



Investing in the Future of Jobs and Skills

Scenarios, implications and options in anticipation
of future skills and knowledge needs

Sector Report Post and Telecommunications



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Preface

This report presents the final results of the study Comprehensive analysis of emerging competences and economic activities in the European Union in the post and telecommunication services sector. The report is part of a series of sixteen future-oriented sector studies on innovation, skills and jobs under the same heading, commissioned by the European Commission (DG Employment, Social Affairs and Equal Opportunities). Eleven of these studies were executed by a core consortium led by TNO (Netherlands Organization for Applied Scientific Research) and consisting of TNO Innovation Policy group (Leiden, the Netherlands), TNO Labour (Hoofddorp, the Netherlands), TNO Innovation and Environment (Delft, the Netherlands, SEOR Erasmus University (Rotterdam, the Netherlands) and ZSI (Centre for Social Innovation, Vienna, Austria). The core consortium was in charge of the overall management of the study, the further elaboration and application of the overall approach and methodology, as well as data collection and analysis. This study on future skills and jobs in the post and telecoms sector has been executed by core team staff in close collaboration with A. Dieke of WIK-Consult (Bad Honnef, Germany, subcontractor post) and S. de Munck (TNO ICT Innovation Management, subcontractor telecoms) (see annex 1 for team composition).

The study was carried out during the period January 2008-May 2009. Stakeholders in the sector, including the European sectoral partners and representatives of various other organisations, have been involved in various ways and forms throughout the study. This included a sectoral kick-off meeting at the start of the study and three multisectoral stakeholder meetings in Brussels during which intermediate results of the studies were presented and discussed. Valuable workshop discussions in the frame of the project were held and inputs received from a number of experts. A draft final version of this report was validated and complemented during a second external, final workshop in Brussels on 12th and 13th February 2009. The final workshop brought together an apt mixture of different European and national sector experts representing the industry, European social partners, other various representative organizations, academia as well as the European Commission (see Annex 2 for a full list of participants). The workshop, which formed an explicit and integral part of the methodological approach, yielded a number of helpful comments and insights which have been used in further finalising the study. We express our sincere gratitude to all workshop participants and to all those that contributed to this study.

A special word of thanks holds for the European Commission, notably Jean-François Lebrun and Manuel Hubert, and Radek Owczarzak of the European Foundation for the Improvement of Living and Working Conditions who proved to be excellent guides during the project.

Delft, 1 May 2009

Dr Frans A. van der Zee (overall project leader)

1 General introduction

This report presents the final results of the study Comprehensive analysis of emerging competences and economic activities in the European Union in the post and telecom sector. The report is part of a series of sixteen future-oriented sector studies on innovation, skills and jobs under the same heading, commissioned by the European Commission (DG Employment, Social Affairs and Equal Opportunities). The study was executed by a consortium led by TNO (Netherlands Organization for Applied Scientific Research) and consisting of TNO, SEOR – a consultancy of Erasmus University (Rotterdam, the Netherlands) and ZSI (Centre for Social Innovation, Vienna, Austria). The study was carried out during the period January 2008-May 2009.

While the main focus of the study is on the future of skills and jobs by 2020, the study is both backward- and forward-looking in nature. It analyses recent relevant sector developments and trends and, at the same time, depicts the current state of play in the sector with an emphasis on innovation, skills and jobs. Current trends and developments form the stepping stone and fundament for the second and third future-oriented part of the study which is scenario-based, forward-looking and exploratory in nature.

Background and context

The study should be placed against the background of the EU's renewed Lisbon strategy in which securing and improving EU competitiveness and redeploying the European economy to new activities with more value-added and new and better jobs are key. In the process of change and restructuring to adapt to new realities, there is a need for a more strategic management of human resources, encouraging a more dynamic and future-oriented interaction between labour supply and demand. Without there is the risk that bigger shortages, gaps and mismatches of skills will result not only in structural unemployment but also hamper longer-term competitiveness.

Skills and jobs are of vital importance for the future of the European economy and have recently gained increasing attention, both at national and EU level. As stressed by the European Council in March 2008, investing in people and modernising labour markets is one of the four priority areas of the Lisbon Strategy for Growth and Jobs. The New Skills for New Jobs initiative launched in December 2008 (European Commission, 2008a) elaborates on how this could best be done. The initiative aims to enhance human capital and promote employability by upgrading skills, as well as to ensure a better match between the supply of skills and labour market demand. More transparent information on labour market trends and skills requirements, but also the removal of obstacles to the free movement of workers in the EU, including administrative barriers would help achieve this goal, and improve occupational, sector and geographical mobility. The initiative also stresses the need to improve the Union's capacity for skills assessment (by improved monitoring and forecasting), anticipation (by better orientating skills development) and matching with existing vacancies. The current financial and economic crisis makes these challenges even more pressing. Further strengthening the economic resilience and flexibility of the European economy and its Member States calls, along with other measures, for support of employment and further facilitation of labour market transitions (European Commission, 2008a:10).

Approach and methodology

The study takes a longer term future perspective, and looks ahead to 2020, but also back, and takes a highly aggregated European perspective. While it is fully acknowledged that more detailed Member State and regional analyses are important and vitally important for anticipating future skills and knowledge needs, the European perspective has been central in this analysis. Key to the study and a common point of departure was the use of a pre-defined methodological framework on innovation, skills and jobs (Rodrigues, 2007). During the course of this study this framework has been further developed, operationalised and applied to the sector. The approach combined desk research and expert knowledge available in a broad and dedicated research team with the knowledge and expertise of 'external' sector experts. The purpose of this *common uniform methodology* is to deliver results that enable comparisons across and between sectors and hence enable the preparation of possible future actions to investigate the topic of new future jobs and skills for Europe, by encouraging a more effective interaction between innovation, skills development and jobs creation. The methodology is structured along various steps, each step providing inputs and insights for next steps to come. Overall, the methodology covers the following steps:

Step 1. Identification of economic activities to be considered (i.e. sector selection)

Step 2. Main economic and employment trends and structures by sector

Step 3. Main drivers of change

Step 4. Main scenarios

Step 5. Main implications for employment – changes by job function

Step 6. Main implications for skills – emerging needs by job function

Step 7. Main strategic choices to meet future skills and knowledge needs

Step 8. Main implications for education and training

Step 9. Main recommendations

Step 10. Final Workshop.

Further and next steps

The results of this study – along with 15 other sector studies using the same approach and being released at the same time - will serve as a guide in launching further EU-led but also other actions, by industry, sectoral partners, education and training institutes and others. One important aim of the study is to promote the strategic management of human resources and to foster stronger synergies between innovation, skills and jobs in the sector in the medium and longer run, taking into account the global context and encouraging adaptations to national and regional specificities. A very important element in further enabling and facilitating these goals is sound and continuous monitoring together with a uniform and consistent way of analysing future skills and knowledge needs for the various decision-making levels involved. The approach taken in this study aims to provide a broader framework that does exactly this. Further dissemination and explanation of the methodology at the Member State, regional and local level are therefore vital in the follow-up of this EU level study, as is its actual take-up. The results of the study include implications, conclusions and recommendations to anticipate future skills and knowledge needs. It does not in any way, however, assess or evaluate current or planned policies. Conclusions and recommendations may therefore coincide but may also oppose current policies and/or policy plans at the EU, national or regional level. The implications, conclusions and recommendations logically follow from scenarios – credible plausible sector futures – meant to better structure and anticipate possible future developments.

Looking ahead in times of crisis

Even though the year 2020 may currently seem far off for most of us, the future will announce itself earlier than we think. In times of financial and economic crisis there is a logical tendency to focus on the now and tomorrow; withstanding and surviving the crisis are prime. Nevertheless, at the same time the medium and longer term ask for adequate attention. In this current age of continuing and pervasive globalisation, strong technological change and innovation affecting production and consumption around the globe, timely preparations to be able meet future skills and job needs are called for more than ever before. This is even more true in the face of an ageing European society and ditto workforce.

Contents in five parts

The report consists of five main parts. Part I analyses recent relevant sector developments and trends and depicts the current state of play in the sector, with an emphasis on innovation, skills and jobs. The findings of Part I of the report combine original data analysis using Eurostat structural business statistics and labour force survey data with results from an extensive literature review of relevant already existing studies. While giving a clear and concise overview of the most important trends and developments, the prime function of Part I is to provide the fundamentals and building blocks for Parts II (Post) and Part IV (Telecommunications) of the study. The findings of Part I are based on the present and the recent past. The following parts of the report are future-oriented and look at sectoral developments and more specifically developments in skills and jobs in and towards 2020. The core of part II and IV – which are similar in structure but relate to post and telecoms, respectively - consists of plausible future scenarios and their implications for jobs, skills and knowledge. These implications have been analysed for various job functions. In a final part III (Post) and V (Telecommunications), a range of main strategic options (‘choices’) to meet the future skills and knowledge needs is reviewed, including implications for education and training. The study concludes with a number of recommendations for the sector (individual firms, sector organizations, sectoral partners), education and training institutes and intermediary organisations, and last but not least, policy-makers at various levels, ranging from the EU to the local level. Terminology used in this report is further explained and defined in a glossary at the end of this report.

Part I

Trends, Developments and State-of-Play

Part I. Trends, Developments and State-of-Play

Guide to the reader

Part I presents the results of steps 1, 2 and 3 of the common methodology applied to the post and telecommunications sector. Step 1 delineates and defines the sector. Step 2 presents the main economic and employment trends and developments in the sector (mapping) and reports the results of a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis. Step 3 analyses the main drivers of change of relevance for the sector based on a meta-driver approach and expert opinion. Part I of the report consists of 8 chapters. Chapter 2 identifies and statistically defines the sector. Chapter 3 provides an overview of the structural characteristics of the sector, including developments and trends in employment, production and value added. It contains information on work organisation (part-time/full-time, gender, age), and industrial relations, but also on emergent trends by function. It also addresses existing partnerships for innovation, skills and jobs, one of the possible policy instruments to better prepare for and adapt to the future, facilitate mutual learning and boost innovative capacity both at the sector and firm level. While not part of the methodology as such, partnerships form an interesting example of how the development of skills and jobs can be linked to innovation. Chapter 4 discusses the value chain (network) and its evolution over time, including issues of restructuring and relocation. Chapter 5 focuses on innovation, R&D and technological change, while chapter 6 analyses the impact of globalisation and trade on and for the sector. Chapter 7 highlights the importance of regulation especially in relation to employment. Chapter 8 provides the results of a SWOT analysis of the sector. Chapter 9 concludes with an overview of the most important drivers for the sector.

2 Defining both sectors

Post and telecoms were amongst the most changing sectors of the 1990s. Historically, post and telecoms have shown considerable similarity in terms of sector characteristics. Although postal and telecommunications services represent different kinds of products, post and telecoms were in most European countries supplied by the same state monopolies until the early 1990s. Much has happened since. Both sectors have been privatised and opened up to competition following EU liberalisation law. Part of the new legislation concerned the division between post and telecommunications state monopolies.

An unprecedented pace of technological development and innovation in ICT products set the stage for post and telecoms to become fundamentally different and divergent sectors, showing different sector characteristics in terms of turnover, profit, market size, customer demand, and so on. Particularly, new ICT appliances proved to be partial substitutes for conventional mail and telephone services. The huge increase of the electronic means of personal communication, but also Internet-based applications such as e-business (B2B; B2C), e-billing, e-banking, e-government, and Internet advertising and promotion have importantly altered the post sector. Some of the physical transport involved in postal services has been replaced by digital mail and mobile services have shown a strong growth market. In the postal sector, enhanced technology has led to new products and fostered demand in some areas, most importantly for express parcels. In the mail area, substitution of correspondence (by email) was largely offset by more advertising mail (direct mail). Due to these technological developments postal services are shifting from two-way communication services to advertising and transportation services.

The telecoms sector has been characterised by even more rapid developments, driven by new technologies (Internet, computers, optic fibre networks, mobile and handheld devices), strong liberalisation, deregulation and privatisation. Strong demand for a variety of broadband enabled services such as IPTV, radio but also live streaming (TV, films, music) and VOIP has provided an important incentive to service providers to upgrade their facilities and invest in even newer technologies (fibre in the local loop, wireless and beyond) (OECD, 2009). *Convergence* is a key word in telecoms, not only in technology (the mobile phone being a prime example), but also in the blurring of boundaries between what in the past used to be different sectors. Communication media including electronic media, telecommunications media and broadcast media used to be discrete business operations providing distinct services. Broadcasting, voice telephony and on-line computer services used to be operated on different platforms: TV and radio sets, telephones and computer and were managed by different business support systems. Moreover, different broadcasting media used to be each regulated differently by different regulators. Not anymore. New companies such as eBay, Yahoo, Google and Skype have come to the fore and compete directly with incumbent telecoms providers, but telecoms providers themselves also enter into other business domains such as communication, advertising, and (new) media. Telecom media convergence is about crossing multiple industries, where no longer companies confine themselves to their 'own' traditional markets (cf. Eurescom, 2005). Fixed, mobile, and IP service providers can offer content and media services, equipment providers can offer services directly to the end user, and media/content delivery providers are continuously looking for new distribution channels. Convergence is the combination of all these different media into one operating platform, as the merger of telecom, data processing and imaging technologies. This convergence offers a new era of multimedia, in which voice, data and images are combined to render services to

the user. Convergence also shows itself at the industry level with mergers of telecoms and media & entertainment firms.

Statistically, however, telecoms is confined to wired, wireless, satellite and other telecoms activities. Data processing, hosting, web portals, other information service activities and news agency activities are not part of telecoms, but form a separate NACE category (63) in the recently adopted NACE Rev 2 classification. The same holds for publishing (58), motion picture, video and television (59), programming and broadcasting (60) and information technology service activities (e.g. programming, consultancy, computer facilities management and other IT service activities) (62 in NACE Rev 2). The statistical limitations in analysing both sectors are clear, both because of the convergence phenomenon and because of new services replacing traditional services in the course of time.

As the post and telecoms sectors nowadays differ to such a large extent, they are described and analysed separately as far as possible. In the boxes below a detailed description of both sectors is given based on the definition according to NACE Rev. 1.1. Although NACE Rev 2 is gradually been introduced as from January 2008, no time series are yet available in NACE 2. Therefore throughout this report, data used reflect NACE 1.1 data.

Telecoms – in statistical terms

Telecommunications (NACE Rev 1.1, code 64.2) includes the activities of providing telecommunications and related service activities like transmitting voice, data, text, sound and video. The transmission facilities that carry out these activities may be based on a single technology or a combination of technologies. The commonality of activities classified in this division is the transmission of content, without being involved in its creation. The breakdown in this division is based on the type of infrastructure operated: wired or wireless.

Wired telecommunications activities include operating, maintaining and providing access to facilities using a wired telecommunications infrastructure. They include:

- operating and maintaining switching and transmission facilities to provide point-to-point communications via landlines, microwave or a combination of landlines and satellite linkups;
- operating of cable distribution systems (e.g. for distribution of data and television signals);
- furnishing telegraph and other non-vocal communications using own facilities.

Wireless telecommunications activities include operating, maintaining or providing access to facilities using a wireless telecommunications infrastructure. They include:

- maintaining and operating paging as well as cellular and other wireless telecommunications networks;
- purchasing access and network capacity from owners and operators of networks and providing wireless telecommunications services (except satellite) using this capacity to businesses and households;
- provision of Internet access by the operator of the wireless infrastructure.

In both cases telecommunications resellers are excluded under Rev 1.1.

In NACE Rev 2 radio broadcasting (new code: 60.10) and television programming and television programming and broadcasting activities (ditto: 60.20) are excluded from telecoms; they used to be part of 64.2 NACE Rev 1.1. The main distinction under NACE 2 is again between wired and wireless, but additionally also satellite and other telecommunications activities. The latter include inter alia VOIP, telecoms resellers, specialised telecoms such as satellite tracking, communications telemetry and radar station operations.

Post - in statistical terms

Post (NACE Rev 1.1, code 64.1) comprises postal services ('national post activities', NACE 64.11) and other courier activities (NACE 64.12). This division includes postal and courier activities such as pickup, transport and delivery of letters and parcels (domestic and international). The activities include use of the universal service infrastructure (including retail locations, sorting and processing facilities) and carrier routes to deliver the mail. An important difference exists between companies with a universal service obligation for specific mail items such as letters and companies that have no such obligation. Universal Service Providers, or USPs, have to provide services nationwide for all customers. The other companies deliver primarily express parcels, a service that is not related to universal mail service. Three categories of companies can be distinguished: National Postal Operators (NPOs), Competitor Postal Operators (CPOs), and Other Postal Agents (OPAs). OPAs are organisation that carry out one or more activities in the postal chain without having overall responsibility for the chain. In the remainder of this study reference is made to USPs (i.e. NPOs) and express companies or CPOs.

Not included in this study (and in accordance with the sector definition based on NACE Rev 1.1) are postal giro, postal savings activities and money order activities. These activities are important as they contain 14% of revenue for the average European company (UPU, 2008). These services are included in the financial services sector. This study further excludes logistics services (freight forwarding, supply chain management etc.), which account for a substantial revenues for some of the more progressive postal operators.

3 Structural characteristics of the sector: past and present¹

3.1 Employment, production and value added trends in the EU

Employment

The EU employed about 3.3 million post and telecoms workers in 2006 (Table 3.1). A large share of them, 83%, was working in the EU-15 and this share has not changed during the last seven years. The growth in employment was modest with 1.3% in EU-15 countries and 1.5% in new Member States.

Employment winners are Germany, Ireland, United Kingdom and Slovakia. In these countries growth of employment was not less than 4.7% and the current share in EU employment is 43%. Upcoming are the new Member States Bulgaria, Czech Republic, Latvia and Poland, where growth is still higher with 5.4%. This means that in most EU-15 countries employment is declining. This is also the case in five new Member States.

Table 3.1 Employment post and telecoms, 2000-2006

	Level 2006	Annual growth	Share in EU	Change in share
EU ²	3366	1.3	100	0
EU-15	2789	1.3	83	0
NMS	577	1.5	17	0
Winning	1434	4.7	43	7
Losing momentum	717	-0.5	21	-3
Upcoming	361	5.4	11	2
Retreating	854	-2.1	25	-6
Definition	Level (*1000)	Average annual growth (%)	Share in EU employment sector (%)	Change in share in EU employment sector (%)
	2006	2000-2006	2006	2000-2006
	Concentration >100		Concentration <100	
Growth	Winning: Germany, Ireland, United Kingdom Slovakia		Upcoming: Bulgaria, Czech Republic, Latvia, Poland	
Decline	Losing momentum: Belgium, France, Denmark, Finland, Sweden		Retreating: Italy, Luxembourg, Netherlands, Greece Spain, Austria, Portugal, Estonia Lithuania, Hungary, Romania, Slovenia	

Source: Eurostat/TNO.

¹ As post and telecoms production and consumption take place locally, developments outside the European Union are not always important. Therefore, we concentrate on EU-developments and do not present extensive figures for BRIC-countries, Japan or the United States.

² Note that due to missing data the EU is an approximation of the EU-27 only. GDP and trade data was not available for Bulgaria, Romania, Cyprus, Malta and Latvia. Cyprus and Malta lacked data on employment. This applies to tables 3.1 and following. The list of winning, losing momentum, upcoming, retreating (see subsequent tables in text) indicates for which countries data was available. Throughout this report, a change in volume or absolute number between two years - e.g. the number of jobs - is measured as the *average annual growth*. Similarly, a change of a share or an index is measured as *total change* over the entire period. That is, if the share in 2000 was 10% and in 2006 15%, we report a change of share of 5%.

Figure 3.1 shows that employment in post and telecoms is normally clustered in few regions in each Member State. This uneven distribution can be explained with structural characteristics of the telecoms sector with few large firms and large administrations.

Figure 3.1 Vertical share of the post and telecoms sector in total employment by NUTS 2 region, 2006

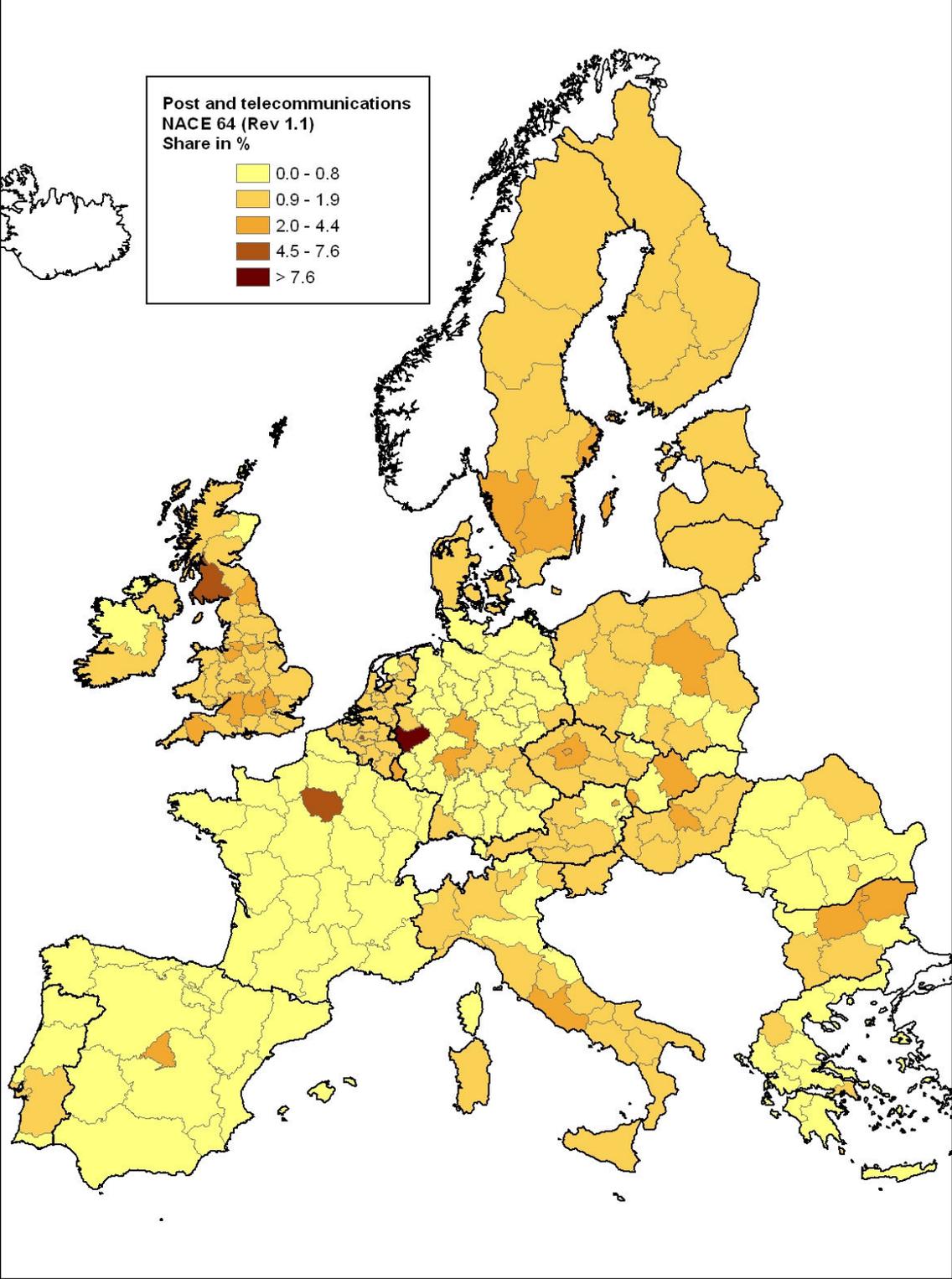
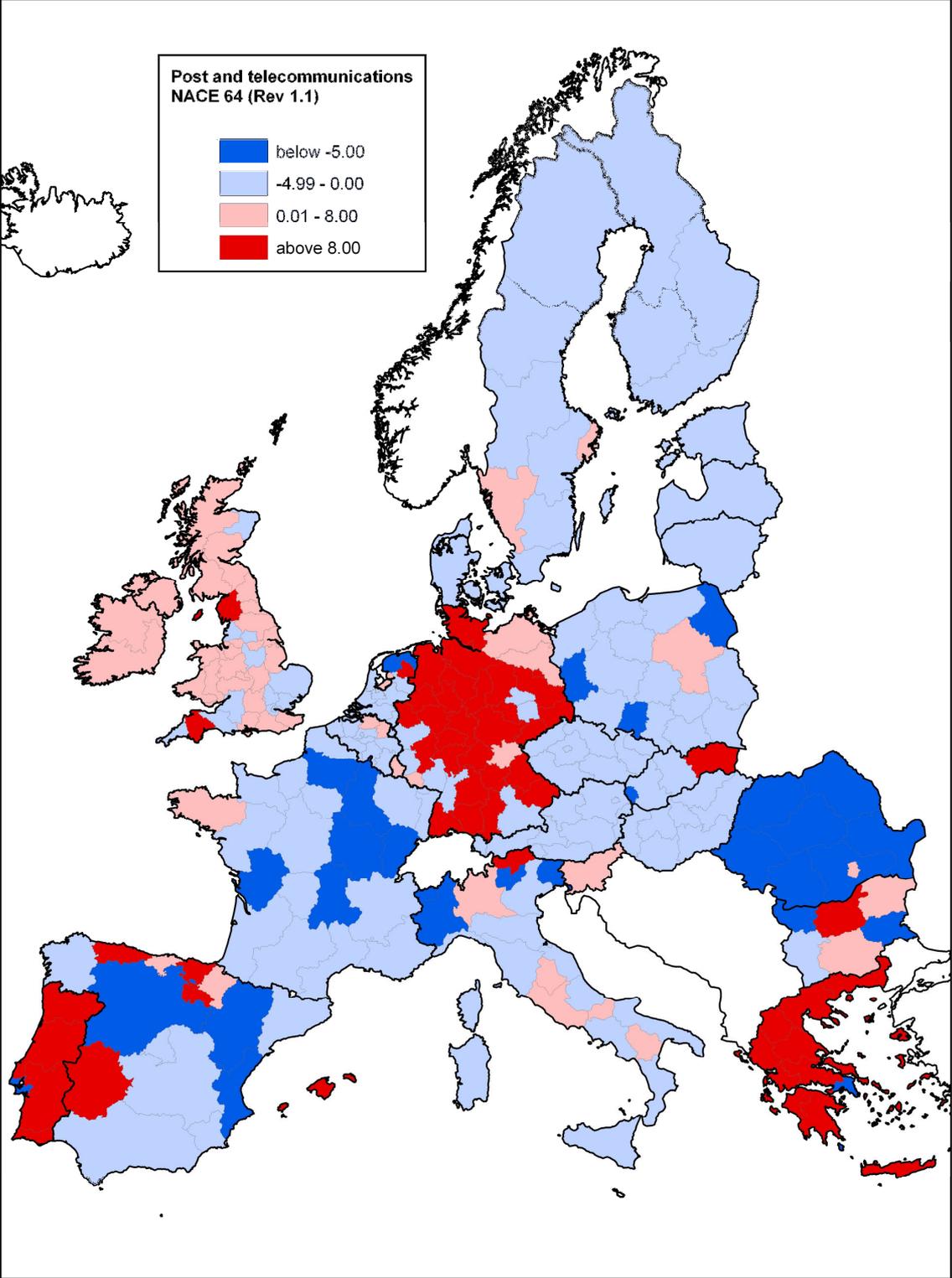


Figure 3.2 shows annual changes in employment by region in the EU between 1999 and 2005 (based on the NUTS regions). It shows that there is no clear pattern of change across regions and also that differences within some countries are very large.

Figure 3.2 Employment changes in the post and telecoms sector by region, 2000-2006 (annual changes, in %)



Box 1. Concentration index: what it is and what it measures

The concentration index assesses the relative contribution of a specific sector to the national economy compared to a greater entity, such as the EU, thereby correcting for the size of the country. In more general terms, the concentration index is a measure of comparative advantage, with changes over time revealing changes in the production structure of a country. An increase of the concentration index for a sector signifies relatively fast growth of that particular sector in the country concerned compared to the same sector in the EU.

How does the concentration index work in practice? We'll give a few examples: if sector x represents a 5% share of the German economy and a 5% share of the EU economy, the concentration index of sector x equals a 100. If sector x represents 5% of the German economy, but 10% of the EU economy, the concentration index of sector x is 50. If the same sector x represents 10% of the German economy and 5% of the EU economy, the concentration index of sector x is 200.

The concentration index concept can be applied using different indicators (variables). In our study we measure the concentration index using employment, value added and trade, in order to make a distinction between the relative performance of countries EU-wide. We distinguish between four country groupings, each signifying a different sector performance over time. If a sector in a country has a strong position (hence showing a concentration index higher than 100) and has experienced a clear index growth over the last years, the sector is defined as *winning* in that country. If the sector has a strong position, but experienced a decline of the concentration index, we say the sector is *losing momentum*. If the sector has a weak position, but gained in the past, we say that the sector in that country is *upcoming*. If the sector has a weak position and experienced a decline of the index, we say that the sector is *retreating*.

Post

About 40,000 enterprises were active in the post sector, with around 37,000 in courier and the remainder in national postal activities. Altogether, they employed 1.94 million people which equals 0.89% of overall EU employment in 2006. The bulk of employment in post and courier activities is in the EU-15 (Table 3.2).³ However, the new Member States show considerably higher growth, 1% higher than the EU-15 and also 1% higher than post and telecoms together. This is especially due to high growth in the Czech Republic and Slovakia. These countries are winning indeed. Winning countries employ 50% of the post and courier workforce. The difference in growth figures between winners and the other categories is considerable, pointing at large dynamics in employment. Although no detailed figures are available for Universal Service Providers (USPs) versus express companies and USPs provide still around two thirds of total employment in the sector, the express industry showed much higher growth rates (Rambol, 2002). From 1998 to 2003 employment in the express sector increased with 13% per year (Rambol, 2002), while the sector as a whole saw increases of only 1.7% per year.

Employment in the postal sector is a factor 1.6 higher than in telecoms (cf. Tables 3.2 and 3.3). With the observed rise in employment in post it should be noted that an increasing number of jobs is part-time based. More freelance work and flexibility are keywords in post. Moreover, the rise of employment in post so far ignores the reduction that could arise from further efficiency gains due to increased competition, and hence should be taken on board in future assessments of employment in the sector. According to BCG (2006) this potential would amount to a 30% efficiency gain, 15% of which would relate to further process optimisation and 15% to a downward effect on wages ('monopoly bonus' effect). Also

³ Note that only for employment separate figures are available for post and telecoms.

diversification in the postal sector as well as decreasing demand for traditional postal services leads to shifts and effects revenues and employment.

Table 3.2 Employment post and courier activities, 2000-2006

	Level 2006	Annual growth	Share in EU	Change in share
EU	1944	1.7	100	0
EU-15	1718	1.6	88	-1
NMS	225	2.7	12	1
Winning	966	6.2	50	11
Losing momentum	460	-1.0	24	-4
Upcoming	104	1.8	5	0
Retreating	414	-2.9	21	-7
Definition	Level (*1000)	Average annual growth (%)	Share in EU employment sector (%)	Change in share in EU employment sector (%)
	2006	2000-2006	2006	2000-2006
	Concentration >100		Concentration <100	
Growth	Winning: Germany, United Kingdom, Czech Republic, Slovakia		Upcoming: Ireland, Greece, Bulgaria, Latvia, Lithuania, Romania	
Decline	Losing momentum: Belgium, France, Luxembourg, Denmark, Finland, Sweden		Retreating: Italy, Netherlands, Spain, Austria, Portugal, Estonia, Hungary, Slovenia	

Source: Eurostat/TNO.

Table 3.3 Employment telecommunications, 2000-2006

	Level 2006	Annual growth	Share in EU	Change in share
EU	1230	0.3	100	0
EU-15	1071	0.7	87	2
NMS	159	-2.5	13	-2
Winning	438	4.9	36	8
Losing momentum	523	-1.5	43	-5
Upcoming	34	2.3	3	0
Retreating	233	-2.8	19	-4
Definition	Level (*1000)	Average annual growth (%)	Share in EU employment sector (%)	Change in share in EU employment sector (%)
	2006	2000-2006	2006	2000-2006
	Concentration >100		Concentration <100	
Growth	Winning: Germany, Netherlands, Ireland, Finland, Sweden, Bulgaria		Upcoming: Czech Republic, Estonia	
Decline	Losing momentum: Belgium, France, Denmark, Greece, United Kingdom, Romania, Slovenia, Slovakia		Retreating: Italy, Luxembourg, Spain, Austria, Portugal, Latvia, Lithuania, Hungary	

Source: Eurostat/TNO.

Telecoms

Altogether the sector accounted for about 29,000 enterprises (figures 2005), employing 1.2 million people or 0.6% of overall EU employment. New Member States (NMS) accounted for almost 13% of EU employment. On average employment growth figures are low and almost down to zero in telecoms, with only a few exceptions (see Table 3.3)⁴. The largest difference is visible in the new Member States, where employment has been decreasing strongly. Only 36% of employment in telecoms is in winning countries, whereas only 3% is in upcoming countries. This appears to be a consequence of the stagnant employment development in the EU with only 0.3% annual growth average. Again, there appears to be a lot of dynamics in the sector looking at the difference in growth figures between winning countries and the other categories. The telecoms dynamics differ from the postal sector as only nine countries are in the same country groupings when both sectors are compared.

Value added and production

The development of value added has been more positive than employment and overall GDP developments for all country groupings (Table 3.4). For the EU value added for the sector grew by 5.6% per year between 1995 and 2006.⁵ For the overall economy, this figure was only 2.3%. Note that the increase in revenues and value added is mostly related to *new* services (diversification), both in post and in telecoms, as the demand for traditional services has significantly decreased.

Table 3.4 Value added post and telecoms and overall economy, 1995-2006

	Sector				Overall economy			
	Level 2006	95-00	00-06	95-06	Level 2006	95-00	00-06	95-06
EU	307	6.2	5.1	5.6	11469	2.8	2.0	2.3
EU-15	286	6.1	4.8	5.4	10883	2.8	1.9	2.3
NMS	21	9.4	9.8	9.6	586	2.7	3.7	3.2
Winning	119	10.9	6.5	8.5	3589	3.4	2.4	2.9
Losing momentum	16	4.8	3.6	4.2	519	2.8	2.8	2.8
Upcoming	86	7.4	6.2	6.8	3272	2.0	1.3	1.6
Retreating	85	1.5	2.7	2.1	4056	2.9	1.9	2.4
Definition	Value added	Annual average growth			GDP	Annual average growth		
	Billion euro	%	%	%	Billion euro	%	%	%
	2006	1995-2000	2000-2006	1995-2006	2006	1995-2000	2000-2006	1995-2006
	Concentration >100				Concentration <100			
Growth	Winning: Netherlands, Denmark, Finland, Greece, Portugal, United Kingdom, Czech Republic, Poland				Upcoming: France, Italy			
Decline	Losing momentum: Belgium, Estonia, Hungary, Lithuania, Slovenia, Slovakia				Retreating: Germany, Austria, Ireland, Spain, Sweden			

⁴ Note that according to (non-comparable) figures by ETNO/IDATE, employment in telcos has been steadily decreasing in the EU-27, from 1,094 thousand in 2001 to 987 thousand in 2007.

⁵ Note that 'raw' value added Eurostat data are not available for post and telecoms as separate sectors. Most recent Eurostat data for telecoms refers to 2005, published in Eurostat (2008).

Source: Eurostat/TNO.

Developments in the new Member States were even faster, with 9.6% on average per year for the sector and 3.2% overall. EU-15 countries and winner countries respectively include the bulk of value added. Remarkable is the fact that Germany is among the retreating countries, whereas other large Member States like the United Kingdom and France are winning or upcoming. Poland and the Czech Republic are among the winner countries. However, even retreating countries show growth of 2.1% on average per year. This figure is a lot lower than the average of 8.6% growth per year for winning countries or 6.8% for upcoming countries, but still positive.

Table 3.5 Value added post and telecommunications, 1995-2006

	Share in country		Share in EU		Concentration index	
	Level	Change	Level	Change	Level	Change
EU	2.6	0.7	100	0	100	0
EU-15	2.6	0.6	94	-2	99	-1
NMS	3.3	1.4	6	2	127	27
Winning	3.2	1.3	38	9	122	23
Losing momentum	3.0	0.3	5	-1	114	-22
Upcoming	2.5	0.9	27	3	95	13
Retreating	2.2	0.0	29	-10	82	-30
Definition	Share in national GDP	Total change in share	Share in value added sector EU	Total change in share	Share in country divided by share in EU	Total change in index
	2006	1995-2006	2006	1995-2006	2006	1995-2006

Source: Eurostat/TNO.

The new Member States feature a relatively high concentration of value added in the post and telecommunications sector, however the share of value added of these countries in the EU total is small (Table 3.5). Still, the share of value added has grown double as fast in the new Member States compared to the EU-15. Winning and upcoming countries feature increasing valued added shares over the 1995-2006 period whereas losing momentum and retreating countries show declining shares.

Post

In the postal sector for universal service providers (USPs), the main providers of postal services, the EU showed less growth than the world average between 1995 and 2000, but much higher growth between 2000 and 2006 (Table 3.6). The USA and especially Japan saw a decline in this period. The BRIC countries all showed high growth in the first or second period. The express industry, the main competitors of USPs after liberalisation, is one of Europe's fastest growing sectors. Turnover grew from € 20 billion in 1998 to € 35 billion in 2003, an increase of 12% per year. Although still small compared with the old Member States, it is expanding particularly rapidly in the new Member States. Total turnover was € 0.5 billion in 2003 in these countries, five times higher than in 1998.

In the period from 2004 to 2006 mail volumes grew by 6.5% on average in the new Member States compared to an average growth of 1.5% in the other fifteen Member States. The postal market is continuing to evolve towards a one way distribution market with business originating mail accounting on average for 85% of total mail volumes (European Commission, 2008b). It is expected that Member States with a less developed mail market

will continue to grow substantively, with a marked growth potential in particular relating to direct mail as quality of service levels improve. In Member States with mature postal markets the situation is different. Some of these Member States can still achieve moderate growth rates whereas other Member States (e.g. the UK and the Netherlands) have already experienced declining addressed mail volumes in recent years (European Commission, 2008b).

Table 3.6 makes clear that USPs moved also towards other services as for several countries high growth in operating revenue is combined with decreasing letters and parcels (see also section 4). The number of international mail item (parcels and letters) sent through USPs declined worldwide, but not in Brazil, Russia and the USA. Domestic letter post is growing worldwide, but not in China, India, Japan and Russia. In terms of size, the EU and the USA provide almost 75% of the worldwide domestic letter post.

Table 3.6 Universal Service Providers in the EU, BRIC, USA and Japan

	Growth operating revenue (%)		Growth international letters and parcels (%)	Growth domestic letter post (%)	Letter post in worldwide post (%)	
	1995-2000	2000-2006			1995-2006	1995-2006
EU	20	91	-20	21	27	
Brazil	21	94	76	45	2	
China	162	9	-71	-9	2	
India	48	141	-27	-16	1	
Japan	4	-59	-35	-8	5	
Russia	-20	194	3	-86	<1	
USA	36	-3	19	13	47	
World	30	21	-30	9	100	

Source: UPU (2008).

Table 3.7 Revenue of public telecoms companies in bn euro, 1999-2005

	1999	2001	2003	2005	Annual growth	Share in total 2005
Australia	11	10	13	18	10%	3%
Canada	13	14	16	18	7%	3%
Japan	95	105	93	103	1%	15%
Korea	11	14	16	25	23%	4%
Mexico	8	11	11	14	15%	2%
New Zealand	1	1	2	4	29%	1%
United States	192	223	227	240	4%	34%
EU	150	162	222	264	13%	38%
OECD	486	545	610	697*	7%	100%

Source: OECD Telecom database, euro's calculated from dollars using rate of 1.5 dollar per euro.

Telecoms

Total value added in the EU-27 amounted to €190.3 bn in 2005, with the UK €37.3 bn), Germany (€33.7 bn), France (€25.3), Italy (€22.9 bn) and Spain (€17.0 bn) accounting for the top-5 of revenue and value added generators (Eurostat, 2008a). In terms of value added, the

top-5 accounted thus for almost 72% of the total. The major public telecoms companies have seen an increase in revenue in the last years all over the world (see Table 3.7). The revenue of an estimated €264 bn for public telcos has to be seen in relation to the overall revenue in telecoms in the EU-27, which amounted to €421.2 bn in 2005 (Eurostat, 2008a). In total about 29,000 companies were active in the telecoms sector (ibidem). Growth for public companies in the EU marked 13 %, which is high compared to Japan (1%) and the USA (4%). However, countries like Korea and New Zealand show much higher growth rates. It should be noted, however, that comparable rates are shown in new markets like Poland and Slovakia. Since Japan, and the USA make up almost half (49%) of the OECD total, their lower rates have a high impact on the OECD total. The EU-25 accounts for 38% of the OECD total.

In terms of turnover, the period 2000-2006 was characterised by uninterrupted growth (from 100 to 145 in index terms), with very strong growth in the beginning of the period, slowing down in 2005-2006 already. The financial and economic crisis further changes this overall picture. Most recent information indicates that overall growth in the telecoms industry's revenue in 2008 amounted to 1.3% (European Commission, 2009). Overall the cluster TV, radio and communications as a whole had decreased by 3.5-4% in output during the period November 2007-November 2008, which is little compared to other sectors. Mobile operators seem to be better placed than fixed operators to weather the economic storm. Due to greater flexibility in cost structure, capital expenditure (capex) and fixed-mobile substitution being potentially sped up (ITU, 2009:10). The demand for basic ICT services such as mobile phones and Internet access has become more income-inelastic and therefore less affected, but demand for advanced applications is more uncertain. Rising unemployment may though accelerate fixed-mobile substitution, with consumers preferring to switch fully to mobile services. Young people may delay decisions to adopt a fixed broadband or voice line in addition to mobile service (Analysys Mason, in ITU, 2009:752). For voice services, fixed-mobile substitution is a 'one-way street' and fixed operators cannot hope to regain lost customers, when the economy improves. Pockets of growth within the downturn also remain: new computing products (like netbooks), telecom handsets (smartphones), software categories (Software as a Service or SaaS) and media niches (WiFi radio) show positive revenue momentum, even while the broader industry is contracting (ITU, 2009:53).

Trade

Export in the EU-15 countries is more than twenty-five fold that of the new Member States (Table 3.8). In the EU-15 exports have been growing at remarkably high rates of over 10% annually whereas decline occurred in the new Member States. Even in the EU-15, however, exports are only 11% of total value added. Still, export and shares develop positively in all country groupings.

The EU-15 represents by far the largest share of EU imports (Table 3.9). As well, growth in imports has been much higher in the EU-15 than in the new Member States. Growth is also higher than for exports. The new Member States did not perform poorly with 4% average growth per year, however the EU-15 showed over 11% growth.

The EU has on aggregate a negative trade balance; imports exceed exports (Table 3.10). This observation is true for the EU-15 and the new Member States as well, although less negative for the new Member States. However, for the EU-15 the trade balance improved between 1995 and 2006, whereas for the new Member States it decreased. Behind the fairly modest aggregate figures considerable differences per Member States are revealed. For example the

winning countries saw their aggregate trade balances improve by almost €5 bn, whereas the retreating countries faced a decline of nearly €4 bn.

Table 3.8 Exports post and telecoms, 1995-2006

	Level	Change	Share	Change
EU	33958	12.0	11	4
EU-15	32678	13.5	11	5
NMS	1280	-2.3	6	-11
Winning	14616	17.1	18	10
Losing momentum	4954	9.4	17	6
Upcoming	6658	22.7	8	5
Retreating	7730	4.7	7	0
Definition	Export in million euro 2006	Annual change % 1995-2006	Exports divided by value added (%) 2006	Total change % 1995-2006
	Concentration >100	Concentration <100		
Growth	Winning: Luxemburg, Netherlands, Ireland, United Kingdom, Estonia	Upcoming: France, Italy, Slovenia		
Decline	Losing momentum: Belgium, Greece, Portugal, Sweden	Retreating: Germany, Austria, Denmark, Finland, Spain, Czech Republic, Hungary, Lithuania, Poland, Slovakia		

Source: Eurostat/TNO.

Table 3.9 Imports post and telecoms, 1995-2006

	Level	Change
EU	36097	11.4
EU-15	34577	11.9
NMS	1520	4.1
Winning	13549	19.2
Losing momentum	14322	8.3
Upcoming	4954	19.6
Retreating	3272	3.1
Definition	Imports in million euro, 2006	Annual change (%), 1995-2006
	Concentration >100	Concentration <100
Growth	Winning: Belgium, Italy, Luxemburg, Netherlands, Ireland, Estonia, Slovenia	Upcoming: France, Spain, Hungary
Decline	Losing momentum: Germany, Sweden, United Kingdom	Retreating: Austria, Denmark, Finland, Greece, Portugal, Czech Republic, Lithuania, Poland, Slovakia

Source: Eurostat/TNO.

Table 3.10 Trade balance post and telecoms, 1995-2006

	Trade balance	Change
EU	-2139	416
EU-15	-1899	1222
NMS	-240	-806
Winning	5302	4964
Losing momentum	306	-632
Upcoming	0	0
Retreating	-7747	-3916
Definition	Exports - imports in million euro, 2006	Total absolute change, 1995-2006

Source: Eurostat/TNO.

The revealed comparative advantage shows the relative contribution of sectors to the trade balance of Member States. This is done by dividing exports relative to the imports of the sector by the exports relative to the imports for the country as a whole. This means that if the country exports more than it imports, the sector can only have revealed comparative advantage if the share of exports to imports exceeds that of the country as a whole. Positive scores can vary between 0 and 100 and indicate that the sector has a strong contribution to comparative advantage than other sectors (measured as the influence on the trade balance).

Negative scores can vary between 0 and -100. They indicate that the sector exerts a less than proportional influence on the trade balance and hence has comparatively low advantage. Rising shares mean that the export share (compared to imports) of the sector rises faster than it does for the country as a whole.

For the EU as a whole, revealed comparative advantage was negative in 2006 (Table 3.11). This is not surprising since the trade balance was negative. If we measure revealed comparative advantage over the 1995-2006 period, the EU has apparently improved. More notably, the EU-15 have increased their revealed comparative advantage over the new Member States. Indeed, of the new Member States only Slovakia is among the winners. Interestingly, the losing momentum countries featured a positive revealed comparative advantage in 2006. These countries include Belgium, Luxembourg, Estonia, Lithuania and Poland. Both the losing momentum and retreating countries (among which, again, Germany) show decreasing revealed comparative advantage between 1995 and 2006.

Conclusions

Three major conclusions can be drawn from this analysis:

- Employment increases in some country, but decreases in other countries. Large differences are present between EU countries. Growth for employment in post is much higher than for telecoms.
- More homogenous developments are visible in value added. All countries show positive growth rates, but the magnitude of growth differs significantly.
- Exports and imports are dominated by the EU-15. The EU as a whole has larger imports than exports. However, this difference is decreasing over time.

Table 3.11 Revealed comparative advantage post and telecommunications, 1995-2006

	Level	Change
EU	-7	8
EU-15	-6	18
NMS	-16	-69
Winning	26	43
Losing momentum	33	-38
Upcoming	-46	20
Retreating	-58	-23
Definition	Exports/ imports sector divided by exports/ imports total economy	Total absolute change 1995-2006
Growth	Winning: France, Netherlands, Austria, Finland, Greece, Ireland, Portugal, United Kingdom, Slovakia	Upcoming: Italy
Decline	Losing momentum: Belgium, Luxemburg, Estonia, Lithuania, Poland	Retreating: Germany, Denmark, Spain, Sweden, Czech Republic, Hungary, Slovenia

Source: Eurostat/TNO.

