggests that the opportunity for the EU firms to off-shore a part of their R&D into relatively more innovative geographical locations or into low cost locations could result in higher innovation capacity and growth in the long term. In fact, based on survey results, econometric analyses and case studies the InnoPro study concludes that “EU firms have either maintained or improved their competitiveness by engaging in global R&D operations” (Pro Inno Europe 2007).

The need for innovation

The innovation gap identified in the European Innovation Scoreboard survey could indicate that Europe risks being squeezed by the US and Asia in the global ICT market. According to Martin Fransman⁹⁷, Europe currently risks falling behind as a globally competitive provider of ICT goods and services, and in some key parts of the ‘ICT ecosystem’. For instance, US companies dominate the global provision of Internet content and applications (examples including Google, Yahoo, eBay, Amazon, and Facebook), and the US and Asian companies are dominant in the areas of computer hardware and software as well as in consumer electronics and semiconductors. Europe, however, has considerable strengths in areas such as mobile equipment and services.

In Fransman’s perspective, Europe needs a new ICT ‘ecosystem’ to promote innovation and thus ensure the global competitiveness of the European ICT sector. However, the current regulatory framework is too focused on market regulation rather than innovation, according to Fransman. He finds that Europe should focus more on the ability to innovate and make the investments that successful innovation requires. This includes investments in Europe’s ICT infrastructure to ensure that it keeps up with the global leaders. Investments are particularly important in areas such as ultra-broadband networks (using optical fibre) and broadband mobile. Furthermore, Europe should focus more on the whole institutional context (financial institutions, regulatory bodies, competition authorities, universities, standardisation, and entrepreneurship) that affects the innovation process – competitive markets alone are not sufficient to generate innovation.⁹⁸ In the context of Fransman’s findings the EU framework programmes could potentially provide such a platform.

The creation of strong high-tech clusters is a way to promote European innovation and competitiveness, and considerable efforts have been made to stimulate the development of European clusters, including the establishment of a European Cluster Observatory in relation to the Europe INNOVA programme.⁹⁹ Clusters are “not the only answer to Europe’s innovation challenge” (High Level Advisory Group on Clusters 2007), but it constitutes an important part of it. However, cluster policies and spending priorities need to be aligned. For instance, there are currently 2000 European clusters and more than 70 different national cluster policies. The US is home to one prominent and very successful cluster that has become a global player, Silicon Valley, though a number of other clusters exist in the USA. In China,

⁹⁷ Professor of Economics and Founder-Director of the Institute for Japanese–European Technology Studies at the University of Edinburgh

⁹⁸ European ICT: innovation is the key (8 May 2008), <http://bulletin.sciencebusiness.net/ebulletins/showissue.php3?page=/548/2875/10588>

⁹⁹ European Cluster Observatory website, <http://www.clusterobservatory.eu/>

resources and tax-breaks have been concentrated on three mega-hubs for technology development.

A range of European stakeholders and experts have criticised the European approach to clusters for fostering the development of clusters that are simply too small to be of significance. Rather than fostering the development of many small clusters, there have been discussions that Europe should direct funds to only a few existing clusters with global potential, and that they should be selected in a transparent, international, data-based competition.¹⁰⁰ Given the way that the framework programmes and other development programmes in the EU currently operate, it would require a major change also in the expectation levels of national policy makers, if such priorities were to be implemented at an EU level and with EU funding.

A study from 2008 has identified some prospective innovation challenges for the European ICT sector (Aslesen 2008). In addition to a range of structural, technological and market related innovation challenges, the study identifies the following skills related challenges:

- The declining numbers of students in scientific and engineering disciplines in the EU compared to its main competitors
- The shortage of experts with specific skills, such as entrepreneurial skills, and ICT professionals with more managerial skills and vice versa
- A shortage of the absolute numbers of ICT practitioners, the imbalance between supply and demand for specific skills and the number of students studying IT and computer science.

Innovation through new business models

The phenomenon of localised modularisation (in which countries or regions specialise in specific activities using globally interchangeable modules linked by ICT) has been successful in the private sector of delivering big cost reductions and quality improvements, and is an example of a business model innovation which is far more successful than conventional product/service or process innovation.¹⁰¹ An example is the automobile industry which used to be large and hierarchically organised. Paul Horn, ex head of research at IBM reports on: *“the decomposition of the vertically integrated business model: car firms were once very integrated but now they don’t make anything – they’re integrators in a ‘value net’”*.¹⁰²

According to the Economist, India's software companies have managed to transform themselves from providers of low-cost offshoring and back-office operations to innovators, with firms like Infosys, Wipro and Tata Consultancy Services (TCS) becoming world leaders in business-software services. A company like TCS has been investing in R&D for 25 years and holds several dozen patents and copyrights, and has been successful in establishing a “global innovation ecosystem” which brings together academic labs, start-ups, venture-capital firms, large independent software firms and some of its most important customers.