3.2 Employment structure and work organisation

Firm size

The majority of firms (over 97%) in the EU employ less than 50 persons (Table 3.12). Almost 2% of firms has between 50 and 249 employees, whereas, almost 1% has over 250 employees. The shares are very much the same between country groupings.

For the EU, the share of companies with less than 50 employees has decreased between 1999 and 2006. This is due to development in the EU-15, showing a decrease by 0.8%. By contrast, companies with less than 50 employees in the new Member States saw their share increase by 1.1%. This increase is mainly due to a decrease of 1.7% in the share of companies with 50-249 employees. Winning and upcoming countries generally feature decreasing shares of companies with less than 50 employees and a rise mainly in companies with 50-249 employees. Losing momentum and retreating countries show the opposite: more companies with less than 50 employees, less companies with over 50 employees. The decrease is largest in companies with 50-249 employees.

It should be noted, however, that the share of employees working for large companies is very high in the post and telecoms sector. Especially for post, many very small companies exist, primarily in parcels. Only 7.7% of all employees were employed in small companies in 2006, and another 4.8% in medium-sized companies. However, employment in large companies has been decreasing substantially, with 4.7 percentage points over the period 1999-2006. This is in line with the emergence of new competitors in both sectors.

Table 3.12 Post and telecoms: firms by firm size, and employment by firm size, 2006 and period 1999-2006

Firms by firm size (shares, in %)						
	Share of firms with employees			Share change		
	<50	50-249	>250	<50	50-249	>250
EU	97.3	1.8	0.9	-0.6	0.5	0.1
EU-15	97.2	1.9	0.9	-0.8	0.6	0.2
NMS	97.8	1.5	0.7	1.1	-1.7	-0.4
Winning	96.1	2.7	1.2	-2.0	1.6	0.4
Losing momentum	97.6	1.5	0.9	0.4	-0.3	-0.1
Upcoming	97.4	1.8	0.7	-1.1	0.7	0.4
Retreating	97.9	1.5	0.7	0.7	-0.6	-0.2

Employment by firm size (shares, in %)						
	Share of firms with employees			Share change		
	<50	50-249	>250	<50	50-249	>250
EU	7.7	4.8	87.5	2.5	2.3	-4.7
EU-15	7.7	5.0	87.3	2.2	2.4	-4.6
NMS	7.8	3.7	88.5	4.3	1.3	-5.6

Note: Country groupings are based on employment (Table 3.1). Source: Eurostat/TNO.

Gender

Employment was dominated by males in post and telecoms in the EU, 39% of employment consisted of women. However, in the new Member States about 53% of employment was done by women. Interestingly, the share of women has risen between 2000 and 2006 in the EU-15, but decreased in the new Member States.

Ageing

In general the workforce within the postal and telecoms sector is aging, especially in the EU-15 (Table 3.13). While shares are currently more or less similar between the old and new Member States, ageing seems to be a larger problem for the old Member States. Not only is the share of younger workers somewhat higher in the new Member States, the change is positive for these countries and negative for the old Member States. New companies on average also have a younger workforce than the old incumbent companies.

Education

Employment in post and telecoms is dominated by mid educated workers. This is even higher in the new Member States, where only 4% of employment consists of low educated workers. In both new and old Member States a decrease can be observed in low and mid educated workers, while the share of high educated workers increased. Most of the low-educated workers appear to have already left the telecoms sector. Still, the share of high educated workers is 4% lower than for the whole economy in the EU-15 and 7% lower in the new Member States.

Table 3.13 Employment by gender, age and education in post and telecoms, 2000-2006

	EU		EU-15		NMS	
	Level %	Total change %	Level %	Total change %	Level %	Total change %
	2006	2000-2006	2006	2000-2006	2006	2000-2006
Women	39	1	36	0	53	-4
Age < 40	48	-4	48	-4	54	3
Age 40 – 50	30	0	30	0	27	-4
Age > 50	22	4	22	4	19	1
Low education	21	-4	25	-2	4	-4
Mid education	57	2	52	-1	71	-5
High education	22	2	23	3	25	9
Definition	Level %	Total change %	Level %	Total change %	Level %	Total change %
	2006	2000-2006	2006	2000-2006	2006	2000-2006

Source: Alphametrics/Eurostat/TNO.

3.3 Employment - main trends by job function

One of the most interesting indicators for analysing the future on jobs and skills is the trends and developments that can be identified at the (micro) level of job functions. More than aggregate employment and more than figures about gender and age distribution can changes in job functions tell us something about ongoing change and restructuring in the sector. Changes in (the need for) competences and changes in the distribution of job functions are closely linked to each other, both at the level of the sector and at the level of the firm. Competences are combined in occupation profiles, and can be distinguished in core competences, specialization competences or complementary competences (Rodrigues, 2007:34). Another distinction is between theoretical, technical and social competences (i.e. knowledge, skills and competences in ECVET) (ibidem). Identifying the changes in job functions by sector is a first step towards a better understanding of the changing competence needs in the sector. Competences for the purpose of this study are assumed to be located in a general grid defined by the main occupation functions: general management, marketing, financial and administrative management, R&D, logistics, production management, production, quality and maintenance (Rodrigues, 2007:35).

As a first step towards identifying trends in competences, the observed changes in the distribution of job functions over time will be analysed, using Labour Force Survey (LFS) data.⁶ In the second part (the scenario-based future-oriented part), a further elaboration of these changes on the need for new and existing competences will be provided. The analysis starts with an analysis of the state-of-play, i.e. the situation as per 2006. Subsequently, changes in job functions over time are discussed, in general (overall) and for different categories of workers classified according to educational level.

Clerks are the largest group workers in the post and telecommunications sector (Table 3.14 and 3.15). Their relative numbers are somewhat larger in the new Member States than in the EU-15. The second most important occupation is that of other professionals, followed by elementary occupations. This last type of occupation shows many more employees in the new Member States than in the EU-15. Winning and upcoming countries have more managers in the sector than the losing momentum and retreating countries. Winner countries have relatively large shares of craft workers and elementary occupations as well. In return they have relatively small shares of clerks and service workers. Still, clerks account for over one

⁶ Data on occupational structure follow the availability of overall employment figures presented earlier.

third of the workforce in winning countries. The other categories of countries show less differences with the general picture.

Table 3.14 Employment level by occupation post and telecoms, 2006 (*1000)

	EU-15	NMS	EU	Winning	Losing momentum	Upcoming	Retreating
Total	2789	577	3366	1434	717	361	854
Managers	243	54	298	146	50	39	54
Engineers	210	52	262	99	59	32	70
Other professionals	471	106	577	181	161	69	159
Clerks	1121	269	1390	514	342	165	383
Service workers	64	20	84	17	21	9	27
Electronic equipment mechanics	146	28	173	90	16	17	49
Craft workers, plant operators, drivers	195	27	222	144	36	18	40
Elementary occupations	339	21	360	244	32	12	72

Note: Country groupings are based on employment (Table 3.1). Source: Eurostat/TNO

Table 3.15 Occupation shares post and telecoms, 2006

	EU-15	NMS	EU	Winning	Losing momentum	Upcoming	Retreating
Total	100	100	100	100	100	100	100
Managers	9	9	9	10	7	11	6
Engineers	8	9	8	7	8	9	8
Other professionals	17	18	17	13	23	19	19
Clerks	40	47	41	36	48	46	45
Service workers	2	3	2	1	3	3	3
Electronic equipment mechanics	5	5	5	6	2	5	6
Craft workers, plant operators, drivers	7	5	7	10	5	5	5
Elementary occupations	12	4	11	17	4	3	8

Note: Country groupings are based on employment (Table 3.1). Source: Eurostat/TNO

Table 3.16 Changes in occupation shares employees, 2000-2006

	EU-15	NMS	EU	Winning	Losing momentum	Upcoming	Retreating
Total	1	2	1	-1	2	3	1
Managers	-2	1	-2	0	-3	-2	-2
Engineers	1	4	1	1	0	3	3
Other professionals	-8	4	-6	-11	-3	10	-3
Clerks	1	2	1	-1	2	0	2
Service workers	-2	-4	-2	-3	0	-4	-2
Electronic equipment mechanics	2	-5	1	3	1	-2	-1
Craft workers, plant operators, drivers	7	-3	6	12	1	-7	3
Elementary occupations	1	2	1	-1	2	3	1

Note: Country groupings are based on employment (Table 3.1). Source: Eurostat/TNO

Table 3.16 shows the change in occupation shares between 2000 and 2006. The most obvious change is the decline in other professionals and the rise in craft workers in the EU-15. In the new Member States the opposite change is visible. Service workers declined in relative numbers for both the EU-15 and the new Member States. A clear development among winning countries is a rapid decline in other professionals (-11%) and a rapid increase in craft workers (12%). Surprisingly, upcoming countries show exact the opposite trend, namely declining numbers of craft workers and rapidly increasing numbers of other professionals. Both winning and upcoming countries show decreases in service workers. Losing momentum and retreating countries show less dynamics in occupations than winner and upcoming countries.

Occupations and education level

Looking at low educated employees, the number of total low educated occupations is shrinking with 3% between 2000 and 2006 (Table 3.17). In new Member States this decrease is larger than in the EU-15. Throughout the EU clerks show the largest decline, followed by elementary occupations (even 19% for the new Member States). Only service workers and craft workers show an increase.

Table 3.17 Changes in occupation shares low educated employees, 2000-2006

	EU-15	NMS	EU	Winning	Losing momentum	Upcoming	Retreating
Managers	-3	-1	-3	-4	-6	-2	4
Engineers	-3	0	-3	1	-2	0	-7
Other professionals	-3	-3	-4	-11	-3	0	-4
Clerks	-5	-5	-6	-11	-3	-6	-4
Service workers	7	4	5	1	-1	-4	10
Electronic equipment mechanics	-4	-2	-3	0	-15	0	-7
Craft workers, plant operators, drivers	2	1	5	-4	15	0	11
Elementary occupations	-6	-19	-4	0	-3	-16	-15
Total	-2	-4	-3	-2	-3	-5	-3

Note: Country groupings are based on employment (Table 3.1). Source: Eurostat/TNO

Moreover, among the low educated workforce in winning countries the share of clerks is rapidly declining (-11%). The number of managers declined by 4% among the low educated in winning countries. Upcoming, but also retreating, countries show a large decline in elementary occupations for low educated persons. Winning and upcoming countries hardly have occupations for low educated employees that show increases, although the total decrease is the lowest for winning countries. For losing momentum countries these are few decreasing shares too. However, for these countries there is a large increases in low educated craft workers. In retreating countries both craft workers and service workers show increased occupancy in post and telecommunications among the low educated.

For the middle educated workforce, we see a overall decline in the EU (Table 3.18). This decline is much larger in the new Member States compared with the EU-15. Engineers (-20%) and other professionals (-14%) are the occupations that decline the fastest in the new Member States. Only in winning countries an increase in mid educated workers is visible at the total occupational level.

A large decrease in engineering occupations can be observed for the EU as a whole. There are declining shares for other professionals, service workers and craft workers as well. The share of mid educated elementary occupations in the new Member States, by contrast, increased by 17%. For the EU-15 less dramatic changes can be observed. The largest decline is in engineers followed by service workers. Increases among the middle educated EU-15 workers can be observed for managers, clerks, electronic equipment mechanics and elementary occupations. Among winner countries, notably managers and clerks are growing occupations among middle educated employees. Other professions grow too. Elementary occupations declined somewhat between 2000 and 2006. In upcoming countries engineers and other professions declined both by 20%. Service work occupations decreased by 13%. An increase of similar size (13%) was observed in elementary occupations. Retreating countries saw declines in engineers and craft workers, and an increase in elementary occupations.

Table 3.18 Changes in occupation shares mid-educated employees, 2000-2006

	EU-15	NMS	EU	Winning	Losing momentum	Upcoming	Retreating
Managers	4	-5	3	7	-3	-3	1
Engineers	-9	-20	-10	2	-12	-20	-11
Other professionals	-1	-14	-2	5	-3	-20	-1
Clerks	2	0	3	11	0	-2	1
Service workers	-6	9	-3	1	-3	-13	5
Electronic equipment mechanics	2	4	2	4	15	0	4
Craft workers, plant operators, drivers	-3	1	-6	3	-20	3	-15
Elementary occupations	3	17	2	-2	6	13	11
Total	-1	-6	-1	4	-3	-6	-1

Note: Country groupings are based on employment (Table 3.1). Source: Eurostat/TNO.

The general picture for the EU high educated employees in the post and telecommunications sector is one of increase in occupations (Table 3.19). In the new Member States this increase was larger than in the EU-15 (10% versus 3%). The largest increase was in engineering, followed by other professionals, particularly in the new Member States. The new Member States observed an increase in occupations for high educated managers and clerks as well. Especially service workers were declining in these countries.

Winning countries showed a general decline in high educated occupations (-2%), while the other three groupings showed increases. Only in elementary occupations winners showed an increase. The other categories showed large increases in engineers and, to a lesser extent, for other professionals. Service workers saw an increase of 17% in upcoming countries, whereas this occupations numbers declined by 15% in retreating countries. In total the largest increase in high educated occupations took place in upcoming countries (11% growth).

Table 3.19 Changes in occupation shares high educated employees, 2000-2006

	EU-15	NMS	EU	Winning	Losing momentum	Upcoming	Retreating
Managers	-1	6	0	-3	9	5	-5
Engineers	12	19	13	-3	14	20	18
Other professionals	4	16	6	-4	6	20	5
Clerks	3	5	3	0	3	8	3
Service workers	-1	-12	-2	-2	4	17	-15
Electronic equipment mechanics	2	-2	1	-4	-1	0	3
Craft workers, plant operators, drivers	1	-2	1	0	5	-3	3
Elementary occupations	2	2	2	2	-2	3	4
Total	3	10	4	-2	5	11	4

Note: Country groupings are based on employment (Table 3.1). Source: Eurostat/TNO.

3.4 Productivity and labour costs

The wage adjusted labour productivity of the sector post and courier activities was only 18% higher than the average personnel costs (Table 3.20). This is considerably below the non-financial business economy average, which is 48% higher than average personnel costs. In contrast, the wage adjusted labour productivity of the telecommunications sector was well above the non-financial business economy average, namely 321%. The large difference in the ratios of these two sectors is mainly attributable to the difference in apparent labour productivity. Labour productivity of the telecommunications sector is much higher (157.400 euro) than the apparent labour productivity of the sector post and courier activities (31.900 euro). While labour productivity is nearly five times as high, average personnel costs is 'only' 80% higher in telecoms. According to data from ETNO (2008) labour productivity had risen further to 305,000 euro for the EU-27 in 2007 (starting at 267,000 euro in 2004, note that ETNO data is not fully comparable with Eurostat).

Table 3.21 gives figures per country for both labour cost and productivity, with figures available relating to both sectors (post and telecoms) together. Labour productivity is much higher in the new Member States with a value of 103 thousand euro per worker versus 37 thousand euro. Average personnel costs are, however, much lower. This results in a wage adjusted labour productivity that is even higher in the new Member States. Only seven EU-15 countries have a wage adjusted labour productivity that is higher than the new Member State with the lowest productivity. Differences between Member States are very large. Latvia has the highest productivity with a value that is more than three times higher than Sweden, which has the lowest productivity.

Table 3.20 Labour productivity, 2004

	Apparent labour productivity (in k€)	Average personnel costs (in k€)	Wage adjusted labour productivity (in %)
Post and courier activities	31.9	26.9	118
Telecommunications	157.4	49.0	321

Source: Eurostat (2008c).

3.5 Industrial relations

Post

The employees in firms with a universal service obligation (USPs) are represented by unions in most countries. The number of unions differs for each country and in some countries unions have been set up following recent reorganisations. In Belgium, Cyprus, Estonia and Luxembourg various private and public labour unions are active, sometimes leading to disputes and competition. In other countries, such as France, Germany, Italy and the Netherlands, small, autonomous, craft or occupation-based unions were formed to protect the interests of specific groups of workers during reorganisation phases. This in addition to the sectoral unions affiliated to the national federations. In general, the number of active unions is high. Courier services, however, do not have specific unions in most European countries but sometimes agreements are made with unions from related sectors (e.g. freight forwarding). Exceptions are Belgium and Austria, where small sectoral organisations are active. In the Czech Republic, Latvia and Lithuania a single union exists for both sectors (EIRO, 2007a). Sometimes, post and telecommunications may be organised in combination with newspapers and other media, such as in Czech Republic and Estonia (EIRO, 2007b).

Table 3.21 Labour productivity post and telecoms by country, 2004

	Apparent labour productivity (in k€)	Average personnel costs (in k€)	Wage adjusted labour productivity (in %)
EU	74	28	263
EU-15	103	41	253
NMS	37	12	301
Sweden	69	48	145
Denmark	71	41	173
France	83	46	181
United Kingdom	88	46	193
Finland	67	33	202
Austria	84	41	204
Belgium	92	45	205
Germany	84	37	227
Netherlands	94	35	269
Italy	113	39	288
Portugal	110	34	328
Spain	110	32	339
Luxembourg	214	55	393
Ireland	165	40	417
Slovenia	51	24	216
Hungary	37	15	255
Czech Republic	34	12	289
Cyprus	102	34	302
Romania	19	6	302
Slovakia	27	9	304
Poland	36	11	323
Lithuania	23	7	340
Estonia	36	9	388
Bulgaria	17	4	414
Latvia	29	6	457

Source: Eurostat (2007c).

Employer organisations have emerged within the postal services sector in only some countries, notably France, Czech Republic, Finland, France, Slovenia and Slovakia. In

Denmark, Estonia, Finland, Ireland, Italy, Latvia, Poland, Slovakia and Slovenia postal companies have joined other private employer organisations (EIRO, 2007a).

Europe's employers federation PostEurop and trade union UNI-Europa Postal are actively engaged in the European Social Dialogue Committee of the Postal Sector (e.g. ILO, 2009; Post Social Dialogue, 2006) (see www.postsocialdialog.org).

The change of state owned to public limited companies resulted in a shift from public law employment contracts to private law contracts and collective bargaining coverage. In some countries, employees who have been working in the sector before privatisation have retained their public law contracts, while new employees receive the new contracts. In Belgium, Cyprus, Germany, Malta, Denmark, Luxembourg and Austria this is the case. In other countries the contracts are similar to private company contracts, although in some cases employees were able to keep some of the benefits they enjoyed in public contracts, such as pension schemes (EIRO, 2007a).

Changes in employee contracts to private law have altered industrial relations, for instance resulting in more possibilities for strikes and collective bargaining. However, in almost all countries, collective bargaining concerns almost exclusively the main provider and takes place solely at company level. In Denmark and Germany civil servants working at the USPs are not allowed to strike. In many European countries wages in the postal sector are under pressure as a result of competition. However, strikes have not been very frequent in the sector, although in many countries demonstrations against job cuts have been noted (EIRO, 2007a).

As a result of liberalisation and given the labour intensity of the sector, increases in wages are increasingly under pressure. Companies increasingly demand wages that follow productivity increases. On average the employee compensation as percentage of total costs decreased in 2000 compared to 1995 with 6%. In 2000 66% of total costs was used for employee compensations in USPs. This high percentage is due to the importance of labour cost for delivery, which accounts for 50% on average of total costs (NERA, 2004) and due to the fact that sorting often takes place at non-regular hours and peak loads are normally paid out through overtime compensation (Rambol, 2002). Sorting and collection are second and third highest component in total costs (NERA, 2004), with sorting accounting for up to 10% of the cost of mail processing (Ecorys, 2008). Progress in automated sorting has importantly reduced manual sorting recently and is an important way to reduce labour cost. In the new Member States the employment costs per employee have significantly increased between 2002 and 2004 (Niederprüm et al., 2006). In this period in the EU-15, however, expenses per employee have risen more slowly or have even decreased (Portugal, Netherlands and Denmark). Since the beginning of the liberalisation process, wage developments have been generally moderate. In many countries, except Portugal, Romania and Slovenia wage increases have been below the average. This has resulted in dissatisfaction with newly hired employees (EIRO, 2007a).

Employee share-ownership programmes have been introduced in Austria, Denmark and Ireland. Intentions to start these programmes have been announced in Portugal and the United Kingdom. In France, there is a consolidated tradition of savings schemes for employees. In the years before 2000 employee bonus programmes hardly played a role.

Telecoms

In industrial relations the telecoms sector is quite similar to the postal sector. In the telecoms sector following restructuring, formerly public sector employment regulations changed to private law contracts. Exceptions are countries such as Austria, Belgium and France, where employees have maintained their status as a civil servant after restructuring. In these countries public employment regulations are still important for the former monopolies that supply the dominant share of jobs. In other companies employment relations are regulated by private regulations.

Global framework agreements that include reference to several ILO Conventions have been signed between workers' organizations and their employers at Telefónica (Spain, 2000), OTE Telecom (Greece, 2001), Portugal Telecom (2006) and France Télécom (2006) (ILO, 2009).

As the sector consisted mainly of monopolized companies, a union in many countries existed for a single company. In the telecoms sector company unionism has been important, especially to influence policy. There is considerable variation in membership for the telecoms sector. Membership in the telecoms sector is lower than in other sectors, except in Portugal and Finland (EIRO, 2007b). The former monopoly providers are usually highly unionised, whereas unionisation is low in the newly established companies. For instance in Spain, 60% of the workforce of the former monopoly provider (Telefónica) is unionised, compared with 20% in telecommunications as a whole (EIRO, 2007b). These differences appear to be extremely high in some countries of central and Eastern Europe, such as Lithuania and Poland, where no union presence is found in new companies in the sector. In the Nordic countries overall and sectoral union membership is high.

Companies are represented by specific trade unions as well, although these organisations exist only in 12 EU countries, mostly in the EU-15. Only in Belgium and Slovenia are more than one employer organisations active in the telecoms sector (EIRO, 2007b). Overall, cooperation between unions in collective bargaining, prevails. In Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Spain, Finland, Italy, Luxembourg, Malta, Poland, Portugal and Slovakia some or even all of the trade unions in the sector have joined forces, forming bargaining cartels to negotiate with the employer side. The main reason is to prevent exclusion from the bargaining process. In Germany, Poland and Romania, the trade unions compete to bargain agreements.

Collective bargaining is important, around half of 18 European countries, have a collective bargaining coverage⁷ of 80% or more. Austria, Belgium, Finland, France, Italy, Romania and Slovenia all record a maximum of 100% coverage. In five countries, namely Bulgaria, Luxembourg, Poland, Portugal and the United Kingdom, the coverage rate is around 50% or less. Multi-employer bargaining is completely absent in 14 countries, where only single-employer agreements are negotiated. In Finland, France and Italy, all of the employees covered come under the terms of multi-employer bargaining.

Unions and employer organisations are in most countries consulted by authorities in policy cases that affect their members. In Denmark, France, Slovakia and Spain sector-specific tripartite bodies are established that participate in policy making.

In the European Union two social partner sector organisations are active that can be consulted under Article 138 of the EC Treaty. These are UNI Europa, with its telecoms section UNI Telecom, and the European Telecommunications Network Operators' Association (ETNO),

⁷ The standard measure of the importance of collective bargaining as a means of employment regulation calculates the total number of employees covered by collective bargaining as a proportion of the total number of employees within a certain segment of the economy.

both engaged in an active EU social dialogue, institutionalised in the Sectoral Social Dialogue Committee (SDC) for Telecommunications.

3.6 Partnerships for innovation, skills and jobs

One of the central tenets of the renewed Lisbon Strategy is the partnership concept; by building a European partnership for growth and employment, the reforms needed to boost growth and employment will be facilitated and speeded up (European Commission, 2005). Partnership in this view “mobilises support” (mobilisation) and “gets the different players at work together” (collective effort), as well as “makes sure that the(se) objectives and reforms are taken on board by all the various players” thus spreading ownership (ibidem, p. 14). In the implementation of the European Cohesion Policy, the partnership principle is fundamental as well. The EU recognises the importance of involving local and regional actors, in particular in areas where greater proximity is essential such as innovation, the knowledge economy and new information and communication technologies, employment, human capital, entrepreneurship, support for SMEs and access to capital financing. Beyond that public-private partnerships and further improvement of governance in the fields of entrepreneurial innovation, cluster management, innovation financing are promoted at all levels – from the local to the regional, the national and the EU level as well as across sectors. Partnerships for innovation, skills and jobs, in connection with technology platforms, industrial high level groups, as well as lead market and cluster initiatives are being promoted at both European and national level.

Existing partnerships for innovation, skills and jobs generally show a number of characteristics, which include:

- *Involvement of all relevant actors*, ranging from companies, research organisations, education and training institutes to public administration and others.
- *Cross-sectoral approach*: even though partnerships may be assigned to a specific sector, they often work across different business sectors.
- *Cross-thematic approach*, i.e. linking innovation, skills and jobs.
- *Inclusion of general human needs into the partnership strategy*: human needs, such as housing, health or mobility can be part of the formulated partnership vision or strategy
- *Long term commitment of actors (members)*.
- *Joint problem solving*, i.e. working on problems that cannot be met by one member alone
- *European dimension*, i.e. being established at the European level.

Partnerships for innovation, skills and jobs can create a leverage effect for innovation, especially if broader *general human needs* are taken into consideration.⁸ For instance, partnerships in the tourism sector aiming at developing ‘leisure’ should combine knowledge in tourism with, e.g., culture, sports and environment. A partnership aiming at developing the quality of habitat consequently should combine knowledge on at least construction, furniture, electronics and urban management. Partnerships for innovation, skills and jobs integrating

⁸ An argument put forward by professor Rodrigues at the workshop “Innovation policies for a knowledge intensive economy – assessing the European experience” in 2005 in Brussels.

general human needs on European level are still very rare.⁹ It is likely to find more inclusive partnerships on the national and regional level.

Whereas the potential benefits of partnerships are clear, finding strong examples that fit the above characteristics at EU level are still difficult to find. There are, however, good examples in various sectors at the national and the regional level. Some of these stand out in terms of partnership approach, innovation capacity, approach for skills development, or their job maintaining and job creating capacity. Examples include the City Fringe Partnership for developing regional job opportunities in the printing sector and the ERRAC and EURNEX network in the rail sector where a European approach is combined with a strong effort to integrate latest research results in an virtual European training curriculum.

Partnerships, networks and clusters on innovation, jobs and skills often face similar barriers and obstacles, whatever sector is at stake. These include:

- *Restricted scope:* Partnerships often are set up in order to solve problems which can not be met by one partner on its own. The problems, thereby, are either defined bottom-up or articulated by the politics in a top-down process. In the latter case, the scope of partnership is limited to their given geographical scope and/or their thematic focus (If partnerships are established top-down as instrument to address specific problems they are usually restricted to the policy represented by the awarding authority, e.g. a particular Ministry). Similarly, partnerships and networks established at the European level, such as e.g. networks of excellence, technology platforms, etc. have a specific thematic focus (in this case innovation in research and development).
- *Short-term nature:* Partnerships which are built up by means of public funding are often project driven, feature a short term nature and, generally, are not sustainable due to their dependence of a single fund.
- *Weak direct links between skills, jobs and innovation processes:* Skills upgrading and job opportunities are a result of innovation processes. Therefore, partnerships which focus on innovation do seldom focus on skills and jobs with the same strong interest.
- *Sectoral restrictions:* In general partnerships working on international or European level seem to be more likely to occur in strongly internationalised economic sectors with a common universal challenge (e.g. pollution or sustainable development). Then they are mostly limited to the problems they want to address.

Partnerships in the post and telecoms sectors

The density of projects, programmes, clusters and initiatives in the field of telecommunications compared to other sectors is very high. Nonetheless it was difficult to identify partnerships in the definition of the project.

The Information Age Partnership (www.iapuk.org/home) is regarded as the key forum for dialogue between the United Kingdom Government and the IT, electronics and communications sectors. As such it makes contributions to Government initiatives and policy priorities combining long-term thinking with a focus on short-term deliverables. The Partnership engages around 40 Chief Executive Officers from across the United Kingdom's ITEC industries, as well as key representative organisations, such as the Confederation of British Industries, and major trade bodies, such as Intellect and the Digital Content Forum (DCF). It meets twice a year as a full Partnership. The Partnership is supported by an executive committee representing companies, intermediate bodies. It is responsible for

⁹ Outside the scope of the current series of studies, there is at least there is one good example, the European Construction technology platform (see <http://www.ectp.org/default.asp>).

carrying out the main tasks and is responsible for the different work streams the partnership is implementing. Currently there are four different work streams in operation:

- ICT and Environment;
- Business Process Centre of Excellence;
- Image;
- Skills.

The Information Age Partnership is definitely not a partnership in the sense of our definition, but it tries to work out a joint position and common view between some stakeholder on challenges of the sector (e.g. carbon footprint). In so far it is quite comparable to the European Technology Platforms. Additionally the partnership tries to strengthen the image of the sector to reduce labour shortages and is co-operating the with United Kingdom e-skill council to further develop competences and skills of the workforce.

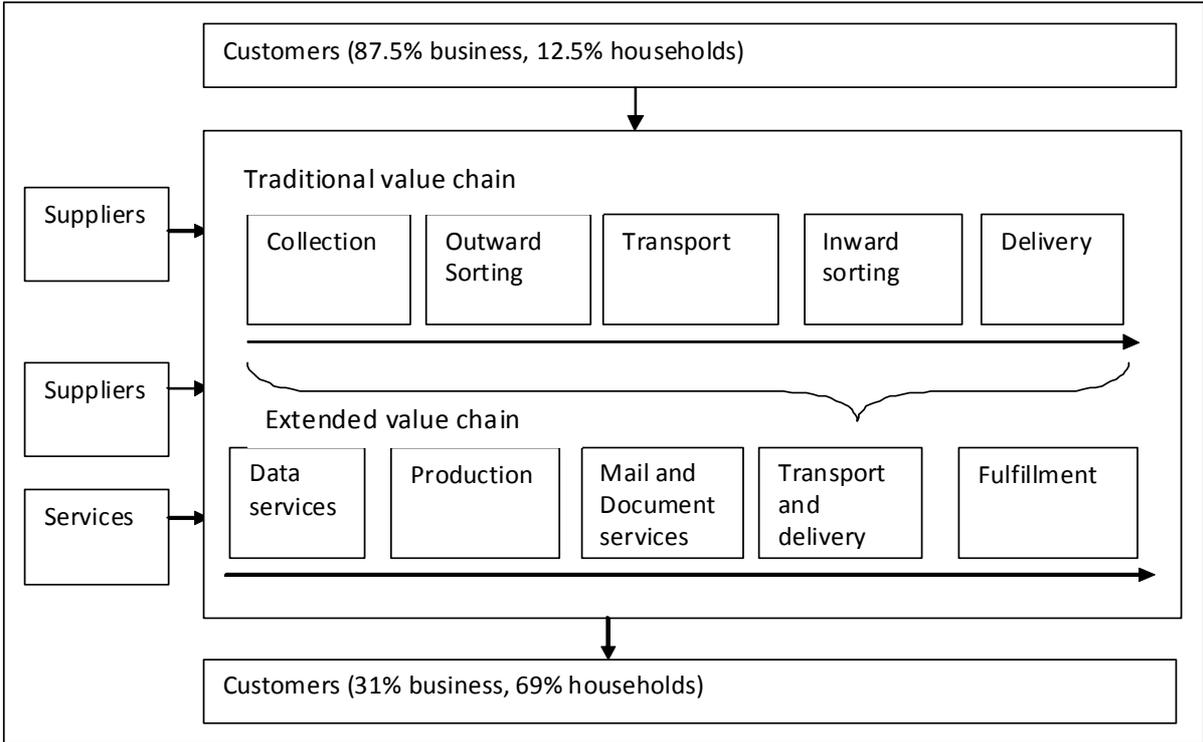
4 Mapping and analysis of the value chain

4.1 Mapping of the value chain

Post

Traditionally postal services dealt with the collection and delivery of post items. Nowadays this signifies only a portion of the value chain. This is shown in figure 4.1, which represents the traditional value chain and the extended value chain as we nowadays observe it. The last years postal companies with a universal service obligation became increasingly active in non-core business activities as a result of changes in consumer demand and a search for higher value activities due to liberalisation (see Chapter 7) and technological developments (see Chapter 5). They compete with independent, generally smaller, firms in these adjacent markets. Two main trends can be observed: one of further diversification and one of increased focus on core competences/activities.

Figure 4.1 The postal service value chain



Source: SEOR (2008) figures for customer data from WIK (2006).

Postal companies have made innovative use of services they already provided to supply other services downstream and upstream of the value chain. Data services include extended use of the postal code databases for marketing purposes. Production means printing services and content creation. Mail and document services include logistic services and facilitating services, such as document handling and mailroom management. Fulfillment means online consumer services, such as e-logistics, online payment services and handing of returned items.

In similar fashion, the large express carriers (the “global integrators”) have extended operations into warehousing, packaging and other logistics services and many traditional postal operators have already become large express carriers and “global integrators”. These services are often referred to as 3rd or 4th party logistics. These express companies primarily focus on delivery of parcels sent by business.

Another difference with the traditional value chain is the inputs used by the postal companies. Traditionally inputs in the postal sector contained mostly equipment, vehicles, products and materials. With the increased diversification postal companies rely now more on other services providers for their inputs, such as logistic services and even express services. In parallel, postal operators increasingly outsource activities that were previously carried out by own staff. Examples include road transport and operation of retail outlets (see section 6.3).

Diversification resulted in tighter relations with other sectors. Postal service companies provide services that are outsourced by other companies, such as contract and document management. Companies are increasingly diversifying in different services. The income share from parcels and other logistic services increased from 9% in 2001 to 12.5% in 2006 (UPU, 2008). For other logistics services this increase is even larger as the number of parcels distributed by USPs decreased. Currently, the share of logistic services in the total revenue of USPs is rather high for some countries. Examples are Estonia (15%), Finland (34%), Germany (15%), Netherlands (31%), Sweden (28%) and United Kingdom (10%) (Van der

Lijn et al., 2005). Indeed, the percentage income from letters declined from 2001 to 2005 for the EU-15 (UPU, 2008).

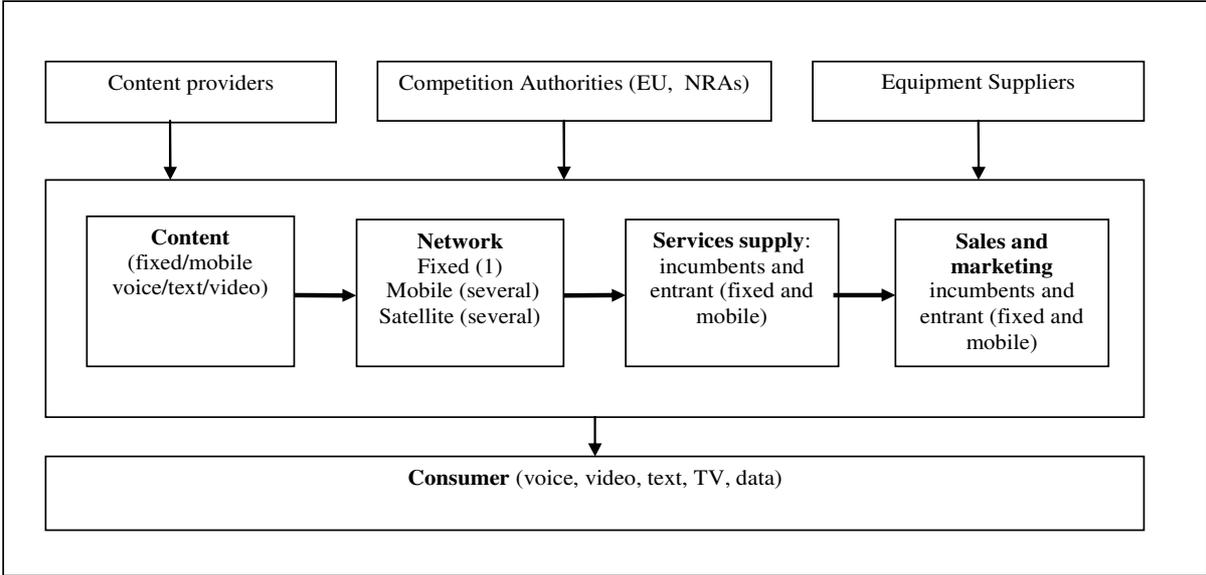
The majority of post offices used to incorporate banking services, either through a post office joint venture between the postal company and a bank (e.g. Belgium, Ireland and Netherlands) or through subsidiaries (e.g. Austria, Germany, Sweden and the United Kingdom). In Denmark some banks are allowed to use the network of post offices for banking services. Today most postal companies still provide financial services. Postal companies in Austria, Belgium and the Netherlands, however, have discontinued their financial services and devoted themselves to their core business. Norway Post previously had its own bank, Postbanken. This is sold and Norway Post provides financial services through a cooperation agreement with the new owner of Postbanken. In the new Member States most USPs provide financial services, except for Latvia. In Estonia and Czech Republic the USPs only provide money orders. Except for Luxembourg, most countries have separated their telecoms and postal activities.

Telecoms

Broadly speaking, telecommunications services encompass transmitting information, in the form of speech, images, text and data streams. The most widespread telecommunications services are voice telephony (supplemented by text messaging, especially in the mobile telecommunications sector), Internet and TV broadcasting. The information to be transmitted is typically described as ‘content’. Content can be produced by specialized companies (TV, partly the Internet, telephone information services) or provided by individual consumers (voice telephony, text messaging, partly the Internet).

To provide telecommunications services, infrastructure is needed in the form of telecommunications networks. Three different types are available: wired (fixed telephony, cable TV, optic fibre), wireless (mobile telephony, terrestrial TV broadcasting) or satellite. Voice telephony typically makes use of fixed and mobile dedicated telephony networks and TV cable networks. The Internet is usually provided on fixed networks (telephony and TV cable) and to a lesser extent but increasingly so on mobile telephony networks. TV is mainly broadcasted using the cable, terrestrial and satellite networks. All telecommunications services make use of technical equipment produced outside the telecommunications sector and are influenced by regulation at the EU and national level. In summary the telecoms value chain can be represented as shown in Figure 4.2.

Figure 4.2 General description of the value chain in telecoms



Until the 1990s, the structure of telecommunications sector in most European countries was characterized by a limited number of services, public ownership and vertical integration. The only widely provided services were fixed telephony and TV broadcasting. Fixed telephony network was typically in the hands of a state-owned monopolist, who was also the sole provider of telecommunications services on this network. TV broadcasting was also largely dominated by the state-owned entities, either public cable companies or terrestrial broadcasting stations, with a limited role for satellite TV.

In the last 20 years, the telecommunications sector has undergone drastic transformations as a result of institutional and technological changes. The telecoms sector first saw equipment manufacturing (new hardware (e.g. wireless, satellites) but especially the ‘middleware’ of enabling devices) transformed by new entrants and subsequently found its networks and international cables opened up to outside services providers transformed by new entrants. Some, e.g. EIU (2008), claim that the influence of customers on new ideas and changes – which is already sizeable nowadays – could prove an equally transformational force in the near future (i.e. user-led innovation).

An important change that enables the was the vertical separation of network ownership and service provision, leading to more competition in services. The state-owned telecommunications companies were privatised and the telecoms market liberalized. Since the large costs of connecting each household and business premise to a fixed network made the emergence of infrastructure competition at the local level doubtful, at least in the short run, competition in services was stimulated by separating network ownership from service provision. Incumbents were obliged to open up their network and rent the local loop (i.e. the last piece of the network connecting a particular premise to the long-distance network) to alternative service providers at a regulated price (Laffont and Tirole, 2001). This has led to entry of operators without their own network or operators who own a long-distance network but lack direct access to consumers’ premises (e.g. Versatel in Benelux and Germany). The direct network access remained in the hands of the incumbent. Although the access obligation is now imposed in the whole EU, the state of its implementation and effectiveness differs per country. Additionally, the incumbents were assigned a universal service obligation, i.e. the obligation to serve all customers (also those located in remote areas) at reasonable prices.

A major development was the introduction of mobile telephony at the beginning of the 1990s. This market has grown explosively to achieve 119% penetration in 2008 (European Commission, 2009). The first mobile operators were often the old fixed telephony incumbents, but they were soon challenged by new entrants who also obtained government licenses for the use of mobile frequencies and in many cases quickly gained substantial market shares. Although the costs of setting up a mobile network are substantial, they are still considerably lower than the costs of a fixed network. As a result several mobile networks are active nowadays in most countries, and there exists vigorous network competition. No access obligation or universal access obligation is imposed in the mobile segment of the market. There is an interconnection obligation, however, meaning that mobile operators have to interconnect their customers to customers of competing providers. This obligation paved the way for mobile virtual network operators, who do not own their own infrastructure but buy capacity from other mobile operators. The introduction of mobile telephony has led to the creation of new telecommunications services such as text messaging (SMS) and image messaging (MMS) and to the development of diversified tariff plans aimed at different user profiles.

Table 4.1 Internet and broadband subscribers by country, 2006

	Internet				Broadband	
	Subscribers		Users		Subscribers	
	Level*	Share	Level*	Share	Level*	Share
EU	104386	22	240596	51	81976	17
EU-15	92890	25	199637	54	73157	20
NMS	11496	11	40959	39	8819	8
Austria	2380	29	4210	51	1452	18
Belgium	2557	25	5490	53	2355	23
Denmark	1900	35	3171	58	1735	32
Finland	1400	27	2925	56	1428	27
France	15252	25	30100	50	12711	21
Germany	20000	24	38600	47	15000	18
Greece	952	9	2048	18	488	4
Ireland	1045	25	1441	34	602	14
Italy	17700	31	30764	53	8639	15
Luxembourg	130	28	339	72	99	21
Netherlands	n.a.	n.a.	14000	86	5192	32
Portugal	1582	15	3190	30	1425	14
Spain	7187	17	18578	43	6690	15
Sweden	3471	38	6981	77	2346	26
United Kingdom	17334	29	37800	63	12995	22
Bulgaria	467	6	1662	22	385	5
Cyprus	106	13	356	42	63	7
Czech Republic	1408	14	3541	35	1113	11
Estonia	259	20	730	55	247	19
Hungary	1292	13	3500	35	1199	12
Latvia	116	5	1071	47	120	5
Lithuania	418	12	1083	32	369	11
Malta	95	24	127	32	52	13
Poland	3244	8	14084	37	2911	8
Romania	3294	15	11300	52	1769	8
Slovakia	395	7	2255	42	317	6
Slovenia	402	20	1250	64	274	14

Source: ITU. * times 1,000.

Another development was the rise of the Internet (see Table 4.1). In 2006 the EU had 51 Internet users per 100 inhabitants, ranging from 18 in Greece to 86 in the Netherlands. The Internet has vastly increased the possibility for mutual interaction between individuals as well as between businesses and individuals. The rise of the Internet provided a new medium for existing services and led to the emergence of new ones, ranging from e-commerce and Internet advertising to dating services. In recent years, an important development in the Internet is the rise of broadband transmission, with high speed and large data-transmitting capacity increasing the scope of services that can be provided even further. Also interesting is the emergence of Internet telephony (VOIP) and TV via the Internet (IPTV) that in the future may compete with the traditional transmission channels. The average broadband subscriber penetration in the EU reached 17% in 2006 (European Commission, 2008).

One of the most recent developments is technological convergence of telecommunications services and networks. The transmission technologies used for Internet, telephony and TV broadcasting are becoming more and more similar. Different networks are increasingly used

for the provision of the same services. For instance, Internet was initially mainly provided on the fixed telephony networks. In the course of 1990s, TV cable networks have been adjusted to provide Internet and, more recently, digital telephony. On the other hand, the fixed telephony networks have also been upgraded and their capacity increased, and some operators (such as KPN in the Netherlands) are experimenting with IPTV and Internet Telephony. This leads to the former monopolists entering each other markets and the bundling of services resulting in the emergence of multi-play, which is competition in bundles of various telecommunications services. Next to the convergence of different fixed networks, one can also observe fixed-mobile convergence as the increasing capacity of mobile networks makes it more and more possible to use them for services that were until now reserved for fixed networks, such as the transmission of images, fast Internet or TV. Also satellite networks are more and more often used for the provision of telecommunications services other than TV broadcasting. Network convergence thus leads to increasing network competition, which is further intensified by the roll-out of completely new high-capacity networks, such as optic fibre. It leads also to the adjustment of other networks, such as energy transmission networks, for the provision of telecommunications services. Next to traditional telecommunications providers adopting new technologies, Internet companies such as Yahoo, Skype and Google are also entering the market for IP-based telecommunications services (OECD, 2007). With respect to employment, convergence means that the employment structures of different operators are likely to become more similar, while the broadening of scope of services will probably lead to a higher diversification of the workforce within companies.

The prices of telecommunications services are falling due to increasing competition and technological progress. For instance, average prices in the mobile sector fell between 2006 and 2007 by 10-14%. On the other hand, the prices in the fixed sector remain relatively stable (European Commission, 2008). As the prices of telecommunications services fall, telecommunications operators will seek ways to increase their revenues. Two business models seem most likely here (OECD, 2007). Firstly, companies may bundle different telecommunications services into multi-play. Hybrid products are generated in this case, combining features of different telecommunications services or combining services with information content or with other types of services, e.g. financial ones (see chapter 5 for examples). Secondly, companies may focus on the efficient provision of basic data transmission capacity, leaving the provision of additional services to others. The choice of business model obviously will have consequences for the development of the structure in the sector and degree of vertical integration.

Networks

The postal and telecoms companies provide a service that is bound by location, but are able to provide services worldwide through the use of the vast international networks. In this regard the Universal Postal Union (UPU) and the International Telecommunication Union play a role in setting rules for international mail and telecoms exchanges and international standardization. Moreover, the mobile operators have contracts with other providers to enable international calls, or have established subsidiaries in local markets. For the postal companies the UPU set up and manages the terminal dues system by which the postal companies are financially compensated for handling volumes of international mail exchanged with companies in other countries. For cross-border mail from one EU country to another, EU legislation prohibits the application of UPU terminal dues since they are not (sufficiently) cost-oriented, and are (discriminatorily) available only to incumbent state monopolies, not to other operators. European postal operators, therefore, have agreed terminal dues under a contract agreed within a separate association (the "REIMS" treaties of the IPC, International Post Corporation), or have agreed bilateral agreements among each other. Although postal

and telecoms companies form an international network and the larger courier companies and mobile operators have a network of branch offices of their own, there are nearly no means of geographic substituting production and therefore no heavy geographical specialization is possible.

4.2 Restructuring

Post

In the last two decades many companies working under the universal service obligation are transformed from state owned to a public company. As a result of liberalisation, the postal sector is being transformed from a process-oriented industry to a market and customer-oriented industry (Van der Lijn et al., 2005). The resulting reorganisation of production had numerous consequences for workers. The most evident is employment cutbacks in most of the large national companies. Although Table 3.2 shows that the number of staff in USPs has not changed very much in the period between 2000 and 2006, this is a large underestimation of the true dynamics. At times of reorganisations many jobs have been lost and replaced by others. Moreover taking growth of revenue into account of 162% for the EU, employment fell dramatically in relative terms. EIRO (2007) reports job cuts of 22% in Austria in five years, 29% in Malta, 17% in Germany to around 30% in Norway, Italy and Malta.

The number of offices decreased worldwide (Table 4.3). However, in Brazil and India the number of post offices increased. In the USA the number of post offices declined sharply, and in the EU the offices with official staff declined with comparable speed. The number of post offices decreased fast in Germany, Great Britain, Denmark, Austria, Spain, Ireland and Finland (28%). Only in Greece and the Netherlands the number of offices increased. Besides offices, also the number of sorting centres decreased in most regions, but not in Japan, the USA and the EU-15.

Reorganizations towards a more result oriented company changed skill requirements within the USPs. Competing postal operators employ a higher qualified workforce compared with USPs. For postmen and operators customer service skills were most important, followed by team work skills. IT skills and multiple work task skills shared a third place. For technical and professional staff team work skills and independent initiative skills were most important, followed by IT skills (also advanced IT skills) and customer service skills. For managers and supervisors, business and leadership skills were most important followed by people and management skills. Finally the ability to take independent initiatives has become more important since 1995 (Rambol, 2002).

Table 4.3 Changes in sorting centres, offices and staff, 1995-2006 (in %)

	Sorting centres	Offices staff	Post offices
Brazil	-52	9	13
China	-15	-18	-9
India	-15	504	2
Japan	150	1	0
Russia	-6	-11	-11
USA	88	-17	-26
EU-15	4	-23	-9
EU	-4	-26	-11
World	n.a.	-16	-7

Source: UPU (2008).

Before 2000 investments in training and education within USPs were just 2% of total wage costs. This is quite remarkable given the changes in the sector. For other postal operators expenses were around 3.5% of total wage costs (Rambol, 2002). The bulk of training for other operators was directed at managers and supervisors. The same is valid for USPs, although their technical and professional staff also accounted for a large part of training expenses.

Despite a decline in employment, in some countries (e.g. Denmark) the postal sector has problems to attract enough employees as liberalisation decreased attractiveness (EIRO, 2007a). This is a result of the shift to more flexible working conditions replacing full time with part time contracts. Moreover temporal agency workers are used more often. In the United Kingdom and France, however, companies are stimulating permanent staffing possibilities for their employees in order to increase their motivation and service. This was also done in response to customer concerns about the integrity of the sector (EIRO, 2007a).

Restructuring also led to changes in deliveries within the member States. On average the number of deliveries per day in urban areas was 1.26 in 1995, but decreased to 1.06 in 2006. Only a few countries had more than one delivery per day in 1995 (Belgium, Estonia, Great Britain, Hungary, Latvia and Lithuania). Belgium changed the number of deliveries in 1998 from two per day to one per day. Great Britain did the same in 2003. Latvia went from three to two deliveries in 2002 (UPU, 2008).

The number of deliveries in rural areas per week changed from 5.38 in 1995 to 5.32 in 2006. Changes are due to Belgium (1999) and Latvia (2005) restricting delivery to five days per week, Greece that diminish delivery from 4.5 to 3.6 (Greece has the lowest number of deliveries in rural areas per week). Slovenia is the only country where deliveries expanded from 4.0 in 1995 to 5.1 in 2006. Also the number of collections from boxes decreased in the period 2001 to 2006 from 1.75 to 1.43 per day. In rural areas the number of collections per week went from 5.9 to 5.6 (UPU, 2008).

Telecoms

Privatizations, liberalization of national markets, technological innovations, and convergence of economic policy and institutional structures have had large consequences for telecoms markets. Historically, incumbent operators in Europe were state-owned, vertically integrated monopolists. Because of the large fixed cost of building a network, telecommunications networks providing voice telephony were viewed as natural monopolies.

As public ownership does not provide strong incentives to decrease costs, most companies in the telecommunications sector operated inefficiently. From 1998 onwards, the markets for networks and services in almost all EU countries were liberalized. Leading the privatisation process were the United Kingdom, Italy and Spain (CPB, 2001).

The dynamic nature of the telecoms sector results in changing demands of the workforce. These changes manifest themselves in the structure of employment and required skills. Generally, traditional skills such as maintenance and repair are less demanded due to improved networks. The demand for computer and electronic engineering skills, and for marketing, has increased, as networks and technology have become more complex and dense, in terms of use.

Incumbent operators have faced trouble in cutting down on traditional maintenance staff due to labour market regulation. Moreover, incumbent operators have faced difficulties in retraining maintenance workers for better suitable positions. New entrants have a relative advantage in this sense and have a lower proportion of technician in their workforce. Newly established virtual mobile operators, operators without their own networks, have hardly any need for technicians. Until 2010, employment for computer support specialists is expected to

increase by more than 75%. Computer software engineering faces an expected increase of 60%, while this figure is almost 50% for information systems managers. Marketing and sales, customer service and financial specialists face increased employment by over 10%. A decline in employment is expected for telephone operators and equipment installers and repair personnel (EMCC, 2005).

The OECD expects, at the occupational level, major growth areas to be retail sales and advertising, marketing, promotions, public relations, and sales managers. Job loss is expected in telephone operation and equipment instalment. Education levels are, on average, rising (OECD, 2005). The general picture seems one of front office activities replacing back office activities mainly through market increase by innovation as well as productivity development in back office processes.

5 Sector dynamics and the role of technological change, R&D and innovation

Post

The need for restructuring in the postal sector in order to increase efficiency has resulted in substantial investments in information and communications technology (ICT). New technologies and thereby possibilities for electronic substitution are important drivers for increased diversity. Information technology, high speed telecommunications and data services, and centralization of printing devices make it possible to substitute all traditional postal activities. However, substitution is not materialising at the rate forecasted some years ago as decreasing volumes for correspondence and transactional mail are offset by increasing advertising mail volumes (Niederprüm et al., 2006).

Apart from efficiency-increasing ICT investments, post companies have also responded in developing new and other services. Physical mail is increasingly being supplemented by multi-channel delivery and tailor-made solutions for customers. One example of this is the development of hybrid mail services which are now offered by most postal operators. Some postal operators even go a step further and are entering adjacent markets through developing IT services for their customers. The development of new and value-added services is a reaction to the threat of e-substitution and the opportunities arising from the development of technology (European Commission, 2008b).

New technology based services are developed such as postal services linked to e-commerce (including fulfilment of web-based service transactions), document management solutions, mailroom, printing and digital document management. Furthermore, databases are developed with customer information, providing companies with the means to extend services to advertising and marketing. These databases can be used for market segmentation on the basis of postal codes. Combined with improvements in sorting this leads to a more effective and efficient distribution possibilities for mailings. Additionally, more printing services are provided in cooperation with advertising companies (Van der Lijn et al., 2005).

Table 5.1 provides data per country on new customer services supplied by USPs that are related to ICT such as mail orderings from the postal company website, Internet access points, email and online information and address change. On average, the EU-6 companies provide most services, although Belgium is lagging behind. The EU-15 provides slightly more

services than the EU-12. However many new Member States already provide various services, such as Czech Republic, Slovenia and Lithuania.

With the shift to newer services the nature of the business has changed to more consultancy-type and technology-driven services, requiring more high skilled labour. Indeed, the technological innovations resulted in companies hiring more high skilled employees than previously, mainly in order to acquire skills required by these new technologies (EIRO, 2007a). Basic IT skills have become more important for the group comprising operators and postmen, while advanced IT skills have become more important for technical and professional operators (Rambol, 2002). However, IT skills are not the most important skills that these groups needed to acquire following liberalization (see also section 8). According to Miles (2008) both technological and organizational innovation plays a relative small role in postal and courier services, compared with other sectors.

Indeed, the sector employed a high number of employees without qualifications. From 1995 to 2000 on average the percentage of employees without qualification has been 57% and has been constant for USPs. The share without qualifications for other operators decreased from 55% in 1995 to 43% in 2000 (Rambol, 2002).

Table 5.2 Growth in Internet and broadband penetration, 2006-2007 (in %)

	Internet Households	Broadband Households	Broadband Enterprises
EU (weighted average)	10	40	5
EU-15 (unweighted average)	9	38	9
NMS (unweighted average)	24	59	11
Austria	15	39	4
Belgium	11	17	2
Denmark	-1	11	-4
Finland	6	13	2
France	20	43	3
Germany	6	10	47
Greece	9	75	24
Ireland	14	138	11
Italy	8	56	9
Luxembourg	7	32	7
Netherlands	4	12	6
Portugal	14	25	15
Spain	15	34	3
Sweden	3	31	-2
United Kingdom	6	30	1
Bulgaria	12	50	7
Cyprus	5	67	25
Czech Republic	21	65	12
Estonia	15	30	3
Hungary	19	50	15
Latvia	21	39	-3
Lithuania	26	79	-7
Poland	14	36	15
Romania	57	60	19
Slovak Republic	70	145	25
Slovenia	7	29	5

Source: Eurostat.

Table 5.1 Overview of services provided by universal service providers (x means a USP provides a service)

	Logistic services	Internet access points	Online services	Internet postage service	Internet billing	E-mail	Online ordering	Direct mail	Trace and track	E-stamp services	Electronic signature	Online postcode lookup	Online tariff info	Online address change	Total number services
Austria		x	x				x		x	x		x	x		7
Belgium		x													1
Cyprus			x			x		x	x						4
Czech Rep.	x		x			x	x	x	x		x	x	x	x	10
Denmark		x	x						x			x	x		5
Estonia	x	x	x						x	x		x	x	x	8
Finland	x		x		x	x		x	x	x		x	x	x	10
France		x	x			x		x	x	x	x	x	x	x	10
Germany	x		x				x	x	x	x	x	x	x	x	10
UK			x	x	x		x		x	x		x	x	x	9
Greece	x		x						x	x		x		x	6
Hungary	x		x												2
Ireland			x		x			x	x				x		5
Italy	x		x	x	x	x	x	x	x	x	x	x	x		12
Latvia	x	x	x							x	x	x	x		7
Lithuania	x	x	x	x	x	x	x		x	x	x	x	x	x	13
Luxembourg		x	x				x		x	x		x	x		7
Malta	x		x					x	x			x	x	x	7
Netherlands	x	x	x	x	x	x	x	x	x	x	x	x	x	x	14
Poland	x	x	x			x	x		x			x	x	x	9
Portugal		x	x			x	x	x	x			x	x	x	9
Slovakia	x	x	x				x	x	x	x		x	x		9
Slovenia	x		x			x		x	x	x	x	x	x	x	10
Spain		x	x	x					x	x		x	x	x	8
Sweden	x		x	x	x	x			x			x	x	x	9
Countries	15	13	24	6	7	11	11	12	22	15	8	21	21	15	

Source: UPU (2008).

Improved and new technologies allow the postal companies and other actors in the postal sector, to increase efficiency of their logistics processes dramatically. Companies have more flexibility, more capacity to treat large volumes and improved performance at lower costs. On average the number of sorting centres in the EU-25 declined between 1993 and 2006 (UPU, 2008). Most efficiency gains, however, were achieved in the decrease of the number of employees needed to staff the sorting centres as a much larger share of letters and parcels are sorted mechanically (EIRO, 2007a). Automated sorting is indeed a crucial area for cost reduction and quality of service improvement. Reducing manual sorting is more difficult in the European Union as for example in the US, as the EU is far from one mail market and all (national) postal operators have different economies of scale, addressing and sorting systems (Ecorys, 2008).

Table 5.3 Mobile cellular phone subscriptions, 2001-2006

	Level 2006	Growth	Share telephony
EU	107	14	72
EU-15	108	8	68
NMS	104	24	77
Austria	113	7	72
Belgium	93	5	67
Denmark	107	8	65
Finland	108	6	75
France	85	7	60
Germany	104	9	61
Greece	99	7	64
Ireland	113	10	69
Italy	135	9	75
Luxembourg	117	6	69
Netherlands	106	7	68
Portugal	116	9	74
Spain	106	9	70
Sweden	106	6	64
United Kingdom	117	9	68
Bulgaria	108	40	78
Cyprus	103	23	68
Czech Republic	122	12	81
Estonia	125	21	79
Hungary	99	15	75
Latvia	95	27	77
Lithuania	138	36	86
Poland	96	30	76
Romania	81	35	81
Slovakia	91	18	81
Slovenia	93	4	69
Definition	Subscription per 100 inhabitants 2006	Growth in Subscriptions (% points) 2001-2006	Share in total telephone subscribers (%) 2006

Source: ITU.

Telecoms

Total revenues in the telecoms sector amounted to €357 bn in 2007, with the fixed and mobile sector accounting for 49% and 51%, respectively (data NRAs, see European Commission, 2009). Telecoms accounted for over 52% of revenues of the whole ICT sector in 2008 (European Commission, 2009: 5). The growth of the sector is not distributed evenly among different types of services. New services such as mobile data services and broadband bundles are showing the strongest growth. Revenues from mobile Internet access (€4.4 bn) were higher than those in the US, with 3 out of 4 European citizens being subscribers of the four main mobile groups, and three of these being subsidiaries of fixed incumbents (*ibidem*). Traditional fixed voice telephony is losing ground. Substitution of services over traditional switched networks by mobile and broadband services are key in the evolution of the market.

Many EU Member States show decreasing market penetration of fixed telephone lines. Spain and Ireland show small increases, whereas the Netherlands and Finland show rapid decline of fixed telephone connections (OECD, 2007). The turnover from fixed voice services decreases by about 5% annually, signifying both the price effects of fostered competition as product substitution (European Commission, 2008).

On the other hand, the wired networks profit from increasing Internet penetration. Both in the EU-15 and the new Member States, growth figures for Internet and broadband penetration are very high (Table 5.2). Given the lower level of penetration in the new Member States (see also Table 5.2), it is not surprising that growth figures are higher. However, large differences exist between countries, both within the EU-15 and the new Member States.

Mobile telephony continues to grow as well, although at a decreasing pace as many national markets are getting close to saturation (Table 5.3). Cellular phone density is highest in Italy, Lithuania, the Czech Republic and Estonia. The new Member States showed larger increases in mobile services subscription between 2001 and 2006 than the EU-15 and are nearly at the same level as the old Member States. Especially Romania, Bulgaria and Lithuania showed very large growth of a catch up character. The high average percentage of all telephone subscribers having mobile phones indicates the relative importance of mobile telephony as compared to fixed telephony, with about 71% on average for Europe. This share is highest in Lithuania, Romania and the Slovak Republic, possibly due to low fixed penetration in these countries previous to introduction of mobile services. As the mobile telephony markets approach saturation (at least in some countries), the focus of the mobile sector moves from attracting new customers to attracting customers from other networks and introducing new products and services. The third generation wireless technology (UMTS), which increases transmission capacity, is expanding service possibilities in mobile telephony (EMCC, 2005), including fast Internet and TV broadcasting.

The engine behind the growth in the telecoms sector is investment and rapid technological progress. In 2007, aggregate investment in telecoms accounted for €51.9 bn, with the fixed and mobile segment accounting for 57% and 43%, respectively (European Commission, 2009). On average, alternative providers spent nearly twice as much of their revenues on investment as incumbents (25% versus 14%), although obviously in absolute terms the major operators – including new ones - invest much more than the smaller ones. As from 2006 investment in the mobile segment with the 3G network deployment almost complete has declined. EU operators invest in stimulating the migration to high-capacity broadband, in optic fibre, Next Generation Access (NGA) and Next Generation Networks (NGN), as well as in the transformation towards converged services. Apart from telcos, this investment also involves Internet Service Providers and media/content delivery companies. EU telecom operators continue also to invest in emerging markets such as India, South Africa and Latin

America (European Commission, 2009). A topic that has generated considerable attention recently is eoc-ICTs or energy-efficient ICTs. Whereas the current carbon footprint of the sector is about 2% of total global emissions, its growth rate of 6% and a doubling by 2020 due to growing technology take-up worldwide raises concern (ITU, 2009:65). Reducing overall use of Internet-related technologies, such as server farms (by turning them off when not in use) or virtualisation technologies (i.e. replacing servers with virtual machines) could reduce electricity demand (e.g. ITU, 2009; OECD, 2008).

The crisis, however, puts a strain on further investment, which could amongst others lead to capacity problems in the near future. A recent study by Nemertes concludes for instance that demand will exceed total broadband capacity at the access layer by 2012, with an associated cost of upgrading of US\$ 137 bn over the next five years, with already network operators in North America spending 60-70% less than they should be (Nemertes, 2008; ITU, 2009:11).

With a rising share of income derived from new sources, most importantly mobile advertising, companies need to revise not only their revenue model, but also their R&D strategies. Convergence means thinking along different development paths in which forming strategic partnerships with other companies, not just from the telecoms industry but from sectors such as television, computer games and publishing will become a more important and pervasive feature in the years to come. Another important feature is greater involvement of customers in the innovation process, and more in general open innovation (EIU, 2008). Spending on R&D appears to be related to the business cycle. Most companies cut their spending in 2003 following the burst of the dotcom-bubble (OECD, 2005). The number of patents filed at the European Patent Office (EPO) shows a large increase for the EU-15 from 309 in 1991 to 1832 in 2003. Like R&D, patent filing topped in 2001 and declined a little bit after the dot.com crisis (OECD, 2007).

With respect to the direction of technological change, one can distinguish several general trends. The first important technological development in the sector is the increasing capacity and speed of data transmission. Transmission capacity increases as slow connections (e.g. dial up) are being replaced by fast ones (broadband). For this purpose, the traditional networks are upgraded, more efficient transmission technologies are applied and new high-capacity networks such as optical fibre are rolled out. The large data transmission capacity in broadband enables new video, photo, and voice services as well as faster processing of emails and Internet. The second influential development is the technological convergence of different telecommunication services, meaning that different types of telecommunications services are increasingly making use of similar transmission technologies. Analogue transmission of voice and TV is being replaced by digital transmission, and the use of IP for these services, although still in its infancy, becomes more and more widespread. For instance, 26% of broadband subscribers in the United Kingdom make use of an independent VoIP provider, Skype (European Commission, 2008). In France, VoIP represents 14% of all fixed traffic (European Commission, 2008). Furthermore, the development of mobile broadband leads to the convergence of fixed and mobile networks. For instance, one third of all retail broadband lines in the Czech Republic and 15% in Slovakia are mobile and in some countries (Italy, France) mobile TV has been introduced. The third technological development is the roll out of new, high capacity networks such as optic fibre and the upgrading of existing networks, such as satellite or energy networks, for the provision of retail telecommunications services. Cities and regions where at this moment an optic fibre network is being laid include Amsterdam, Paris, Department Haut de Seine (France), Köln, Hamburg, Magdeburg, Vienna, Barcelona, Stockholm and Milan (Van der Woude, 2007). The roll out of optic fibre is often realized with a support of local municipalities.

These technical developments have several important consequences. First, it becomes possible to offer several telecommunications products using the same infrastructure. As a result, different networks become substitutes since they can be used for the provision of the same telecommunications services. In many countries it is already possible to phone and use the Internet via the traditional fixed telephony network, TV cable network and the mobile network. On the other hand, the voice telephony networks (fixed and mobile) are experimenting with TV broadcasting. This leads to bundling of different services and selling them as a single product. In 2007, 29% of Europeans were subscribed to at least one bundled service (European Commission, 2008).

Larger capacity and technological convergence stimulate the development of new services. Beyond simple bundling, technological convergence enables the introduction of hybrid products that combine the features of previously separate services, such as interactive TV or videoconferencing. Although Internet services now represent a relatively small part of the total turnover generated in the sector, many new Internet-related products look promising: instant messaging, telephony, videophone, video on demand, music downloads, online games, heavy file transfers and content hosting (EMCC, 2005). The possible applications of these new services include teleworking, distance learning, the possibility for parents to watch their children at day care centres via webcams, medical consultation at a distance, etc. An example of a hybrid service that integrated telecommunications and financial services is the possibility to pay or transfer money via the mobile phone. Moreover, whereas wired and wireless communications used to be about connecting people, a new trend is linking devices to people and one another (Scott and Elixmann, 2008). An example is automotive navigation systems, using the satellite Global Position System to determine the position of a vehicle. In addition, convergence enables the provision of integrated telecommunications products making use of different networks. For instance, some operators (British Telecom, Orange) are experimenting with telephones that work as fixed telephone at home (picking up signals from the home base station connected to a fixed network) and as mobiles outside (picking up signals from a transmission mast). EIU (2008) observes a dual future development of on the one hand software-driven firms like Skype developing even better applications for the end-user, and on the other big telco groups acting as 'guardians' of the cable networks and developing as infrastructure companies.

These technological developments will require changes in the skills of employees in the sector. Due to network convergence and a larger transmission capacity, telecoms operators will offer a wider range of services. That means that companies will need a more diversified technical staff to cope with a wider range of technical issues. On the other hand, the employment structures of different companies are likely to become more similar. Furthermore, the technical possibility to create new telecoms services will lead to an increased need for personnel specializing in market research, product development and product placement. As culture will shift to a more outward-faced more heavily Internet-influenced culture, the younger will most probably be able to adapt more easily than the older generation in telecoms (e.g. EIU, 2008).

6 Trade, globalization and international competition

6.1 International competition

Post

International competition takes place between large integrators in the courier sector and the Universal Service Providers (USPs). The bulk of smaller companies are mostly regionally or nationally focussed. International mail is regulated by international treaties between countries and USPs, enabled and overseen by the Universal Postal Union (for mail coming from, or addressed to countries outside the EU). These contracts as well as regulations determine how mail is handled internationally. If mail and parcels are sent by the USP in the home country, the USP in the receiving country will in general handle delivery. The choice in the home country between a courier and a USP, therefore, determines competition. International branches have been of great importance for the larger express companies and are starting to become more important for USPs.

Since companies in the sector provide a service, international competition is possible through the establishment of subsidiaries in other countries or through partnerships with providers in other countries. However, most USPs are mainly focussed on national markets (Van der Lijn et al., 2005). Exceptions are TNT, Deutsche Post, Royal mail and the French La Poste. It is in the countries these companies are active in that Ecorys expects competition will become most fierce (Van der Lijn et al., 2005). TNT Post, for instance, is active in Germany, Czech Republic, the United Kingdom, Slovakia and Italy. Royal mail had been active in the Dutch market in Selektvracht, but has recently withdrawn their stake and has set up RM Netherlands. The express divisions of these USPs are active worldwide.

In recent years international competition between USPs and integrators decreased as some of the traditional courier and postal companies have merged. The acquisitions provided economies of scale as express companies can use the networks of the USPs. However, in some countries express and postal services function independently. In more densely populated areas services are separate, while in rural areas services are mostly combined (NERA, 2004). With the exception of UPS, all large parcels groups are owned by European USPs today. For instance, the courier services of Luxembourg post are provided in partnership with TNT. In other cases consolidation of activities has occurred. Deutsche post acquired DHL, TPG acquired TNT and Italy's Poste Italiane acquired SDA couriers.

Telecoms

Registered trade in telecommunications services constitutes 0.66% of trade in services for all OECD countries, which represents a growth by about 40% between 2000 and 2005 (OECD, 2007). However, as more and more telecommunications traffic takes place on the Internet and is therefore not registered, the actual increase in trade is probably much higher. One of the main international issues is the interconnection between operators from different countries (roaming). Interconnection can be described as being able to establish and maintain communications with the customers of another operator. Hence, interconnection differs from access, which entails mainly using another operator's facilities. Due to the Calling Party Pays principle applied in Europe, the network of the party that receives the call does not receive any payment from its customer. Instead, it receives a termination fee from the network of the caller. Typically, the conditions of interconnection, both in the fixed and the mobile sector are set in bilateral agreements between operators. Such bilateral agreements may sometimes lead

to roaming tariffs which are at above the socially optimal level, due to the fact that each operator has a monopoly on the termination of calls to its customers and that it may be in the joint operators' interest to set mutual terminating tariffs at a monopoly level. High termination tariffs can in turn lead to high call prices.

In the fixed sector, this problem is typically solved by the presence of competitors in the long-distance market. Due to access obligation, these competitors can rent the local loop at a regulated price in order to offer own long-distance, including international, call services. As a result, the prices of call in the international fixed markets are relatively low. In the mobile market for national calls, this problem can be solved by imposing a price cap on termination tariffs. However, in the market for international calls the problem remains as a price cap on the international roaming tariff of a certain mobile operator harms this operators' profits and benefits consumers from other countries. Thus, national regulators have no incentives to impose price caps on international roaming tariffs of domestic mobile operators. As a result, the international mobile call tariffs are much higher than the price of national calls, a difference that is not justified by cost differentials. The high mobile tariffs for international calls have attracted attention of the European authorities who have started an investigation that may end with regulation of these tariffs. For mobile services, roaming tariffs were capped in the summer of 2007. There are now maximum tariffs on international calls within the EU (European Commission, 2008).

The popularization of IP as the transmission technology is likely to lead to the internationalization of telecommunications services. Services such as VoIP and IPTV can be provided from each place on the earth and thus are international in scope. In general, all services which use the Internet Protocol as transmission technology can be provided internationally. The same is true of satellite transmission. The markets for information content, e.g. Internet content and TV, are in principle global, but due to language barriers are often national or at least limited to language zones. English-language content is the exception due to the status of English as the international language.

Another international aspect of the telecommunications sector is the fact that several players in the national markets are national divisions of international firms. Examples are Vodafone (with shares in mobile operators in all EU countries except Cyprus), T-Mobile (active in eight EU countries), Orange (eight countries) or Telefonica (six countries).

According to ITU (2009) the current crisis could catalyze further consolidation and mergers & acquisitions (M&A) within the industry. Pressures on revenues and cashflow could force some companies to seek rescue by angel investors. Inmarket consolidation of smaller players and new entrants (carrying higher debt gearing levels and facing financing problems) looks even more likely. A new wave of consolidation could occur, even though specific conditions, including the financial situation of each operator, level of liquidity and cash flow, and specific conditions of the country of operation matter (European Commission, 2009).

6.2 Trade issues

Post

The postal sector provides a service that is locally bound for all mail and express must be delivered locally. Especially in the letter services access to the network is important. Having no access can create barriers for entry in the market. Historically, postal networks have been in the hands of USPs. As a result of government regulation they could limit access for other companies. However, the European market was liberalised resulting in a growing competition of courier and express companies. During the years an increasing share of traditional mail

services was liberalised increasing the possibilities for competition. Competition in the sector is stimulated through EU legislation. The liberalisation process began soon after implementation of the 1997 EU directive 97/67/EC (the ‘Postal Directive’), with the exception of France and Ireland, where liberalisation started later (EIRO, 2007a). In the new Member States liberalisation has only recently started, except for Malta. Conversely, in other countries governments have decided to accelerate complete liberalisation before the original deadline of 2009, such as the Netherlands (EIRO, 2007a). In the United Kingdom Royal mail has been facing competition since 2006. Estonia, Finland and Sweden already fully liberalized their postal markets (Van der Lijn et al., 2005).

Table 6.1 gives an overview of ownership and competition in the postal sector for USPs. The ownership of USPs is very different between countries, with a large share still publicly owned. Only in the Netherlands 100% privatisation took place.

Table 6.1 Overview of ownership and competition

Country	Percentage private	Number of postal competitors in letter-post in 2001	Market share mail of competitors in 2005	Total number of companies in 2005
Austria	49% private	1	1.6%	556
Belgium	49.99% Danish post	0	<2%	3277
Bulgaria	State owned	n.a.	n.a.	1226
Cyprus	State owned	0	0%	147
Czech Rep.	State owned	1	4.5%	933
Denmark	25%	n.a.	3-5%	1290
Estonia	State owned	1	5-6%	131
Finland	Public limited state owned	n.a.	0.5-1%	n.a.
France	Public limited state owned	1	2%	5476
Germany	58.3%	3	4%	8636
Great Britain	Public limited state owned	1	<1%	15958
Greece	Public limited state owned	1	0-0.5%	605
Hungary	Public limited state owned	0	0%	2338
Ireland	Public limited state owned	1	0%	1193
Italy	Public limited state owned	3	1-2%	4545
Latvia	Public limited state owned	0	<1%	305
Lithuania	Public limited state owned	2	0%	365
Luxembourg	Public limited state owned	1	1-2%	115
Malta	50%	0	0%	n.a.
Netherlands	100%	3	5%	3650
Poland	Public limited state owned	0	0%	4496
Portugal	Public limited state owned	1	<1%	2019
Romania	Public limited state owned	n.a.	n.a.	3018
Slovakia	Public limited state owned	0	0%	113
Slovenia	10%	1	0%	632
Spain	Public limited state owned	3	7-11%	6879
Sweden	Public limited state owned	n.a.	7%	936

Source: Van der Lijn et al. (2005), Eurostat (2008) and USP websites.

The number of competitors differs also very much between countries. While in the EU-15 nearly all countries have one or more competitors, in the new Member States a monopoly is often present. Private equity funds provide means to invest in their distribution infrastructure for new entrants competing with USPs (e.g. Dutch Sandd) but other funds invest in incumbent USPs (e.g. in Denmark and Belgium). Most countries require licences for postal services that do not fall under the universal service obligation. The only countries that do not have license

obligations, besides the universal service obligation, are France and the Netherlands (Van der Lijn et al., 2005). These licenses can be a barrier for entry to other competitors. Another barrier is the imposition of Value Added Tax on postal services, which is not applicable for the services falling under the universal service obligation (PWC, 2006). A final barrier to entry is that postal services have become more capital intensive requiring much higher investment in sorting equipment and facilities. However, compared to other sectors, such as telecoms, capital expenditure is relatively low, with capital expenditure never exceeding about 30% of total costs.

In 2005 most national postal operators have maintained a market share above 90% in addressed mail delivery (Table 6.1). The countries that have liberalized a relatively large part of the addressed mail segment show the highest market share for competitor postal operators (Van der Lijn et al., 2005). However, the market share for mail is still very small in 2005 for all countries. Competitors, therefore, are often very small in this segment. This means that competition is widespread as the number of companies shows, but dedicated to certain services and regions. The majority of competition comes from express companies. The market for international mail was first liberalised, stimulating competition and a flourishing express sector.

The express industry is more international than the USPs. Especially the four ‘integrators’ DHL, FedEx, TNT and UPS have many local offices worldwide, as they rely on their own international network. Having their own international networks enables express companies to deliver international post items faster than most USPs. These companies rely on international trade and play an important role in facilitating international trade. The reason for this is that some products with a high value to weight ratio, such as high-tech products and prototypes, can be transported safely and easily by express companies. In addition, just-in-time production and strategies to reduce stocks lead to smaller but more frequent shipments. This meant that large transportation volumes shifted from the freight forwarding sector to express parcels.

Indeed, the delivery of parcels and the international delivery of letters by USPs decreased in the period 1993 to 2006 in the EU (Table 6.2). Worldwide, the number of letters sent internationally through USPs went down 31% in the period 1993 to 2006, while the number of international parcels decreased 7%. The same was the case for the EU, although letters sent through universal providers declined ‘only’ 18%. The decline of parcels sent internationally was larger for the EU than worldwide.

Only the number of letters sent domestically has risen in these years. The difference between the EU-15 and EU shows that growth was higher in new Member States. A rise in letters is mainly due to a rise in the number of express post and insured letters, as normal letter mail has decreased in the EU-15 countries (UPU, 2008). In the new Member States letter mail has increased, in some case spectacular.

Table 6.2 Change in post delivered by USPs, 1993-2006 (% of total delivered in 1996)

	World	EU	EU-15
Letters domestic	11	22	18
Letters international	-31	-18	-14
Parcels domestic	61	-19	-19
Parcels international	-7	-16	-20

Source: UPU (2008).

The table also shows that the number of parcels sent domestically through USPs has increased 60% worldwide from 1993 to 2006, although in the EU this has in fact decreased. This last development comes from taking a greater share of the market by couriers companies.

It should be noted that all figures mentioned above with respect to parcels should be interpreted with care. A major reason for the decline in the statistics on parcels is that several USPs now deliver them through express companies that they have acquired in recent years, such as DHL, Geoposte, TNT GLS, etc. While USPs are obliged to report their delivered volumes, their express companies have not such an obligation resulting in a lack of data for the volumes they deliver.

Although competition is growing, barriers to entry are very high for the non-liberalised parts of the postal sector. Main political discussion is the access to the network of universal service companies. This is not only the case for companies operating in one country, but also for companies operating internationally. To deliver international mail, access to several networks is essential. To solve this problem, firms increasingly cooperate. For instance, Spring is a global joint venture in cross-border mail combining the expertise, systems, networks and products of TNT, Royal Mail Group and Singapore Post.

Several regional or Pan-European parcel networks have emerged by acquisitions made by USPs, or co-operations among USPs: For example, La Poste's subsidiary GEOpost acquired DPD, through which it has a partnership with Posten in Sweden. Norway post has several partnerships in Sweden and Denmark, but also with TNT. Royal Mail's business unit GLS operates in many European countries. Finally, some USPs offer an express document service called EMS globally, in cooperation organized within the UPU (Posten, 2007). Another example is PNL, which is owned by Post Danmark and Posten Norway and cooperates closely with postal companies in Estonia, Finland, the Faroe Islands, Greenland, Iceland, Poland and Sweden.

Although USPs in most countries have been fully privatised, in many cases their shares are still government owned (see Table 6.1) For this reason foreign direct investment in USPs in Europe is almost non existent. However this is not the case for express companies and competition within the EU is stimulated by either private equity firms or foreign direct investment. The appearance of private equity firms in the postal sector can be seen as a sign of vitality of competition in the sector (Niederprüm et al., 2006). For instance, Sandd in the Netherlands was started using funds from private equity firms. Within the express sector companies are private and the larger companies are mostly listed on a stock exchange. Foreign ownership can therefore play a role and this has occurred in recent years, with Australian based TNT and US based DHL taken over by Dutch TPG and the German company Deutsche Post respectively.

The growth in international trade, combined with higher consumer demands for later pick-up and earlier delivery and the huge growth in traffic, puts extreme operational pressures both on customs and the express integrators. Current divergence in customs clearance procedures and practices adds costs and erects barriers to trade which impact upon the express sector. Over the years, express delivery companies have made major investments in automated systems to support and facilitate government agencies in carrying out their border control responsibilities. The implicit benefit of these investments is that express consignments are processed expeditiously and released promptly at the border, as long as information regarding shipments is supplied in advance.

Telecoms

The fixed telecommunications infrastructure has to be provided locally. Due to the high fixed costs of connecting a particular premise to the fixed network, the local loop – the connection of a given premise to the fixed network - is typically in the hands of a (local) monopolist, often the former state monopolists. On average, 87% of EU fixed subscribers use the network of the incumbent operator for direct access (European Commission, 2008). Thus, competition in fixed telecommunications services is based on the unbundling of the local loop and renting it out to the alternative providers, with or without their own long-distance network. A potential competitive problem here is foreclosure, namely a situation in which incumbents deny alternative providers access to the local loop or charge for it a prohibitively high price.

Table 6.3 Number of fixed operators (firms), 1997-2006

	1997	2000	2003	2006
Belgium	n.a.	45	46	59
Bulgaria	1	1	5	21
Czech Republic	3	5	83	54
Denmark	7	26	32	n.a.
Germany	59	362	525	87
Estonia	1	9	32	24
Ireland	n.a.	8	9	70
Greece	n.a.	1	17	n.a.
Spain	11	169	33	33
France	n.a.	1	17	39
Italy	n.a.	29	n.a.	n.a.
Cyprus	1	1	1	6
Latvia	1	1	8	n.a.
Lithuania	1	1	3	52
Luxembourg	n.a.	1	17	17
Hungary	n.a.	13	5	23
Malta	1	1	1	n.a.
Netherlands	n.a.	4	29	29
Austria	n.a.	114	38	n.a.
Poland	n.a.	53	83	82
Portugal	1	14	13	13
Romania	1	1	1	n.a.
Slovenia	1	1	1	n.a.
Slovakia	1	1	17	n.a.
Finland	n.a.	50	44	38
Sweden	n.a.	8	50	75
United Kingdom	8	5	n.a.	n.a.
EU average	7	34	44	42

Source: Eurostat Information society statistics.

To prevent this problem, in most countries incumbents have been obliged to rent the local loop, at a regulated price, to competitors. These competitors include virtual network operators, that is providers of telecommunications services without infrastructure as well as operators who own long-distance infrastructure (backbones) but miss the last piece of the network. This unbundling led to the development of competition in the long-distance call market. However, although the market shares of incumbent companies are steadily decreasing, their positions in the EU markets are still strong with, on average, 64% of fixed

call revenues in January 2006 (European Commission, 2008). In six EU countries the market share of the incumbent is above 90%, and only in the United Kingdom this market share is (marginally) less than 50%. For similar reasons, in some regions cable companies dominate the local market for TV broadcasting. In other regions their position is less strong as they compete with terrestrial or satellite broadcasting.

Despite the strong position of incumbent networks, the technological developments described in section 5 lead to the gradual emergence of network competition. Table 6.3 shows the increase in the number of fixed telecommunications service providers in different EU countries.

In many countries the increase in the number of fixed operators has been substantial. However, one should be cautious in interpreting these numbers since many alternative fixed operators they are often active only locally and thus of limited importance for competition in the national markets. Other competing networks own only long-distance infrastructure, and thus depend on the incumbent for the direct access to consumers. Thus, the relatively high number of fixed telephony operators does usually not imply vigorous fixed network competition.

Table 6.4 Number of mobile operators (firms), 1997-2006

	1997	2000	2003	2006
Belgium	2	3	3	3
Bulgaria	2	2	3	4
Czech Republic	2	3	3	4
Denmark	3	12	5	4
Germany	3	6	4	4
Estonia	3	3	3	3
Ireland	n.a.	2	3	4
Greece	n.a.	3	4	n.a.
Spain	2	4	3	4
France	n.a.	6	10	11
Italy	n.a.	4	4	n.a.
Cyprus	1	1	1	2
Latvia	2	2	3	n.a.
Lithuania	3	4	3	3
Luxembourg	n.a.	2	4	4
Hungary	6	5	4	3
Malta	1	2	2	n.a.
Netherlands	3	7	5	4
Austria	n.a.	4	6	5
Poland	3	3	3	3
Portugal	2	3	3	3
Romania	3	4	4	4
Slovenia	1	2	4	2
Slovakia	2	2	2	n.a.
Finland	16	10	15	4
Sweden	n.a.	5	4	5
United Kingdom	4	4	n.a.	n.a.

More recently, TV cable networks are developing as competitors of traditional fixed telephony networks. In countries with a high cable penetration (such as the Netherlands or

Belgium) fixed telephony incumbents already have to face fierce competition from cable companies. These companies have for some years competed with the fixed telephony incumbents in the market for Internet provision, and recently entered the market for voice transmission services. On the other hand, some fixed telephony providers (such as KPN in the Netherlands) began experimenting with television transmission using IP technology, trying to break into the market until now dominated by TV cable companies. In addition, in some areas a third local network is rolled out, optical fibre-to-the-premises, with a large capacity that allows for providing all telecommunications services at a high quality. Thus, there is some competition arising at the local level, but its scope is still limited. Other potential competitors in the fixed sector are energy networks that can be adjusted for the provision of the telecommunications services.

Table 6.5 Market shares of leading mobile operator, 2001 and 2006 (in %)

	Level 2001	Level 2006	Change 01-06 (%)
EU	49	46	-6
EU-15	48	39	-19
Belgium	56	45	-20
Czech Republic	n.a.	41	-13
Denmark	49	32	-35
Germany	41	37	-10
Estonia	n.a.	46	-2
Ireland	62	47	-24
Greece	37	41	11
Spain	56	46	-18
France	48	46	-4
Italy	48	41	-15
Cyprus	n.a.	90	-10
Latvia	n.a.	35	-31
Lithuania	n.a.	36	-14
Luxembourg (Grand-Duché)	61	51	-16
Hungary	n.a.	45	-6
Malta	n.a.	52	-5
Netherlands	44	48	9
Austria	43	39	-9
Poland	n.a.	34	-11
Portugal	44	46	5
Slovenia	n.a.	71	-9
Slovakia	n.a.	56	0
Finland	62	45	-27
Sweden	49	43	-12
United Kingdom	28	26	-7

Source: Eurostat Information society statistics.

An alternative to fixed networks are mobile networks. Mobile telephony is usually provided at a national level, which is due to the fact that the national governments issue licences for the use of frequencies at the country's territory and regulates the placing of transmission masts. In most countries, several mobile networks are active, reflecting lower fixed costs of establishing a network than in the case of wired networks. Table 6.4 shows the number of mobile operators active per country and its change between 1997 and 2003. In most countries, competition increased in this period, although in recent years there seems to be a trend

towards consolidation as well, e.g. in the Czech Republic, Hungary, Austria, the Netherlands, Slovenia and Finland.

Another indicator of competitive conditions and its development in the mobile sector is the market share of the leading mobile operator. In most countries this market share decreased between 2001 and 2006, but in 19 countries it still remains higher than 40% (Table 6.5). Next to the mobile operators with an own network, in many countries mobile virtual network operators (MVNO's) are active. These companies do not own a mobile network themselves but buy capacity on other providers' networks. Unlike the fixed network owners, mobile network owners are not obliged to give access to their networks. They are, however, obliged to terminate on their own network calls coming from all other operators, including virtual ones. Although mobile telephony seems to be a good alternative of fixed telephony regarding voice transmission, its transmission capacity is at this moment still too limited to compete with fixed networks in the market for Internet provision or TV broadcasting. However, given the fast technological developments in the mobile sector, it is possible that in several years the mobile networks will be able to compete with the fixed networks also in this respect.

An important question is whether the current trend of increasing network competition will persist. It is possible that we are entering a transitional phase in which different infrastructures fight for the dominance. In the long run, one fixed infrastructure may emerge, for instance optical fibre. The superiority of such a network may lead in the long run to the switch off of the traditional fixed networks (cable and fixed telephony) and the return to the situation in which only one fixed network is present. The remaining competition will be mobile networks and possibly satellite networks. But whether this is the case, the future will learn.

6.3 Externalisation strategies – outsourcing and offshoring

Post

Due to liberalisation and increased competition, companies operating under the universal service obligation try to find ways to improve efficiency. The dominant objectives for outsourcing are increasing flexibility and reduction of cost. As USPs pay higher wages than private sector firms in many Member States, outsourcing can be interesting. However, offshoring in the postal sector is very limited as services are bound locally. The main fields where outsourcing is important are in collection, office services, transport and parcels & express.

Third party collection agreements for partial outsourcing of the collection activity are operated by La Poste (France), Correos (Spain), La Poste (Belgium), Denmark Post and Estonia Post (NERA, 2004).

In some regions office services have been outsourced to other businesses. This is, for instance, done in Finland. This is different from partnerships with other businesses to provide postal services, which is usually done through various forms of cooperation. This form of outsourcing is practised by most EU-15 Member States, except Italy and Belgium. From the new Member States, only Poland, Malta and Hungary provide services through postal agencies in other stores (Niederprüm et al., 2006).

Outsourcing is starting to develop in transport of mail items. In Denmark, Lithuania and Germany the USPs outsources some of the transport to private carriers. In Germany this has resulted in a job loss of 4000 people in Deutsche Post (NERA, 2004). A number of operators have outsourced some of their activities in relation to parcels and express. In France and

Luxembourg delivery of parcels is outsourced, while in Spain all parcel activity is outsourced (NERA, 2004).

Box 2. Defining and measuring relocation and outsourcing

One of the biggest challenges when analysing and discussing offshoring and outsourcing is the definitional issue of what precisely is meant and - closely related – how to measure the phenomenon. Outsourcing covers activities previously carried out in-house sourced to third parties whether abroad or in the home country. Offshoring in its strictest sense relates to activities being discontinued in the home country and transferred to a location abroad managed within the same entity or by an affiliated legal entity (Van der Zee et al., 2007). Frequently, the political debate mixes the above three and also discusses job losses due to restructuring unrelated to offshoring under the same label. Furthermore, the political debate is fuelled by estimates which are the main source of evidence in the absence of hard statistics. Two broad sources on job relocation have as a result emerged: private consulting estimates and press monitoring estimates (Van der Zee et al., 2007). While consulting estimates have severe limitations (ibidem), the estimates collected by press monitorings such as the ERM are more reliable. The most valid data, however, systematic official statistics on the employment impact of relocation, are not collected anywhere in the world today. As a result, academics who nevertheless want to use official statistical data resort to proxies of indicators of relocation activity, such as trade data, FDI flows and input–output tables (Van der Zee et al., 2007). However, these indicators only measure the indirect effects of relocation and are affected by a number of other factors making hard conclusions difficult to draw.

Telecoms

Outsourcing is a major driver of cost efficiency in the telecoms industry. Concrete offshoring (transfer of activities to developing countries) entails mainly information technology (e.g. programming), contact functions (call centres) and operations (finance and accounting).

Companies practice outsourcing extensively, locating their telecommunications services in low-cost countries. Notably India is interesting because many locals there master English.

Another important trend is firms concentrating on core competences and hence outsourcing their telecommunications activities to (mostly large) telcos. A recent example is Shell, outsourcing all of its telecommunications activities to a number of European telecoms providers, among others Deutsche Telekom. This trend included first predominantly new telecoms products such as Internet subscription; especially SME's outsourced these activities to specialised providers. While the specialisation-related advantages of outsourcing telecommunications appear to be clear, the outsourcing trend relates to traditional telecoms activities too.

7 Regulation

7.1 Post

As explained above, the main regulation relevant for the postal sector is liberalisation of the postal sector. The postal sector has to provide services to all clients, including those in the most remote areas, which is the argument for government interference and to oblige universal service delivery. While historically a state owned monopoly form was chosen as an instrument to guarantee this, discussions about liberalisation increased in the last fifteen years.

Main issues were the wish to restrict public expenditure, the possibilities to increase efficiency by competition and the growing preference for free market systems. This led to liberalisation and privatisation initiatives.

The main EU directive influencing liberalisation is Directive 97/67/EC of 1997. This 'Postal Directive' imposed on all Member States an obligation to deliver letters and parcels universally and at an affordable price. In addition, there is an obligation to provide some uniformity in service quality, including access to common and necessary postal services via readily accessible counters (PWC, 2006).

Traditionally, the companies with a universal service obligation had a monopoly and sometimes prices were regulated. Today, most countries have adopted some form of pricing schemes for the universal service, e.g. placing a cap on prices, but the methods used for price regulation vary much. Also, prices are very different between EU countries (Eurostat, 2007).

In 1997 Member States were forced to limit their postal monopolies to letters weighing less than 350g. By means of Directive 2002/39/EC (which amended the Postal Directive), the maximum extents of the monopoly were relaxed to 100 grams in 2003 and 50 grams in 2006. By lowering the weight threshold of the monopoly, the market was gradually opened up to other competitors. All Member States have transposed Directive 97/67/EC as amended by Directive 2002/39/EC through a series of primary and secondary postal law.

In February 2008 the Council and the European Parliament adopted Directive 2008/6/EC further amending the Postal Directive (referred to as the Third Postal Directive). Directive 2008/6/EC stipulated that postal monopoly will have to be abolished entirely by the end of 2010. By way of derogation, eleven Member States (mostly new Member States) were allowed to maintain 50 gram monopolies for two more years (end 2012). This Third Postal Directive thus provides the legal basis for the accomplishment of the internal market for postal services.

In most EU countries national regulatory authorities (NRAs) have been set up to supervise the liberalisation and to ensure fair competition, such as Opta in the Netherlands and Postcomm in the United Kingdom. In Estonia, Austria, Italy and Spain, supervision of the sector is still the responsibility of the competent ministry (EIRO, 2007a). Almost all regulatory authorities are multi-sector regulators. The only purely postal regulatory authorities are those of Austria, Slovakia, Spain, and the United Kingdom. However, in most Member States regulatory authorities do not have the authority to decide on major determinants of the regulatory framework. Notable exemptions are the regulatory authorities in Czech Republic, Denmark, Slovakia, and the United Kingdom (Niederprüm et al., 2006). NRAs play an essential role in realising the goal of accomplishing the Internal Market and in a multi-operator environment. The main challenges ahead for the NRAs will be, among others, to arrange interoperability in a multi-operator market, take action against strategic barriers to entry and ensure that tariffs are more geared to costs. In order to allow NRAs to successfully fulfil their tasks, the expertise and staffing of the NRAs should be increased in most of the Member States (European Commission, 2008b).