¹⁰⁰ Financial Times, Europe: A piquant recipe for a Silicon Valley, July 15 2008, http://www.ft.com/cms/s/0/67c3fe6e-5268-11dd-9ba7-000077b07658,dwp_uuid=70662e7c-3027-11da-ba9f-00000e2511c8.html

¹⁰¹ Economist, “Something new under the sun: a special on innovation”, 13 October 2007

¹⁰² Economist, “Something new under the sun: a special on innovation”, 13 October 2007

These new business models also link directly to the idea of open innovation (or open source innovation), which also include the involvement of the users of products or services in their design and production. An even more important factor than capital is the culture within which innovation takes place, both in terms of the culture of collaboration (cf. the Linux and similar phenomena in the software industry), as well as the social culture within which services are used, and which often seems to defy top-down business logic (for example, the very unexpected explosion of SMS services).

European strengths in the global economy

Countries in and outside the European Union have benefited from policy initiatives targeted at increasing the global competitiveness of the national ICT sector. India for example is investing in becoming a world leader in ICT software and services. Also, Ukraine has invested heavily in developing its human resources to becoming an attractive sourcing destination.

Europe has a range of strengths on which to build future initiatives, including:

- Advanced lead users/early adopters which again can lead to a competitive position as an advanced test laboratory, a reasons why some of the global players for example have located test and development functions in the Swedish/Danish Oresund region despite general high salary costs and company taxes
- Key European technological strengths in the areas of enterprise software; embedded and distributed software; hard real-time design and dependable/fault-tolerant systems; software engineering; and high-end computing and GRID architectures (EU ICT Task Force 2006).

There are a range of national strengths that can form the basis for national or regional specialisation. For instance, Denmark has very strong environment in mobile and wireless technologies and content production, whilst the UK on the other hand is a leader in exploiting technology to solve business problems and the UK furthermore has several strong sectors with a clear ICT orientation e.g. financial services, biotechnology (Danish Ministry of Science, Technology and Innovation 2006).

European countries will need to identify strengths and benchmark industries to industries in other countries in and outside Europe, and governments will have to take a number of policy initiatives to stimulate Europe's competitiveness (attracting talented ICT students from non-European countries, reducing regulatory burdens etc). The current European efforts to identify and assess clusters in Europe is an important step in identifying clusters with global growth potential, and on this basis potentially re-focus support mechanisms to ensure efficient use of public means for innovation (see Pro Inno Europe 2007b). However, measures which aim to spur regional specialisation and development of strong clusters should open up the local or regional innovation system to input from other regions and regional governments could stimulate the integration in global knowledge networks through public policy instruments. As pointed out by BRIE, California, the experiences with a labour market model that combines security and flexibility could give Europe a competitive advantage if applied at a broader scale across all of Europe.

The way ahead

The recent study “Globalisation and Europe: Prospering in the new whirled order” finds that the ability to benefit from globalisation correlates directly with the willingness and ability to embrace and keep pace with economic, commercial and technological developments. For citizens, this predominantly means learning new skills to ensure they remain employable in an economy that is rapidly transforming from industrial to post-industrial. Not all European countries are well placed to benefit from globalization, either. Those that are, according to the study are those countries that invest heavily in innovation, skills, and research & development, and which actively engage in European and global trade (Hamilton 2008).

In 2005, the OCED concluded that national governments need to respond to the enhanced locational mobility of ICT-enabled services by focusing on providing the appropriate investment climate and infrastructure, and especially education and training (including vocational training). Governments could stimulate the uptake of ICT by encouraging the wider use of electronic transactions and processes in its own transactions and across the economy. Promoting local-global partnerships would also offer an opportunity for local firms to benefit from the investment and presence of more globally-oriented foreign firms in both domestic markets and international markets.¹⁰³

According to Kirkegaard (2005) outsourcing and offshoring can help solve the productivity growth problem in Europe and may also - provided the right structural reforms are implemented - assist in solving Europe’s low employment problem. This, however, requires that offshoring and outsourcing is addressed through a mix of policy instruments rather than just being treated as a trade issue.

5.9. Conclusion – key challenges

The transformation of the global market for ICT software and services and the resulting changes in global value chains are presenting ICT practitioners, companies, policy makes and stakeholders with new challenges that need to be addressed at both policy level, sector level, and at company level.