Environmental regulation in the postal sector is mainly driven by the transporting activities of courier and postal companies. Most USPs have moved from rail to road transport, except for France (NERA, 2004). Increasingly new demands are placed upon vehicles and other transportation means. This is not different from other sectors, however, and does not influence employment significantly.

7.2 Telecoms

The EU has strongly promoted privatisation of formerly state-owned telecoms companies since the mid-1980s. The European Commission took a stance in favour of competition in the 1987 Green Paper. Initial reluctance of Member States to give up control over telecoms state monopoly firms was overruled by the European Court of Justice, recognising the power of the Commission to promote directives concerning telecommunications (EMCC 2005). During the 1990s all EU Member States dismantled their state monopolies, although national differences remained. Since 2002 a new European regulatory framework deals with application of principles set forward in competition law (e.g. dealing with companies that have significant market power), simplification of market access rules, convergence, and cooperation between national regulatory authorities and the EC. The new legislation is formulated in a set of directives replacing the over 20 directives adopted since 1990.

In the EU-15, national regulation authorities were established by 1997. The United Kingdom was a pioneer, dating back as far as 1984. In the new Member States, the establishment of national regulatory authorities was part of the EU accession process. More competition was promoted by several regulatory measures: reducing interconnection and call termination charges, unbundling of carriers and operators of networks and mobile number portability for customers. The latter has not been very effective yet, but this could follow in the coming years (EMCC, 2005). Several EU countries, such as France, require telecoms carriers to allocate a certain amount of turnover to research and development, heavily influencing the total size of R&D (OECD, 2005).

The ultimate goal of the EC is abolishing *ex ante* economic legislation, provided that competition has developed to a satisfying degree. Generally, the European Commission is worried about insufficient power of national regulating authorities (NRAs) to fine companies breaking the rules, notably in Bulgaria, Estonia and Austria. Independent NRAs are a prerequisite for ensuring fair and effective regulation of the sector. Independence may be compromised in particular where Member States still have control over operators (European Commission, 2009). Moreover, concerns exist about the possibilities NRAs have to intervene should access or interconnection problems occur (mainly in Poland and Sweden). Independence of NRAs forms a necessary condition and hence a central concern for certainty with respect to implementation of regulation (European Commission, 2008).

For wired telecommunications, access obligation is a major regulation issue (see Marcus and Elixmann, 2008; Jaspers et al., 2005). Access obligation implies forcing incumbent telcos to allow other suppliers of services on their networks and capping the tariffs they can charge for network access, thus avoiding foreclosure. Additionally, as universal service obligation means that the incumbent operator has to provide the telephony services to everyone at non-discriminatory and reasonable conditions, it implies retail price capping. Germany and Luxembourg are the only Member States where no universal service obligation exists or has existed. The Czech Republic has abolished the obligation, and Romania limits the service to so-called telecenters in rural areas.

With some exceptions (e.g. Cyprus), mobile networks are not subject to access obligation. All telecommunications operators, fixed and mobile, face interconnection obligation. Any end user should be able to call other networks' end users. Due to the Calling Party Pays principle, the network of the user that receives the call does not get paid by its subscriber, but it receives a termination fee from the caller's network. Since operators may have incentives to charge too high (from the point of view of social welfare) termination fees, these fees are subject to cost-based regulation in the fixed sector and, in several countries (e.g. Cyprus, Luxembourg, Hungary, Malta, Romania, Sweden), in the mobile sector. In 2007, the European Parliament

adopted the Roaming Regulation, which puts a maximum on retail international call prices. This has led to a decrease of international call prices by 60% (European Commission, 2008).

Another regulatory issue in the telecommunications sector is number portability, which obliges operators to allow end users to keep their telephone number if they switch to a competing services provider. This reduces the trouble end-users might have when switching, lowering transaction costs and thus reducing the market power that operators have over their captive consumers. Bulgaria and Romania are the only countries where number portability is still not available (European Commission, 2008).

In many countries, different telecommunications networks and services are subject to different regulatory regimes and are sometimes supervised by different regulatory authorities. For instance, TV broadcasting services and cable companies are typically subject to media laws, not telecommunications laws and are not supervised by telecoms regulators.¹⁰ Furthermore, regulation of fixed networks is much stricter than of mobile networks, although some countries (e.g. the Netherlands) have been loosening the regulation of the fixed telephony incumbents in the face of increasing competition in the telecommunications services and emerging infrastructure competition. This piecemeal approach to regulation is gradually becoming obsolete in the face of convergence of various networks and services and the emergence of a single market for telecommunications services. A question that gains importance is whether services should be regulated based on separate types of networks or on integrated service provision. Furthermore, a reconciliation of communication and broadcast policy would have beneficial effects both for broadcasting and communication markets (OECD, 2007). The European Commission stresses the importance of an encompassing approach (European Commission, 2008). Another issue in the regulation is the EU-attitude towards municipal investments in the optic fibre. In some cases municipalities have been prohibited to enter into private-public partnerships rolling out new networks, the argument being that such partnerships involve competition-distorting state aid.

The future of telecommunications regulation will depend on the direction in which competition in the sector will develop. A crucial question is whether the currently emerging network competition will develop and persist, or whether in the long run one high-capacity (local) network will emerge, that will marginalize other networks and become the dominant infrastructure. In the former case, the original plan of replacing ex ante regulation with ex post competition policy may be realized. In the latter case, the traditional regulatory issues of access and universal service may become relevant again.

8 SWOT

SWOT analysis is a tool in management and strategy formulation, used to evaluate the Strengths, Weaknesses, Opportunities, and Threats involved in a project, business venture or – as in this case – a sector, the latter being defined within a well-described geographical entity. The aim of a SWOT analysis is to identify the key internal and external factors that are important to achieving a particular objective or set of objectives.

¹⁰ One of the obligations that the providers of broadcasting services usually have to fulfil is the so-called must-carry obligation, meaning that a certain package of (usually public) broadcasting stations must be included in the package provided by the (cable) companies.

Strengths and weaknesses are internal factors that create or destroy value. For a company these can include assets, skills or resources that a company has at its disposal, compared to competitors. Opportunities and threats are external factors that create or destroy value. They emerge from either the company dynamics of the industry/market or from demographic, economic, political, technical, social, legal or cultural factors (STEEP or DESTEP, see also chapter 9). When applied to the sector level, SWOT has a similar meaning, albeit on a higher, more aggregated level.

The SWOT analysis presented in Table 8.1 is the result of an intensive workshop discussion which was subsequently validated and amended in two external workshops, including the final workshop in Brussels (step 10 in the methodological framework).

Table 8.1 Analysis of Strengths, Weaknesses, Opportunities and Threats

Strengths	Weaknesses
<ul style="list-style-type: none"> ○ Post: Stable demand overall – but might go down in future ○ Telecom: Increasing demand overall ○ New companies act as initiators ○ Dense network ○ New IT technologies ○ Diversification of job profiles ○ Trusted brands ○ Universal service provision 	<ul style="list-style-type: none"> ○ ‘Old’ culture incumbents – civil service rather than business culture ○ Universal service provision ○ License obligations (entry barrier)(post) ○ Lack of separation between powers of government as incumbent-owner and as regulator in certain Member States ○ Oligopoly (potent players drive the sector) ○ Enhanced automation leads to lower quality, lower paid jobs (post) ○ High number of low-skilled-low-qualifications (post)
Opportunities	Threats
<ul style="list-style-type: none"> ○ Liberalisation ○ Privatisation ○ Deregulation / transparent, long term and foreseeable regulation ○ Technology: IT ○ New products and services – based on virtual communication and digitalization (counteracting the shrinking demand for traditional services both in post and telecoms) ○ Diversification of products and services ○ Telecoms: convergence communications, advertising and new media ○ Growth new EU Member States and global growth, driven by income and lifestyle ○ New forms of cooperation (public/private and private/private; open innovation) ○ High skilled job opportunities, need for up-skilling ○ Adaptation to new needs 	<ul style="list-style-type: none"> ○ Security problems (mostly post) ○ Competition from ICT and new media in product and labour markets ○ Telecoms: network capacity vs increasing future demand ○ Post: less interesting jobs due to insecurities ○ Relocation of enterprises (long-term, T: outsourcing of services) ○ Increasing regulation - acting as a barrier to growth if unclear

9 Drivers

9.1 Identification of sectoral drivers: methodology and approach

The methodological framework as defined by Rodrigues (2007) serves as the starting point for the identification of drivers. Rodrigues identifies three main driver categories: economic, technological and organizational drivers, with the economic dimension representing the main trends in demand and supply, the technological dimension covering the main trends in process and product innovation (including services) and the organizational dimension representing main trends in job functions (conceptual, executive). The Rodrigues' approach in principle enables the identification of drivers, and especially so at the meso (sector) and micro (firm or company) level. The search and identification procedure of drivers itself is less well defined, however. Implicitly it is assumed that expert opinion and desk study are sufficient tools to come up with a relevant and plausible set of drivers at the sector level.

During the first stage of the project, a methodological tool (approach) has been developed to facilitate and help the identification and further delimitation of drivers, to arrive at a set of key drivers. Apart from expert opinion mobilised and managed as discussion panel (in a similar manner as a SWOT analysis is usually organised), this approach strongly builds on the findings of existing foresight and other future studies. By consistently linking the search for drivers with the findings in existing foresight and other future studies, a more coherent and all-embracing methodology to finding sector-specific drivers can be deployed.¹¹ This so-called 'meta-driver' approach of identifying main sectoral drivers starts from a more generic list of meta-drivers derived from a literature survey, and subsequently in a step-wise manner delimits the drivers to a set of most relevant and credible drivers. It does so by combining adequate expert (sector) knowledge in a panel setting. By subsequently asking the expert panel to score the different drivers on a range of characteristics, including relevance, uncertainty, and expected impact (similar to a SWOT procedure), a corroborated and conclusive list of sector-specific drivers can be derived. The meta-driver approach hence enables filtering out in a systematic and consistent way meso and possibly micro (sector-specific) as well as the macro (economy-wide) trends and developments judged relevant and important to the sector, directly and indirectly.

The meta-driver approach includes the following five steps:

Step 1. Drawing up of a list of relevant generic or meta-drivers based on literature review and expert knowledge (check-list: rows)

Step 2. Designing a list of key questions in order to identify the sector relevance and other properties of meta-drivers at sector level (check-list: columns)

Step 3. Filling in the check-list matrix: which meta-drivers do matter most for the sector?

Step 4. Which drivers do matter most for jobs and skills?

Step 5. Does the tailor-made list herewith cover all relevant sectoral drivers, i.e. are there any sector-specific drivers missing (check on completeness)

Arguments in favour of the use of the 'meta-driver' approach are:

¹¹ Common ways to rank trends and drivers are the DESTEP (Demographic-Economic-Social-Technological-Ecological-Political) and STEEP (Social-Technological-Economic-Ecological-Political) categorisations. For our purpose, slightly altered DESTEP definitions are used to reflect the embracing dimension of analysis.

- The ability and opportunity to use the rich potential of a multitude of already available studies on drivers, determinants of change and key trends
- Circumventing the risk of a too narrow focus on the sector per se while acknowledging sector-specificity, and avoiding the risk of analyzing sectors as if they were isolated (cf the difference between ‘general equilibrium’ and ‘partial equilibrium’ approaches)
- Guaranteeing overall consistency, coherence and completeness, as well as warranting a same point of departure important across lots/sectors – i.e. a way of integral assessment, making sure that all important factors are systematically taken on board.

An alternative and second way to arrive at a list of main sector-specific drivers of change is to start with a SWOT and subsequently translating the Opportunities and Threats part into sector-specific drivers. The SWOT is used as a tool to verify and check the resulting list of drivers. By combining the results of both the “from meta-drivers to sector-drivers” and the “from SWOT to sector-drivers” exercises a complete and consistent list of sector-specific drivers can be derived.

9.2 Sectoral drivers

In the next table all meta-drivers are analysed for relevance for the health and social sector.

The most important drivers for post are:

- Institutional: Trade and market liberalisation
- Institutional: Deregulation/regulation
- Institutional: Quality of institutions
- Institutional: Labour market regulation
- Technology: Internet changing production and consumption patterns (less mail, more parcel delivery)
- Technology: New/additional value-added services
- Cultural values: Lifestyle changes
- Economic: Income per capita

The most important drivers for telecoms are:

- Institutional: Trade and market liberalisation and deregulation
- Institutional: Deregulation/regulation
- Institutional: Quality of institutions
- Technology: Internet changing production and consumption patterns; ditto for shift from fixed to mobile, with employment impact
- Technology: New/additional value-added services
- Cultural values: Lifestyle changes; consumer becoming creator of content
- Economic: Income per capita.

Table 9.1 Assessment of main drivers based on the meta-driver approach

Category	Driver	Is this driver relevant for the sector?	How relevant is this driver for the sector?	How uncertain is this driver for the sector?	Are substantial impacts expected on the volume of employment?	Are substantial impact expected on employment composition?	Are substantial impacts expected on new skills?	Short, medium or long run impact? ¹²			Are substantial differences expected between (groups of) countries?	Are substantial differences expected between subsectors?
		Y / N	Scale 0-10	Scale 0-10	Y/N	Y/N	Y/N	S	M	L	Y / N	Y / N ²
Ageing / demographics	Ageing - Adapt to the market demands of an ageing and more diversified society	N										
	Ageing – declining labour force	N										
	Population growth (birth and migration)	N										
Economic	Income per capita and household	Y	P:8, T:10	5	Y	N	N	Y	Y	Y	Y	N
	Income distribution	N										
Globalisation	Outsourcing & offshoring	N										
	Increasing global competition	Y	P:5 T:7	3	Y	N	N	Y	Y	Y	N	Y
	Emerging economies driving global growth (new market demand, especially BRICs ¹³)	Y	P:3 T:5	3	N	N	Y	N	N	Y	N	N
	Global / regional production networks (dispersed production locations, transport)	N										
	Counter-trend regionalism / protectionism	N										

¹² Short = 0-3 years; medium = 3-7 years; long = > 7 years. All three categories may apply.

¹³ BRIC countries: Brazil, Russia, India, China.

Category	Driver	Is this driver relevant for the sector?	How relevant is this driver for the sector?	How uncertain is this driver for the sector?	Are substantial impacts expected on the volume of employment?	Are substantial impact expected on employment composition?	Are substantial impacts expected on new skills?	Short, medium or long run impact? ¹²			Are substantial differences expected between (groups of) countries?	Are substantial differences expected between subsectors?
		Y / N	Scale 0-10	Scale 0-10	Y/N	Y/N	Y/N	S	M	L	Y / N	Y / N ²
Cultural values	Increasing market segmentation (tailor made production, mass customization), e.g. services for ageing population (IT devices)	T: Y	6	2	N	N	Y	Y	Y	Y	N	Y
	Lifestyle changes – duality of society, both geographic and (inter)generational asymmetries; open access: consumer as producer (telecoms)	T:Y, P:N	10	2	N	N	Y	Y	Y	Y	N	N
	Increasing demand for environmentally friendly products	N										
Technology, R&D and product and process innovation	Advances in IT impacting on organizational structures & new business models (open access!)	Y	P: 7 T: 7	4	N	N	Y	N	Y	Y	N	N
	Internet and IT (devices) changing production and consumption patterns (e-business; open access/source, etc.)	Y	10	0	Y	Y	Y	Y	Y	Y	N	N
	New types of work organization (teams-based, sociotechnique, etc.)	Y	P:5 T:5	0	N	Y	Y	Y	Y	Y	Y	N
	New/additional value-added services	Y	10	0	Y	Y	Y	Y	Y	Y	N	N
	Other (sector specific): impact of crisis on R&D expenditure	Y	7	6	Y	Y	Y	Y	Y	Y	Y	N

Category	Driver	Is this driver relevant for the sector?	How relevant is this driver for the sector?	How uncertain is this driver for the sector?	Are substantial impacts expected on the volume of employment?	Are substantial impact expected on employment composition?	Are substantial impacts expected on new skills?	Short, medium or long run impact? ¹²			Are substantial differences expected between (groups of) countries?	Are substantial differences expected between subsectors?
		Y / N	Scale 0-10	Scale 0-10	Y/N	Y/N	Y/N	S	M	L	Y / N	Y / N ²
Natural resources	Availability (and price developments) of oil and energy	N										
	Availability and price of other natural resources	N										
Institutional / Political	Trade and market liberalisation (national level)	Y	10	4	Y	Y	Y	Y	Y	Y	Y	N
	Regulation/deregulation	Y	9	4	Y	Y	Y	Y	Y	Y	Y	N
	EU integration – deepening (single European market etc.)	N										
	EU integration – broadening (bigger domestic market)	Y	5	5	Y	Y	Y	N	N	Y	Y	N
	Quality of institutions (separation of powers*, law enforcement, transparency, and broader: corruption, business climate, structural rigidities)	Y	10	0	Y	N	N	Y	Y	Y	Y	Y
	Labour market regulation	Y	P:10 T: 3	3	Y	N	N	Y	Y	Y	N	N
	Environmental regulation	P:Y	5	3	Y	Y	Y	Y	Y	Y	N	N
	Security and safety regulation	Y	P:7 T:7	5	N	N	Y	Y	Y	Y	N	N

Note: P = postal sector, T = telecoms sector. * Includes also good/bad ownership-incumbent vs. regulator (see SWOT).

Part II.

Future Scenarios and Implications for Jobs, Skills and Knowledge

Post

Part II. Post - Future Scenarios and Implications for Jobs, Skills and Knowledge - Guide to the reader

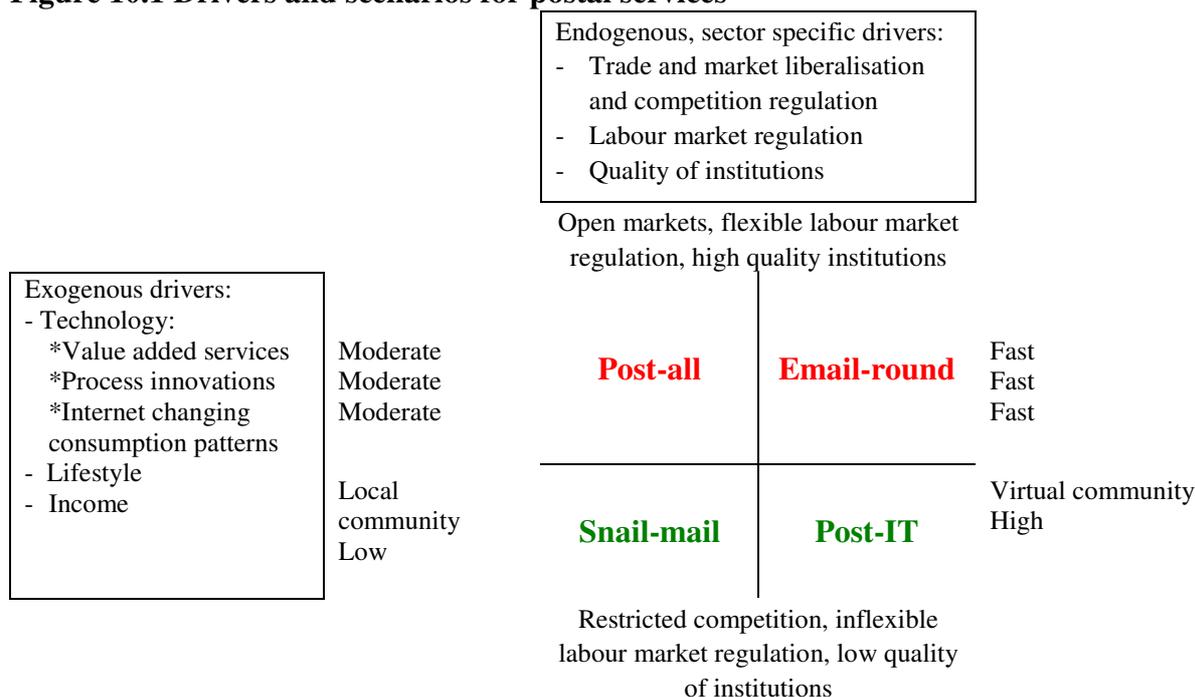
Part II presents the scenarios and their implications for jobs, skills and knowledge for the Postal Services. It reflects steps 4, 5 and 6 of the common methodology. The contents of part II are as follows: Chapter 10 describes the structure and highlights the content of the four main scenarios (step 4). For each of these scenarios plausible yet different assumptions have been made as to how the main drivers of change will develop and add up to different states of the future. In subsequent steps the implications of the scenarios for jobs and skills are analysed. In order to facilitate a translation of these implications to the job function level, first a workable job function structure is proposed. This structure is based on the functions as they appear in Eurostat's Labour Force Survey and further elaborated. Chapter 10 discusses the main implications of the scenarios in terms of future employment volumes by job function (step 5). Chapter 11 assesses the implications of scenarios for future skills and knowledge needs by job function. It translates the implications of the scenarios for skills and knowledge by function (step 6).

10 Scenarios

10.1 Overview of scenarios and main underlying drivers

Figure 10.1 presents four different scenarios and their underlying drivers for the postal sector. The scenarios which were specifically constructed for and used in this study are based on a clustering of relevant drivers identified in part I.

Figure 10.1 Drivers and scenarios for postal services



The scenarios are construed to ‘scan’ the future, and are for the purpose of this study used to assess the impact of future developments on jobs, skills and knowledge. It is important to understand what scenarios can deliver and what not. Scenarios depict plausible futures and might reveal possible paths of development towards these futures. They are neither predictions or forecasts, nor wishful pictures (‘dreams’, ‘crystal ball gazing’) of the future. Grounded in existing data and trends, scenarios are derived in a logical and deductive way, with different and sometimes opposing presumptions about how key drivers might develop, resulting in inferences about plausible, i.e. credible and imaginable, futures.

In drafting the scenarios, a clear distinction has been made between exogenous and endogenous drivers; the horizontal axis in the figure represents the relevant exogenous drivers, whereas the vertical axis represents the relevant endogenous drivers. The main difference between the two categories of drivers is the scope and ability for direct influence. Exogenous drivers are drivers that form a “given” for the sector without much room for influence for/by individual actors. Value-added services and process innovations form a category of ‘semi-exogenous’ drivers as they are partly dependent on the state of technological development across the sector, and at the same time can be influenced by individual actors once innovations have indeed emerged. Endogenous drivers are drivers

that can be influenced at the sector level, for instance by national or European policy-making. Only those drivers that received the highest ranking - a score between 8 to 10 on a scale of 0 to 10 (see chapter 9) - have been taken into consideration.

10.2 The drivers – building blocks for scenarios

The drivers form the main fundament and can be regarded as the key building blocks for the construction of the scenarios. One of the central tenets of the scenarios identified here is a clear distinction between exogenous and endogenous drivers. The endogenous drivers are defined as those drivers which can be directly influenced by governmental actors, in other words where there is the scope and ability to change the course of action by policy-making, either at the regional/national or the European level. Two sets of drivers - which *a priori* might also be labelled endogenous factors - are not included in the scenarios. These relate to those factors that concern possible actions taken at the industry and company level itself and measures directed towards the educational and training system, respectively. The reason for excluding these drivers in the formulation of the scenarios is that these factors have to be regarded as solutions, so-called strategic options, that logically follow from the scenarios as implications rather than as building bricks for the scenarios. These strategic options represent the degrees of freedom for policy and other action (see further chapter 14: strategic choices to meet emergent skills and knowledge needs).

Figure 10.1 summarizes the main drivers, with the horizontal axis reflecting the relevant exogenous drivers and the vertical axis reflecting the relevant endogenous drivers. A further description of each of the individual drivers is given below, followed in section 10.3 by concise descriptions of the four scenarios.

Overview and description of endogenous drivers

- Technology: In the scenarios three types of technology change, leading to new demand and supply of value added services and a decrease in process costs, play a major role. However, the speed of improvement differs. On the left-hand side technological change is moderate, on the right side it is fast.
- Lifestyle: Lifestyle on the right-hand side is characterised by virtual communities. Individuals are organised in virtual networks. Letter mail will reduce as it is replaced partly by electronic mail. At the same time parcel post increases, as more is ordered on the Internet. On the left-hand side lifestyle is characterised by a local community. Personal and physical contact is important. Letter mail and parcels will remain at the same level.
- Income: Income is demand inducing in the postal sector. On the right-hand side a high per capita income level is assumed, while on the left-hand side a low level is assumed.

Overview and description of exogenous drivers

- Trade and market liberalisation/regulation: At the top of the scheme we assume that regulation ensures fierce international competition in the market. It is allowed to enter the market and there are no entry barriers. This means that several large local providers compete also in other countries. Globalisation results possibly in the entry of large global firms. At the bottom of the scheme the regulators fail to regulate the market adequately, barriers to entry exist and certain segments of the sector face less competition.
- Quality of institutions: Service provisions and obligations, imperfect competition due to significant market power enjoyed by incumbents, and network access require

formal monitoring by regulatory authorities. At the top of the scheme we assume high quality institutions promoting the solution of problems, while at the bottom of the scheme the quality of institutions is low. Institutions are here defined narrowly as legal bodies supervising and enforcing regulations (e.g. competition authorities).

- Labour market regulation: Since the postal sector is heavily dependent on labour, labour market regulation is important for the sector. At the top of the scheme we assume that the labour market is flexible and is therefore able to quickly restore imbalances between demand and supply of labour, while at the bottom of the scheme we assume that the labour market is inflexible.

10.3 The scenarios – detailed discussion

Based on the combination of endogenous and exogenous drivers we discriminate between four sector scenarios for postal services¹⁴:

- Scenario I: *Snail-mail*
- Scenario II: *Post-all*
- Scenario III: *Post-IT*
- Scenario IV: *Email-round*.

Scenario I: *Snail-mail*

The scenario ‘Snail-mail’ is characterised by a low level of change. Income levels are low, which result in small increases in demand. The local community is important and technology does not change very fast. This stimulates ‘old’ patterns of postal services to survive. Change is also not stimulated by competition. The intended postal market liberalisation is not carried through and the quality of regulatory bodies is low.

Still, some competition is present as new entrants try to conquer market share of the incumbents. The niche firms can only establish themselves in parts of the market that are economically less interesting for the incumbent firms. These are usually the remote and rural areas. As competition regulation is not optimal, competition is limited and therefore does not endanger the larger incumbent firms. Incumbent firms become less market driven and more focussed internally, which means that they focus on reliability of their infrastructure and procedures. Although companies are still privately owned and have to be profitable, limited competition decreases the efficiency of firms. Inefficiencies will obscure the potential gains that could be made economy-wide. The market on aggregate (counting both traditional and ‘new’ services) is stable, meaning limited layoffs. Moreover, only a little number of offices is closed down as companies keep their focus local. For this reason distributing centres are located near the local offices. The labour market is inflexible, but this is no major problem given the low level of change.

Scenario II: *Post-all*

The ‘Post-all’ scenario has the same exogenous drivers as ‘Snail-mail’ (moderate technological growth, low income and a community focus). Main difference, however, is that competitive market regulation and high quality institutions are present. Liberalization ensures a high level of competition in the postal market. The larger corporations face increasing competition from smaller niche players, both in the traditional postal markets

¹⁴ During the final workshop it was pointed out that *Email-round* reflects the most desirable scenario for the sector, whereas *Snail-mail* resembled most the common starting point until recently.

as in the express sector. Communities become the driving factor and local presence is the major competitive driver for the domestic market. Smaller firms usually start in remote and uneconomical areas and successfully expand into wider areas, because of their local presence.

Incumbent firms, in the postal segment and the express sector are forced into restructuring. As income is relatively low and technological innovation is moderate, reorganisations are focused on scale economies and cost efficiency for the incumbent firms. As the number of deliveries goes down and sorting is increasingly done in large scale sorting centres, offices are closed down and remuneration of low educated workers is under pressure. This reduces their local presence and service, further incapacitating incumbents, while smaller niche firms are able to expand their strong position. An efficient labour market is able to cope with changing demand patterns.

Scenario III: *Post-IT*

In 'Post-IT' technological progress is fast. Virtual communities become more important than personal contacts. The express segment is growing as a result of rising income and more Internet shopping, while traditional postal activities are lagging behind. An interesting way to cope with these challenges for traditional postal companies is to invest in more value added services. Incumbents are not very efficient, however, as competition is restricted and the quality of institutions is low. Moreover, companies have consolidated in order to cope with diminishing market demands and to try to increase efficiency. The larger firm size has made incumbents unable to change quickly to changing market conditions. Inflexibility of companies causes market demand to decline for the incumbents, as consumers turn to other sectors to provide them with the services they require.

New entrants are not able to gain enough market share to guarantee that supply and demand of new services match. Often, new entrants are absorbed by the incumbents. As market demand has lagged behind, companies are overstaffed in various departments and are forced to reorganise in order to remain profitable. Labour market regulation is not helping as the labour market is quite inflexible. Incumbent companies are again turning to politics to try to get subsidies.

Scenario IV: *Email-round*

In 'Email-round' technological progress is fast, communities become virtual and income develops favourably. At the same time competition is stimulated through market regulation, the labour market is optimally regulated and institutions are of high quality. The traditional mail lags behind. The number of deliveries goes down, sorting is increasingly done in large scale sorting centers, offices are closed down and remuneration of low educated workers is under pressure. However, companies are stimulated to develop many new value added services. This creates new chances for workers. Companies are growing, but changing at the same time. Incumbents and new entrants compete heavily. If high margins exist in a market segment, this leads to entry of (inter)national competitors and express companies are also diversifying into other mail segments. Their ability to service items quickly has given them significant advantage, but incumbents react quickly. Labour market regulation facilitates this process, as the labour market is flexible enough to cope with changing patterns in labour demand.

11 Job functions – towards a workable structure

In order to determine the quantitative and qualitative implications of the scenarios for jobs and skills, a workable job classification is needed. The occupational classification of the available sector data derived from the Eurostat Labour Force Survey (LFS) is used as a starting point (see Box 3). The advantage of using this classification is that developments in the past as observed in the LFS can help to foresee likely trends for the future. For example, it might be expected that future developments in new Member States in some cases will follow similar paths as old Member States in the recent past. Moreover, where strong growth of certain job functions appeared in most recent years, one might have a reason to cautiously weigh and re-assess any further increases in future years, as the situation (markets and other factors) might have stabilised in the mean time. The share of job functions in total sector employment is not unimportant either; sizeable shares call for adequate attention. This does not imply that job functions with only very minor shares of the total should be ignored altogether. It might well be that occupations that have small shares now will face strong growth in the oncoming years, or are strategic and vital for growth of the sector as a whole, even if small in size.

However, the LFS job classification cannot be taken over one to one. First, the given LFS definitions of the job function groups are highly aggregated and cover therefore highly heterogeneous but not always comparable job functions. Reporting on this most aggregate level therefore would not be very illuminating. Second, some functions which may be strategic for the sector when looking at the future can be ‘hidden’ in a broader statistical category. This also includes ‘new’ emergent job functions. For both reasons some of the aggregated categories have been split up into separate job function categories, which have been given a more in-depth treatment. The opposite case, where certain job functions may be closely related, but do not fall within the same statistical LFS class, may also apply. Here it would be logical to combine them.

Box 3. The European Labour Force Survey

The European Union Labour Force Survey (LFS) is conducted in the 27 Member States of the European Union and two countries of the European Free Trade Association (EFTA) in accordance with Council Regulation (EEC) No. 577/98 of 9 March 1998. The data collection covers the years 1983 to 2006 and covers all industries and occupations. The national statistical institutes are responsible for selecting the sample, preparing the questionnaires, and conducting the direct interviews among households. The Labour Force Surveys are centrally processed by Eurostat, using the same concepts and definition, based on the International Labour Organisations guidelines and common classifications: (NACE (rev 1), ISCO-88 (COM), ISCED, NUTS).

Although the LFS can be used for comparative purposes, the relative small sample size (in 2002 the sample size was about 1.5 million of individuals, which represents 0.3% of the EU population) means that error margins can be high, especially when the industry itself is rather small.

Source: Eurostat (2008b)

Third, in the trend analysis it was already observed that whereas in some countries employment shares of a particular (production) job function were extremely large, similar shares in other countries appeared extremely low, often with another closely related job function being much higher. A very likely explanation for this phenomenon is that in some countries workers are reported as job function x while in others they are reported as

job function y, where basically similar tasks on the job are performed. By taking aggregates for these function types, this sort of reporting bias can be avoided. Fourth, the job functions that appear from statistical data analysis might not always be similar to what a person in or familiar with that sector would rank as the job functions that matter “in reality”, i.e. from a work floor perspective. On the basis of discussions with experts and national sector skills studies, an attempt was made to provide a job classification that is both workable and recognisable by the sector in practice. This classification is shown as Table 11.1 below.

In order to establish a meaningful and appropriate classification, the existing LFS occupational classification for the post and telecom sector was adapted by either aggregating and/or selecting further differentiating some professions out of the original LFS statistical classification. This exercise was based on four criteria:

- employment shares (aggregating);
- closely related job functions (aggregating);
- strategic role in sector (disaggregating by further selecting among the occupational groups identified in the statistical classification);
- emergent job functions not yet covered and/or brought fully to light by current statistics.

Table 11.1 Adaption of the original job classification

<i>Classification in statistical data</i>	<i>Adapted classification used in our analysis</i>	<i>Names in Table</i>
Managers	Managers	Managers
Engineers	Aggregation and selection: - Business professionals (finance, analysts, accountants, lawyers) - Logistics, operations, ICT	Business professionals
Other professionals		Operations professionals
Clerks	Aggregation and selection: - Mail carriers and sorting clerks - Sales personnel - Administrative staff	Sorting staff and mail carriers
Service workers		Sales personnel
		Administrative staff
Electronic equipment mechanics	Aggregation and selection: machine operators	Technicians
Craft workers, plant operators, drivers		
Elementary Occupations	Selection: transport labourers and freight handlers	Transportation workers

The functions used in further analysing jobs and skills needs can be described as follows:

- The category managers contains top management, but also entrepreneurs and different management occupations, such as HRM, Finance and Production management.
- Business professionals include accountants, financial controllers and finance professionals, but also sales professionals.

- Operations professionals include logistical specialists, but also ICT and other engineers specialised in managing and streamlining operations.
- Sorting staff and mail carriers sort and deliver mail. This function type is the most common function in the postal sector.
- Sales personnel include employees in postal offices, as far as these are employed by postal companies and include the lower sales workers (compare business professionals for higher sales professionals).
- Administrative staff includes general administrative functions, such as bookkeeping, administrative support, secretaries.
- Technicians contain the technical staff, responsible for maintaining and repairing machinery and other equipment.
- Transportation workers are employees that deal with the transportation of post items to and from sorting centres.

12 Implications of scenarios by job function – volume effects

Different futures will have different implications for jobs, both in quantitative and in qualitative terms. In this chapter the implications of the four scenarios in terms of volume effects for each of the identified job functions are assessed. Trends and developments of the recent past provide an important starting point in forming an idea about these future developments. This quantitative trend information has been combined with expert opinions of a core expert team and supplemented with insights from invited sector experts in a dedicated workshop to assess which volume effects would be likely to occur for which job functions. It should be emphasized that the referred expected changes are qualitative in nature, reflecting the outcome of expert judgements and expert discussion as well as desk research taking into account the results of other studies. The results of the following chapter should therefore be used as a supplement and an independent expert assessment in addition to other more formal analyses, e.g. based on mathematical and/or econometric modelling and simulation.

The results for the post sector are presented in Table 12.1. The table shows the different occupations selected and the changes expected for each of the scenarios. The scenarios ‘Post-all’ and ‘Snail-mail’ are the scenarios where technology does not have a strong impact. Both scenarios do not differ greatly, except for the function of business professionals. In the scenarios ‘Post-IT’ and ‘Email-round’ the technological impact is large. Technological change, however, has very different consequences due to the different institutional settings of the scenarios ‘Post-IT’ and ‘Email-round’. The main differences between the scenarios will be in skill changes. The most relevant changes and differences for each function are discussed below. Substantial differences will continue to exist between new companies and old incumbents in terms of addressing change.

Table 12.1 Scenarios: relative volume changes by job function 2009-2020

	Snail-Mail	Post-all	Post-IT	Email-round
Managers	M	D	M	M
Business professionals	D	M	I	I
Operations professionals	M	D	M	I
Sorting staff and mail carriers	M	D	D	D
Sales personnel	M	M	D	D
Administrative staff	M	D	D	D
Technicians	M	D	M	M
Transportation workers	D	D	D	D

Note: D=decrease, I=increase, M=maintain.

Managers

In three scenarios the number of managers is expected to maintain, although reasons for this expectation vary. In the low competition scenarios managers use their power to maintain themselves. Competition is at low levels and not much pressure is present to reduce management layers. In the high competitive scenarios this pressure does exist. This means that in 'Post-all' the number of managers decreases. In the 'Email-round' scenario, the decrease in managers is compensated as frequent changes, with high levels of diversification, decentralisation, new start ups and concentration, need to be managed.

Business professionals

The volume of business professionals is expected to increase in the scenarios with fast changing market conditions and strong technological change. In these scenarios, 'Post-IT' and 'Email-round', business professional are needed. Moreover, business professionals have an incentive and the position to increase their importance and influence, further creating a need for their services. The business professionals are able to generate new high value ideas, while the execution requires the input of more business professionals. In the scenarios 'Snail-mail' and 'Post-all', there is not much need for business professional. In the 'Snail-mail' scenario their number is even expected to decline. The reason for this is that competition technological change is low and few possibilities exist to generate high value services. In the 'Post-all' scenario competition is possible and restructuring of the sector is more commonplace. Large restructurings require more business professionals. At the other hand, however, technological change and income is low providing not many chances to develop business.

The number of business professionals in the period 2000-2006 has increased slightly in both the telecom and postal sectors (*see Data Annex for details*).

Operations professionals

For the post sector we include the operational function, which includes ICT and other engineering professionals, but also the logistic specialists. The demand for their services is for the most part driven by technological developments and supply of new high value added services, but also by changes in the organisation.

Therefore, in scenario 'Email-round' where technology and competition plays a substantive role, the volume of operational professionals will increase. Also in the scenario 'Post-IT' their services are needed due to technological changes. However, the number of companies reduces, which decreases this demand. In the 'Snail-mail' scenario the number of operations professionals is also expected to maintain, as the number of companies is more steady and their focus on infrastructure and operations will maintain demand for their services.

In the period 2000-2006 the number of engineering professionals has increased slightly in recent years (*see Data Annex for details*). In the new Member States their number has increased more than in the other EU Member States.

Sorting staff and mail carriers

Sorting staff and mail carriers represent the bulk of employment in the postal sector (*see section 3 for details*). Their position has decreased in the period 2000 to 2006 throughout Europe. The decline was larger in the old Member States than in the new Member States (*see Data Annex for details*). The number of sorting staff and mail carriers is mostly dependent on demand for postal services, but also on efficiency considerations, as they are such a large component in the total costs of the firms. In the scenarios with the strongest push for competition and technological change, the position of the sorting and mail carriers faces a lot of pressure. The only scenario in which the number of sorting staff and mail carriers is maintained is the 'Snail-mail' scenario, where local communities play an important role and competition and technological change is low. In the other three scenarios sorting staff and mail carriers face (the constant pressure of) substantial lay-offs both as a main way to cutting costs for employers and because of high substitution effects from other technological services. For these services little sorting staff and mail carriers are required. A notable divide in wage pay and conditions exists between old and younger mail carriers. New companies are hiring a new type of distribution worker. Active redeployment of this category of workers is one of the main challenges for the coming years.

Sales personnel

In the scenarios where local rather than virtual communities play a role the number of sales personnel is expected to maintain, as they provide an important way for companies to achieve their local presence. These are the 'Snail-mail' scenario and the 'Post-all' scenarios. In the 'Post-all' scenario the pressure on incumbent firms is on to cut costs, but at the same time competitors take up positions that are uneconomic for the incumbent firms. Because of their local presence they are able to acquire more market share. Therefore the number of sales personnel maintains. This is not the case however for the scenarios with high technological change where communities become more virtually oriented. Local presence is not required anymore, and this provides the means for companies to cut back on costs, which is needed in both the competitive scenario ('Email-round') and the non-competitive scenario ('Post-IT').

Administrative staff

Expected changes for administrative staff are similar to the sorting staff and mail carriers. The main reason for this is that administrative staff are mostly seen by management as overhead and are therefore subject to job cuts when profits are falling behind.

The one scenario where the number of administrative staff is expected to maintain is the scenario with a low level of changes, namely the 'Snail-mail' scenario. In this scenario

companies focus on streamlining the organisation, which means that administrative staff is needed. Still, pressure to decrease costs through these functions maintains. In the other scenarios competition and technological change forces companies to cut costs. Therefore the demand for administrative staff declines.

Technicians

The expected growth of the number of technical staff differs from the other functions. In the high paced scenarios 'Email-round' and 'Post-IT' the number of technicians is expected to maintain. The reason for this is that more value added services are offered, but at the same time demand for letter mail decreases, which requires new equipment and maintenance of this equipment.

In the two lower paced scenarios the expectations differ. In the 'Post-all' scenario reduction of overhead costs is important. Therefore companies reorganise their sorting centres and other technical facilities. Moreover companies try to cut costs by economising on maintenance. This however is not the case for the 'Snail-mail' scenario. Reliability is more important in that scenario. Therefore it is expected that companies rather overstaff their technical departments. This is the main reason that the number of technicians is expected to maintain in the 'Snail-mail' scenario.

Transportation workers

Transportation workers are needed to deliver mail and packets from and to the main sorting centres. In the scenarios with strong technological change mail items are partly replaced by digital items, reducing the need for transportation. This reduces the number of transport workers in 'Post-IT' and 'Email-round'. In the 'Snail-mail' scenario local presence requires local delivery and transport to local offices. Still transportation workers are vulnerable to efficiency gains and therefore subject to outsourcing. This is especially relevant in the 'Post-all' scenario, where companies try to limit transportation costs. This means that incumbent firms will try to reduce the number of transport workers. However, other new start-up companies will require transport workers, but this is not expected to offset the decrease in demand. Therefore in both low technology scenarios the number of transport workers is expected to decrease. Active redeployment of this category of workers is one of the main challenges for the coming years.

13 Implications of scenarios - main emergent competences

13.1 Introduction

Determining emergent competences is at the very heart of this study. In order to identify the main emergent competences by occupational function, the Rodrigues (2007) methodology refers to three main competences: theoretical, technical and social competences. This distinction builds on the distinction between knowledge, skills and competences in the European Qualifications Framework (EQF) and the European Credit system for Vocational Education and Training (ECVET) (see Box 4 below). The term human capital broadly defined by the OECD as 'the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being' (OECD, 2001:18) captures all three. The use of the term 'capital' leads one to think in terms of investments in education and training which are often necessary in order to acquire skills and knowledge. However, skills and knowledge can

also be acquired through work experience, informal on-the-job learning and a variety of other means.

Box 4. Definition of competences, skills and knowledge in EQF and ECVET

Several definitions of knowledge, competences and skills are nationally as well as internationally under discussion. Moreover, Member States of the European Union still have different approaches in defining these terms. The European Union has set up a joint process to co-ordinate the different existing terminologies and to find a common basis. Aims of this process are for example to strengthen the mobility of the labour force within the European Union and to facilitate sectoral developments. In the following reference is made to the definition used by the European Qualification Framework (EQF) and the European Credit System on Vocational Education and Training (ECVET).

The EQF links national qualification systems and tries to make vocational training and lifelong learning more transparent and understandable. Therefore a common terminology was developed. The following descriptors are taken from the EQF (European Commission, 2008e; see also European Commission, 2008f):

- *Knowledge* refers to the outcome of the accumulation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the European Qualifications Framework, knowledge is described as theoretical and/or factual;
- *Skills* refers to the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the European Qualifications Framework, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments);
- *Competence* refers to the proven ability to use knowledge, skills and personal, social and/ or methodological abilities, in work or study situations and in professional and personal development. In the context of the European Qualifications Framework, competence is described in terms of responsibility and autonomy;
- *Qualification* refers to a formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standards (see also footnote 13);
- *Learning outcomes* refer to statements of what a learner knows, understands and is able to do on completion of a learning process, which are defined in terms of knowledge, skills and competence.

In the actual identification of future competences, the EQF/ECVET definitions are used as indicative. It is noted that the difference between competences and skills is not always clear-cut, for instance where 'soft skills' come into play. A similar comment holds for what determines job or occupational qualifications.¹⁵ Partly because of these identification issues, adequate measurement of competences, knowledge and skills is notoriously difficult. In some of the literature, the problem of skills measurement is sometimes avoided by using indicators (proxies) focusing on qualifications (high-level,

¹⁵ 'Qualification' denotes the requirements for an individual to enter or progress within an occupation. It also denotes an official record (certificate, diploma) of achievement which recognises successful completion of education or training, or satisfactory performance in a test or examination. The concept of qualification varies from one country to another. It may express the ability – formally defined in work contracts or collective agreements – to perform a certain job or meet the requirements of the workplace. A qualification may give rise to a number of rights and prerogatives which determine the individual's position within the hierarchy of his/her occupational context. (Tessaring, 2004: 235).

intermediate-level, low-level) as well as occupations. For the purpose of identifying *future* skill needs such approach will not deliver useful results. Instead it is the knowledge and skills behind that need to be identified.

Rather than producing a full and exhaustive list of all competences for each job function, the key focus in this chapter is on identifying and describing key and critical competences for the future. The description will be focused but also general enough to be meaningful across countries. A slight extension of the original Rodrigues methodology is that together with the identification of critical skills and knowledge needs, a differentiation by scenario is made. Skills and knowledge needs are operationalised as expected key changes in specific skills and knowledge categories by occupation.

Box 5. Skills needs, skills shortages and skills gaps defined

- *Emergent skills needs* are defined here as the change in skills that is needed to adequately fulfil a certain job function in the future. Addressing emergent skills is needed in order to avoid skills shortages and/or skills gaps in the future.
- *Skills shortages* exist where there is a genuine lack of adequately skilled individuals available in the accessible labour market. A skill shortage arises when an employer has a vacancy that is hard-to-fill because applicants lack the necessary skills, qualifications or experience.
- *Skills gaps* arise where an employee does not fully meet the skills requirements for a specific job function but is nevertheless hired. This skills gap needs to be closed through training. Skills gaps can arise where new entrants to the labour market are hired and although apparently trained and qualified for occupations still lack some of the skills required.

Table 13.1 Overview of skills and knowledge clustered by category

Knowledge ('hard skills')
<ul style="list-style-type: none"> • Legislative / regulatory knowledge (environmental / safety / labour / contracting); Language*; e-skills; Marketing skills; Technical knowledge; Product knowledge; Product development
Social Skills
<ul style="list-style-type: none"> • Team working skills; Social perceptiveness (listening / understanding); Communication; Networking; Language*; Intercultural
Problem-solving Skills
<ul style="list-style-type: none"> • Analytical skills; Interdisciplinary; Initiative, Multi-skilling; Creativity
Self management
<ul style="list-style-type: none"> • Planning; Stress and time management; Flexibility; Multi-tasking
Management skills
<ul style="list-style-type: none"> • Strategic & visionary; Coaching and team building; Change management; Project management; Process optimizing; Quality management; people skills crucial for collegial management style
Entrepreneurial skills
<ul style="list-style-type: none"> • Supplier and customer relationship / understanding; Business understanding; Trend setting / trend spotting

Throughout this report the term *competences* is defined as the “proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development.” (see Box 4 for definitions). In the practical elaboration of competence needs hereafter the focus is predominantly on knowledge and skills needs, with a further distinction to what is usually described as ‘soft skills’ such as team working skills, and planning and organising. Note that the ‘personal, social and/or methodological abilities’ included in the definition of competences (see Box 5) come very close to what is generally understood as ‘soft skills’.

A number of different skills categories have been taken into account, including social skills, problem solving skills, (self) management skills, skills related to entrepreneurship, as well as knowledge requirements (sometimes labelled as ‘hard skills’). Table 13.1 provides an overview of the different skills and knowledge categories taken into consideration. Literacy and numeracy skills are not specifically mentioned in the tables. In practice these skills cannot be taken for granted. However, they are a prerequisite rather than an emerging skill to participate in the workforce.

For each job function key future skills and knowledge needs were identified. This was done in a workshop with a number of invited sector experts, and validated in two subsequent workshops, including the step 10 final workshop; the results therefore remain based on joint expert opinion. The analysis in Part I and the data tables formed a ‘levelling’ starting point for each of the discussants.

The emergent future competences – defined as skills and knowledge needs - are identified and clustered together with similar ones in a concise overview table per job function (see next sections 13.2 to 13.11). Only *substantive key changes* in skills and knowledge needs are taken into account, which means that only part of the cells in the table is ‘filled’. However, if a certain skill or knowledge type is highlighted in one scenario, but is not addressed in another, this does not mean that it is irrelevant. Rather it means that relative demand for this skill in the latter case will not increase within the time frame 2009-2020.

13.2 Managers

Most companies in the postal sector are large integrated companies. Managers usually are at a large distance from the people lower in the organisation. A reason for this is that most operations are highly decentralised, while management is highly centralised due to scale economies.

Developments in the postal sector, even in the scenarios with strong(er) technological change are not as fast as in for instance the telecom sector. Therefore development of skills need will be subject to more long term adjustments. Skill changes can be less dramatic compared to other sectors, but can have a substantial impact for managers.

For managers the scenarios with strong technological change with high competition, ‘Email-round’, will have the largest impact on skills as it drastically changes the business. ‘Post-IT’ reflects a scenario where the environment changes rapidly, but companies are not prepared for all the changes and eventually have to ask for government funding.

The low technological scenarios represent business as usual, although the scenario with little competition departs from current practices. The reason is that the local community plays a decisive role in competition and managing a company with a community focus requires different techniques than traditional management skills.

Knowledge is a major asset for managers. In the 'Post-IT' and 'Post-all' scenarios legislative and judicial knowledge is needed in order to successfully acquire other companies. In 'Post-all' and 'Email-round' regulatory knowledge becomes more important due to the role of trade and market regulation. In the scenarios with strong technological change technical knowledge and e-skills will become more influential, as managers need to keep up with developments.

In all scenarios **social skills** are required, but there are differences between the scenarios. The most important skill is social perceptiveness. In the local community scenarios social perceptiveness is important to be able to identify what the community wants and thus align the company towards community demands. In the high technological scenario it is important to understand customers in order to foresee developments and to identify new opportunities. In the scenarios where efficiency or technological development is important, 'Post-all', 'Post-IT' and 'Email-round', social perceptiveness is directed also internally, towards employees, as many organisational changes will affect them, also in unpleasant ways. For this managers also need to be able to communicate to explain the chosen policies. In 'Email-round' language and intercultural skills become more important as companies are active in more countries.

New opportunities create needs for more **problem solving skills**, most notably analytical skills and creativity. These skills are needed in order to understand technologies and to be able to combine them into business opportunities. In all scenarios where reorganisations play an important role analytic skills are important. This is the case in three scenarios, namely the two high-tech scenarios and the low technology scenario with competition.

Other problem solving skills are less important as the pace of change is not very fast in this sector and therefore other skills are less relevant. The same goes for **self management skills**. In the fast paced scenarios flexibility is a central emerging skill, while planning skills become more important in the low technological scenarios.

As far as **entrepreneurial skills** are concerned, marketing, business development and trend spotting will become more relevant in the two scenarios with high technological developments. These skills are especially relevant for former state monopolies, where competition has just started its influence. In the low technology, high competition scenario, 'Post-all', entrepreneurial skills are less important, as there is little opportunity for most managers to develop new lines of business. In this scenario the main task of management is to decrease costs. In all scenarios it is crucial that managers understand their suppliers and customers.

Most diversity occurs in **management skills**. Strategic skills are only required in the high technology scenarios. In scenarios with forced reorganisations, namely the 'Post-all' and the 'Post-IT' scenarios, coaching and team building and change management skills will be more important, as forced reorganisations can lead to resistance within the workforce. In the 'Email-round' scenario changes can be more bottom-up, therefore managers need to be approachable and have a more collegial management style. Therefore, in all scenarios leadership skills emerge as critical skill, especially leadership for guiding changes that are under way. Process optimising skills are expected to become more important in three scenarios, namely 'Post-all', 'Post-IT' and 'Email-round'. In the low technological scenario process optimising skills will be relevant, because companies have to improve what they do best. This skill is not only related to the company itself, but also to the whole value chain. In the other two scenarios companies have to innovate and successfully exploit their innovations. Process optimisation skills are needed to successfully incorporate these innovations into existing organisational processes.

Table 13.2 Emerging skills and competences for managers, 2009-2020*

		Snail-mail	Post-all	Post-IT	Email-round
Knowledge	Legislative / regulatory knowledge				
	e-skills				
	Technical knowledge (logistics)				
Social Skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress and time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding suppliers customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic and visionary				
	Coaching and team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Total emerging skills and competences		3	9	15	19
Scenario characteristics:					
- Technological change		Slow	Slow	Fast	Fast
- Lifestyle: social interaction		Local	Local	Virtual	Virtual
- Income		Low	Low	High	High
- Trade and market regulation		Bad	Optimal	Bad	Optimal
- Labour market regulation		Bad	Optimal	Bad	Optimal
- Quality of institutions		Bad	Optimal	Bad	Optimal

Note: shaded areas highlight specific skills and knowledge that will become relatively more important in the future, and require up-skilling and knowledge upgrading. This does not mean that blank areas are irrelevant; rather here no change in terms of up-skilling and knowledge upgrading is needed. The darker the area shaded the more important it is in the scenario. * Updated and validated on the basis of discussions during the final workshop, February 2009.

13.3 Business professionals

The scenarios where technological change is present are the scenarios where the number of business professionals is expected to increase. The high technology scenarios, 'Post-IT' and 'Email-round', bring about changing conditions in the business environment in which business professionals play an important role. In the high technology scenario with limited competition their contribution is to adapt the organisation to technological development, which is especially crucial considering the limitations that exist in the market and the organisation. In the scenario with high technological developments and high competition, organisations need to implement new organisational forms and new techniques. Business professionals play a major role in implementing changes and setting up new businesses, models, strategies and marketing plans.

In the 'Post-all' scenario business professionals will also have a large role, as competition forces organisations to become very efficient, while technological possibilities for becoming more efficient are limited. Business professionals therefore have to invent new ways of becoming more competitive. The main difference between the 'Email-round' and the 'Post-all' and 'Post-IT' scenarios is that in the 'Post-all' and 'Post IT' scenarios companies have to focus on becoming more efficient, while in the 'Email-round' scenario companies have to focus on becoming more innovative. In the 'Snail-mail' scenario, with little competition and little technological development business professionals have little to contribute to the organisations, as it is not their plans that drive business, but the wishes of the community.

In the low technology scenario 'Snail-mail' the fewest changes in skills needs are relevant. As communities are important it is important for business professionals to stay in touch with the customers and to understand their wishes. They have to be socially perceptive to pick up the various signals they get from consumers. This way of organising is not very appealing for business professionals, as community wishes are not easily translated into organisational models. Rather than translating wishes by thinking up new business models, they are responsible for signalling and transmitting wishes. In order to do so they need to be able to understand their customers and suppliers.

Business professionals need **knowledge**. Legislative and regulatory knowledge is important in three scenarios. The reason why these skills are expected to become more prominent is because of reorganisations and the role of markets and regulation. The effects of reorganisations have to fall within legislative procedures. Hence, business professionals, in order to be effective, need to have knowledge of these aspects. In the high technological scenarios technical knowledge and e-skills are more needed in order to assess the possibilities of new technologies.

Social skills that are required in three scenarios are communication and team working skills. Communication skills are relevant as in all three scenarios changes occur that require the organisation to change, sometimes in unpleasant ways. Business professionals need to be able to communicate the need for these changes to other people in the organisation. For this reason team working skills are important as well. In order for new plans to work business professionals have to be able to work together with other people within the organisation. In the 'Post-IT' and 'Email-round' scenarios, networking skills are also important, as business professionals have to look for outside assistance co-operation.

Table 13.3 Emerging skills and competences business professionals, 2009-2020*

		Snail-mail	Post-all	Post-IT	Email-round
Knowledge	Legislative / regulatory knowledge				
	e-skills				
	Technical knowledge				
Social Skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress and time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding suppliers customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic and visionary				
	Coaching and team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Total emerging skills and competences		2	9	12	22
Scenario characteristics:					
- Technological change		Slow	Slow	Fast	Fast
- Lifestyle: social interaction		Local	Local	Virtual	Virtual
- Income		Low	Low	High	High
- Trade and market regulation		Bad	Optimal	Bad	Optimal
- Labour market regulation		Bad	Optimal	Bad	Optimal
- Quality of institutions		Bad	Optimal	Bad	Optimal

Note: shaded areas highlight specific skills and knowledge that will become relatively more important in the future, and require up-skilling and knowledge upgrading. This does not mean that blank areas are irrelevant; rather here no change in terms of up-skilling and knowledge upgrading is needed. The darker the area shaded the more important it is in the scenario. * Updated and validated on the basis of discussions during the final workshop, February 2009.

The same changes also require **problem solving skills**, most importantly analytical skills. Both are needed as reorganisations and new technologies require the business

professionals to come up with solutions for new challenges. In 'Email-round', with high competition and fast changing technology, initiative will become more important, as companies need to be able to pick up new value added services and exploit these.

In most scenarios changes in **self management skills** are not very important, as most changes for the business professionals do not change the way they perform their work. The exception to this is the need for more flexibility and stress and time management skills in the high technology and high competition scenario, 'Email-round'. In this scenario the incumbent firms have to apply more flexible forms of organisation, which is not the case in the other scenarios. This means that business professionals have to be able to adapt to changing circumstances.

In all scenarios understanding customers is an important skill change. Marketing and trend setting skills become more important in 'Email-round' as picking up trends and use them effectively is crucial to survive. Other **entrepreneurial skills** that will become more important are business development skills, in all scenarios except the 'Snail-mail' scenario. Business development is important because of new technological development, but also, in the case of the low technology scenario, because of reorganisations to exploit economies of scale.

Reorganisations will also require new **management skills** for business professionals. These skills are most apparent in the scenarios 'Post-all', 'Post IT' and 'Email-round'. In these scenarios change management skills will be needed to successfully implement changing policies. In the 'Email-round' scenario also project management skills will become more important, as new technology has to be developed into marketable products. Furthermore in the three scenarios mentioned here, process optimising and quality management skills are required, but for different reasons. In the high technology scenario 'Email-round', process optimising is needed in order to exploit newly established products, and in the other two scenarios, 'Post-all' and 'Post-IT', because companies need to become more efficient.

13.4 Operations professionals

In the postal sector logistical efficiency is of great importance and this is the primary area of operations professionals. The operations professionals are responsible for all aspects of operations, including ICT and web related services, planning and distribution systems. In the 'Post-all' and 'Post-IT' scenarios, where companies focus on reducing costs, in order to cope with competition or new technological developments, operations professionals will play an important role in streamlining the organisation. This means that they have to find ways of improving the efficiency of processes and to integrate new services into current systems and processes. Integrating new value added services is especially apparent in the high technology and high competition scenario 'Email-round'.

In the 'Snail-mail' scenario, with little changes and little competition, companies focus on reliability of their processes and the coherence of their operations with local communities. This is completely different from the other scenarios and requires different new skills.

Knowledge is important for the operational professionals, especially in the scenarios with strong technological change. In these scenarios E-skills are demanded, but also other technical knowledge, operational, logistical, but also more management knowledge.

Social skills are important in three scenarios. In the low technology scenarios, social perceptiveness is increasingly demanded, as the role of communities is vital for the

organisation. For operational professionals this skill requirement is more challenging than the more technically oriented skills. Other social skills are only important in the high technology scenarios, where technological changes require the operations professionals to convince managers and the business professionals to allocate means to new technologies. Therefore operations professionals need more networking skills, communication skills and team working skills.

Technological changes also require more **problem solving skills**. These are related towards taking initiative, which means to signal changes and to act accordingly. Interdisciplinary skills are also important, as new value added services are dependent on many different technologies and management skills. Analytical skills are important in three scenarios, namely 'Post-all', Post-IT and 'Email-round'. In these scenarios the capabilities of the operations professionals are intensively explored and used to improve organisational efficiency and effectiveness.

Changes in the business environment require the operational professionals to adjust themselves to new circumstances. The most obvious **self management** skills that are related to these changes are flexibility skills in the 'Email-round' scenario because of fast changing technologies and better planning skills in the 'Email-round', 'Post-IT' and 'Post-all' scenarios, which are needed to work in an organisation that tries to improve its efficiency.

Business development skills are needed in all scenarios. The reason for this is that in all scenarios development requires strategies to further develop business, while the direction of business is different in all scenarios. Other needed **entrepreneurial skills** include understanding consumers and suppliers. The reason for this is that in the low tech scenario operations professionals have to align their organisation according to the community, while in scenarios with strong technological change keeping up with technological developments is important to remain competitive. Trend setting and spotting is very important in 'Email-round' as technological change and competitive pressure is high.

All scenarios require some form of new **management skills**. For business professionals strategic skills were only assumed to be necessary in the 'Email-round' scenario. For operations professionals strategic skills are also required in the 'Post-IT' scenario. The reason for this difference is that in the 'Post-IT' scenario business professionals have to deal with organisational change, to diminish the barriers that limit strategic behaviour of the companies. They rely on the operational professionals to identify new opportunities in the market. In the 'Email-round' scenario both are expected to be able to do so.

In the 'Email-round', 'Post-IT' and 'Post-all' scenarios quality management is important. As companies economise on overhead, quality management becomes an issue. In the scenario with many changes change management and project management skills are required, either to deal with forced changes or to develop new possibilities. Moreover, in all scenarios process optimising skills are highly relevant.

Table 13.4 Emerging skills and competences Operations professionals, 2009-2020

		Snail-mail	Post-all	Post-IT	Email-round
Knowledge	Legislative / regulatory knowledge				
	e-skills				
	Technical knowledge				
Social Skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress and time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding suppliers customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic and visionary				
	Coaching and team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Total emerging skills and competences		4	9	16	18
Scenario characteristics:					
- Technological change	Slow	Slow	Fast	Fast	
- Lifestyle: social interaction	Local	Local	Virtual	Virtual	
- Income	Low	Low	High	High	
- Trade and market regulation	Bad	Optimal	Bad	Optimal	
- Labour market regulation	Bad	Optimal	Bad	Optimal	
- Quality of institutions	Bad	Optimal	Bad	Optimal	

Note: shaded areas highlight specific skills and knowledge that will become relatively more important in the future, and require up-skilling and knowledge upgrading. This does not mean that blank areas are irrelevant; rather here no change in terms of up-skilling and knowledge upgrading is needed. The darker the area shaded the more important it is in the scenario.

13.5 Sorting staff and mail carriers

For lower skilled staff, such as sorting staff and mail carriers, quantitative changes are more important than qualitative changes. For these workers, operating more or less outside the organisation without many degrees of freedom, qualitative changes are not very important. There are not many ways to change their functions.

In some scenarios however, new demands can be placed upon mail carriers and sorting staff, due to internal requirements and technological developments. In the 'Email-round', 'Post-all' and the 'Post-IT' scenarios most changes occur because of efficiency considerations, while changes in the other scenarios occur because of changes in the environment, although these are limited in the 'Snail-mail' scenario. In the 'Email-round' and 'Post-IT' scenarios more low skilled poorly paid personnel will be used, often from outside the company. Therefore, entrants have to be trained regularly the basic skills – compared to the less competitive scenarios. A further increase of atypical employment (part-time, self employed) is very probable.

In the two scenarios with high technological development, technological **knowledge** will become more essential. E-skills and other technical knowledge are needed in order to cope with automated workflows, the use of web applications and sorting equipment. Mail carriers will need to apply logistic software for more efficient route planning.

Mail carriers are the main group of employees to represent the company to the outside world. In the scenarios with few changes and a community focus, **social skills**, especially communication skills and social perceptiveness, become more important. The sorting staff and mail carriers function as a bridge between the organisation and the community and their input can be of importance to the organisations. In the high technology scenarios mail carriers and sorting staff are more instrumental. The focus is on working efficiently.

In the scenarios with competition and strong technological change, 'Post-IT', 'Post-all' and 'Email-round', **problem solving skills** are demanded. This is not the case in the 'Snail-mail' scenario. The problem solving skills relate to development of multiple skills. Due to changes in the working environment and new technologies employees will have to be able to change quickly to new circumstances and be able to perform various duties, if that makes the company more productive or innovative.

Connected to these skills are **Self management skills**, which will become more relevant in all scenarios, 'Post-IT', 'Post-all' and 'Email-round', and are related to the problem solving skills or more market pressure. These are flexibility, planning and multi tasking. Those who are able to plan their work better and are more flexible will have an advantage as they are able to increase company productivity. Workers with more self management skills are also more attractive to be hired by mail companies.

Table 13.5 Emerging skills and competences sorting staff and mail carriers, 2009-2020*

		Snail-mail	Post-all	Post-IT	Email-round
Knowledge	Legislative / regulatory knowledge				
	e-skills				
	Technical knowledge				
Social Skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress and time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding suppliers customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic and visionary				
	Coaching and team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Total emerging skills and competences		2	7	6	8
Scenario characteristics:					
- Technological change		Slow	Slow	Fast	Fast
- Lifestyle: social interaction		Local	Local	Virtual	Virtual
- Income		Low	Low	High	High
- Trade and market regulation		Bad	Optimal	Bad	Optimal
- Labour market regulation		Bad	Optimal	Bad	Optimal
- Quality of institutions		Bad	Optimal	Bad	Optimal

Note: shaded areas highlight specific skills and knowledge that will become relatively more important in the future, and require up-skilling and knowledge upgrading. This does not mean that blank areas are irrelevant; rather here no change in terms of up-skilling and knowledge upgrading is needed. The darker the area shaded the more important it is in the scenario. * Updated and validated on the basis of discussions during the final workshop, February 2009.

13.6 Sales personnel

The sales personnel have more or less similar characteristics to the sorting staff and mail carriers. In scenarios where virtual communities become more widespread, physical sales personnel are replaced by web based support and call centres. In the scenarios where companies have to focus on producing efficiently sales personnel represents a customer service function and do not contribute directly to profits. Therefore they become expendable, or their tasks are redeveloped as to contribute more directly to company results. This is less the case in 'Post-all' where the local community plays a larger role. In the competitive scenarios the functions of sales personnel are in some countries outsourced to e.g. large retailers with high density of markets. Only in densely populated areas or areas with important industry customer post offices will remain for certain. This does not change in general the identified skill needs but gives them a little bit another direction and deepens some skills related to industry costumers.

In two scenarios new **knowledge** is required. This is the case in both scenarios with strong technological change. The use of Internet and web applications, but also databases in the front office will increase, therefore knowledge of these items is important.

As was the case with the mail carriers and sorting staff, the sales personnel are the front office workers of the organisation. However, where contacts with mail carriers are purely social, for sales personnel this is not the case. Changing demographics place more demands on sales personnel in terms of **social skills**. Intercultural skills are more important in order to deal with different behaviour. Other social skills that are important are social perceptiveness and communication. These are expected to be of relevance in only the low technology scenarios, because in these scenarios communities matter for organisations. In the other scenarios consumer judgement will be more instrumental. This means that it is subject to market research and training, but does not receive the attention it deserves from managers, as other considerations have a higher priority.

Table 13.6 Emerging skills and competences for sales personnel, 2009-2020

		Snail-mail	Post-all	Post-IT	Email-round
Knowledge	Legislative / regulatory knowledge				
	e-skills				
	Technical knowledge				
Social Skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress and time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding suppliers customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic and visionary				
	Coaching and team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Total emerging skills and competences		3	9	8	8
Scenario characteristics:					
- Technological change		Slow	Slow	Fast	Fast
- Lifestyle: social interaction		Local	Local	Virtual	Virtual
- Income		Low	Low	High	High
- Trade and market regulation		Bad	Optimal	Bad	Optimal
- Labour market regulation		Bad	Optimal	Bad	Optimal
- Quality of institutions		Bad	Optimal	Bad	Optimal

Note: shaded areas highlight specific skills and knowledge that will become relatively more important in the future, and require up-skilling and knowledge upgrading. This does not mean that blank areas are irrelevant; rather here no change in terms of up-skilling and knowledge upgrading is needed. The darker the area shaded the more important it is in the scenario.

In the scenarios 'Post-all', 'Post-IT' and 'Email-round' **problem solving skills** and **self management skills** will become more important. Again similarities with the mail carriers are large. For sales personnel quantitative changes play a role in all three scenarios, as well as new technological developments. This means that they have to combine more tasks, have to increase the use of technology. For this they require flexibility and multitasking skills. At the same time customers will see the diminishing of the number of offices and sales personnel as a decline in service. In order to make sure that their demands are met they express these more explicit and forcefully. This adds to the pressure of sales personnel. Stress management is therefore needed, but also initiative, to be able to deal proactively with client wishes.

13.7 Administrative staff

Administrative staff is the back office within the postal sector. In the scenarios where efficiency determines competitive advantage, their role is to secure efficient procedures, while at the same time they are considered to be overhead. In the scenario where innovation is combined with a high level of competition, the 'Email-round' scenario, administrative staff can hinder flexibility. Procedures are moved to the background, as new products and technologies have to be implemented within existing procedures. In the community scenario 'Snail-mail', the role of administrative staff is minimal and effectiveness of their operations is the main factor that determines their functioning.

In order to efficiently implement new services, e-skills are needed for administrative staff. As value added services are not very important in the other scenarios, **knowledge** skills hardly play a role in these scenarios.

Administrative staff does not require additional **social skills**, except in the high technology and competition scenario. The reason for this is that administrators have to work together with various other departments in order to change processes and procedures, requiring team working skills. In other scenarios changes of procedures do not happen frequently, or can be a purely administrative matter.

Problem solving skills, on the other hand, will become more important, in the high competition, or scenarios with strong technological change, 'Post-IT', 'Post-all' and 'Email-round'. Skills that will become more relevant in all three scenarios are analytical skills, initiative and multi-skilling. Procedures in these three scenarios have to be optimised, either following reorganisations, either because of new technologies. In order to optimise processes analytical skills are needed, and understanding of other tasks. Moreover, initiative is needed to change procedures that do not work. In the scenarios with strong technological change, 'Email-round' and 'Post-IT', interdisciplinary skills also become important, as administrative staff need to be knowledgeable about requirements from various departments within the organisation. In the 'Email-round' scenario creativity is need to incorporate new developments into administrative processes.

Additionally, **self management skills** are required in order to implement changes effectively, but these are different in the various scenarios. In the scenarios where efficiency is the driver, namely 'Email-round', 'Post-IT' and 'Post-all', planning skills are more important, as the focus is on performing tasks efficiently. In the 'Post-IT' scenario, where competition is low and technological developments are high, administrative staff have to deal with conflicting requirement; efficiency on the one hand and new technologies on the other, which means that pressure comes from two sides: management to function efficiently, and operational professional to incorporate new technology in their

Table 13.7 Emerging skills and competences for administrative staff, 2009-2020

		Snail-mail	Post-all	Post-IT	Email-round
Knowledge	Legislative / regulatory knowledge				
	e-skills				
	Technical knowledge				
Social Skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress and time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding suppliers customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic and visionary				
	Coaching and team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Total emerging skills and competences		2	6	8	13
Scenario characteristics:					
- Technological change	Slow	Slow	Fast	Fast	
- Lifestyle: social interaction	Local	Local	Virtual	Virtual	
- Income	Low	Low	High	High	
- Trade and market regulation	Bad	Optimal	Bad	Optimal	
- Labour market regulation	Bad	Optimal	Bad	Optimal	
- Quality of institutions	Bad	Optimal	Bad	Optimal	

Note: shaded areas highlight specific skills and knowledge that will become relatively more important in the future, and require up-skilling and knowledge upgrading. This does not mean that blank areas are irrelevant; rather here no change in terms of up-skilling and knowledge upgrading is needed. The darker the area shaded the more important it is in the scenario.

processes. This requires more planning, but also more stress management skills. In the high technology and competition scenario both flexibility and multitasking become more

important, as new value added services require administrative staff to deal with more different types of work and adjust to the different requirement accordingly.

Table 13.8 Emerging skills and competences for technicians, 2009-2020

		Snail-mail	Post-all	Post-IT	Email-round
Knowledge	Legislative / regulatory knowledge				
	e-skills				
	Technical knowledge				
Social Skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress and time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding suppliers customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic and visionary				
	Coaching and team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Total emerging skills and competences		3	2	9	9
Scenario characteristics:					
- Technological change		Slow	Slow	Fast	Fast
- Lifestyle: social interaction		Local	Local	Virtual	Virtual
- Income		Low	Low	High	High
- Trade and market regulation		Bad	Optimal	Bad	Optimal
- Labour market regulation		Bad	Optimal	Bad	Optimal
- Quality of institutions		Bad	Optimal	Bad	Optimal

Note: shaded areas highlight specific skills and knowledge that will become relatively more important in the future, and require up-skilling and knowledge upgrading. This does not mean that blank areas are irrelevant; rather here no change in terms of up-skilling and knowledge upgrading is needed. The darker the area shaded the more important it is in the scenario.

Some **management** and **entrepreneurial skills** are important for administrative staff. In all scenarios process optimising skills play a role, however the role is different in the scenarios. In the low technology and competition scenario it is important to align the administrative processes with community demands. In order to know what the community wants, an understanding of consumer and suppliers is needed. In the 'Post-all' and 'Post-IT' scenarios, with the focus on efficiency, optimising processes is important in order to maximise economies of scale. This requires formal monitoring of the quality, which makes quality management more important. Finally, in the high technology and competition scenarios process optimising skills are needed to ensure the working of new value added services.

13.8 Technicians

The technicians play different roles within the scenarios. In the 'Snail-mail' scenario their main task is to arrange the reliability of operations. In the 'Post-IT' and 'Post-all' scenarios internal considerations become the main driver of their tasks. Service aspects are undermined by efficiency considerations. In the scenarios with strong technological change their function is extended in order to supply new value added services. This is the focal point of their work in the 'Email-round' scenario.

The technicians have to focus on **social skills**, more specifically, their team working skills. In the 'Post-all' scenario, team working skills are less important, as the main expectation management has of technicians is to work efficient. In the high technology scenarios team working skills are needed in order to incorporate new technologies, regardless of other expectations. In the 'Snail-mail' scenario, where change is slow, team work is important as reliability is the main driver. In order to establish reliability, technicians need to be able to work, while also taking others into consideration, in order not to affect their work and thus the overall reliability.

In the high technology scenarios **problem solving skills** become more important. These are initiative, multi skilling and creativity. The reason why these are only important in the scenarios with strong technological change is that value added services in the scenarios are the main driver for these skills. New technologies require more creative technicians, who are able to switch from using one technology to another.

Self management is important in more scenarios, especially planning. Technicians need to be able to plan to either work efficiently or more effectively or more friendly towards their consumers. In the high technology scenarios flexibility and multi tasking become more important, due to technological changes. In the 'Post-IT' scenario efficiency requirement and the importance of innovations place different requirements on technicians, which means that they have to manage a great deal of stress.

Finally, **entrepreneurship** skills have an influence in all scenarios. In this case technicians need to be able to understand their internal customers in order to perform their task effectively. In this case also for the 'Post-all' scenario are these skills important, as in this case they need to understand the problems in order to perform their task efficiently.

13.9 Transportation workers

Transport workers are responsible for the distribution of mail items within the company and from and to distribution centres. As was the case with the technicians, their function requirements change according to the scenario. In the 'Snail-mail' scenario reliability is the main issue. In the 'Post-all' and 'Post-IT' scenarios efficiency is the main element needed. In the 'Email-round' distribution has little different requirements for transportation workers, as physical redistribution is simply replaced by digital distributions.

As far as transportation workers are concerned emerging skills occur in the **self management skills**. Planning will become more important in all scenarios, but for different reasons. In the low technology scenario 'Snail-mail' planning will become more important in order to increase reliability. In the scenarios where competition revolves around efficiency, planning skills are needed in order to optimise deliveries. In the high technology scenario with high competition, planning will become more important as deliveries will decrease as will the number of transport workers. Planning is needed to maintain efficiency.

In three scenarios, namely 'Post-IT', 'Post-all' and 'Email-round' will flexibility skills become more important. Changes in the business environment can mean that transport workers will receive additional tasks. Transport workers have to be able to adapt to new working conditions.

Table 13.9 Emerging skills and competences for transportation workers, 2009-2020

		Snail-mail	Post-all	Post-IT	Email-round
Knowledge	Legislative / regulatory knowledge				
	e-skills				
	Technical knowledge				
Social Skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
Problem solving skills	Intercultural				
	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
Self management	Creativity				
	Planning				
	Stress and time management				
	Flexibility				
Entrepreneurship	Multi-tasking				
	Understanding suppliers customers				
	Business development				
	Marketing skills				
Management skills	Trend setting / spotting				
	Strategic and visionary				
	Coaching and team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
Quality management					
Total emerging skills and competences		1	2	2	2
Scenario characteristics:					
- Technological change		Slow	Slow	Fast	Fast
- Lifestyle: social interaction		Local	Local	Virtual	Virtual
- Income		Low	Low	High	High
- Trade and market regulation		Bad	Optimal	Bad	Optimal
- Labour market regulation		Bad	Optimal	Bad	Optimal
- Quality of institutions		Bad	Optimal	Bad	Optimal

Note: shaded areas highlight specific skills and knowledge that will become relatively more important in the future, and require up-skilling and knowledge upgrading. This does not mean that blank areas are irrelevant; rather here no change in terms of up-skilling and knowledge upgrading is needed. The darker the area shaded the more important it is in the scenario.

Part III.

Available Options to Address Future Skills and Knowledge Needs, Conclusions and Recommendations

Post

Part III. Postal Services - Available Options to Address Future Skills and Knowledge Needs and Recommendations - Guide to the reader

In the final third part of this report, a range of main strategic options ('choices') is reviewed, including possible actions in education and training. The report concludes with a number of conclusions and recommendations for the sector (individual firms, sector organizations, others) and policy-makers at various levels, ranging from the EU to the local level. Part III reflects steps 7 (Main strategic choices), 8 (Main implications for education and training) and 9 (Main recommendations) of the common methodology. Its contents are as follows: Chapter 14 highlights the various strategic choices in response to future skills and knowledge needs. Chapter 15 focuses on specific implications for education and training. Chapter 16 concludes by providing a number of key recommendations and conclusions.

14 Strategic choices to meet emergent skills and knowledge needs

14.1 Introduction

This chapter identifies the main strategic choices to meet the skills and knowledge needs identified (step 7). It provides a framework to pick and select the most relevant strategic choices – i.e. solutions to meet future skills and knowledge needs - available. Strategic choices refer and relate to the medium- and longer term, even though emerging skills needs in practice may also apply to the now and tomorrow. Essential in seeking appropriate solutions is to keep this longer time perspective in mind. Rather than focusing on one single solution, a set of linked strategic choices will in most cases be the best strategy to follow. Prioritising both in time (what first, where to follow up) and in allocation of resources (budgetary focus) followed by further fine-tuning is a clear necessity to guarantee that skills needs are targeted and solved. Skill needs can be identified at various levels, ranging from assessments at the national or even European sector level - which are by nature rather general - to more precise assessments at the regional and company level. Especially for large enterprises not only the identification of skills needs but also the search for adequate solutions will be an integral part of an overall longer-term business strategy. Some solutions will be found within the company itself, for instance by reorganising functions within or between plants, by offering (re)training trajectories and by active global sourcing of personnel. For SMEs and especially for micro-enterprises¹⁶ such longer-term, more strategic human resource management often will be more difficult to organise and operationalise. It should be emphasized that at all possible levels identified different actors need to act to address skills needs and offer solutions and preferably also in close concert. These can be individual firms, organised interests at the sector level (employers and employees), but also others. Local, regional and national governments have also a important role to play. This chapter offers first of all a better insight in the ‘menu’ of possible strategic choices (section 14.2). It also provides for a framework that can identify skills needs at the appropriate level and helps to decide which should be the actual choices to be made (see section 14.3). This framework is subsequently applied to the post sector (section 14.4 and following sections).

The possible strategic choices contained in this chapter refer to the strategic choices originally proposed by Rodrigues (2007: 42) as well as a number of other, additional choices. Whereas *strategic* choices mostly refer to the medium and longer term, most of the choices mentioned can also be implemented in the short run, to ‘mend’ existing skills shortages and/or skills gaps. Each of the solutions at hand differs in whether or not it can resolve direct skills shortages and/or gaps. A longer term horizon, however, means that there is possibility of adapting, steering and fine-tuning the available solutions towards a more optimal allocation of skills supply and demand. In view of the time horizon, the period up to 2020, the strategic choices and instruments with a more long-term impact especially need to be addressed. Identification of possible solutions obviously is not enough. Concrete initiatives, policy and strategic decisions need to be taken at all

¹⁶ Defined as firms with less than 10 employees.

appropriate levels with each actor having a different responsibility and a different role to play.

Strategic choices to meet future skills needs need to be taken by a number of actors and at different levels (firm, local, regional, national, sectoral). For obvious reasons, firms are an important player in finding solutions for the skills needs – both in volume (skills shortages) and in matching any existing skills gaps. Companies avail of a number of options to meet their skills needs. These include:

- A. Recruiting workers from other sectors
- B. Recruiting workers from other Member States
- C. Recruiting workers from non-Member States
- D. Recruiting unemployed workers with or without re-training
- E. Recruiting young people coming from the education system, with or without re-training (first job recruits)
- F. Training employed workers
- G. Changing the work organisation (including network collaboration and mergers)
- H. Outsourcing and offshoring.

Sectoral organisations, educational institutions and governments also have a role to play. They will be the prime actors in addressing the following options:

- I. Changing general and vocational education
- J. Designing and offering new courses (continuing vocational education and training)
- K. Providing information about jobs and (emerging) skills: career guidance; updating job profiles regularly.
- L. Improve the image of the sector (joint action of companies together)
- M. Stronger cooperation with the industry (internships, company visits for participants in education, image improvement).

A more detailed description of these strategic options can be found in annex III. Whether these strategic options are feasible and viable depends on a number of factors. In order to discuss and select from the available list of strategic options, one should first - as described in the introduction - know whether and when skills needs are indeed likely to arise, both in quantitative (number of job functions) and in qualitative terms (what knowledge and skills). An important question that needs to be addressed first is at what level and to whom the skills needs question applies. Obviously for an individual firm different information is required for identifying these needs and taking the right action than for a national ministry or a training institute.

The identification of possible strategic choices would in principle require extensive and detailed future analysis at the Member State and preferably also the regional level of skills and knowledge demand and supply patterns by job function and sub-sector, in a similar way and along the steps provided by the methodology of this study so far. The methodology and step-wise approach followed are applicable at the national and regional level of analysis. Ideally, these results should be complemented by the results of labour market model forecasts to corroborate results. Such an analysis would also need to include an assessment of the numbers and skills composition of currently being educated,

i.e. an assessment of all cohorts of primary, secondary and tertiary pupils and students (and their skills potential) currently in the educational system and arriving at the labour market in the oncoming years. It would need a thorough assessment of the current educational and training system itself, including the already decided changes herein for the oncoming years, to see whether the system as it is now in place is able to satisfy the prevailing and future new skills demands both in terms of numbers of new potential recruits and in terms of skills and knowledge.

14.2 Matching future skills and knowledge needs by making the right choices

In order to address the identified future skills and knowledge needs in an encompassing and timely manner, appropriate joint action is needed by all stakeholders, including the industry (firms, sector organisations and social partners), training and education institutes, intermediary organisations and, last but not least, government at all levels (EU, national, regional and local). Collaboration and co-operation between stakeholders will be needed, at all decision-making levels, in order to agree on and implement a package of feasible solutions. In order to prepare for this, timely, targeted and reliable information is essential.

This section presents a targeted short-cut strategic options decision tool to enable and support decision-makers in making the right (mix of) choices, supported by appropriate and reliable information on actual needs, possible choices and stakeholders to be involved. The strategic options decision tool is aimed to provide answers and solutions at the job function level and consists of a shortlist of a number of key questions - a concise menu of choice -, with answers providing decision-relevant information about the need and viability of available options. The questions need to be answered at the national, and where relevant at the regional level so as to map and identify the specific sector needs. The decision tool can also be used at the level of the firm. New job function information (e.g. new upcoming functions) can be added where thought relevant.

The key question list – consisting of six ‘framing’ questions, followed by option-specific questions - should be filled in for each job function. The ‘framing’ questions constitute a summary of main expected quantitative and qualitative skills needs developments. The filling in of the list should, however, only be done on the basis of an informed discussion between several stakeholders involved, representing together an informed body of knowledge on the various aspects at stake, including labour market developments and prospects at the sub-sector level, skill and knowledge requirements at job function level and developments in and make up/orientation of the educational and training system.

Key questions for identifying skills and knowledge needs

Question 1. Is the demand for workers expected to decrease or increase between now and 2020? (both related to market prospects and replacement demand due to ageing)

If decreasing, there is probably less need for recruiting workers from other sectors and (non-) Member States and less need for recruiting unemployed.

If increasing, analyse whether less radical options are enough to meet demand or whether options should be chosen like recruiting workers from other sectors and (non-) Member States and recruiting unemployed. *[Note: see Table 12.1 for estimated volume effects per scenario.]*

Question 2. Are the required qualitative skills expected to be rather stable between now and 2020?

If there are not many changes in required skills and knowledge, there is probably no need to apply many strategic options. Please focus on the options that are most effective.

If many skills and knowledge categories are changing, there is probably a need to apply many strategic options. Create a package of strategic options to meet skill needs. *[Note: see Table 13.2 and following for the number of competences changing per job function per scenario.]*

Question 3. Do SMEs and especially small companies (including micro enterprises) play a large role in the sector?

If yes, several options (like recruiting) are less viable for companies themselves as it is often difficult for small companies to organize this. If this is the case, sector organisations or intermediary organisation might play an important role in helping to match supply and demand. Another solution could be found in changing the work organisation. Through cooperation or mergers, for instance, the relevant scale can be increased which makes it easier to use these options. The same holds, more or less, for the organisation of training and re-training. Larger (associations of) companies have less difficulties to organise this and the need for support from other actors is lower. *[Note: see Table 3.12 for number of firms per size class.]*

Question 4. Are companies in general active on Member State level, EU level or global level?

Companies who are active on a larger regional level will have, in general, more opportunities to use the option of recruiting workers from other Member States (for companies active at the EU level) and the option recruiting workers from non-Member States (for companies active at the global level). The same holds for the option offshoring. *[Note: see chapter 3]*

Question 5. Are workers in a job function in general low-educated?

If yes, training is less easy to implement as a viable option as difficulties arise in organising this, while the need for training might be even higher. *[Note: see Table 3.17 to 3.19, for education shares]*

Question 6. Are workers in a job function in general old (i.e. older than the average age in the subsector and compared to other sectors)? *[Note: see section 3.2, for age structure.]*

If yes, training is less easy to implement as a viable option as difficulties arise in organising this and less new knowledge endogenously enters the companies, while the need for training might be even higher.

Key questions for identifying suitable options and relevant acting stakeholders

The six questions form the first part of the short-cut approach. The second part discusses the viability of strategic options to tackle and solve emergent skills and knowledge needs for each of the job functions identified. It confronts the list of available strategic options with the analysis of quantitative and qualitative developments on headlines based on the preceding six questions. For each job function identified an assessment is made on whether the available strategic options are relevant or not, and who should be prime actors to change the current situation into a more favourable direction. If the strategic option is considered relevant, a “yes” is filled in, else a “no” is included. If the strategic option is dependent on specific characteristics of the sub-sector or components thereof, this is included in the table. For example, if recruiting workers from other Member States

is only an option for large companies a “Yes, but only for large companies” will be included. Characteristics that are dealt with in the table are based on the six question analysis, representing:

- The change in volume (as a reference we include the most challenging scenario in terms of change required; i.e. “Email-round”)
- The change in skills (as a reference we include the most difficult scenario, which is often the scenario with the largest change in skills and knowledge needs, i.e. “Email-round”)
- Education level (i.e. Table 3.13)
- Age of the workforce (i.e. Table 3.13)
- Scale of the company and region the company is working in.

In principle, the following tables can be made scenario-dependent. In the descriptions below, the Email-round scenario has been taken as the point of reference as the most demanding and dynamic in terms of up-skilling, knowledge upgrading and change.

14.3 Managers

Table 14.1 presents viable strategic options to meet emergent competences of managers in the ‘Email-round’ scenario in which the most changes in skills and competences occur. In this scenario the number of managers is expected to stay constant. Hence, the strategic options have to address the emergent volume gaps only in so far as they are caused by natural fluctuation.

Due to the basic general skills of managers it will be possible to recruit managers from other sectors, from other Member States and from non-Member States, provided that the latter possess the required skills. However, due to the limited gaps in volumes this is not absolutely necessary. Recruiting managers from other sectors could help to gain necessary hard skills such as supply chain management or logistics for, especially in the scenarios with fast technological growth, the sector’s ever more extended value chain. Examples are managers coming from the transport sector and from other industry sectors with a highly differentiated supply chain and differentiated logistic effort.

To successfully address natural fluctuation and replacement recruitment of young workers from the education system presents a more viable option than the ones mentioned before because it is less cost intensive. Young workers do need to follow a good intern traineeship, but managers from other sectors may also need to be re-trained and headhunting costs can be very high. Training and re-training of employees is also a viable option. Particularly entrepreneurial and management skills and knowledge about logistics and the impact of regulations will be strongly needed in the ‘Email-round’ scenario (see section 10.3 and chapter 13). Therefore, designing new trainings and directing training offers towards these skill areas will be important and viable options.

Table 14.1 Strategic options managers

1. What is the maximum volume effect?	Maintain
2. What is the maximum change in skills?	19
3. Do SME's play a large role?	No
4. Is the sector national/EU/global?	Mainly national
5. Is the workforce old?	No
6. Is the workforce low educated?	No

Option	Is this option viable?	Actors ¹
A. Recruiting workers from other sectors	Yes, especially viable option for services of the extended value chain	C
B. Recruiting workers from other Member States	Yes, already done	C
C. Recruiting workers from non-Member States	Yes, but not really necessary	C, G
D. Recruiting unemployed with or without re-training	Yes, but not very necessary	C
E. Recruiting young people from the education system	Yes, viable to address the natural replacement demand	C
F. Training and re-training employed workers	Yes, and in this scenario most prominent option	C, E, S, U
G. Changing work organisation	Yes, e.g. teamwork to combine different skills.	C
H. Outsourcing and offshoring	No, quite unlikely for this occupational function as long as complete department is not outsourced or offshored	
I. Changing vocational education	No	
J. Designing and offering new courses	Yes, especially for entrepreneurship	C, E
K. Providing information about emerging skills	Yes, mainly about emerging entrepreneur and management skills	C, E, I, U
L. Improve the image of the sector	No, not necessary	
M. Stronger co-operation between stakeholders	Yes, in order to design new courses	C, E, S, U, G

Notes: C (company), S (sector organisations and chambers of commerce), U (trade unions), E (education & training), G (governments), I (intermediary organisation, public or private).

Changing work organisation might be a viable option to meet existing skills gaps. An extension of team work methodologies is for example a viable option to combine different competences such as legislative and entrepreneurial competences. Outsourcing and offshoring of management functions will only be conceivable in combination with the outsourcing of departments as a whole. This is, of course, quite unlikely to happen to core business units, but for some business units outsourcing is an option. Changing vocational education and improving the image of the sector is not necessary for this occupational function, because new skills can be integrated in existing curricula with relative ease and

the image of the sector and its management is not poor. To design new courses and to keep up to date with emergent skill needs a strong co-operation between all relevant stakeholders of the sector, in particular between Higher Education and companies – Universal Service Providers (USPs) as well as Competitive Postal Operators (CPOs).

14.4 Business professionals

The number of business professionals is expected to increase in the ‘Email-round’ scenario. Hence, not only skill gaps but also shortages are likely to occur in the scenario. Due to the general skills of business professionals such as accounting, controlling, finance and sales, recruiting professionals from other sectors is a viable option. On the basis of the emergent technological and regulative knowledge as well as the need for greater flexibility and initiative of business professionals, recruitment from the telecommunication subsector or the energy sector, which are already confronted with business reorganisation due to regulatory and technological change, presents a conceivable strategic choice. Sector specific training is certainly needed. Recruiting workers from other Member and non-Member States is also a viable option if the language gap can be bridged and recruitment costs are not too high. This is mainly an option for winning and upcoming countries, where the sector is growing relatively fast (see Part 1 for details). For these countries, the recruitment of unemployed also presents an option. However, this will be limited in scope due to the usually low number of unemployed business professionals.

Recruiting young people from the education system and training as well as re-training of employees are the most viable options to address skill gaps and shortages. In this respect strong co-operation between companies and the education and training system is of utmost importance in order to adapt existing courses to the emergent needs and to provide profound knowledge and information about future skill needs of occupational functions in the sector. Up-skilling and re-training of qualified personal from the shrinking occupational functions from within the sector - such as administrative staff and sales personnel - is another viable option for the lower layers of business professionals. The advantage is that these occupational groups already have insights into the sector and may provide necessary basic knowledge.

Changing work organisation is again another viable option to address emergent skill gaps. Job enrichment but foremost an increase in team work could help to combine the different emergent skills in this occupational function such as technical and regulatory knowledge, sales and marketing. Outsourcing and offshoring present feasible options for functions that take place in the back office, such as accounting, but also some financial and marketing functions. Outsourcing and offshoring is difficult for business professionals in front end activities, such as sales (except for cases where the whole sales department is outsourced).

A change of the structure in initial vocational training is not seen as necessary, but a stronger accentuation of soft and self-management skills in training is conceivable. An improvement of the image of the sector related to this occupational function is not necessary, because of the good reputation of both the sector and the occupational function.

Table 14.2 Strategic options business professionals*

1. What is the maximum volume effect?	Increase
2. What is the maximum change in skills?	17
3. Do SME's play a large role?	No
4. Is the sector national/EU/global?	Mainly national
5. Is the workforce old?	No
6. Is the workforce low educated?	No

Option	Is this option viable?	Actors¹
A. Recruiting workers from other sectors	Yes, with sector specific training	C, E, U
B. Recruiting workers from other Member States	Yes, especially for fast growing countries	C, U
C. Recruiting workers from non-Member States	Yes, especially for very fast growing countries	C, U
D. Recruiting unemployed with or without re-training	Yes, but limited in scope	C, E
E. Recruiting young people from the education system	Yes, very viable option	C
F. Training and re-training employed workers	Yes, important and viable option	C, E, U, S
G. Changing work organisation	Yes, but limited in scope for this function	C, U
H. Outsourcing	Yes, if language gaps can be bridged (not for sales)	-
I. Changing vocational education	No	
J. Designing and offering new courses	Yes, in order to integrate emergent hard and soft skills	C, E
K. Providing information about emerging skills	Yes	C, E, S, U
L. Improve the image of the sector	Yes, to underline that post is a modern, advanced sector.	
M. Stronger co-operation between stakeholders	Yes, to design and offer sector specific new courses and inform about emerging skills	C, E, S, G

Notes: C (company), S (sector organisations and chambers of commerce), U (trade unions), E (education & training), G (governments), I (intermediary organisation, public or private). *Validated in final workshop.