First, a shortage of ICT practitioners in Europe could pose a serious threat to the growth and competitiveness of the European ICT sector. In 2008, the World Economic Forum concluded that leveraging ICT is an essential instrument for countries and national stakeholders to ensure continued prosperity and growth. Therefore, rapid adjustments of education and lifelong learning systems, measures to improve the image of ICT occupations, and efforts to ensure well-functioning and dynamic labour markets, are key priorities that must be addressed to ensure an adequate supply of e-skills in Europe. Policy initiatives focusing on the supply of e-skills in Europe need to take into consideration trends in the global sourcing of ICT activities, as global sourcing trends will have an impact on the future demand for e-skills – quantitatively as well as qualitatively.

Second, ensuring a high quality of the ICT workforce is a challenge for both ICT practitioners and companies. In face of skills mismatches, companies could either relocate to regions where they have access to the required skills or try to attract ICT practitioners from non-European

¹⁰³ OECD, Panel session on ICT-enabled services offshoring: country and business perspectives, 2005, <http://www.oecd.org/dataoecd/37/20/35036650.pdf>

countries. In other words, the employability of European ICT practitioners and the attractiveness of Europe as a location for companies are at risk if the ICT workforce in Europe does not succeed in upgrading its skills base to meet the current and future demand.

In order to avoid future skills mismatches, Europe needs to improve collaboration between universities and industry in relation to the development of curricula so that graduates have the right skills. To do so, policy makers and stakeholders need to monitor trends to better anticipate future skills needs.

Third, global sourcing is an opportunity for companies to increase their global competitiveness by locating specific activities in regions that provide the right business conditions such as favorable cost level, access to knowledge, a well educated workforce, and strong protection of intellectual property rights. However, not all companies are able to reap the benefits of global sourcing. Small and medium sized companies (SMEs) in particular do not have the same opportunities to offshore ICT tasks as the larger companies.

Finally, global specialisation and the development of strong European clusters is a way to promote European innovation and competitiveness. However, a range of European stakeholders and experts have criticised the European approach to clusters for fostering the development of clusters that are simply too small to be of significance. In this perspective, Europe should direct funds to only a few existing clusters with global potential rather than fostering the development of many small clusters. In addition, there is a need for measures which aim to open up the local or regional innovation system to input from other regions, and policy instruments that stimulate the integration of clusters in global knowledge networks.

Appendix 1: List of case studies

5.10. Companies

Name	Title	Organization	Country
Arne Hansen	Country manager for Denmark	Ciklum Denmark/Ukraine	Denmark
Kim Nielsen	Innovation Center Lead	Microsoft Western Europe	Denmark
David Lloyd	CTO	Moviestorm	Cambridge
Thomas Larsen	Nordic HR Officer	Shell	Denmark
Henrik Hasselbalch	Nordic Field Services Director	SAP	Denmark
Xavier Dutoit		Sydesy Ltd	France

5.11. Clusters

UK/Cambridge

Name	Title	Organization	Type of organization
David Lloyd	CTO	Moviestorm	Company
Bill Parsons And Sara Feulner	Executive Vice President - HR manager and VP Global HR Services	ARM	Company
Jack Lang	MA, Chairman of the computer lab outreach project at The University of Cambridge. MA, business angel and cofounder of Artimi Ltd	Artimi Ltd	Academia

Hungary

Name	Title	Organization	Type of organization
Attila Suhajda	President	Hungarian Outsourcing Association	Stakeholder
Tamas Klotz	Secretary General	Hungarian Informatics and Telecommunications Companies Organization	Stakeholder

Ireland

- Desk research

Kista – Sweden

- Desk research

Oulu, Finland

- Desk research

Appendix 2: List of interviewees

Policymakers

Name	Title	Organization	Country
Carlos Zorrinho	National Coordinator of Lisbon Strategy Head of Mission	Prime Minister Office	Portugal
Juoni Kangasniemi	Senior advisor	Finish Ministry of Education	Finland

Stakeholders

Name	Title	Organization	Country
Sebastiano Toffaletti	PIN-SME Secretary General	PIN-SME -The PanEuropean ICT and eBusiness Network for SMEs	Belgium
Stefan Phisterer	Dr., Bereichsleiter Bildung und Personal	BITKOM - The German Association for Information Technology, Telecommunications, and New Media	Germany
Marianne Kolding	Associate Vice President, European Services and Software	IDC	UK
Rajdeep Sahrawat		NASSCOM	India
Margaret Sambell	Head of strategy	E-skills UK	UK
Michael Caspersen	Director of it-vest at University of Aarhus	University of Aarhus and IT Vest	Denmark
Gerhard Rohde	Head of department	UNI IBITS	Switzerland
John Sarborg Pedersen	Chief consultant	ITEK - The Danish trade association for it, telecommunications, electronics, and communications enterprises.	Denmark
Peter Hagedoorn	Head of the EuroCIO Task Force on ICT Skills	EuroCIO Task Force on ICT Skills	The Netherlands
Anne Miroux	Director, Division of Investment, Technology and Enterprises	UNCTAD	Switzerland

Academia

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