14.5 Operations professionals

In Table 14.3 the strategic choices to meet the emergent skills of operation professionals in the postal sector are summarised. In the 'Email-round' scenario this occupational function is expected to grow in the future. Therefore, skill gaps not only arise as a result of the changing market. Generally speaking, nearly all strategic choices are possible options. Recruiting professionals from other sectors is a viable option. However, it is important to note that this group is quite heterogeneous in itself, so matching of skills will

have to be screened carefully. Logistic professionals can be recruited from the transport sector but also from industry sectors with a highly differentiated supply chain. Recruiting engineers and ICT professionals from other sectors may also present a feasible option because they share a common set of general and generic skills. In such cases sector specific training on regulation knowledge will have to be conducted. Recruiting experts from other Member States and non-Member States is also a possible option provided that the language gap can be bridged and hiring costs are not too high. Furthermore, this option is only possible if wage differentials are not negative.

Nevertheless, it is expected that migration of the labour force, if this would be desirable, will not be sufficient to meet the skill shortages and gaps in this occupational function. Hence, the recruitment of unemployed, if they are given sector specific training, provides also an option to meet the emergent skills demand. There are still numerous unemployed from technical occupations while at the same time skill shortages occur. The main reason for this is the ongoing specialisation in technical equipment and, due to this reason, in technical skills. For training a co-operation between the public employment services and companies will be necessary to provide and support necessary and specific training. On the basis of the expected increase of the occupational function, the recruitment of young people from the education system is a viable and important choice for the sector. The training and re-training but also the up-skilling of promising candidates with occupational profiles from decreasing professions, such as sorting staff, sales personnel, and transportation workers as well as technicians, present further viable measures for addressing the emergent skill demand and expected shortages. Technical skills but also management and entrepreneurship skills as well as problem solving skills are becoming more and more important in the scenario Email-round. These skill areas should be strongly taken into account when designing and offering new courses. Additionally, flexibility of training should be developed to better combine training and work. This will be important for new market entrants.

Changing work organisation as well as outsourcing and offshoring are viable options for the occupational function. Team work, for instance, between management and logistic skills, presents an adequate measure to overcome skill gaps within the occupational function. The development and maintenance of ICT networks, applications and related services, for instance, can be outsourced to ICT service companies if the availability of services on short notice is granted. Changing initial vocational training does not seem necessary in this occupational function, as training is already widely adapted to sector needs.

An improvement of the sector's image is not necessary for this occupational function. However, information about the changing skill composition of the occupational function should be provided to help prevent any misdirection of the labour force and to keep job entrants, employees as well as employers informed about the ongoing specialisation. For this reason as well as for the purpose of designing adequate courses a solid co-operation between sector relevant stakeholders should be established.

Table 14.3 Strategic options for operations professionals

1. What is the maximum volume effect?	Increase
2. What is the maximum change in skills?	18
3. Do SME's play a large role?	No
4. Is the sector national/EU/global?	Mainly national
5. Is the workforce old?	No
6. Is the workforce low educated?	No

Option	Is this option viable?	Actors ¹
A. Recruiting workers from other sectors	Yes, because of a common set of general skills in this occupational function	C, E
B. Recruiting workers from other Member States	Yes, but limited in scope	C
C. Recruiting workers from non-Member States	Yes, but very limited in scope	C, G
D. Recruiting unemployed with or without re-training	Yes, with respective training	C, E, I
E. Recruiting young people from the education system	Yes, an important option	C
F. Training and re-training employed workers	Yes, and also upskilling of endangered occupational functions	C, E, I, U
G. Changing work organisation	Yes	C
H. Outsourcing and offshoring	Yes	C
I. Changing vocational education	No	-
J. Designing and offering new courses	Yes	C, E, U
K. Providing information about emerging skills	Yes	C, E,
L. Improve the image of the sector	Yes, for technical occupations	C, E, S, , U, G
M. Stronger co-operation between stakeholders	Yes, in order to keep training in line with industry needs	C, E, S, U, I, G

Notes: C (company), S (sector organisations and chambers of commerce), U (trade unions), E (education & training), G (governments), I (intermediary organisation, public or private).

14.6 Sorting staff and mail carriers

The demand for sorting and supporting staff is expected to decrease in the Email-round and in the other two high technology scenarios. Only in the scenario 'snail mail' the volume is expected to stay constant. In the last decade the occupational function of mail carriers steadily lost reputation, declining from civil servant status with stable employment prospects, relative high wages and good prospects to sometimes precarious employment status. In some Member States these professions were traditionally comparatively well paid given the low education requirements. As this seems to have come to an end - the competitors of the Universal Service Providers (USPs) started this

development which has already lead to shifts in labour conditions of USPs (ILO, 2002: 33; Jeffrey et al., 2008; Brandt, 2007; Brandt et al., 2007: 268) – the main development will be a decrease in numbers and a decrease in earnings. Additionally, as a result of the decrease in earning, skill shortages might occur. This relates to the different possible future developments which may occur simultaneously in this occupational function.

Table 14.4 Strategic options for sorting staff and mail carriers

1. What is the maximum volume effect?	Decrease
2. What is the maximum change in skills?	6
3. Do SME's play a large role?	No
4. Is the sector national/EU/global?	Mainly national
5. Is the workforce old?	No
6. Is the workforce low educated?	Yes

Option	Is this option viable?	Actors ¹
A. Recruiting workers from other sectors	No	-
B. Recruiting workers from other Member States	No	-
C. Recruiting workers from non-Member States	No	-
D. Recruiting unemployed with or without re-training	Yes, but only to fill the natural re- placement demand	C, E, I
E. Recruiting young people from the education system	Yes, but only to fill the natural and temporary re- placement demand	C
F. Training and re-training employed workers	Yes, in e-skills, self management and basic business skills for self-employed and upskilling of promising workers	C, E, S, U, I
G. Changing work organisation	Yes, but will be of limited sufficiency	C, U
H. Outsourcing and offshoring	No, not to meet the emergent skill demand	-
I. Changing vocational education	No	C
J. Designing and offering new courses	Yes, for emergent skills and flexible trainings	C, E, S, U
K. Providing information about emerging skills	Yes, to avoid mismatch	C, E, S, U, I
L. Improve the image of the sector	Yes, will be necessary in the future	C, E, S, U, G
M. Stronger co-operation between stakeholders	Yes, especially to set incentives for training and upskilling	C, E, S, U, G

Notes: C (company), S (sector organisations and chambers of commerce), U (trade unions), E (education & training), G (governments), I (intermediary organisation, public or private).

It can be expected that the core task of mail carriers will be undertaken by low skilled and low paid labourers in the future. Yet it is also possible that, for example in sparsely populated areas, mail carriers will take over some functions of sales personnel and act as

mobile post offices. This would mean that several other strategic options become possible. A third possibility – again especially for sparsely populated areas - is that mail is not carried out anymore but has to be collected at a franchised retailer by the customer itself. Due to the fact that in the European Union all of these three developments may take place simultaneously in different countries and regional settings, it is quite difficult to assess which of the strategic choices presents a viable option for mail carriers.

In general, not all of the strategic choices which are laid out in Table 14.4 are viable options for this occupational function. Recruiting workers from other sectors, other Member States and non-Member States will not be necessary for addressing the identified skills demand. Nonetheless, mail carriers from other Member States have already been employed, but for reasons of cost reduction (Hermann et al. 2008). Recruiting unemployed with or without respective sector training is one possibility to address the natural low replacement demand of the low skilled mail carriers and recruiting young people from the education system is another. What seems more important, although this is dependent on the regional setting, is to train and perhaps re-train the existing workforce for increasing occupational functions such as operation professionals. To keep up the employability of the occupational functions probably affected by unemployment, intermediate organisations such as the public employment service can take a strong responsibility in re-training. For the sorting staff and mail carriers training in e-skills is more demanded in the scenario ‘Email-round’. But also self-management and basic business knowledge will be needed for the growing numbers of self-employed in the sector. For this group it is also necessary to design new, affordable and flexible trainings for the emergent skill needs. For sorting staff in sorting centres a regular update of e-skills to new sorting techniques will be a necessary. Changing work organisation to cope with job enrichment and integration of cashier functions will be a viable option to meet emergent skill demands. Increasing use of outsourcing, though, will lead to the opposite development, namely a further reduction of job requirements. Nonetheless, outsourcing is expected to rise in this occupational function, not to address the expected skill gaps but to respond to the greater need for cost reduction in the competitive scenarios.

Providing information about emergent skills and developments in the occupational function (also in volume) is necessary to prevent a mismatch between labour market demand and supply. For this reason and for the design of new skills a solid co-operation between the sector stakeholders will be necessary in the future. However, it will be more important to address the general labour conditions of this group than dealing with issues in relation to skill sets. For some employees labour conditions will definitely decrease in quality. It will be hard, therefore, to stimulate a positive image of this occupational function.

14.7 Sales personnel

The occupational group of sales personnel, just as that of mail carriers and sorting staff, is part of the biggest occupational group of clerks in the postal sector. The group of sales personnel is expected to decrease in the two competitive scenarios ‘Email-round’ and ‘Post-IT’. Hence, no major volume shortages are expected for this occupational group. But due to strong competition major quantitative and qualitative changes can be expected. In Table 14.5 the strategic choices to adapt to these changes are outlined.

Recruiting workers from other sectors, from other Member States and non-Member States, will not be necessary due to the expected decrease of this occupational function - thus they present no strategic choices. Recruiting unemployed is in general a strategic

choice but of very low plausibility because of the expected low replacement demand. Other placement possibilities such as recruiting young people from the education system are more feasible and important strategic choices. The most important strategic choice in order to adapt the shrinking occupational function of sales personnel to the emergent skill demand is training of already employed. In the case of promising candidates re-training and up-skilling to other occupational functions within the own company, like business professionals or operations professionals, provides a possibility. In the case of up-skilling and re-training of sales personnel, who otherwise would be threatened by unemployment, intermediate organisations like the public employment service can take over some responsibility in co-financing training schemes. Training should be provided in the emergent skills (see section 5.7).

Table 14.5 Strategic options sales personnel

1. What is the maximum volume effect?	Decrease
2. What is the maximum change in skills?	9
3. Do SME's play a large role?	No
4. Is the sector national/EU/global?	Mainly national
5. Is the workforce old?	No
6. Is the workforce low educated?	No

Option	Is this option viable?	Actors ¹
A. Recruiting workers from other sectors	No	-
B. Recruiting workers from other Member States	No	-
C. Recruiting workers from non-Member States	No	-
D. Recruiting unemployed with or without re-training	No	-
E. Recruiting young people from the education system	Yes, but only to fill the natural replacement demand	C
F. Training and re-training employed workers	Yes, most important option	C, E, I
G. Changing work organisation	Yes, job enlargement and team work	C
H. Outsourcing and offshoring	No	-
I. Changing vocational education	No	-
J. Designing and offering new courses	Yes, flexible forms	C, E, S, U
K. Providing information about emerging skills	Yes, to avoid mismatch	C, E, S, U
L. Improve the image of the sector	No	-
M. Stronger co-operation between stakeholders	Yes, to design trainings and to provide information	C, E, S, U, G

Notes: C (company), S (sector organisations and chambers of commerce), U (trade unions), E (education & training), G (governments), I (intermediary organisation, public or private).

Changing work organisation in postal offices such as job enlargement and team work is a viable and important option to pool several skills and realise multi-skilling which will become more and more important in the 'Email-round' scenario. Outsourcing and

offshoring is not a strategic option to react to the emergent skills, but it is expected that some functions of sales personnel will be taken over by mail carriers or outsourced to retailers or to communities.

Not necessary or viable strategic options are changing vocational education and improving the image of the sector for this occupational function. However, designing new and flexible courses, which are strongly adapted to practical needs, will be of importance. Especially specific trainings for retailers who take over sales personnel functions will be necessary in the future. Regardless of whether or not this occupational function will be outsourced, self-management and problem solving skills will become key skills. The provision of information about the quality and quantity of emergent skills is necessary to avoid mismatch between labour market supply and demand. For this reason and for the purpose of designing suitable courses a strong co-operation between the sector representatives is a viable option for planning and directing the expected changes in this occupational function.

14.8 Administrative staff

In Table 14.6 strategic options for emergent competences related to administrative staff are presented. In three scenarios, namely 'Post-all', 'Post-IT' and 'Email-round', efficiency is expected to grow and this occupational function is subsequently expected to decrease. Consequently, skills gaps will be more prevalent than volume shortages. However, basic skills required in this function, such as administrative skills as well as basic Internet, spreadsheet and word processing competences are available in other sectors, other Member States and non-Member States. But it will not be necessary to choose these strategic options because of the availability of other – less costly and consuming – strategic options. It is much more plausible to recruit unemployed for lower skilled administrative functions or – even more plausible – to recruit young freshly trained and cheap candidates from the education system. Due to the expected decrease the most viable and plausible option will be to train the employees.

The main emergent competences in the 'Email-round' scenario are related to e-skills, problem solving and self-management skills. While USPs such as Deutsche Post World Net (DPWN 2008: 30 ongoing) or other European USPs already have implemented worker skills assessments and vocational training programmes for upskilling and re-training in a flexible and modern way (ILO 2002: 36 ongoing), the expected growing number of market entrants in the competitive scenarios do not have the same possibilities. For this target group even more flexible and affordable trainings have to be developed to keep the competences of their staff up to date. The development of e-learning schemes could help to reduce the over all costs and the release time for training (DPWN 2008: 34). In other sectors it happens sometimes (e.g. in the UK for utilities) that large companies provide training opportunities for small companies, although they compete in the product market. This could be a viable option.

Changing the work organisation is also a viable option. In the 'Email-round' scenario it is expected that team work will become increasingly important for administrative staff due to the growing differentiation of services and of tasks, respectively. Job enlargement alone will not be sufficient. Outsourcing of administrative functions is mainly undertaken to reduce costs but not to gain competences which are not available in-house. Due to outsourcing, it is likely that competences for the companies will be lost according to the 'Email-round' scenario and that know-how for some administrative functions is only found outside the own company. As a result outsourcing and offshoring of administrative

functions, such as customer services (e.g. call centres), accounting, and customer database management, is a viable option.

Table 14.6 Strategic options administrative staff

1. What is the maximum volume effect?	Maintain
2. What is the maximum change in skills?	13
3. Do SME's play a large role?	No
4. Is the sector national/EU/global?	Mainly national
5. Is the workforce old?	No
6. Is the workforce low educated?	No

Option	Is this option viable?	Actors ¹
A. Recruiting workers from other sectors	No, not necessary	-
B. Recruiting workers from other Member States	No, not necessary	-
C. Recruiting workers from non-Member States	No, not necessary	-
D. Recruiting unemployed with or without re-training	Yes, but also limited in plausibility	C, E
E. Recruiting young people from the education system	Yes, most viable options	C
F. Training and re-training employed workers	Yes, very important option	C, E, U
G. Changing work organisation	Yes, teamwork to combine different competences	
H. Outsourcing and offshoring	Yes	C
I. Changing vocational education	No	-
J. Designing and offering new courses	Yes, in particular flexible trainings for market entrants	C, E
K. Providing information about emerging skills	Yes, to avoid labour market mismatch	C, E, S, U
L. Improve the image of the sector	No	
M. Stronger co-operation between stakeholders	Yes	C, E, S, U, G

Notes: C (company), S (sector organisations and chambers of commerce), U (trade unions), E (education & training), G (governments), I (intermediary organisation, public or private).

Providing information about emergent competence and the volume of employment in the occupational function is very important to avoid a mismatch of labour market demand and supply in quantity and quality. For these reasons as well as for the purpose of designing new and flexible trainings a solid co-operation between all relevant stakeholders is necessary. In this co-operation not only USPs and their representatives should be integrated but also the new market entrants. Changing vocational education and improvement of the image of the sector for this occupational function is not necessary.

14.9 Technicians

In Table 14.7 strategic options for emergent competences related to technicians are presented. Except for the 'Post-all' scenario, the occupational function is expected to maintain in volume. Although demand is expected to maintain, it is quite likely that in the future not only skill gaps, but also volume shortages might occur. The reason for this is that technical occupations in general are seen as less attractive than service occupations as well as the fact that in some countries, for example in Germany, an ageing of this occupational function is expected (Beicht et al. 2003: 29, PLS et al.: 66 ongoing).

Recruiting workers from other sectors will be a viable option to address skill shortages and also gaps if sector specific training is provided. Recruiting workers from other sectors is possible due to a common set of general skills within the occupational functions. But it has to be taken into account that specialisation in equipment is growing due to technological progress, therefore sector specific training will be certainly needed. The recruitment of workers from other Member States and non-Member States generally presents a possible option, and might be necessary if the low replacement demand can not be met by the national labour force. More viable options are recruiting unemployed with respective training and support by the public employment service and to recruit young people from the education system to address the natural replacement demand and to acquire up to date technical skills. Training and re-training of employees is a viable and important option. This helps to adapt their technical skills to the technological progress foreseen in the 'Email-round' scenario and to obtain the more demanded problem solving and self-management skills in the scenario.

Changing the work organisation is also a viable option to address the emergent competences in the sector. Despite the classic work organisation instruments such as team work and job enlargement, it is also conceivable to built generational mixed and comprehensive teams in this occupational function. This could support intergenerational learning and combine different know-how.

Designing and offering new courses is a viable option in order to adapt existing skills to new technologies and train problem solving and self management skills to technicians. But it is also needed to adapt training to the needs of older workers and to compensate for restricted possibilities for training of new entrants to the labour market.

An improvement of the image of the sector or of technical occupations is a viable option in the near future to get new applicants and meet replacement demand. To obtain good applicants, information about emergent competences is necessary and an option to prevent mismatch. For this reason a strong co-operation of the relevant stakeholders in the sector is also an option to react on the emergent skills and competences.

Table 14.7 Strategic options technicians

1. What is the maximum volume effect?	Maintain
2. What is the maximum change in skills?	9
3. Do SME's play a large role?	No
4. Is the sector national/EU/global?	Mainly national
5. Is the workforce old?	Yes
6. Is the workforce low educated?	No

Option	Is this option viable?	Actors¹
A. Recruiting workers from other sectors	Yes, due to a common set of general skills	C, E
B. Recruiting workers from other Member States	Yes, but limited in scope	C
C. Recruiting workers from non-Member States	Yes, but limited in scope	C, G
D. Recruiting unemployed with or without re-training	Yes, in order to address natural replacement demand	C, E, I
E. Recruiting young people from the education system	Yes, in order to address natural replacement demand	C
F. Training and re-training employed workers	Yes, important option	C, E, U
G. Changing work organisation	Yes but limited in addressing skill gaps in this occupational function	C
H. Outsourcing and offshoring	Yes, indeed	C
I. Changing vocational education	No, not necessary	-
J. Designing and offering new courses	Yes, to adapt skills to new technologies and develop flexible training forms	C, E
K. Providing information about emerging skills	Yes, to avoid qualitative and quantitative mismatch	C, E, S, U
L. Improve the image of the sector	Yes, to attract workers and address the re-placement demand	-
M. Stronger co-operation between stakeholders	Yes, in order to design suitable trainings and inform about emergent competences	C, E, S, U, G

Notes: C (company), S (sector organisations and chambers of commerce), U (trade unions), E (education & training), G (governments), I (intermediary organisation, public or private).

14.10 Transportation workers

Transportation workers are expected to decrease in the high technology scenarios, ‘Post-IT’ and ‘Email-round’, and to maintain in the other two scenarios. For this reason not all strategic options are viable and necessary to chose. Recruiting workers from other sectors, other Member States and non-Member States is viable, but not necessary. To address the low replacement demand recruiting unemployed and young people from the education system will be sufficient. Training and re-training of the existing workforce is a viable option to increase the self-management skills of the occupational function. An important option to avoid labour market mismatch in this occupational functions is to inform about emergent skills and even more so about the volume changes in this occupational functions. All the other strategic options do not necessarily have to be chosen for this occupational function.

Table 14.8 Strategic options transportation workers

1. What is the maximum volume effect?	Decrease
2. What is the maximum change in skills?	2
3. Do SME’s play a large role?	No
4. Is the sector national/EU/global?	Mainly national
5. Is the workforce old?	No
6. Is the workforce low educated?	Yes

Option	Is this option viable?	Actors ¹
A. Recruiting workers from other sectors	No	-
B. Recruiting workers from other Member States	No	-
C. Recruiting workers from non-Member States	No	-
D. Recruiting unemployed with or without re-training	Yes	C
E. Recruiting young people from the education system	Yes	C
F. Training and re-training employed workers	Yes	C, E, U
G. Changing work organisation	No	-
H. Outsourcing and offshoring	No	-
I. Changing vocational education	No	-
J. Designing and offering new courses	No	-
K. Providing information about emerging skills	Yes	C, E, S, U
L. Improve the image of the sector	No	-
M. Stronger co-operation between stakeholders	No	-

Notes: C (company), S (sector organisations and chambers of commerce), U (trade unions), E (education & training), G (governments), I (intermediary organisation, public or private).

14.11 Scenario implications, future skills and knowledge needs and possible solutions: summary and main conclusions

Implications of the scenarios in terms of expected volume changes in employment (jobs), future skills and knowledge needs as well as ways to address and solve these needs (strategic choices) have all been analysed so far at the individual job function level. This section serves to summarise the main implications and solutions for each of the job functions presented in chapters 12, 13 and 14. It serves as a bridge to the next chapter where we shift from a micro perspective (job functions) to a meso (sector and policy) perspective.

Table 14.9 Summary of job volumes, skills changes, strategic choices and main players in anticipatory action by scenario

		Snail-mail	Post-all	Post-IT	Email-round
Managers	1. Employment volume change	M	D	M	M
	2. Skills changes counted	3	9	15	19
	3. Emerging skills needs	Self-management, Social, Entrepreneurship	Management, Social, Entrepreneurship, Self-management	Entrepreneurship, Management, Knowledge, Social, Self-management, Problem-solving	Entrepreneurship, Management, Social, Entrepreneurship, Self-management, Problem-solving
	4. Most important solutions	In-house development; recruiting from other sectors	In-house development; recruiting from other sectors	In-house development; recruiting from other sectors	In-house development; recruiting from other sectors
	5. Most important actors	C	C	C	C
Business professionals	1. Employment volume change	D	M	I	I
	2. Skills changes counted	2	9	12	22
	3. Emerging skills needs	Social, Entrepreneurship	Social, Management, Entrepreneurship, Knowledge, Problem-solving	Social, Knowledge, Management, Entrepreneurship, Problem-solving	Entrepreneurship, Management, Self-management, Problem-solving, Social, Knowledge
	4. Most important solutions	Recruit	Recruit, (Re)train	Recruit, (Re)train	Recruit, (Re)train
	5. Most important actors	C	C	C	C
Operations professionals	1. Employment volume change	M	D	M	I
	2. Skills changes counted	4	9	16	18
	3. Emerging skills needs	Entrepreneurship, Management, Social	Management, Entrepreneurship, Social, Self-management	Problem solving, Management, Knowledge, Entrepreneurship, Social, Self-management	Problem solving, Management, Knowledge, Entrepreneurship, Social, Self-management
	4. Most important solutions	Recruit	Recruit, (Re)train	Recruit, (Re)train	Recruit, (Re)train
	5. Most important actors	C, E	C, E	C, E	C, E

		Snail-mail	Post-all	Post-IT	Email-round
Sorting staff and mail carriers	1. Employment volume change	M	D	D	D
	2. Skills changes counted	2	7	6	8
	3. Emerging skills needs	Social	Self-management (stress), Social, Problem-solving	Self-management (stress), Problem-solving, Knowledge	Self-management (stress), Social, Knowledge
	4. Most important solutions	Retrain, Information	Retrain, Recruit, Information	Retrain, Recruit, Information	Retrain, Recruit, Information
	5. Most important actors	C, E, S, U	C, E, S, U	C, E, S, U	C, E, S, U
Sales personnel	1. Employment volume change	M	M	D	D
	2. Skills changes counted	3	9	8	8
	3. Emerging skills needs	Social	Social, Problem solving	Knowledge (regulatory), Self-management, Problem solving Entrepreneurship	Knowledge (regulatory), Self-management, Problem solving Entrepreneurship
	4. Most important solutions	(Re)train, Information	(Re)train, Information	(Re)train, Information	(Re)train, Information
	5. Most important actors	C, E, S, U	C, E, S, U	C, E, S, U	C, E, S, U
Administrative staff	1. Employment volume change	M	D	D	D
	2. Skills changes counted	2	6	8	13
	3. Emerging skills needs	Management, Entrepreneurship	Problem solving, Management, Self-management	Problem solving, Management, Self-management	Problem solving, Self-management, Entrepreneurship , Management
	4. Most important solutions	(Re)train, Information	(Re)train, Information	(Re)train, Information	(Re)train, Information
	5. Most important actors	C, E	C, E	C, E	C, E

		Snail-mail	Post-all	Post-IT	Email-round
Technicians	1. Employment volume change	M	D	M	M
	2. Skills changes counted	3	2	9	9
	3. Emerging skills needs	Self-management, Social, Entrepreneurship	Self-management, Entrepreneurship	Problem solving, Self-management, Social, Entrepreneurship	Problem solving, Self-management, Social, Entrepreneurship
	4. Most important solutions	(Re)train, Information	(Re)train, Information	(Re)train, Information, New courses	(Re)train, Information, New courses
	5. Most important actors	C, E	C, E	C, E	C, E
Transportation workers	1. Employment volume change	D	D	D	D
	2. Skills changes counted	1	2	2	2
	3. Emerging skills needs	Self-management	Self-management	Self-management	Self-management
	4. Most important solutions	(Re)train, Information	(Re)train, Information	(Re)train, Information	(Re)train, Information
	5. Most important actors	C, E, U	C, E, U	C, E, U	C, E, U

C=Companies; S=Sectoral organisations, U=trade Unions; E=Education and training institutes; G=Government (EU, Member State, regional, local)

15 Conclusions and recommendations for education and training

15.1 Introduction

This chapter presents the main conclusions and recommendations for education and training; chapter 16 presents the main other conclusions and recommendations. Whereas the earlier chapters very much take a micro perspective by focusing on job functions in terms of expected volume changes, skills and knowledge needs and ways to address and solve these needs (strategic choices), chapter 15 takes a *meso* or *sector* perspective. It addresses a number of issues, part of which coming already to the fore in earlier chapters, and part being ‘new’ issues although much related to those already raised. The conclusions and recommendations are mostly based on the results of the preceding chapters; they were discussed during the final workshop with social partners, the industry and other experts.

The recommendations contained in this chapter should not be seen as fully exhaustive. They rather form the basis for further discussion and elaboration at various decision-making levels, ranging from the European Union and the Member State to the regional and local level. Industry itself – firms – have an important role to play, as do education and training institutes, social partners and the government (EU, national, regional and local). In most cases action should be taken jointly, by involving various actors, sometimes even at different levels. Collaboration and co-operation as buzzwords in today’s economy are easily coined. Making collaboration work in practice is, however, a challenge which requires mutual understanding, compromise and perseverance.

Several implications for education and training surfaced through observing the steps of the Rodrigues methodology as well as through reviewing the relevant literature. The implications address different forms of education ranging from schools, universities and colleges to initial vocational training institutions. The key finding is that challenges for education and training in the sector cannot be solved by education and training institutions alone. Collaboration and joining forces is needed. Stakeholders need to seriously sit and work together in order to provide joint answers and solutions to the range of challenges identified below. This need is more pressing, the more the main forces driving the sector, notably liberalisation and new technologies, find their way in. Most challenging in terms of skills and knowledge needs is the ‘Email-round’ scenario, resulting in the following main challenges for the education and training system:

- The ongoing liberalisation of the postal sector leads to stronger competition and profound changes in business strategies and models with a strong impact on several occupational functions in terms of quantity and on the development of new competences.
- The accompanying trend of development and use of new technologies will lead to changes in consumer behaviour which in turn will require changes in business models and strategies. The use of new technologies will lead to an extended value chain and to further changes in business models and strategies. Both developments have an impact on several occupational functions in terms of quantity and on the development of new competences.

The ongoing liberalisation will lead to stronger competition between USPs and CPOs, and further privatisation of the sector. This will lead to an increase in skills, especially for managers and business professionals. First, they will have to develop new products and markets and organise the transition of business organisation. Second, pressure from new market entrants will further increase competition. Changes and adaptation requirements for

education and training at nearly all levels (initial and continuing vocational training and higher education) will be the consequence. Liberalisation will also put pressure on the lower educated occupational functions like sorting staff, mail carriers, sales personnel and administrative staff. Their numbers are expected to decrease and more self-employed, part-time workers and precarious employed will be the result. A trend of simultaneous de-skilling, up-skilling and re-training will emerge, with training having to adapt to these developments.

Technological progress will further intensify the above mentioned trends and lead to quantitative and qualitative changes also in higher and medium skilled technical occupational functions such as operational professionals and technicians. While operational professionals are expected to increase, they will have to apply more specific technical equipment in their workplaces, requiring new knowledge, techniques and ditto skills.

15.2 Conclusions and recommendations for education and training

1) Adapt and modernise vocational education and training (VET) and general education systems

Both Vocational Education and Training (VET) systems and general education systems (primary, secondary and tertiary education) differ considerably between Member States, in terms of set-up, organisation and implementation (see Box 6). While a discussion about which are the most adequate models and/or best practices is useful, the current variety in VET and general education systems in Europe makes it very difficult to come up with specific conclusions or recommendations about education needs and requirements for the post sector from an EU-wide perspective. Most conclusions and recommendations should be based on the particularities of the existing education systems in the Member States, or even regions. This obviously is beyond the scope of this study. Some general observations can, however, be made. As a general trend most Member States at all levels of education tend to focus more than in the past on ‘teaching’ soft skills, by integrating soft-skills related lessons in existing curricula. One also observes a counterdevelopment in that in some Member States there is again a call for conventional knowledge and the teaching of ‘harder’ skills, as the attention for soft skills would go at their expense. This holds both for secondary education (relating to essential knowledge of foreign languages, mathematics, physics and chemistry) as well as university education (too broad curricula). In the post sector, most of the employees have medium or low qualification levels. The majority of occupational functions are either trained at schools, in apprenticeships or on the job. Therefore, the initial vocational training system is important for most of the job functions, notably for administrative staff, sales personnel, technicians and to some extent also sorting staff and mail carriers.

Expected technological change in the transformation scenarios will lead to profound changes in both business strategies and occupational functions. However, the precise extent of the impact of these changes is hard to predict. The education and training system will have to cope and adapt to this uncertainty by a transition to *flexible training, modularisation* and by offering *new content*. To keep up pace with new trends and changes the system will need to base itself on state-of-the-art knowledge of technologies and developments in the sector. Only in this way can adequate education and training trajectories be prepared to address the skills and knowledge needs of tomorrow. This challenge can not be met by one actor alone. The half-life period of skills and knowledge is getting shorter due to changes in customer demands and resulting changes in business models. This has several implications for education and training systems, both to the way and the content of training offerings.

Box 6. Vocational education and training– rich variety between Member States

A number of different systems in Vocational Education and Training (VET) as well as Initial and Continuing Vocational Education and Training (IVET and CVET) can be observed throughout the European Union. Various characteristics of these systems have to be taken into consideration when discussing possible specific implications for education and training. Existing VET-systems can be grouped into three main categories ('idealtypes'), (i) liberal, (ii) state-controlled and (iii) corporatist VET-systems, each having a different underlying rationale and distinguishing characteristics. Key in this distinction are those who decide about the structure and content of VET: business itself, the state or the state together with social partners (see Table below). The three VET-systems of Germany, France and the United Kingdom are of special importance as they can be taken as representative for each of the three 'idealtypes' categorisations. They are evidence of the rich variations in existing VET systems and their implementation in Europe. The enterprise-based training system of Germany (the 'Dual System') is implemented by the social partners and the state. Next to this prevailing system other forms of VET exist. In France, a school-based training system is established and implemented by the state. Even though the full-time school-based training system competes to some extent with an upcoming apprenticeship training system, it is still the dominant form of vocational training in France. The system implemented in the UK, the national vocational qualification, is regulated and driven by market forces in several important segments. Although national vocational qualifications (NVQ) and general national vocational qualifications (GNVQ) are regulated at national level, the implementation of training is not yet regulated at national level. Commercial certification systems are still competing with national ones. Work-based, as well as full-time school-based training can be found. Special training schemes for unemployed, such as school-based schemes for unemployed youths or work social enterprises for long-term unemployed, are present in several European Member States. Besides these 'idealtypes' several mixed forms in Europe exist. In Spain, for example, one finds more informal forms of VET and in Central and East European countries the trend can be detected, that VET moves from a state centred model to a stronger corporatist model, while also business driven approaches exist in some sectors.

Table to Box 6. Three 'ideal-type' VET-models (elaborated from Clematide, 2005)

	A. Liberal	B. State-controlled	C. Corporatist
Decision maker	Business (and individuals)	State	State and social partner organisations
Rationale	Liberalistic competitive	Centralistic state-centred	Corporative – social consensus
Programmes	Business and individual	Education and citizen	Occupation
Content	Needs of business and individual, utility oriented, short term and specific	Politically determined, general knowledge, course-oriented, academic	Determined by social partners, occupation centred, traditions
Labour markets VET relates to	Internal (business) labour markets	Occupational and internal labour markets	Occupational labour markets
Strengths	Flexible, cheap for the state, close to the needs of production	Strong linkage to the education system, no lack of training places	Broad vocational educations with status equal to general education
Weaknesses	Under-investment in training and education	Weak linkage to the labour market	Inertia in the institutions
Representatives	United Kingdom, Ireland	France	Germany, Austria, Denmark
Trends	Stronger state involvement in certification and quality	"Dual system" emerging and stronger orientation on business needs	Internal labour markets Marketing of VET

2) Modernise VET by enhancing flexibility and modularisation

Several implications arise due to the strengths and weaknesses of the different VET systems in place, sector specific challenges and employer needs. Firstly, an enhanced flexibility in education and training of technical occupations is needed. Flexibility here refers to the capability of the VET System to adapt effectively to new training needs in terms of quality and quantity. A flexible VET-system is particularly required in circumstances in which profound changes take place and job functions and occupational profiles alter quickly; which definitely is the case in this sector. In order to achieve more flexibility and to respond in-time with altering training contents and enhanced quantity of training needs a modularisation of education and training is recommended. Even if problems might occur because of the modularisation of training in some IVET-Systems, more modular systems will facilitate the building up of competences and ease the interaction between IVET and CVET Systems. Flexibility is also required for different forms of education and training. Enhanced flexibility and a modularisation of IVET might be a big challenge for some state controlled and corporatist systems. Liberal systems will probably find their ways easier. However, the liberal market driven systems with their strong focus on technical on-the-job skills have a tendency to lag behind in general education, which in turn will be an obstacle to the up-skilling of the individual and to a higher permeability of the education system in general. Besides, general and generic skills are not obsolete but become more important as a basis for the ability to react to new training demands emerging from new technologies and changing production processes.

More important and sometimes presenting a deadlock is the consequence following from different VET systems for individual life long learning. Corporatist and school based VET Systems guarantee a more universal initial vocational training and in the case of combined apprenticeships also a practical training on the job (dual system). However, continuing training is mostly disregarded by the systems. Qualification levels once acquired lead to reposing on the achieved and life long learning is not given a key focus. VET structures are not capable of adapting quickly to new skill needs. Thus, better and solid co-operation between VET suppliers and companies is required to better match skills needed by the industry and the supply throughout the working life cycle.

In the high technology and competitive scenarios a broader set of skill needs for all occupational functions as well as the ability of individual workers to choose between the right ones are expected. But as competition leads to greater cost awareness of USPs and CPOs, this will affect also initial and continuing vocational training and IVET and VET will have to meet this demand. Therefore stronger modularisation and flexibility in IVET and also in CVET together with the development and introduction of web-based learning will be needed. General and better IVET is needed to enable and enhance inner- and inter-sector mobility. As long as (state) monopolies of postal services existed this was not really necessary, or was not even allowed in some countries (e.g. in Germany there was an apprenticeship monopoly for the German post). But with the upcoming of different competing postal services, general initial vocational training becomes more necessary, even and explicitly for decreasing occupational functions. Only if there is recognition and certification of their competences and skills, horizontal (between companies) and vertical mobility (occupational advancement) will be possible. Additionally, IVET for lower skilled occupations at CPOs will help to bring the utility of training and education to the employees as the majority of them might be at least partly illiterate and can give them the chance to improve their employability which will be threatened by several developments in the future. Stronger modularisation and flexibility is already executed to a different extend by some USPs in Europe, for example by the German

DPWN (DPWN, 2001) and the Swedish Posten (Posten AB, 2001). This is mainly done with the use of web-based training tools. Especially under the high competitive scenarios it could be necessary to find a new balance between of-the-job and on-the-job apprenticeship training to adapt to the needs of companies and the general training needs.

3) Foster better and more collaboration between companies and (higher) education

To meet the growing demand of financial and operational professionals and their skills development co-operations between companies and higher education will become more necessary, in particular for CPOs. While USPs, like the German Deutsche Post World Net already have numerous co-operations with universities and other education institutes, CPOs lag behind. Conceivable options are either a joint co-operation of several CPOs to establish co-operations with universities or co-operations between the social partner organisations USPs and CPOs and universities in order to develop the training solutions for tomorrow.

4) Increase flexibility by promoting e-learning and blended learning

A stronger use of e-learning, also in apprenticeships, could help to reduce training costs and to give the employees the possibility to learn whenever they want and to reduce absence from work. In nearly all European countries USPs have developed web-based training modules, training cd-roms combined with coaching and off-the job training for nearly all occupational functions (e.g. DPWN, 2001; DPWN 2007; Postaitaliana, 2001; Posten, AB (b); ILO, 2002). A future challenge will be to keep these modules up-to-date and to strengthen e-learning and blended learning at CPOs respectively to make e-learning accessible, especially for employees of CPOs. A feasible option to realise this objective could be the joint development of blended learning by and for several CPOs.

ICT based training media are widely used by Universal Service Providers to reduce the cost of vocational training and to strengthen self directed and flexible learning. (for example DPWN, 2007; Posten AB w.D.(b); La Poste, 2001). One of the challenges ahead is to use and apply the good practices to CPOs and self-employed in the sector. To meet this challenge not only CPOs themselves but also sector social partner organisations should work together to develop and generalize such instruments.

An important improvement would be the development of ICT-based training modules for the increasing number of *self-employed* in the sector, in particular for mail carriers and transport workers. ICT-based training should be developed by social partner organisations and training institutions in co-operation with companies of the sector. Self-employed mainly lack access to affordable vocational training. A certification of training levels acquired would help support the recognition of skills, foster employability and help to enhance mobility of the self-employed occupational functions in the sector.

5) Pro-actively re-train and up-skill employees and those made redundant

Sorting staff, mail carriers, sales personnel, and administrative staff are low to medium skilled job functions that are expected to decrease in larger numbers in the coming years. Together these occupational functions form the largest group in the sector. To ensure their future employability (also outside the sector), up-skilling and re-training is required posing a huge challenge. Public authorities such as the public employment service or communities (as part of their responsibility for regional development) should pro-actively engage and support companies and individuals in their training efforts and prepare these groups for the future.

Universal Service Providers already use continuing vocational training to retrain and up-skill their employees. For example, the German Deutsche Post World Net, the Swedish Posten AB and the French La Poste have elaborated programmes to train and up-skill their workforce. In the German (DPWN, 2001) and the French (La Poste, 2001 b) case, managers and tutors are responsible for the assessment of the employees and the identification of individual training requirements. This procedure is not exclusively used for employees who are threatened by restructuring or layoffs but for all employees. The Swedish Posten AB and the French La Poste developed restructuring programmes especially for employees which are threatened by these developments. Part of both programmes was a skills and competence assessment and analysis undertaken by consultants and managers, a search for new job possibilities within the firm and the design of a subsequent training plan to reach this position.

6) Train the trainers - keep vocational teaching up-to-date

In apprenticeship systems, training supervisors and teachers should keep up-to-date with latest business and technological developments as well as with training methods. More intensified use of web-based training will also require training tutors. Train the trainers is usual in some USPs, for example the Posta Romania (Posta Roman, 2003) and the Italian Post (PostaItaliana, 2001) have programmes to train the trainers and to develop web-based training content. Due to stronger diversification of the sector and a growing number of market participants, it will be necessary to regularly adapt the knowledge of external trainers to changing skill needs of the sector. Also in this case strong co-operation on a regular basis between social partner organisations, public authorities, training institutions and companies (USPs as well as CPOs) will be necessary.

7) Improve the provision of information on skills and training needs to both students and trainers

Information gaps between present and future education and training needs and their supply are still evident. The sector is still in a phase of restructuring and different pathways are possible (Chapter 3; UPU, 2007). Consequently, a mismatch between actual VET supply and demand in quality as well as in quantity is observed for some occupational functions. Information systems on sectoral as well as on regional, national and European level, assist in minimising information asymmetries in order to overcome skill gaps resulting from information deficits. Close collaboration between all relevant stakeholders, companies, education and training organisations, social partners, research institutions and public authorities, will help to reduce information deficits on current and emergent skills needs. The European Social Dialogue Committee for the Postal Sector and its Working Group on Training and Social Responsibility recommends in its joint declaration on training and skills development in the postal sector that the anticipation of (training) needs should be further developed in the sector and forecast methods should be applied (PostSocialDialog, 2006).

8) Provide better career guidance for labour market entrants and employees

Due to the expected change in the quantity and the quality for most occupational functions and the required changes in competences within these functions, career guidance is an important instrument. Career guidance can be used to pursue two objectives. Firstly, it can help to redirect pupils and students to occupations where an increased demand is expected and to the sector in particular. Secondly, career guidance assists in supporting the placement of those mature workers which are threatened of becoming unemployed.

Career guidance for pupils is undertaken in most countries by several different actors such as schools, training organisations, public employment services and related career information

centres, trade unions, universities, sector organisations and companies. To enhance career guidance for pupils, a solid regional co-ordination between these actors can be very effective as this helps in counselling and directing students into a profession suitable for them. Universal Service Providers such as Deutsche Post World Net (DPWN) in Germany or La poste in France are already involved in career guidance mainly for students and higher skilled occupations like financial and operational professionals and managers. They offer placements and run award competitions for students. They are present at career exhibitions and for students and run universities of co-operative education (“Berufsakademie”).

To strengthen career guidance for pupils, it would be necessary to conduct more detailed national assessments of the future demand of occupational functions taking into account the specific national situation in the postal sector and an information campaign at schools to direct future labour market supply at an early stage and prevent mismatch on the labour market as far as possible. This is essential because of the expected strong job losses in mail carriers, sales personnel and administrative staff and the growth in financial and operational functions. The French La Poste, for example, assigned a study about future skills and job developments to redirect their training efforts (La Poste, 2001).

Because of the major and numerous changes of labour composition in the sector it is also necessary to provide career guidance for the employees of the sector. While the Universal Service Providers are already engaged in career guidance for their employees threatened by unemployment and provide numerous trainings - the Swedish Posten AB is a good example for this (Posten AB w.D.) - it is necessary to open up possibilities also for the CPOs and to some extent also for part-time employed and self-employed in the sector. For career guidance of this group of employees it would require social partner organisations, sector companies and to some extent also public authorities, for example, the public employment service to co-operate and develop and support career guidance measures and instruments for employees of the sector.

9) Foster multi-skilling

Multi-skilling – training employees to master different skills in order to fulfil a range of tasks – is becoming increasingly important. Multi-skilling applies across job functions, but is especially relevant in the medium skilled job segment. The increasing use of ICT in the post sector (UPU, 2007) and the extension of the sector’s value chain requires new skills. For example to provide total business communication solutions – not only sending their post but also managing the database, printing personal letters and advertising - will lead to new skills requirements mainly related to providing a broader variety of communication services to business customers. This especially requires good soft skills to deal effectively with customers.

10) Provide special training and support to self-employed and part-time employees

The number of self-employed in the sector is expected to grow, especially in the competitive and technological scenarios. Not only mail carriers are expected to be confronted with this development, but it is quite likely that also transportation workers will be affected. In general, self-employed face specific problems to keep up with skill developments (ILO, 2002). In some countries chambers of commerce provide training for self-employed to gain basic skills in business administration. Necessary would be sector specific training for mail carriers and transportation workers and profound information about the job profiles. When designing training for the target groups, it should be taken into account that the majority of individuals from the group are rather low skilled. For them to be “positively” self employed will require

special training. In many countries further training is already credited by tax authorities. If a stronger involvement of further training is seen as necessary, a more substantial recognition is a conceivable option. Social partner organisations can take a stronger responsibility for further training of self-employed.

In the case of part-time employed it will be necessary to design special courses and to provide information about career paths within the sector. Further training is mainly the responsibility of the part-time employees themselves, but targeted training offers would be helpful and should be combined with measures to raise the awareness of part-time employees of the utility of further training and its importance for their future employability.

11) Take special courses and support for older workers seriously

In the past early retirement of older employees was used as a restructuring tool to reduce the workforce in the sector without firing people. Due to costs and political changes this is not pursued anymore. At the same time, fewer job market entrants especially in engineering functions have led to labour shortages. Companies therefore have to increasingly harness the potential of older workers. Nonetheless, participation their participation in training is below average. As fast technological developments outdate specific skills within an ever shorter time, continuing vocational training for older workers - starting from 45 and older - is essential. Furthermore, special part time retirement schemes could be developed to keep older workers in the job market. Changes in the work organisation should cater for the needs of older workers. Already existing examples of good practices should be made available within the sector.

Some Universal Service Providers have already recognized the need for continuing vocational training of older workers and for special career planning as well as for specific forms of work organisation. At the German Deutsche Post World Net, for example, special instruments to assess the demographic risks in certain regions and company sectors are applied (DPWN, 2007:34). Furthermore, an age diversity project was carried out to assess the training demand of older employees and to promote training of all ages within the company. In Austria special measures in the work organisation were applied during the restructuring of the branch network. In particular, tandems of older and younger workers were set up to combine the different strengths for the management of branch offices. This could be also seen as special form of training because young and old can learn from each other during work and, hence, gain new skills. This should be in particular applied for the ageing technical occupations of the sector.

16 Main other conclusions and recommendations

16.1 Introduction

This report concludes with a number of ‘other’ (i.e. going beyond education and training) conclusions and recommendations based on the results and insights gained during the course of this study. They include the results of an intensive two day workshop with various stakeholders and the European Commission during which the draft final results, including preliminary recommendations, were discussed. The conclusions and recommendations apply

to the sector at large (including individual firms, sector organisations, chambers of commerce, social partners), intermediary organisations, education and training institutes, as well as policy-makers (EU, Member States, regions).

The recommendations point into viable and useful directions rather than that they represent ready-made proposals for change. Reflection and debate, and finding creative answers to plausible futures in skills and jobs is, in the absence of a crystal ball, the way forward. The bandwidth between the expected developments in the most extreme scenarios is indicative for the degree of uncertainty by which the future should be approached. Solutions to future skills needs should therefore be flexible, smart and encompassing enough to address the differences between the various scenario outcomes, not knowing what real future will eventually emerge.

16.2 Main other recommendations

As employment characteristics and training strategies and possibilities vary enormously from traditional monopolistic enterprises to CPOs and newly emerging self-employed, the principal recommendation to meet existing and emerging skills needs is to intensify co-operation between all relevant stakeholders in the sector. The challenge to overcome sectoral skill gaps and shortages will only be met sufficiently if industry, training providers, social partners, research and public authorities act in concert. Collaboration is not only required to meet skills needs, but also to support the development of sectoral learning strategies.

Major quantitative shifts between the occupational functions in the sector are expected. There will be a big need for upskilling and re-training of the largest group of employees of the sector, namely sorting staff, mail carriers and sales personnel, to keep them in employment and at the same time also to profit from their general knowledge of the sector. Additional training for employees of CPOs and for self-employed should be strengthened. Cost sharing mechanisms between actors such as public authorities, companies and individuals need to be developed and lifelong learning throughout the life cycle should be promoted (LLL). Learning must be made more attractive to all, e.g. via tax incentives or a change of attitudes in order to integrate learning into all phases of life. In addition, training and education systems in the Member States need to be improved to cope with more modular based needs for VET to cover knowledge shortages and upskilling needs, as already stated in the above described implications for education and training.

Lifelong learning is the key for companies as well as for individuals to keep up with competitiveness and to prevent less favourable scenarios. Social partners should develop joint programmes of lifelong learning in co-operation with public authorities and other relevant stakeholders such as training organisations and universities in order to up-grade skills of the workforce in the sector. Examples of good practices should be made available for all.

1) Improve the image of the sector in view of attracting high-skilled and technical staff

Efforts are needed to enhance the image of the sector as a young dynamic sector, especially among the young. Up to now no special skill shortages in the sector have been reported. But skills and labour shortages for technical occupations and engineers are expected and have already been reported in other sectors, particularly in the ICT sector. It is quite likely that the postal sector, respectively the upcoming services of the extended value chain, will face a shortage in the future. Therefore, programmes to improve the image of the sector to attract technicians, operation professionals and high-skilled in general should be thought through and implemented. This also applies to greater transparency about plans and aspirations of postal companies for the future. Good examples of firms that have been active in realising a

high image profile are TNT, Deutsche Post and Danish Mail. For the future, maintaining the current favourable working conditions (including pay) might be difficult to sustain. This makes improving the sector image the more pressing.

2) Collaborate with all relevant stakeholders and intensify co-operation: Partnerships for Innovation and Job creation and Social Dialogue

To meet existing and emergent skills and knowledge needs for the post sector is to support intensified co-operation between all relevant stakeholders in the sector. The challenge to overcome sectoral skill gaps and shortages can be met if industry, research, training providers, social partners and public authorities act in concert. Employers' organisations and trade unions in most countries are capable, in co-operation with training providers and educational institutes, to commonly and better address future skills and knowledge needs, and also set up funds for the training of employees. Collaboration is required to meet the skills and knowledge needs and support the development of sectoral learning strategies, but also to foster and exchange best practices and promote R&D and innovation, for instance by discussing the setting up of a *partnership for innovation and job creation*. This is especially relevant as the traditional value chain has altered substantially over the last decade, making the opportunities for innovation – both technological and non-technological (e.g. new business models) even more relevant. The European Social Dialogue in the Postal Sector can play a vital role in putting future skills and knowledge high on the agenda and in mobilising further action. The Joint Declaration on Training and Skills Development implementation produced by its Working Group Training and Skills Development is a step in the right direction. More can and needs to be done to confidently face the future.

3) Recognition of prior learning, skills assessment and validation

In the sector scenarios, it is expected that layoffs will lead to a decrease in lower skilled occupations like sorting staff, mail carriers, sales personnel and administrative staff. As outlined above, career guidance assists in finding new job possibilities within or outside the sector. In combining career guidance with skills assessments (e.g. potential analysis) as well as with the recognition of soft skills by companies, the scope for placements can be expanded for the employed as well as for labour market entrants.

Regularly, persons equipped with the required skills and qualifications are available but do not apply for vacancies due to lack of information on the labour market possibilities. Career guidance and personal development for mature lower-skilled workers should be supported by an assessment of those skills which are not certified or documented so far. Systems for the recognition of prior learning (RPL) support the identification to what extent people possess necessary competences for a new job (Duarte, 2004). The integration of RPL in career guidance and targeted training bridges the gap between hidden competences and formal qualification especially for mature workers. Some Member States already include RPL in their system. In Portugal, for instance, a national system of **R**ecognising, **V**alidating and **C**ertifying Prior Learning (RVCC) is implemented through a network of centres. Adults, whether employed or unemployed, are offered a three-tiered service, namely information, counselling and complementary training, including the accreditation of competencies (OECD/European Communities, 2004: 31). The centres are supported by the Ministry of Education and operated by training organisations or universities. The validation and certification of skills is undertaken by a jury with an external evaluator.

USPs in some countries, as for example Germany, France, Sweden (Posten AB, 2001) are already providing systems for skills assessment and training programmes for re-training or

up-skilling of employees who are threatened by unemployment.¹⁷ It would be important and conceivable to extend these programmes and trainings to employees of CPOs with the help of social partner organisations or public authorities.

¹⁷ <http://www.postsocialdialog.org/index.php> November 2008.

Part IV.

Future Scenarios and Implications for Jobs, Skills and Knowledge

Telecommunications

Part IV. Telecommunications - Future Scenarios and Implications for Jobs, Skills and Knowledge - Guide to the reader

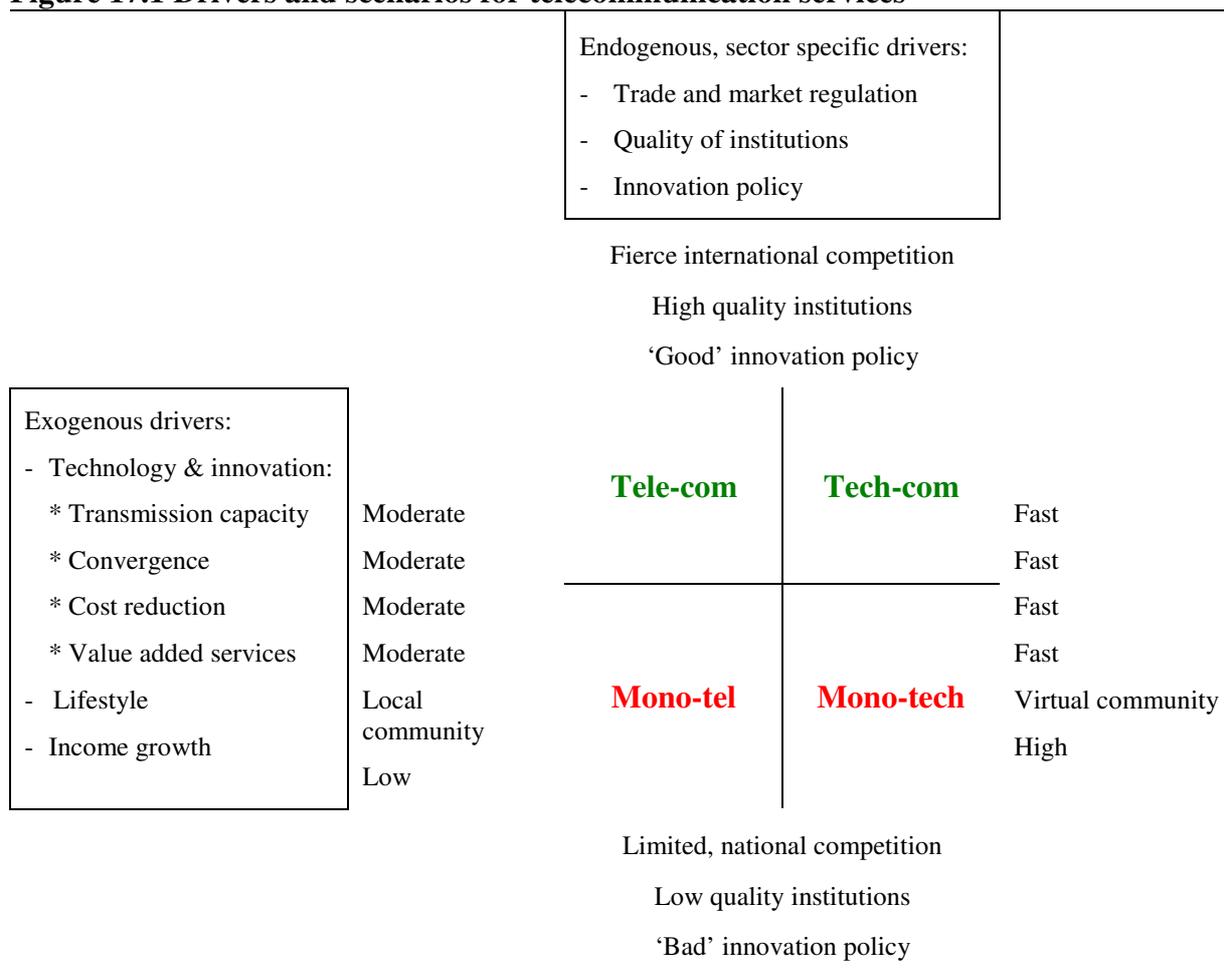
Part IV presents the scenarios and their implications for jobs, skills and knowledge in telecommunications. It reflects steps 4, 5 and 6 of the common methodology. The contents of part IV are as follows: Chapter 17 describes the structure and highlights the content of the four main scenarios (step 4). For each of these scenarios plausible yet different assumptions have been made as to how the main drivers of change will develop and add up to different states of the future. In subsequent steps the implications of the scenarios for jobs and skills are analysed. In order to facilitate a translation of these implications to the job function level, first a workable job function structure is proposed. This structure is based on the functions as they appear in Eurostat's Labour Force Survey and further elaborated. Chapter 19 discusses the main implications of the scenarios in terms of future employment volumes by job function (step 5). Chapter 20 assesses the implications of scenarios for future skills and knowledge needs by job function. It translates the implications of the scenarios for skills and knowledge by function (step 6).

17 Scenarios

17.1 Overview of scenarios and main underlying drivers

Figure 17.1 presents four different scenarios and their underlying drivers for the telecom sector. The scenarios which were specifically constructed for and used in this study are based on a clustering of relevant drivers identified in part I.

Figure 17.1 Drivers and scenarios for telecommunication services



The scenarios are construed to 'scan' the future, and are for the purpose of this study used to assess the impact of future developments on jobs, skills and knowledge. It is important to understand what scenarios can deliver and what not. Scenarios depict plausible futures and might reveal possible paths of development towards these futures. They are neither predictions or forecasts, nor wishful pictures ('dreams', 'crystal ball gazing') of the future. Grounded in existing data and trends, scenarios are derived in a logical and deductive way, with different and sometimes opposing presumptions about how key drivers might develop, resulting in inferences about plausible, i.e. credible and imaginable, futures.

In drafting the scenarios, a clear distinction has been made between exogenous and endogenous drivers; the horizontal axis in the figure represents the relevant exogenous drivers, whereas the vertical axis represents the relevant endogenous drivers. The main difference between the two categories of drivers is the scope and ability for direct influence. Exogenous drivers are drivers that form a “given” for the sector without much room for influence for/by individual actors drivers. Endogenous drivers are drivers that can be influenced at the sector level, for instance by national or European policy-making. Only those drivers that received the highest ranking - a score between 8 to 10 on a scale of 0 to 10 (see chapter 9) - have been taken into consideration.

17.2 The drivers – building blocks for scenarios

The drivers form the main fundament and can be regarded as the key building blocks for the construction of the scenarios. One of the central tenets of the scenarios identified here is a clear distinction between exogenous and endogenous drivers. The endogenous drivers are defined as those drivers which can be directly influenced by governmental actors, in other words where there is the scope and ability to change the course of action by policy-making, either at the regional/national or the European level. Two sets of drivers - which *a priori* might also be labelled endogenous factors - are not included in the scenarios. These concern those factors that concern possible actions taken at the industry and company level itself and measures directed towards the educational and training system, respectively. The reason for excluding these drivers in the formulation of the scenarios is that these factors have to be regarded as solutions, so-called strategic options, that logically follow from the scenarios as implications rather than as building bricks for the scenarios. These strategic options represent the degrees of freedom for policy and other action (see further chapter 21: strategic choices to meet emergent skills and knowledge needs).

Figure 17.1 summarizes the main drivers, with the horizontal axis reflecting the relevant exogenous drivers and the vertical axis reflecting the relevant endogenous drivers. A further description of each of the individual drivers is given below, followed in section 17.3 by concise descriptions of the four scenarios.

Overview and description of exogenous drivers

- *Technology & innovation:* This is the main exogenous driver in this sector. In all scenarios it is assumed that the current technological trends (increase in transmission capacity, service and network convergence, cost reduction and the introduction of new services) will continue. However, the speed of change may differ. On the left-hand side technological change is more moderate, on the right side it is fast.
- *Lifestyle:* The most important difference refers to the model of social interaction. On the right-hand side a very large proportion of interaction between individuals takes place on and via telecommunication networks (fixed and mobile telephone, broadband fixed and wireless Internet, also with images). On the left-hand side more contacts between individuals are still personal (face-to-face) and are therefore geographically concentrated, even though virtualisation proceeds, but at a far lesser pace.
- *Income:* Income is demand-inducing in the telecoms sector. It is assumed that income growth per capita is high on the right-hand side and low on the left-hand side.

Overview and description of endogenous drivers

- *Trade and market regulation:* At the top of the scheme we assume that regulation ensures fierce international competition in the market. It is allowed to enter the market and there are no entry barriers. This means that several large local providers compete

also in other countries. Globalisation results possibly in the entry of large global firms. At the bottom of the scheme the regulators fail to regulate the market adequately, barriers to entry exist and certain segments of the sector face less competition.

- *Quality of institutions*: Service provisions and obligations and network/ infrastructure access require formal monitoring by regulatory authorities. At the top of the scheme we assume high quality institutions promoting the solution of problems, while at the bottom of the scheme the quality of institutions is low. Institutions are here defined narrowly as legal bodies supervising regulations (e.g. competition authorities).
- *Innovation policy*: At the top of the scheme we assume pro-active and well-tuned innovation policies at different levels (EU, national, regional). Innovation policy may be directed at stimulating green IT. At the bottom we assume poor-guided innovation policies lacking the incentive to bring the telecoms sector forward.

17.3 The scenarios – detailed discussion

Based on the combination of endogenous and exogenous drivers we discriminate between four sector scenarios for the telecoms sector¹⁸:

- Scenario I: *Mono-tel*
- Scenario II: *Tele-com*
- Scenario III: *Mono-tech*
- Scenario IV: *Tech-com*.

Scenario I: *Mono-tel*

In ‘Mono-tel’ technological progress is limited, income growth is relatively low and the adoption rate of technological innovations is moderate. The possibilities and demand for virtual social interaction are limited and work, shopping, social life and leisure take place mainly at the local level. Personal contacts remain an essential feature of social interaction and virtual contacts are seen as a supplement rather than a substitute for local contacts. EU rules warrant a minimal level of competition, but the degree of competition is limited. The incumbent plays still a dominant role and the quality of regulatory measures and of regulatory bodies is low, resulting in entry barriers for new entrants. Instead, mergers and acquisitions between incumbents and new companies lead to consolidation. International players have large problems to enter local markets. Prices of telecommunications services are relatively high due to limited competition. Innovation policy is largely absent. Due to low income growth and high prices demand for telecoms services is reduced.

Scenario II: *Tele-com*

In ‘Tele-com’ liberalization and regulation has led to fierce international competition in the telecommunications market. Large EU-players enter each others markets and even telecoms companies from emerging economies like China and India try to penetrate the EU market. Prices continue to fall, leading to an increase in the volume of telecommunications services. Still, income growth is relatively low and the adoption rate

¹⁸ During the final workshop it was pointed out that *Tech-com* (first) and *Mono-tech* (second, later) reflect the most likely scenarios for the sector, whereas *Mono-tel* resembled most the common starting point until recently.

of technological innovation is relatively slow. Personal contacts remain an essential feature of social interaction and the virtual contacts are seen as a supplement rather than a substitute for local contacts.

Scenario III: *Mono-tech*

Technological progress and innovation are very fast in 'Mono-tech'. Activities take increasingly place by telecommunications networks and virtual contacts become more important than personal contacts. Individuals become more and more reliant on virtual contacts in their work, shopping, leisure and social contacts, and grow more dependent on infrastructure (fast telecoms networks). Virtual contacts are seen as a substitute rather than a supplement for local contacts. However, regulation fails to keep pace with technological change and restricts competition. Competition is limited and only takes place at a national level. Consolidation and hence concentration rule, with only a few large companies surviving. Limited competition leads to high telecoms service prices. Consumers – having grown addicted to their virtual lifestyles - have no choice but to pay. High income growth enables consumers to pay high prices. In the longer run, ill-defined innovation policies and limited competition leads to a relative slowdown of technological progress.

Scenario IV: *Tech-com*

In 'Tech-com', just as in 'Mono-tech', technological progress and innovation tend to be fast and the virtual community takes over from the local community. A large proportion of people's lives take place on telecommunications networks and the personal, 'real' face-to-face contacts are limited to family and a small circle of friends. High-quality regulation ensures that fierce international network and service competition is present. Newcomers enter the market, especially from neighbouring countries but also from countries like China and India. Consumers can choose between several fixed and mobile networks and many different service providers. Competition leads to low price of telecommunications services and boosts further technological progress. Well-targeted innovation policy further stimulates this progress. High income growth guarantees a vast demand for telecommunications services.

18 Job functions – towards a workable structure

In order to determine the quantitative and qualitative implications of the scenarios for jobs and skills, a workable job classification is needed. The occupational classification of the available sector data derived from the Eurostat Labour Force Survey (LFS) is used as a starting point (see Box 7). The advantage of using this classification is that developments in the past as observed in the LFS can help to foresee likely trends for the future. For example, it might be expected that future developments in new Member States in some cases will follow similar paths as old Member States in the recent past. Moreover, where strong growth of certain job functions appeared in most recent years, one might have a reason to cautiously weigh and re-assess any further increases in future years, as the situation (markets and other factors) might have stabilised in the mean time. The share of job functions in total sector employment is not unimportant either; sizeable shares call for adequate attention. This does not imply that job functions with only very minor shares of the total should be ignored altogether. It might well be that occupations

that have small shares now will face strong growth in the oncoming years, or are strategic and vital for growth of the sector as a whole, even if small in size.

However, the LFS job classification cannot be taken over one to one. First, the given LFS definitions of the job function groups are highly aggregated and cover therefore highly heterogeneous but not always comparable job functions. Reporting on this most aggregate level therefore would not be very illuminating. Second, some functions which may be strategic for the sector when looking at the future can be 'hidden' in a broader statistical category. This also includes 'new' emergent job functions. For both reasons some of the aggregated categories have been split up into separate job function categories, which have been given a more in-depth treatment. The opposite case, where certain job functions may be closely related, but do not fall within the same statistical LFS class, may also apply. Here it would be logical to combine them.

Box 7. The European Labour Force Survey

The European Union Labour Force Survey (LFS) is conducted in the 27 Member States of the European Union and two countries of the European Free Trade Association (EFTA) in accordance with Council Regulation (EEC) No. 577/98 of 9 March 1998. The data collection covers the years 1983 to 2006 and covers all industries and occupations. The national statistical institutes are responsible for selecting the sample, preparing the questionnaires, and conducting the direct interviews among households. The Labour Force Surveys are centrally processed by Eurostat, using the same concepts and definition, based on the International Labour Organisations guidelines and common classifications: (NACE (rev 1), ISCO-88 (COM), ISCED, NUTS).

Although the LFS can be used for comparative purposes, the relative small sample size (in 2002 the sample size was about 1.5 million of individuals, which represents 0.3% of the EU population) means that error margins can be high, especially when the industry itself is rather small.

Source: Eurostat (2008b)

Third, in the trend analysis it was already observed that whereas in some countries employment shares of a particular (production) job function were extremely large, similar shares in other countries appeared extremely low, often with another closely related job function being much higher. A very likely explanation for this phenomenon is that in some countries workers are reported as job function x while in others they are reported as job function y, where basically similar tasks on the job are performed. By taking aggregates for these function types, this sort of reporting bias can be avoided. Fourth, the job functions that appear from statistical data analysis might not always be similar to what a person in or familiar with that sector would rank as the job functions that matter "in reality", i.e. from a work floor perspective. On the basis of discussions with experts and national sector skills studies, an attempt was made to provide a job classification that is both workable and recognisable by the sector in practice. This classification is shown as Table 18.1 below.

In order to establish a meaningful and appropriate classification, the existing LFS occupational classification for the post and telecom sector was adapted by either aggregating and/or selecting further differentiating some professions out of the original LFS statistical classification. This exercise was based on four criteria:

- employment shares (aggregating);
- closely related job functions (aggregating);
- strategic role in sector (disaggregating by further selecting among the occupational groups identified in the statistical classification);

- emergent job functions not yet covered and/or brought fully to light by current statistics.

Table 18.1 Adaption of the original job classification

<i>Classification in statistical data</i>	<i>Adapted classification</i>	<i>Names in table</i>
Managers	Managers	Managers
Engineers	IT professionals and Engineers	Engineers and IT professionals
Other professionals	Selection: <ul style="list-style-type: none"> ○ Sales professionals ○ other professionals 	Sales & marketing professionals Other professionals
Clerks	Aggregation and selection: <ul style="list-style-type: none"> ○ administration ○ sales personnel 	Administrative personnel Sales personnel
Service workers		
Electronic equipment mechanics	Aggregation: technicians	Technicians
Craft workers, plant operators, drivers		

Table 18.1 shows the adaption of job functions for the telecommunications sector, as well as the names we gave the functions that will be used during the foresight analysis. The functions used in further analysing jobs and skills needs can be described as follows:

- The category Managers includes top management, but also entrepreneurs and different management occupations, such as HRM, Finance and Production management.
- IT professionals and Engineers include IT, electronics and telecommunications engineers and engineering technicians, operators, but also other engineering functions, like electronics such as electrical or mechanical engineering.
- Sales & marketing professionals form a crucial link between engineers and customers, by analyzing consumers' needs and communicate them to engineers, as well as giving feedback about the performance of new products which will allow engineers to make improvements.
- Other professionals comprise financial, legal or human resource professionals, as well as organization specialists.
- Sales personnel are the workers who actually sell the telecommunications products to clients. To be distinguished from sales & marketing professionals.
- Administration includes those employees with general administrative functions, such as bookkeeping, administrative support, and secretaries.
- Technicians comprise technical staff, responsible for maintaining and repairing equipment.

19 Implications of scenarios by job function - volume effects

Different futures will have different implications for jobs, both in quantitative and in qualitative terms. In this chapter the implications of the four scenarios in terms of volume effects for each of the identified job functions are assessed. Trends and developments of the recent past provide an important starting point in forming an idea about these future developments. This quantitative trend information has been combined with expert opinions of a core expert team and supplemented with insights from invited sector experts in a dedicated workshop to assess which volume effects would be likely to occur for which job functions. It should be emphasized that the referred expected changes are qualitative in nature, reflecting the outcome of expert judgements and expert discussion as well as desk research taking into account the results of other studies. The results of the following chapter should therefore be used as a supplement and an independent expert assessment in addition to other more formal analyses, e.g. based on mathematical and/or econometric modelling and simulation.

The job implications of each of the scenarios are presented in Table 19.1. The table shows the different occupations selected and the changes expected for each of the scenarios. The expected volume changes are given for both developed markets and markets in transition, as large differences in market maturation exist within the European Union. These differences will have important consequences for the development in job volumes in the years to come.

For **managers**, fast technological progress leads to a more dynamic market that requires quick and adequate reactions. These increase the demand for managers. On the other hand, high income customers and growing markets make it easier to run a firm, which may decrease the need for managers. The effect of competition is ambiguous as well. More competition leads to more dynamics asking for more management, but this effect is offset by the tendency to rationalize and cut costs as a result of competitive pressure. As more competition typically means more firms, this has a positive effect on the number of managers. All in all, we expect that in developed markets the number of managers will be maintained while in markets in transition, where the market dynamics is higher, the positive effects will dominate leading to an increase of managers in the scenarios ‘Mono-tech’ and ‘Tech-com’. In ‘Tele-com’ the positive effect of dynamic markets will be offset by the tendency to substitute other professionals for managers, as described below.

All four scenarios foresee technological progress and – associated - a need to develop new products and improve existing ones as well as solve more complicated problems that new and immature technology brings along. This continuing trend will further increase the demand for **high-skilled engineers and IT professionals**. As in the scenarios ‘Mono-tech’ and ‘Tech-com’ technological progress is fastest, the number of engineers will increase more than in the remaining scenarios, where demand is more likely to be stable rather than increase. One could expect that the infrastructure and equipment will be of better quality and thus require less maintenance. As a result, fewer **technicians** would be needed. Faster progress leads to a faster improvement of quality but also brings about more problems caused by immature technology, so that a similar rate of decrease is expected in scenarios with both fast and slow technological progress.

Table 19.1 Expected volume changes in job function structure 2009-2020

	Market development	Mono-tel	Tele-com	Mono-tech	Tech-com
Managers	Developed	M	M	M	M
	In transition	M	M	I	I
Engineers and IT professionals	Developed	M	M	I	I
	In transition	M	M	I	I
Technicians	Developed	D	D	D	D
	In transition	D	D	D	D
Sales & marketing professionals	Developed	M	I	M	I
	In transition	M	I	M	I
Sales personnel	Developed	M	M	D	M
	In transition	M	M	D	M
Other professionals	Developed	M	I	M	M
	In transition	M	I	I	I
Administrative personnel	Developed	M	M	M	D
	In transition	M	D	M	D

Note: D=decrease, I=increase, M=maintain.

In an increasingly virtual society, more and more sales take place on the Internet; this decreases the need for less educated, face-to-face **sales personnel**, but increases the need for knowledge-able higher qualified sales personnel. Furthermore, high consumer income makes telecoms products easier to sell. This decreases the need for low educated sales personnel in scenarios ‘Mono-tech’ and ‘Tech-com’. On the other hand, the competitive pressure present in scenario ‘Tech-com’ stimulates the intensification of sales effort. Moreover, more competition usually implies a larger number of firms, which also leads to higher total employment. All in all, we expect that in the ‘Mono-tech’ scenario the technological effect will dominate and the number of low educated sales personnel will decrease, while in scenario ‘Tech-com’ the technological and competitive effects will balance out and the size of sales personnel will remain unchanged. For scenarios ‘Mono-tel’ and ‘Tele-com’ we expect that the demand for sales personnel will be maintained as the technological effect and income effect that leads to its decrease is weak, and the various effects of competition in the ‘Tele-com’ scenario cancel out just as for ‘Tech-com’.

For high-educated **sales professionals** the situation is different. In scenarios ‘Mono-tech’ and ‘Tech-com’ fast technological progress creates the need to translate technological innovations into marketable products. Furthermore, consumers need to be informed about the existence and advantages of new products and convinced to buy them. This development stimulates the demand for highly educated, creative marketing and sales professionals who recognize the potential uses of more advanced technologies, co-operate

with engineers in creating new products, inform consumers of their existence and convince them to buy them and, finally, monitor consumers' experiences with these new products and conceive ways of improving them to better satisfy consumers' needs. This effect outweighs the downward pressure on sales professionals staff in the 'Mono-tech' scenario and as a result the number of sales professionals is maintained. In the 'Tech-com' scenario this effect leads to an increase in the number of sales professionals. In the two scenarios with slow technological progress this effect is much weaker, and therefore we expect no changes in the number of sales professionals in 'Mono-tel'. On the other hand, in the 'Tele-com' scenario a relatively low number of new innovative products, low income growth and strong competition makes selling difficult, which requires sales professionals that will manage to differentiate their product from others by creating new bundles of existing products, develop new selling and advertising techniques. For this reason, combined with the fact that a higher number of firms typically increases employment, we expect an increase in the number of sales professionals in this scenario.

The demand for **other professionals**, just as the demand for managers, is likely to increase with market dynamics, the degree of 'difficulty' of the market and a low pressure for rationalization. For this reason, for all scenarios but 'Tele-com' we expect the demand for other professionals to follow the same pattern as the demand for managers. This means that the number of other professionals remains constant in developed markets, whereas in markets in transition it is stable in 'Mono-tel', while it increases in the highly dynamic 'Mono-tech' and 'Tech-com'. For the 'Tele-com' scenario we take into account the fact that other professionals are used as substitutes for managers, taking over some of the managers' analytical tasks. As managers are typically more expensive than other professionals, this is likely to happen under high pressure to cut costs, which is the case in a competitive market that does not grow much. For this reason, we expect the number of other professionals in this scenario to increase, while the number of managers remains constant.

Faster technological progress and higher income lead to the development of new products. A higher number of different products increases the demand for **administrative personnel**. On the other hand, fast technological progress leads to more automation and less need for administrative personnel. For the 'Mono-tech' scenario we expect the effects to balance out, resulting in unchanged demand for administrative personnel. For the 'Tech-com' scenario, competitive pressure will dominate and the number of administrative personnel is expected to decrease. For scenarios with slow technological progress, the number of new products is relatively low but so is the possibility to automate administration. Hence, the demand for administrative personnel in the 'Mono-tel' and 'Tele-com' scenarios in developed markets remains constant. On the other hand, the competitive pressure for rationalization in the 'Tele-com' scenario will lead to a decrease in the administrative personnel in markets in transition, where the rationalization processes have not been completed yet.

20 Implications of scenarios - main emergent competences

20.1 Introduction

Determining emergent competences is at the very heart of this study. In order to identify the main emergent competences by occupational function, the Rodrigues (2007)

methodology refers to three main competences: theoretical, technical and social competences. This distinction builds on the distinction between knowledge, skills and competences in the European Qualifications Framework (EQF) and the European Credit system for Vocational Education and Training (ECVET) (see Box 8 below). The term human capital broadly defined by the OECD as ‘the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being’ (OECD, 2001:18) captures all three. The use of the term ‘capital’ leads one to think in terms of investments in education and training which are often necessary in order to acquire skills and knowledge. However, skills and knowledge can also be acquired through work experience, informal on-the-job learning and a variety of other means.

In the actual identification of future competences, the EQF/ECVET definitions are used as indicative. It is noted that the difference between competences and skills is not always clear-cut, for instance where ‘soft skills’ come into play. A similar comment holds for what determines job or occupational qualifications.¹⁹ Partly because of these identification issues, adequate measurement of competences, knowledge and skills is notoriously difficult. In some of the literature, the problem of skills measurement is sometimes avoided by using indicators (proxies) focusing on qualifications (high-level, intermediate-level, low-level) as well as occupations. For the purpose of identifying *future* skill needs such approach will not deliver useful results. Instead it is the knowledge and skills behind that need to be identified.

Rather than producing a full and exhaustive list of all competences for each job function, the key focus in this chapter is on identifying and describing key and critical competences for the future. The description will be focused but also general enough to be meaningful across countries. A slight extension of the original Rodrigues methodology is that together with the identification of critical skills and knowledge needs, a differentiation by scenario is made. Skills and knowledge needs are operationalised as expected key changes in specific skills and knowledge categories by occupation.

Throughout this report the term *competences* is defined as the “proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development.” (see Box 8 for definitions). In the practical elaboration of competence needs hereafter the focus is predominantly on knowledge and skills needs, with a further distinction to what is usually described as ‘soft skills’ such as team working skills, and planning and organising. Note that the ‘personal, social and/or methodological abilities’ included in the definition of competences (see Box 9) come very close to what is generally understood as ‘soft skills’.

¹⁹ ‘Qualification’ denotes the requirements for an individual to enter or progress within an occupation. It also denotes an official record (certificate, diploma) of achievement which recognises successful completion of education or training, or satisfactory performance in a test or examination. The concept of qualification varies from one country to another. It may express the ability – formally defined in work contracts or collective agreements – to perform a certain job or meet the requirements of the workplace. A qualification may give rise to a number of rights and prerogatives which determine the individual’s position within the hierarchy of his/her occupational context. (Tessaring, 2004: 235).

Box 8. Definition of competences, skills and knowledge in EQF and ECVET

Several definitions of knowledge, competences and skills are nationally as well as internationally under discussion. Moreover, Member States of the European Union still have different approaches in defining these terms. The European Union has set up a joint process to co-ordinate the different existing terminologies and to find a common basis. Aims of this process are for example to strengthen the mobility of the labour force within the European Union and to facilitate sectoral developments. In the following reference is made to the definition used by the European Qualification Framework (EQF) and the European Credit System on Vocational Education and Training (ECVET).

The EQF links national qualification systems and tries to make vocational training and lifelong learning more transparent and understandable. Therefore a common terminology was developed. The following descriptors are taken from the EQF (European Commission, 2008e; see also European Commission, 2008f):

- *Knowledge* refers to the outcome of the accumulation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the European Qualifications Framework, knowledge is described as theoretical and/or factual;
- *Skills* refers to the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the European Qualifications Framework, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments);
- *Competence* refers to the proven ability to use knowledge, skills and personal, social and/ or methodological abilities, in work or study situations and in professional and personal development. In the context of the European Qualifications Framework, competence is described in terms of responsibility and autonomy;
- *Qualification* refers to a formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standards;
- *Learning outcomes* refer to statements of what a learner knows, understands and is able to do on completion of a learning process, which are defined in terms of knowledge, skills and competence.

Box 9. Skills needs, skills shortages and skills gaps defined

- *Emergent skills needs* are defined here as the change in skills that is needed to adequately fulfil a certain job function in the future. Addressing emergent skills is needed in order to avoid skills shortages and/or skills gaps in the future.
- *Skills shortages* exist where there is a genuine lack of adequately skilled individuals available in the accessible labour market. A skill shortage arises when an employer has a vacancy that is hard-to-fill because applicants lack the necessary skills, qualifications or experience.
- *Skills gaps* arise where an employee does not fully meet the skills requirements for a specific job function but is nevertheless hired. This skills gap needs to be closed through training. Skills gaps can arise where new entrants to the labour market are hired and although apparently trained and qualified for occupations still lack some of the skills required.

A number of different skills categories have been taken into account, including social skills, problem solving skills, (self) management skills, skills related to entrepreneurship, as well as knowledge requirements (sometimes labelled as ‘hard skills’). Table 20.1 provides an overview of the different skills and knowledge categories taken into consideration. Literacy and numeracy skills are not specifically mentioned in the tables. In practice these skills cannot be taken for granted. However, they are a prerequisite rather than an emerging skill to participate in the workforce.

For each job function key future skills and knowledge need, to which the s were identified. This was done in a workshop with a number of invited sector experts, and validated in two subsequent workshops, including the step 10 final workshop; the results therefore remain based on joint expert opinion. The analysis in Part I and the data tables formed a ‘levelling’ starting point for each of the discussants.

Table 20.1 Overview of skills and knowledge clustered by category

Knowledge (‘hard skills’)
<ul style="list-style-type: none"> Legislative / regulatory knowledge (environmental / safety / labour / contracting); Language*; e-skills; Marketing skills; Technical knowledge; Product knowledge; Product development
Social Skills
<ul style="list-style-type: none"> Team working skills; Social perceptiveness (listening / understanding); Communication; Networking; Language*; Intercultural
Problem-solving Skills
<ul style="list-style-type: none"> Analytical skills; Interdisciplinary; Initiative, Multi-skilling; Creativity
Self management
<ul style="list-style-type: none"> Planning; Stress and time management; Flexibility; Multi-tasking
Management skills
<ul style="list-style-type: none"> Strategic & visionary; Coaching and team building; Change management; Project management; Process optimizing; Quality management; people skills crucial for collegial management style
Entrepreneurial skills
<ul style="list-style-type: none"> Supplier and customer relationship / understanding; Business understanding; Trend setting / trend spotting

The emergent future competences – defined as skills and knowledge needs - are identified and clustered together with similar ones in a concise overview table per job function (see next sections 20.2 to 20.8). Only *substantive key changes* in skills and knowledge needs are taken into account, which means that only part of the cells in the table is ‘filled’. However, if a certain skill or knowledge type is highlighted in one scenario, but is not addressed in another, this does not mean that it is irrelevant. Rather it means that relative demand for this skill in the latter case will not increase within the time frame 2009-2020.

20.2 Managers

One of the main distinctions between the scenarios is market dynamics. In the scenarios dynamics are stimulated by fast technological progress and by strong competition. Cost

management (no gold plating!) and optimising the value chain within companies is an important task for managers in the coming years. There will be a further shift away from an ‘engineering-solutions’ driven culture towards a more ‘cost-conscious creative services’ orientation which needs a different set of management tools. The more dynamic the environment, the stronger the variety of tasks required and the more new skills are demanded from managers.

As all scenarios envision technological progress, managers have to rely on knowledge of **technical** developments of their engineers and other technical specialists, although this will be most required in scenarios with fast technological progress (‘Mono-tech’ and ‘Tech-com’). In scenarios with much competitive pressure this knowledge is not only related to telecommunications technology, but also to knowledge that makes it possible to decrease costs.

Legislative and regulatory knowledge is in all scenarios necessary, but differs in nature between the scenarios. Again, also here managers will predominantly rely on legal specialists’ knowledge and skills. ‘Tele-com’ and ‘Tech-com’ require a combination of legislative and regulatory knowledge and knowledge of societal innovation trends (e.g. ‘green IT’) and how innovation policy can help to change and/or further improve existing business models. Such knowledge would also help to guarantee that no problems occur with regulatory bodies. In the other two scenarios legislative and regulatory knowledge would primarily serve to establish what is allowed and to use regulation to increase opportunities.

Of the **social skills** communication and networking skills are necessary, to lobby and to find your way in a highly networked – in some scenarios further internationalising - environment. In a monopolized market the regulator may want to impose restrictions on the dominant firms, and that will trigger these firms’ lobbying efforts to prevent the regulator from imposing harsh measures and PR efforts to prevent the public from demanding them. Low quality of institutions in this scenario increases the effectiveness of lobbying efforts. In scenarios with a high level of competition these skills are needed for international competition. In scenarios with fast technological progress these skills are needed for a different reason. Since no single firm controls the whole vertical production chain, co-operation with other firms to set standards and ensure compatibility between different networks and services requires co-operation with other firms. Networking and communication skills are needed very much to organise and enable such co-operation. Furthermore, **team working skills** are needed. Technological convergence and the emergence of new services will require co-operation between different specialists within the firm, but also with other firms.

In ‘Mono-tech’ and ‘Tech-com’ **problem solving skills**, creativity and analytical skills are needed to perform analyses of the organisation and of value chains and change management to win support for changes in the organisation. Fast technological progress will make it necessary to formulate a vision of how the firm will react to this progress that will lead to changes within the firms even under little competitive pressure.

Competitive pressure stimulates market dynamics and the need to be alert. For this reason more **self management** skills planning and flexibility are needed. Flexibility and planning are necessary to respond quickly to competitors’ actions. In ‘Tech-com’ also more stress and time management skills are needed as dynamics are further increased by fast technological change.

Table 20.2 Emerging skills and competences for managers, 2009-2020*

		Mono-tech	Tech-com	Mono-tel	Tele-com
Knowledge	Legislative, regulatory				
	e-skills				
	Technical knowledge				
Social Skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress and time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding suppliers customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic and visionary				
	Coaching and team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Total emerging skills and competences		13	21	3	8
Scenario characteristics:					
- Technological change	Fast	Fast	Slow	Slow	
- Lifestyle: social interaction	Virtual	Virtual	Local	Local	
- Income	High	High	Low	Low	
- Trade and market regulation: degree of competition	Low	High	Low	High	
- Quality of institutions	Low	High	Low	High	
- Innovation policy	Bad	Good	Bad	Good	

Note: shaded areas highlight specific skills and knowledge that will become relatively more important in the future, and require up-skilling and knowledge upgrading. This does not mean that blank areas are irrelevant; rather here no **change** in terms of up-skilling and knowledge upgrading is needed. The darker the area shaded the more important it is in the scenario. * Updated and validated on the basis of discussions during the final workshop, February 2009.

The scenarios with a high level of competition require more **entrepreneurial** skills, such as trend setting and spotting, marketing and the ability to understand customers and suppliers. In ‘Tech-com’ business development is very important as competitive pressure is accompanied by fast technological change.

In scenarios where technology is changing fast, it is necessary to identify the opportunities and threats and to use coaching and team building to cash opportunities and to prevent problems. Managers need strong **management skills**. They need the ability to formulate strategy and vision, but also to stimulate others to come up with new ideas. Especially in ‘Tech-com’ change management skills are needed to guarantee that companies adjust quick and in the right direction.

20.3 Engineers and IT professionals

All considered scenarios foresee technological change. The main difference between the scenarios is the pace of technological change. The role of engineers and IT professionals will especially change in scenarios with high technological change. High competition also adds extra dimensions to the tasks of engineers and IT professionals. In these scenarios they will have to be able to identify and exploit opportunities for translating technological advances into marketable products. Nevertheless, the image of this job function category will gradually lose its shining image (once having been the ‘kings’ of the sector).

In all scenarios engineers and IT professionals require additional and new **knowledge**. This will, for instance, include the ability to develop new software and to use new programming languages. Technological convergence will require broader, interdisciplinary knowledge, that can be applied to develop hybrid, cross-media products and to system integration. Technical knowledge is in Table 20.3 marked with black as it is essential for the future competitive position of telecommunications firms. Knowledge about green IT and eco-efficiency will be important especially in the ‘Tele-com’ and ‘Tech-com’ scenarios.

Social skills are highly relevant in scenarios with much competitive pressure or fast technological change. These social skills are team working skills, social perceptiveness and communication and networking skills. Technological developments necessitate the creation of teams in which experts co-operate to develop integrated products using different technological aspects. The increased importance of teamwork will require the improvement of communication and networking skills. These skills are also relevant to persuade management to adopt new technologies. Networking skills will be needed to gather information about technical developments, both from research institutions and competitors. Language and intercultural skills are important in Mono-tech and Tech-com, especially in across-border matrix organisations.

In high paced scenarios, ‘Tech-com’ and ‘Mono-tech’, **problem solving** analytical skills and initiative are needed. New technologies have a shorter time to market. This leads to more different technologies in the market and corresponding problems. Engineers need to be highly skilled in order to work out new solutions for these problems. *Interdisciplinary skills* are needed in fast technological and high competition scenarios, as teamwork requires a good understanding of other types of work.

Table 20.3 Emerging skills and competences engineers & IT professionals, 2009-2020*

		Mono-tech	Tech-com	Mono-tel	Tele-com
Knowledge	Legislative, regulatory				
	e-skills				
	Technical knowledge				
Social Skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress and time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding suppliers customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic and visionary				
	Coaching and team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Total emerging skills and competences		16	19	2	13
Scenario characteristics:					
- Technological change		Fast	Fast	Slow	Slow
- Lifestyle: social interaction		Virtual	Virtual	Local	Local
- Income		High	High	Low	Low
- Trade and market regulation: degree of competition		Low	High	Low	High
- Quality of institutions		Low	High	Low	High
- Innovation policy		Bad	Good	Bad	Good

Note: shaded areas highlight specific skills and knowledge that will become relatively more important in the future, and require up-skilling and knowledge upgrading. This does not mean that blank areas are irrelevant; rather here no change in terms of up-skilling and knowledge upgrading is needed. The darker the area shaded the more important it is in the scenario. * Updated and validated on the basis of discussions during the final workshop, February 2009.

As the environment will be relatively dynamic in all scenarios but 'Mono-tel', **self management skills** will be needed. Flexibility is needed to adapt to changing situations and engineers and IT professionals must be able to work under stress created by time pressure.

The development of new products requires commercial thinking and the ability to 'put oneself in the shoes of customers', as part of **entrepreneurial skills**. Understanding consumers and supplier is important in highly competitive scenarios, as new and often complex products will make it necessary to develop user-friendly interfaces. Engineers need to understand customers, to spot trends and to develop products.

Management skills in the scenarios with much competitive pressure are necessary to keep costs down. Attention should be given to process optimising with cost savings effects. In three of the four scenarios except 'Mono-tec' more coaching and team building skills are required. In the two scenarios with strong technological change further project management skills are needed to develop new products and technologies as projects become more complex.

20.4 Technicians

The emerging skills for technicians resemble partly those required for engineers and IT professionals. For technicians there is less focus on product development and more on daily maintenance and solving consumers' problems. Since all scenarios foresee technological progress involving convergence and the emergence of new products, all scenarios require the development of **technical knowledge**.

Next to knowledge technicians need to be able to communicate in a clear way about technology for those who are not familiar with all technologies. Therefore **social skills** are needed, like communication skills and social perceptiveness. These skills are not only needed towards customers, but also towards colleagues, such as sales personnel, but also engineers and IT professionals in order to improve products and services. They become more important if the competitive pressure increases or when technological development is fast.

In all scenarios with high market or technology dynamics, multi-skilling is expected to become an even more useful **problem solving skill**. In scenarios with high dynamics more is expected from technicians and they will need to be able to switch between different technologies and services.

In these scenarios flexibility and stress and time management will be more important. In the high competition scenarios planning is an important **self management skill**. The reason is that technicians need to be able to work efficiently and customer friendly. In order to accomplish this they need planning skills.

In the scenarios 'Tech-com' and 'Tele-com' intensive competition will require process optimization skills in order to keep costs down. Technicians function as a bridge between plans and practice and can have a valuable input into making the company more effective.

Table 20.4 Emerging skills and competences technicians, 2009-2020

		Mono-tech	Tech-com	Mono-tel	Tele-com
Knowledge	Legislative, regulatory				
	e-skills				
	Technical knowledge				
Social Skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress and time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding suppliers customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic and visionary				
	Coaching and team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Total emerging skills and competences		6	8	1	8
Scenario characteristics:					
- Technological change		Fast	Fast	Slow	Slow
- Lifestyle: social interaction		Virtual	Virtual	Local	Local
- Income		High	High	Low	Low
- Trade and market regulation: degree of competition		Low	High	Low	High
- Quality of institutions		Low	High	Low	High
- Innovation policy		Bad	Good	Bad	Good

Note: shaded areas highlight specific skills and knowledge that will become relatively more important in the future, and require up-skilling and knowledge upgrading. This does not mean that blank areas are irrelevant; rather here no change in terms of up-skilling and knowledge upgrading is needed. The darker the area shaded the more important it is in the scenario.

20.5 Sales & marketing professionals

Skills requirements for sales professionals increase with the speed of technological progress and the degree of competition. In scenarios with fast technological progress, importantly 'Mono-tech' and 'Tech-com', the focus is on the development of new products. Intensive competition leads to the development of more new skills related to sales and marketing. A crucial task of sales professionals, when technological change is fast and especially when competition is fierce, is organising the connection between engineers and IT professionals on the one hand and customers on the other, analyzing consumers' needs and wishes as well as giving feedback about the performance of new products which will allow engineers and IT professionals to make improvements.

Technological developments increase the need for technical **knowledge**, which is important in the high technology scenarios. Examples are on-line sales, keeping track of consumers' preferences and targeting different customer segments. Internet advertising is an example of a selling technique that will play an increasing role. In scenarios with high competition, legislative and regulatory knowledge becomes more important as sales professionals will search for the boundaries in trying to market their products.

The role of sales professionals as interface between customers and engineers and IT professionals leads to the emergence of teamwork as an important **social skill** in the scenarios with strong technological change. Networking skills are important when competition is strong, amongst others to obtain information from and about competitors. In the scenarios with large market dynamics (high competition and technological developments), communication skills and social perceptiveness become relevant social skills, because sales professionals have to be able to understand both customers and colleagues. Moreover, they have to be able to convince both groups of the possibilities of new products.

Fierce competition makes the task of price-setting more complex, which requires **problem solving skills** like creativity and analytical skills. Sales professionals need to be able to think through new strategies to outperform their competitors.

In scenarios with intensive competition firms have to be able to react fast to competitors' actions and new developments. That requires the **self management** skills flexibility and stress management.

In all scenarios **entrepreneurial skills** are needed. Even in the low technological and competition scenario 'Mono-tel' business development skills are needed, but the development of business is different in each scenario. In the 'Mono-tel' scenario telecommunications again becomes a luxury product and demands a different way of doing business. In other scenarios more entrepreneurial skills are needed. In the high competition scenarios sales professionals need to understand customers, marketing skills and trend spotting and visionary skills to adapt to changing business environments.

Sales professionals also need strategic and visionary skills in both the high competition scenarios and the scenarios with strong technological change.

Table 20.5 Emerging skills and competences sales & marketing professionals, 2009-2020

		Mono-tech	Tech-com	Mono-tel	Tele-com
Knowledge	Legislative, regulatory				
	e-skills				
	Technical knowledge				
Social Skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress and time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding suppliers customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic and visionary				
	Coaching and team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Total emerging skills and competences		5	16	2	12
Scenario characteristics:					
- Technological change		Fast	Fast	Slow	Slow
- Lifestyle: social interaction		Virtual	Virtual	Local	Local
- Income		High	High	Low	Low
- Trade and market regulation: degree of competition		Low	High	Low	High
- Quality of institutions		Low	High	Low	High
- Innovation policy		Bad	Good	Bad	Good

Note: shaded areas highlight specific skills and knowledge that will become relatively more important in the future, and require up-skilling and knowledge upgrading. This does not mean that blank areas are irrelevant; rather here no change in terms of up-skilling and knowledge upgrading is needed. The darker the area shaded the more important it is in the scenario.

20.6 Sales personnel

Whereas for sales professionals the strategic aspect is most important, the focus of sales personnel is on contact with the customer. Thus, skills such as market research, product development and product pricing are of less importance here, whereas skills related to direct contacts with consumers are more important.

In scenarios 'Mono-tech' and 'Tech-com', fast technological progress makes it necessary to acquire technical and product **knowledge** in order to be able to give pre-purchase advice to consumers and provide after-sales support. Further, the increased importance of virtual contacts will make skills related to Internet selling necessary in the scenarios with strong technological change.

Keeping up-to-date in the fierce competition scenario with fast technological change requires co-operation with technicians and engineers, which requires **social skills**. Team working and communication skills as well as social perceptiveness towards colleagues are necessary. In scenarios with intensive competition, 'Tech-com' and 'Tele-com', selling is harder, and that creates demand for selling-related skills such as networking, communication, social perceptiveness towards customers and intercultural skills.

Fast technological development and high competitive pressure also require **problem solving skills**. Creativity is important when sales personnel have to increase their efforts for selling telecom products. Sales personnel have to be able to quickly understand new technologies and therefore multi-skilling is required.

In the scenarios with fierce competition **self management skills** are needed for stress and time management. Commercial pressure is high, asking a lot from sales workers. When technological development is fast, they need flexibility to be able to adapt almost continuously from product to product.

In the scenarios with high competition the **entrepreneurial** skill understanding customers becomes more important.

Table 20.6 Emerging skills and competences sales personnel, 2009-2020

		Mono-tech	Tech-com	Mono-tel	Tele-com
Knowledge	Legislative, regulatory				
	e-skills				
	Technical knowledge				
Social Skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress and time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding suppliers customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic and visionary				
	Coaching and team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Total emerging skills and competences		5	12	0	7
Scenario characteristics:					
- Technological change		Fast	Fast	Slow	Slow
- Lifestyle: social interaction		Virtual	Virtual	Local	Local
- Income		High	High	Low	Low
- Trade and market regulation: degree of competition		Low	High	Low	High
- Quality of institutions		Low	High	Low	High
- Innovation policy		Bad	Good	Bad	Good

Note: shaded areas highlight specific skills and knowledge that will become relatively more important in the future, and require up-skilling and knowledge upgrading. This does not mean that blank areas are irrelevant; rather here no change in terms of up-skilling and knowledge upgrading is needed. The darker the area shaded the more important it is in the scenario.

20.7 Other professionals

Other professionals include financial, legal or human resource professionals, and organization specialists.

In scenarios with fast technological progress, 'Mono-tech' and 'Tech-com', professionals will have to acquire additional technical **knowledge** in order to make adequate decisions. For instance, organization specialist need to know the 'production process' of telecommunications services in order to organize it effectively and financial specialists to be able to design adequate accounting information systems.

In scenarios with intensive competition, 'Tech-com' and 'Tele-com' firms have to keep the costs minimal in order to be able to compete, and therefore the knowledge of cost accounting systems will have to develop. Judicial knowledge on telecom and environmental regulation will be important in all scenarios. In scenarios 'Tech-com' and 'Mono-tech', fast technological progress will lead to changes in regulation. The other two scenarios require the development of judicial knowledge as well. In scenario 'Mono-tel' a low quality of institutions creates many opportunities to find profitable loopholes in regulation and to influence it through lobbying. In the scenario 'Tele-com' fierce competition in a slowly growing market is likely to lead to much litigation among competitors.

Lobbying is important in all scenarios, which creates the need for **social skills**, networking and better communication. In scenarios with much competition, 'Tech-com' and 'Tele-com', networking ability will be important in order to gather information about competitors' actions.

Other professionals need the ability to analyse the internal organization of the firm in scenarios with relatively high dynamics caused by fast technological progress or competition, thus in all but 'Mono-tel'. Furthermore, they have to translate insights from this analysis into organizational improvements. This requires **problem solving skills** such as analytical skills and creativity.

Additionally, the other professionals will require **self management skills** in order to cope with the rapid changes in the environment. The ability to work under pressure will be especially important in more dynamic scenarios, especially 'Tech-com' and 'Tele-com'.

The other professionals have much influence on restructuring business, as they are the experts within the organisation in many fields. In scenarios with high competition they require **entrepreneurial skills**, more specifically business development skills. Related to this are **management skills**. In order to develop business, strategic skills, vision and process optimizing are needed. In 'Tech-com' many changes occur, asking for skills in change management. Strategic and visionary skills are also needed in 'Mono-tech' as many technological changes take place.

Table 20.7 Emerging skills and competences other professionals, 2009-2020

		Mono-tech	Tech-com	Mono-tel	Tele-com
Knowledge	Legislative, regulatory				
	e-skills				
	Technical knowledge				
Social Skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress and time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding suppliers customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic and visionary				
	Coaching and team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Total emerging skills and competences		7	11	3	10
Scenario characteristics:					
- Technological change		Fast	Fast	Slow	Slow
- Lifestyle: social interaction		Virtual	Virtual	Local	Local
- Income		High	High	Low	Low
- Trade and market regulation: degree of competition		Low	High	Low	High
- Quality of institutions		Low	High	Low	High
- Innovation policy		Bad	Good	Bad	Good

Note: shaded areas highlight specific skills and knowledge that will become relatively more important in the future, and require up-skilling and knowledge upgrading. This does not mean that blank areas are irrelevant; rather here no change in terms of up-skilling and knowledge upgrading is needed. The darker the area shaded the more important it is in the scenario.

20.8 Administrative personnel

Changes in administrative job functions are mostly related to increasing product and service variety, the intensity of competition and the speed of innovation. Therefore changes are more frequent in the high technological and competition scenarios. In the 'Mono-tel' scenario no new skills requirements are foreseen.

In all scenarios except 'Mono-tel', the large number of services will make administration more complex, requiring more complex software and procedures, which will lead to the development of ICT related **knowledge** for administrative personnel. They need more e-skills and technical knowledge.

Social skills will have to be developed as well, especially related to administrative customer support. Keeping the records up-to-date will require close co-operation with sales, which stimulates teamwork. Finally, the large amount of information present in administrative systems will make it necessary to develop skills related to the extraction of information and communicating it to other departments.

The large number of different types of services and subscriptions is expected to increase substantially, which will increase the demand for **self management skills**, planning and time management skills. Moreover, pressure from inside the organisation and from clients to deal effectively with their demands adds to the demand for stress management.

In scenarios with much competition **entrepreneurship skills** are required as well. Administrative workers need to have an understanding of the company's clients and suppliers in order to efficiently deal with procedures and to try to improve procedures. In both high competition scenarios certain **management skills** are needed as well. Competition forces companies to work more efficiently, therefore administrative workers need to be able to optimise processes.

Table 20.8 Emerging skills and competences administrative personnel, 2009-2020*

		Mono-tech	Tech-com	Mono-tel	Tele-com
Knowledge	Legislative, regulatory				
	e-skills				
	Technical knowledge				
Social Skills	Team working skills				
	Social perceptiveness				
	Communication				
	Networking				
	Language				
	Intercultural				
Problem solving skills	Analytical skills				
	Interdisciplinary				
	Initiative				
	Multi-skilling				
	Creativity				
Self management	Planning				
	Stress and time management				
	Flexibility				
	Multi-tasking				
Entrepreneurship	Understanding suppliers customers				
	Business development				
	Marketing skills				
	Trend setting / spotting				
Management skills	Strategic and visionary				
	Coaching and team building				
	Collegial management style				
	Change management				
	Project management				
	Process optimizing				
	Quality management				
Total emerging skills and competences		10	13	4	11
Scenario characteristics:					
- Technological change		Fast	Fast	Slow	Slow
- Lifestyle: social interaction		Virtual	Virtual	Local	Local
- Income		High	High	Low	Low
- Trade and market regulation: degree of competition		Low	High	Low	High
- Quality of institutions		Low	High	Low	High
- Innovation policy		Bad	Good	Bad	Good

Note: shaded areas highlight specific skills and knowledge that will become relatively more important in the future, and require up-skilling and knowledge upgrading. This does not mean that blank areas are irrelevant; rather here no change in terms of up-skilling and knowledge upgrading is needed. The darker the area shaded the more important it is in the scenario. * Updated and validated on the basis of discussions during the final workshop, February 2009.

Part V.

Available Options to Address Future Skills and Knowledge Needs, Conclusions and Recommendations

Telecommunications

Part V. Telecommunications - Available Options to Address Future Skills and Knowledge Needs and Recommendations - Guide to the reader

In the final third part of this report, a range of main strategic options ('choices') is reviewed, including possible actions in education and training. The report concludes with a number of conclusions and recommendations for the sector (individual firms, sector organizations, others) and policy-makers at various levels, ranging from the EU to the local level. Part V reflects steps 7 (Main strategic choices), 8 (Main implications for education and training) and 9 (Main recommendations) of the common methodology. Its contents are as follows: Chapter 21 highlights the various strategic choices in response to future skills and knowledge needs. Chapter 22 focuses on specific implications for education and training. Chapter 23 concludes by providing a number of key recommendations and conclusions.

21 Strategic choices to meet emergent skills and knowledge needs

21.1 Introduction

This chapter identifies the main strategic choices to meet the skills and knowledge needs identified (step 7). It provides a framework to pick and select the most relevant strategic choices – i.e. solutions to meet future skills and knowledge needs - available. Strategic choices refer and relate to the medium- and longer term, even though emerging skills needs in practice may also apply to the now and tomorrow. Essential in seeking appropriate solutions is to keep this longer time perspective in mind. Rather than focusing on one single solution, a set of linked strategic choices will in most cases be the best strategy to follow. Prioritising both in time (what first, where to follow up) and in allocation of resources (budgetary focus) followed by further fine-tuning is a clear necessity to guarantee that skills needs are targeted and solved. Skill needs can be identified at various levels, ranging from assessments at the national or even European sector level - which are by nature rather general - to more precise assessments at the regional and company level. Especially for large enterprises not only the identification of skills needs but also the search for adequate solutions will be an integral part of an overall longer-term business strategy. Some solutions will be found within the company itself, for instance by reorganising functions within or between plants, by offering (re)training trajectories and by active global sourcing of personnel. For SMEs and especially for micro-enterprises²⁰ such longer-term, more strategic human resource management often will be more difficult to organise and operationalise. It should be emphasized that at all possible levels identified different actors need to act to address skills needs and offer solutions and preferably also in close concert. These can be individual firms, organised interests at the sector level (employers and employees), but also others. Local, regional and national governments have also a important role to play. This chapter offers first of all a better insight in the ‘menu’ of possible strategic choices (section 21.2). It also provides for a framework that can identify skills needs at the appropriate level and helps to decide which should be the actual choices to be made (see section 21.3). This framework is subsequently applied to the telecommunications sector (section 21.4 and following).

21.2 Possible strategic choices

The possible strategic choices contained in this chapter refer to the strategic choices originally proposed by Rodrigues (2007: 42) as well as a number of other, additional choices. Whereas strategic choices mostly refer to the medium and longer term, most of the choices mentioned can also be implemented in the short run, to ‘mend’ existing skills shortages and/or skills gaps. Each of the solutions at hand differs in whether or not it can resolve direct skills shortages and/or gaps. A longer term horizon, however, means that there is possibility of adapting, steering and fine-tuning the available solutions towards a more optimal allocation of skills supply and demand. In view of the time horizon, the period up to 2020, the strategic choices and instruments with a more long-term impact especially need to be addressed. Identification of possible solutions obviously is not

²⁰ Defined as firms with less than 10 employees.

enough. Concrete initiatives, policy and strategic decisions need to be taken at all appropriate levels with each actor having a different responsibility and a different role to play.

Strategic choices to meet future skills needs need to be taken by a number of actors and at different levels (firm, local, regional, national, sectoral). For obvious reasons, firms are an important player in finding solutions for the skills needs – both in volume (skills shortages) and in matching any existing skills gaps. Companies avail of a number of options to meet their skills needs. These include:

- N. Recruiting workers from other sectors
- O. Recruiting workers from other Member States
- P. Recruiting workers from non-Member States
- Q. Recruiting unemployed workers with or without re-training
- R. Recruiting young people coming from the education system, with or without re-training (first job recruits)
- S. Training employed workers
- T. Changing the work organisation (including network collaboration and mergers)
- U. Outsourcing and offshoring.

Sectoral organisations, educational institutions and governments also have a role to play. They will be the prime actors in addressing the following options:

- V. Changing general and vocational education
- W. Designing and offering new courses (continuing vocational education and training)
- X. Providing information about jobs and (emerging) skills: career guidance; updating job profiles regularly.
- Y. Improve the image of the sector (joint action of companies together)
- Z. Stronger cooperation with the industry (internships, company visits for participants in education, image improvement).

A more detailed description of these strategic options can be found in annex III. Whether these strategic options are feasible and viable depends on a number of factors. In order to discuss and select from the available list of strategic options, one should first - as described in the introduction - know whether and when skills needs are indeed likely to arise, both in quantitative (number of job functions) and in qualitative terms (what knowledge and skills). An important question that needs to be addressed first is at what level and to whom the skills needs question applies. Obviously for an individual firm different information is required for identifying these needs and taking the right action than for a national ministry or a training institute.

The identification of possible strategic choices would in principle require extensive and detailed future analysis at the Member State and preferably also the regional level of skills and knowledge demand and supply patterns by job function and sub-sector, in a similar way and along the steps provided by the methodology of this study so far. The methodology and step-wise approach followed are applicable at the national and regional level of analysis. Ideally, these results should be complemented by the results of labour market model forecasts to corroborate results. Such an analysis would also need to

include an assessment of the numbers and skills composition of currently being educated, i.e. an assessment of all cohorts of primary, secondary and tertiary pupils and students (and their skills potential) currently in the educational system and arriving at the labour market in the oncoming years. It would need a thorough assessment of the current educational and training system itself, including the already decided changes herein for the oncoming years, to see whether the system as it is now in place is able to satisfy the prevailing and future new skills demands both in terms of numbers of new potential recruits and in terms of skills and knowledge.

21.3 Matching future skills and knowledge needs by making the right choices

In order to address the identified future skills and knowledge needs in an encompassing and timely manner, appropriate joint action is needed by all stakeholders, including the industry (firms, sector organisations and social partners), training and education institutes, intermediary organisations and, last but not least, government at all levels (EU, national, regional and local). Collaboration and co-operation between stakeholders will be needed, at all decision-making levels, in order to agree on and implement a package of feasible solutions. In order to prepare for this, timely, targeted and reliable information is essential.

This section presents a targeted short-cut strategic options decision tool to enable and support decision-makers in making the right (mix of) choices, supported by appropriate and reliable information on actual needs, possible choices and stakeholders to be involved. The strategic options decision tool is aimed to provide answers and solutions at the job function level and consists of a shortlist of a number of key questions - a concise menu of choice -, with answers providing decision-relevant information about the need and viability of available options. The questions need to be answered at the national, and where relevant at the regional level so as to map and identify the specific sector needs. The decision tool can also be used at the level of the firm. New job function information (e.g. new upcoming functions) can be added where thought relevant.

The key question list – consisting of six ‘framing’ questions, followed by option-specific questions - should be filled in for each job function. The ‘framing’ questions constitute a summary of main expected quantitative and qualitative skills needs developments. The filling in of the list should, however, only be done on the basis of an informed discussion between several stakeholders involved, representing together an informed body of knowledge on the various aspects at stake, including labour market developments and prospects at the sub-sector level, skill and knowledge requirements at job function level and developments in and make up/orientation of the educational and training system.

Key questions for identifying skills and knowledge needs

Question 1. Is the demand for workers expected to decrease or increase between now and 2020? (both related to market prospects and replacement demand due to ageing)

If decreasing, there is probably less need for recruiting workers from other sectors and (non-) Member States and less need for recruiting unemployed.

If increasing, analyse whether less radical options are enough to meet demand or whether options should be chosen like recruiting workers from other sectors and (non-) Member States and recruiting unemployed. *[Note: see Table 19.1 for estimated volume effects per scenario.]*

Question 2. Are the required qualitative skills expected to be rather stable between now and 2020?

If there are not many changes in required skills and knowledge, there is probably no need to apply many strategic options. Please focus on the options that are most effective.

If many skills and knowledge categories are changing, there is probably a need to apply many strategic options. Create a package of strategic options to meet skill needs. *[Note: see Table 20.2 and following for the number of competences changing per job function per scenario.]*

Question 3. Do SMEs and especially small companies (including micro enterprises) play a large role in the sector?

If yes, several options (like recruiting) are less viable for companies themselves as it is often difficult for small companies to organize this. If this is the case, sector organisations or intermediary organisation might play an important role in helping to match supply and demand. Another solution could be found in changing the work organisation. Through cooperation or mergers, for instance, the relevant scale can be increased which makes it easier to use these options. The same holds, more or less, for the organisation of training and re-training. Larger (associations of) companies have less difficulties to organise this and the need for support from other actors is lower. *[Note: see Table 3.12 for number of firms per size class.]*

Question 4. Are companies in general active on Member State level, EU level or global level?

Companies who are active on a larger regional level will have, in general, more opportunities to use the option of recruiting workers from other Member States (for companies active at the EU level) and the option recruiting workers from non-Member States (for companies active at the global level). The same holds for the option offshoring. *[Note: see chapter 3]*

Question 5. Are workers in a job function in general low-educated?

If yes, training is less easy to implement as a viable option as difficulties arise in organising this, while the need for training might be even higher. *[Note: see Table 3.17 to 3.19, for education shares]*

Question 6. Are workers in a job function in general old (i.e. older than the average age in the subsector and compared to other sectors)? *[Note: see section 3.2, for age structure.]*

If yes, training is less easy to implement as a viable option as difficulties arise in organising this and less new knowledge endogenously enters the companies, while the need for training might be even higher.

Key questions for identifying suitable options and relevant acting stakeholders

The six questions form the first part of the short-cut approach. The second part discusses the viability of strategic options to tackle and solve emergent skills and knowledge needs for each of the job functions identified. It confronts the list of available strategic options with the analysis of quantitative and qualitative developments on headlines based on the preceding six questions. For each job function identified an assessment is made on whether the available strategic options are relevant or not, and who should be prime actors to change the current situation into a more favourable direction. If the strategic option is considered relevant, a “yes” is filled in, else a “no” is included. If the strategic

option is dependent on specific characteristics of the sub-sector or components thereof, this is included in the table. For example, if recruiting workers from other Member States is only an option for large companies a “Yes, but only for large companies” will be included. Characteristics that are dealt with in the table are based on the six question analysis, representing:

- The change in volume (as a reference we include the most challenging scenario in terms of change required; i.e. scenario ‘Tech-com’)
- The change in skills (as a reference we include the most difficult scenario, which is often the scenario with the largest change in skills and knowledge needs; i.e. scenario ‘Tech-com’)
- Education level (i.e. Table 3.13)
- Age of the workforce (i.e. Table 3.13)
- Scale of the company and region the company is working in.

In principle, the following tables can be made scenario-dependent. In the descriptions below, the Tech-com scenario has been taken as the point of reference as the most demanding and dynamic in terms of up-skilling, knowledge upgrading and change.

21.4 Managers

Table 21.1 presents viable strategic options to meet emergent competences of managers. In all scenarios the number of managers is expected to stay stable in developed economies and no skill shortages are expected, even though turnover rates might be – like in the past – high (up to 10%). In the scenarios with fast technological progress ‘Tech-com’ and ‘Mono-tech’ an increase in the number of managers is expected in the economies in transition. In these cases also skill shortages can occur and more strategic choices might be an option to meet the demand.

With regard to the basic general skills of managers it will be possible to recruit managers from other sectors, from other Member States and from Non-Member States (provided that the latter possess the required skills). This strategic choice will be especially viable for companies in economies in transition due to the expected increase in managers. Due to the expected skill needs managers from sectors which are driven by high technology (e.g. the ICT manufacturing sector) or from sectors influenced by major regulatory changes such as the energy or postal sector are conceivable options. By all means, according to the ‘Tech-com’ scenario, it will become more important for managers to lead the conversion process from technology development to marketable products in ever faster product cycles. Recruiting unemployed managers is also a viable option mainly for economies in transition, because of their expected growth in demand. But this option will be limited in scope due to general low numbers of unemployed with the respective skills. More important will be to train and re-train employees from within the companies. The development and improvement of internal career paths will become more important in the future. This is crucial not only for management but also for engineering professions (see chapter 6.4). Up-skilling of sales professionals, which are expected to decrease, is one particular option. Regular training of managers in future skills (see Chapter 20.2) will be also needed - especially to keep up with the faster technological development.

Table 21.1 Strategic options managers*

1. What is the maximum volume effect?	Maintain (but high turnover levels)
2. What is the maximum change in skills?	21
3. Do SME's play a large role?	No, but marginal role of innovative SMEs
4. Is the sector national/EU/global?	Activities EU, some companies global
5. Is the workforce old?	Yes ²¹
6. Is the workforce low educated?	No

Option	Is this option viable?	Actors ^{1,2}
A. Recruiting workers from other sectors	Yes, especially for economies in transition	C, U**, I
B. Recruiting workers from other Member States	Yes, especially for economies in transition	C
C. Recruiting workers from Non-Member States	Yes, especially for economies in transition – mostly from USA	C, G
D. Recruiting unemployed with or without re-training	No	-
E. Recruiting young people from the education system	No, limited in scope (traineeships)	C, E
F. Training and re-training employed workers	Yes, with respective training and development of internal career paths	C, E, U
G. Changing work organisation	Yes mainly through team work but also lean management=restructuring	C
H. Outsourcing and offshoring	Yes, for executive and strategic management	C
I. Changing vocational education	No	-
J. Designing and offering new courses	Yes	C, E, U
K. Providing information about emerging skills	Yes	C, E, S, U, G
L. Improve the image of the sector	No, not necessary for this occupational function	-
M. Stronger co-operation between stakeholders	No, not necessary for this occupational function	-

Notes: 1. C (company), S (sector organisations and chambers of commerce), U (trade unions), E (education & training), G (governments), I (intermediary organisation, public or private, including headhunters). ** In Scandinavia, Denmark. * Updated and validated on the basis of discussions during the final workshop, February 2009.

To successfully address natural fluctuations and replacement demand, recruitment of young workers from the education system presents a more viable option than the ones

²¹ Difference between old incumbent companies and new companies, with an old, respectively a young age profile. Overall, 22% are older than 50 years and 35% are between 40 and 49 years (Manshanden et al., 2009). So an ageing workforce of managers is at stake, but it has to be taken into account, that age per se is not a barrier for employability or high productivity. This is in particular for management functions true. But old aged employees are to some extent excluded from further training in the sector.

mentioned before because it is less cost intensive and easier. The same holds true for training and re-training of employees. To some extent it will also be possible to outsource strategic and executive management functions to freelancers or to management consultants. If project based work forms are becoming more important this will be a likely and viable option, in particular for the scenarios where skill shortages can be expected.

Entrepreneurial and management skills as well as knowledge about the impact of regulations will be strongly needed, especially in the fast-paced scenarios. Designing new training and directing training offers towards these skill areas will be important and viable options.

Changing vocational education and improving the image of the sector is not necessary for this occupational function, because new skills just have to be integrated in existing curricula and the image of the sector and its management occupations is quite good. Positive co-operations between higher education and telecommunications companies already exist and most of them run their own programmes or universities of co-operative education for young potentials. Good co-operation agreements between companies and the education system do already exist. Therefore stronger co-operation is not needed for this occupational function. More important will be to keep up co-operations in the scenarios with fierce competition.

21.5 Engineers and IT professionals

Table 21.2 presents the strategic options to address emergent competences of engineers and IT professionals. Engineers and IT professionals are a very important job category in the telecommunications sector. In all scenarios for both developed economies and economies in transition an increase and in the high-technology scenarios even a very strong increase is expected. It is quite likely that skill gaps and major shortages will occur, also because of an ageing engineering workforce. Consequently, all strategic options pointed out in the table are viable and will probably have to be used in combination.

Strategic options vary for the different engineering functions such as design engineers, electronic engineers and production engineers (control, equipment maintenance). Recruiting engineers from other sectors is one option and especially recruiting engineers from the ICT manufacturing sector or lecturers from the education system could be seen as a good strategic choice, even if sector specific skills have to be trained. Recruiting engineers from other Member and from non-Member States is another option, if the language gap can be bridged. Particularly in Asia, engineering professionals are well educated and alumni numbers are comparatively high. Another supporting factor is the still high wage difference between Europe and Asian countries. Therefore, international recruitment of this occupational function can be still enlarged. National governments in Europe will have to rethink their policies regarding opening up of the labour market for this occupational function. Recruiting young people from the education system will be another very important option to address the skill shortages foreseen. But an important prerequisite for this strategy will have to be to improve the image of the occupation to attract more young people to the engineering profession. For this reason special programmes to attract also more females to the profession would be helpful.

Table 21.2 Strategic options engineers and IT professionals

1. What is the maximum volume effect?	Maintain
2. What is the maximum change in skills?	19
3. Do SME's play a large role?	No
4. Is the sector national/EU/global?	Activities national, some companies EU
5. Is the workforce old?	No ²²
6. Is the workforce low educated?	No

Option	Is this option viable?	Actors ^{1,2}
A. Recruiting workers from other sectors	Yes	C, E, U**, I
B. Recruiting workers from other Member States	Yes, for all functions	C,
C. Recruiting workers from Non-Member States	Yes, in respect to recruitments from Asia. The option is dependent on international wage levels	C, G
D. Recruiting unemployed with or without re-training	No	-
E. Recruiting young people from the education system	Yes for all functions	C, E
F. Training and re-training employed workers	Yes, for soft and hard skills in all functions	C, E, U
G. Changing work organisation	Yes, an option for large companies in order to match hard and soft skills	C
H. Outsourcing and offshoring	Yes, However, the option fits mainly for production and for product software development (insourcing).	C, G
I. Changing vocational education	Yes, for a better matching of the demand of the industry and the supply of training	C, S, U, E, G
J. Designing and offering new courses	Yes, hard and soft skills. Flexible forms of training are essential.	C, E, I
K. Providing information about emerging skills	Yes, mainly in respect to emerging soft skills and sector specific qualifications	C, E, I
L. Improve the image of the sector	Yes, in order to attract more personnel to technical occupations in the sector and to overcome skills shortages	C, S, U, E, G, I
M. Stronger co-operation between stakeholders	Yes, in order to design coherent measures for attracting more personnel to engineering and to diversify the workforce (women, youth). In addition, yes, to improve the matching of supply and emerging demands.	C, S, U, E, G, I

Notes: 1. C (company), S (sector organisations and chambers of commerce), U (trade unions), E (education & training), G (governments), I (intermediary organisation, public or private; headhunters). * Updated and validated on the basis of discussions during the final workshop, February 2009. ** In Scandinavia.

²² Aggregated post and telecoms data suggests that 23% are older than 50 years and 33% are between 40 and 49 years (Manshanden et al., 2009). However, according to the telecoms sector most of the old employees would have already left the sector. It has to be taken into account, that age per se is not a barrier for employability or high productivity. This is in particular for engineering functions true. But old aged employees are to some extent excluded from further training in the sector.

Recruiting unemployed is a viable strategic option with comparatively short-term impact. But it will be necessary to train sector specific skills. This training, as it has to be sector specific, should not only be in the responsibility of public employment services but also lie with companies.

For the engineering function the training and re-training of employed workers is a further important strategic option. To address the emerging skill gaps training of engineers and IT professionals in the respective skills (see section 20.3.) will be necessary. Another important option is to up-skill and retrain technicians (see also next chapter). For this reason, company internal career paths and respective training for promising candidates should be developed and applied.

Changing work organisation, explicitly more team and project based work is also a strategic choice especially to address the non-engineering skills which will become more important such as entrepreneurial skills in both competitive scenarios 'Tele-com' and 'Tech-com'. Due to fierce competition training of engineers and IT professionals in these skills will be necessary and job enlargement of engineering functions is less cost intensive than other strategic options.

The main driver of the sector is the rapid technological change. However, VET systems are hardly able to adjust as quickly. The rapid technological progress in production thus is not fully reflected by VET systems. Consequently, a modernisation of the VET system with modifications in respect to more flexible and modular training offers is essential. Tailor-made modular courses for engineers and IT professionals in the sector need to be adjusted and made accessible for specific target groups such as young, women, older workers, etc.

Next to training offers on technical hard skills, courses should also be provided on project management, team work and communication. According to the scenarios training and courses to enhance skills on self management and on problem solving should be given more interest. In addition, engineers and IT professionals should be stimulated in their entrepreneurship skills, especially in relation to understanding the customer and spotting trends. Team work and communication skills are of great importance and should therefore constitute an integral part of the trainings. For higher education systems this means a reconsideration of the classical divide between management and technical study paths. For the necessary reforms but also to attract more young to the occupation a solid co-operation of sector stakeholders (in this case: companies, social partners, government etc.) should be built up.

21.6 Technicians

In all scenarios the occupational function of technicians is expected to decrease and it is also the occupational function with the lowest number of emerging skills expected. Hence, there are only little strategic options viable and needed to address emerging skill gaps. Most important for this occupational function will be to up-skill personnel to engineering functions or to retrain them to sales professionals to keep up their employability. Due to the fast technological changes in 'Mono-tech' and 'Tech-com', business professionals will need profound technical understanding to develop technical solutions for customer needs. Therefore, both pathways stated above comprise possible options for this occupational function.

In addressing the emerging skill gaps, training of technicians will be necessary especially in social and self-management skills. To keep up with technological development, there is a need for regular and regularly updated training. Hence the design and offer of flexible courses especially in co-operation with suppliers of technical equipment will become more important in the future. Recruiting of young people from the education system is a viable option to address natural replacement demand. Information about emerging skills has to be provided together with a clear message about the expected substantial reduction in volume. This is also important in the regional context, as differences in speed and in the effect of this development can be expected.

Table 21.3 Strategic options technicians

1. What is the maximum volume effect?	Decrease
2. What is the maximum change in skills?	8
3. Do SME's play a large role?	No
4. Is the sector national/EU/global?	Activities national, some companies EU
5. Is the workforce old?	No
6. Is the workforce low educated?	Yes ²³

Option	Is this option viable?	Actors ^{1,2}
A. Recruiting workers from other sectors	No, not necessary	-
B. Recruiting workers from other Member States	No, not necessary	-
C. Recruiting workers from Non-Member States	No, not necessary	-
D. Recruiting unemployed with or without re-training	No, not necessary	-
E. Recruiting young people from the education system	Yes, to meet natural replacement demand	C
F. Training and re-training employed workers	Yes to keep up with technological changes, gain soft skills	C, E, U
G. Changing work organisation	No, not necessary	-
H. Outsourcing and offshoring	No, not necessary	-
I. Changing vocational education	No, not necessary	-
J. Designing and offering new courses	Yes in order to provide more flexible courses and train soft skills	C, E, S, U
K. Providing information about emerging skills	Yes, to avoid quantitative and qualitative mismatch	C, E, S, U
L. Improve the image of the sector	No, not necessary	-
M. Stronger co-operation between stakeholders	Yes, particularly co-operations with equipment providers but also to inform about emergent skills	C, E, S, U, G

Notes: 1. C (company), S (sector organisations and chambers of commerce), U (trade unions), E (education & training), G (governments), I (intermediary organisation, public or private).

²³ The majority of technicians (electronic equipment mechanics, craft workers, etc.) are between forty and 65 (Manshanden et al., 2009). So an ageing workforce of engineers is at stake, but it has to be taken into account, that age per se is not a barrier for employability or high productivity. This also for technicians true. But old aged employees are to some extent excluded from further training in the sector.

21.7 Sales & marketing professionals

Table 21.4 presents the viable options for sales & marketing. Nearly all options are more or less viable due to the fact that the occupational function is expected to stay stable in numbers in the scenarios with limited competition ('Mono-tel' and 'Mono-tech') and is expected to grow in the competitive scenarios. The number of emergent skills is highest in the 'Tech-com' scenario. Fast emerging social skills - compared to the other scenarios – are the main reason for this. Differences between economies in transition and developed economies are not expected.

Recruiting sales professionals from other sectors is a viable option, both in addressing skill shortages and skill gaps, due to a given set of generally applicable business skills in the occupational function. This is especially true if knowledge about technological trends in the sector is available (for instance from the ICT manufacturing sector) and can be trained. In the high technology scenario it is most important for this occupational function to have knowledge about technological development in order to help develop and sell new products. Recruiting experts from other Member States and non Member States is a viable strategic option as well, if the language gap can bridge and know-how about the national market developments and customer demands is available. Recruiting unemployed sales professionals could be an option though it will be of limited scope due to the low numbers of unemployed.

Recruiting young people from the education system will be an important option to address skill shortages and gaps, and applies to all scenarios. The same holds true for training and re-training employees. To train technological knowledge flexible and fast training methods are necessary to keep up with technological developments in the scenarios with fierce competition. Entrepreneurial skills training is becoming more important. Training methods have to be adapted to meet sector developments, which also means an increase in the efficiency in training by requiring less time absent from the working place. Outsourcing and offshoring of sales functions is a viable option to address skill gaps as well. In some cases, e.g. in German telecoms, external job centres already lease skilled personnel for project based sales and management functions.

Changing vocational training (i.e. towards higher education) does not seem necessary, but elements of practicing should be assured in the curricula, because experience is the key to some sector-specific skills like sales conversation. Placement programmes and universities of co-operative education are an adequate action taken by the industry to overcome lack of practical knowledge of students. Crucial is to provide information about the emergent skills to improve the matching of labour market demand and supply in qualitative and quantitative terms. For this reason a solid co-operation between sector representatives should be established. This is also necessary to keep training forms up-to-date with technological developments.

Table 21.4 Strategic options sales & marketing professionals

1. What is the maximum volume effect?	Increase
2. What is the maximum change in skills?	15
3. Do SME's play a large role?	No
4. Is the sector national/EU/global?	Activities national, some companies EU
5. Is the workforce old?	No
6. Is the workforce low educated?	No

Option	Is this option viable?	Actors ^{1,2}
A. Recruiting workers from other sectors	Yes, but sector specific knowledge and training is needed.	C, E
B. Recruiting workers from other Member States	Yes, a viable option for strategic and operative marketing.	C
C. Recruiting workers from Non-Member States	Yes, a viable option for strategic and operative marketing.	C, G
D. Recruiting unemployed with or without re-training	Yes, but limited in scope	C, E, I
E. Recruiting young people from the education system	Yes	C, E
F. Training and re-training employed workers	Yes, especially e-business skills need to be increased.	C, E, U
G. Changing work organisation	Yes, in order to strengthen soft and hard skills	C
H. Outsourcing and offshoring	Yes	C
I. Changing vocational education	No	-
J. Designing and offering new courses	Yes, flexible forms of training are becoming more essential.	C, E, I, U
K. Providing information about emerging skills	Yes	C, E, S, U, I
L. Improve the image of the sector	No, not necessary.	-
M. Stronger co-operation between stakeholders	Yes, to order to improve the matching of skills supply and emerging demands.	C, S, U, E, G, I

Notes: 1. C (company), S (sector organisations and chambers of commerce), U (trade unions), E (education & training), G (governments), I (intermediary organisation, public or private).

21.8 Sales personnel

Sales personnel is expected to decrease in numbers in the 'Mono-tech' scenario in economies in transition as well as in developed economies. In all other scenarios this occupational function is expected to stay stable. Due to this reason not all strategic options are necessary to choose as it is laid out in table 21.5.

Recruiting workers from other sectors, other Member States or non-Member States, respectively, will not be prime choices. In the latter two cases it would be needed to bridge the language gap, and language skills are a key feature of this occupation. Recruiting unemployed sales personnel is in general an option but not very realistic to chose, if there is the possibility to recruit young people from the education system, who have up-to-date qualifications. Training of employees will be the most important option

to address the identified emerging skills. Crucial will be to adapt sales personnel to the fast changing technology and new products and their different applications. For this reason flexible training methods and instruments should be developed allowing also for self-directed learning, e.g. e-learning, to be used more extensively. Internet and intranets are important instruments in this direction - they are flexible in use and cost efficient. In the competitive scenarios this will become very important.

Table 21.5 Strategic options sales personnel

1. What is the maximum volume effect?	Maintain
2. What is the maximum change in skills?	12
3. Do SME's play a large role?	No
4. Is the sector national/EU/global?	Activities national, some companies EU
5. Is the workforce old?	No
6. Is the workforce low educated?	No

Option	Is this option viable?	Actors ^{1,2}
A. Recruiting workers from other sectors	No, not necessary	-
B. Recruiting workers from other Member States	No, not necessary and due to the language gap not very viable	-
C. Recruiting workers from Non-Member States	No, not necessary and due to the language gap not very viable	-
D. Recruiting unemployed with or without re-training	No, not necessary	-
E. Recruiting young people from the education system	Yes, to meet the natural replacement demand	C
F. Training and re-training employed workers	Yes, especially to adapt skills to technological change	C, E, U
G. Changing work organisation	Yes, team work	C
H. Outsourcing and offshoring	Yes a viable option	-
I. Changing vocational education	No, not necessary	-
J. Designing and offering new courses	Yes, more flexible trainings to adapt skills to rapid technological change	C, E, S, U
K. Providing information about emerging skills	Yes, to avoid mismatch	C, S, U, E
L. Improve the image of the sector	No, not necessary	-
M. Stronger co-operation between stakeholders	Yes, in order to design flexible trainings	C, S, U, E, I

Notes: 1. C (company), S (sector organisations and chambers of commerce), U (trade unions), E (education & training), G (governments), I (intermediary organisation, public or private).

Changing work organisation and explicitly increasing team work is another important option to address the emergent skill needs. This is especially a viable solution when it comes to addressing the needs of global communication solutions for business customers. It helps to combine different skills, in this case technological knowledge and sales skills.

Due to an expected increase in product differentiation this will become even more important in the high technology scenarios.

Outsourcing is another possibility to address the emergent skill needs. In some countries, several functions within the telecommunications sector are already outsourced to job centres or to self-employed. While the main reason for outsourcing is to increase cost efficiency, in future it will be conceivable to use outsourcing as a way to incorporate knowledge. A radical change of vocational training for this occupation seems not necessary but incremental adaptation to the emerging need of self-management in particular in the 'Tech-com' scenario will constitute an interesting option. Designing and offering new courses is therefore a more important and a more viable option. Especially, more flexible training courses have to be implemented in the future.

An improvement of the image of the sector is not necessary for this occupational function, but information about emergent skills and the expected volume of employment are necessary to avoid mismatch of labour market supply and demand. For this reason a stronger co-operation between stakeholders will be supportive though not as crucial as for engineering professionals.

21.9 Other professionals

Table 21.6 presents the viable strategic options for other professionals. Except of the low competitive and low technology 'Mono-tel' scenario the occupational function is expected to increase in economies in transition. In developed economies the occupational function is only expected to increase in the scenario 'Tele-com' while in the other scenarios the occupational function is expected to stay stable in numbers. Therefore, only slightly skill shortages are expected to occur and it will be more important to address skill gaps.

Other professionals is a very heterogeneous group including experts from financial, human resource and legal occupations. What they have in common is a set of sector independent skills; hence, recruiting workers from other sectors is a viable and an important option especially in the scenario with increasing demand. For some occupations such as organisation specialist, additional training of sector specific knowledge will be necessary. In general, recruiting workers from other Member States as well as from non-Member States are viable options for economies in transition and developed economies in the 'Tech-com' scenario, provided that the language gap can be bridged and knowledge about national markets and regulations is available or can be trained.

Recruiting unemployed is another viable option especially in scenarios and countries where an increase of this function is expected. Training will be needed and a stronger commitment of public employment service in sharing training costs would be helpful. Recruiting young people from the education system is a viable option in all cases either to meet the natural replacement or the increasing demand of this function. Further vocational training for employees is an important option to adjust their knowledge to changing regulations, new technologies and the emerging self-management and management skill needs.

Table 21.6 Strategic options other professionals

1. What is the maximum volume effect?	Increase
2. What is the maximum change in skills?	11
3. Do SME's play a large role?	No
4. Is the sector national/EU/global?	Activities national, some companies EU
5. Is the workforce old?	No
6. Is the workforce low educated?	No

Option	Is this option viable?	Actors ^{1,2}
A. Recruiting workers from other sectors	Yes, due to common set of general skills.	C
B. Recruiting workers from other Member States	Yes, especially for economies in transition.	C, E
C. Recruiting workers from Non-Member States	Yes, especially for economies in transition.	C, E,G
D. Recruiting unemployed with or without re-training	Yes, with respective training	C, E, I, U
E. Recruiting young people from the education system	Yes, in all cases to meet the natural replacement demand	C
F. Training and re-training employed workers	Yes, especially in technical and regulative knowledge	C, E
G. Changing work organisation	Yes, especially team work to combine different skills.	C
H. Outsourcing and offshoring	Yes	
I. Changing vocational education	No not necessary	-
J. Designing and offering new courses	Yes, flexible training forms and emergent skills	C, E, S, U
K. Providing information about emerging skills	Yes, especially related to the sector	C, E, S, U, I
L. Improve the image of the sector	No, not necessary	-
M. Stronger co-operation between stakeholders	Yes, in order to provide information about emerging skills and to develop adequate sector training	C, E, S, I, U

Notes: 1. C (company), S (sector organisations and chambers of commerce), U (trade unions), E (education & training), G (governments), I (intermediary organisation, public or private).

Due to the strongly expected interdisciplinary mixture of general occupational skills and sector specific knowledge, changing work organisation such as team work – to combine these different skills – as well as job enlargement and enrichment, are options to meet the skill gaps and shortages. Outsourcing and even offshoring of some functions will be an other option as it has already happened to some extent in the sector and therefore, the need to obtain certain emerging skills on the market will be a continuous necessity. Changing vocational training (i.e. Higher Education) does not seem necessary for this occupation functions. But industry should provide sufficient numbers of internships,

especially in economies in transition. This will be important for sector unspecified occupations such as human resource specialists, so this group can gain sector specific knowledge. Even more important will be the design of flexible training methods to efficiently adapt experts' skills to new technologies.

Providing information about the emergent skills regarding the group of other professionals in the sector and to inform about the application of its general skills and knowledge at an early stage is a viable and important option. To develop adequate training it would be helpful to develop a stronger co-operation of companies and universities but also with external training providers and researchers to develop adequate training. An improvement of the image of the sector is not necessary for this occupational function.

21.10 Administrative personnel

Table 21.7 presents the strategic options to address emergent competences related to administrative personnel. In most scenarios and countries it is expected that the workforce will stay stable in volume. Only in the high competition and high technology scenario 'Tech-com' and in economies in transition in the 'Tele-com' scenario the workforce is expected to decrease. For this reason and the relative low numbers of emergent skills not all strategic options are necessary.

Basic skills required for this function, such as administrative skills as well as basic Internet, spreadsheet and word processing competences will of course be available in other sectors, other Member and Non-Member States. But if one leaves aside pure cost arguments there will be other and easier strategic options to follow. It is much more plausible to recruit unemployed for lower skilled administrative functions or – even more plausible – to recruit young freshly trained candidates from the education system. Due to the expected stability in most scenarios and the decrease in 'Tech-com' the most viable and plausible option will be to train the employees. The main emergent competences in the 'Tech-com' scenario are related to e-skills, technical knowledge, self-management skills and understanding customers – resulting from either the technological progress or the competitive pressure. To meet this more flexible and efficient trainings will be needed and designing new courses is a viable option to meet the emergent skill demand. A stronger use of e-learning methods could assist in this.

Changing work organisation is also a viable option. In all scenarios except the 'Mono-tel' scenario team work is expected to become increasingly important for administrative staff due to the growing differentiation of services and of tasks, respectively. Job enlargement alone will not be sufficient. Outsourcing of administrative functions is mainly undertaken to reduce costs but not to gain competences which are not available in-house. According to the 'Tech-Com' scenario competences of companies might be lost due to outsourcing and know-how for some administrative functions will thus increasingly be available only outside the own company. As a result outsourcing of administrative functions, such as customer services (e.g. call centres), accounting, and customer database management, is a viable option.

Providing information about emergent competences and the volume of employment in the occupational function is very important to avoid a mismatch of labour market demand and supply in quantity and quality. For these reasons as well as for the purpose of designing new and flexible trainings a solid co-operation between companies, education system and social partner organisations and to some extent also public employment

services is an option. Changing vocational education and improvement of the image of the sector for this occupational function is not necessary.

Table 21.7 Strategic options administrative personnel

1. What is the maximum volume effect?	Decrease
2. What is the maximum change in skills?	13
3. Do SME's play a large role?	No
4. Is the sector national/EU/global?	Activities national, some companies EU
5. Is the workforce old?	Yes, especially incumbents.
6. Is the workforce low educated?	No, rather medium.

Option	Is this option viable?	Actors ^{1,2}
A. Recruiting workers from other sectors	No, not necessary	-
B. Recruiting workers from other Member States	No, not necessary	-
C. Recruiting workers from Non-Member States	No, not necessary	-
D. Recruiting unemployed with or without re-training	Yes.	C, E, I
E. Recruiting young people from the education system	Yes to meet the natural replacement demand	
F. Training and re-training employed workers	Yes to adapt to emergent skills and prepare for more promising occupations	C, E, U, G
G. Changing work organisation	Yes, mainly team work	
H. Outsourcing and offshoring	Yes, back-office (bookkeeping, accounting, procurement)	C
I. Changing vocational education	Yes	C, G, S
J. Designing and offering new courses	Yes, to develop and apply flexible training.	C, E
K. Providing information about emerging skills	Yes, to avoid mismatch on the labour market	C, E, S, U
L. Improve the image of the sector	Yes. Massive lay-offs have negatively impacted on image.	C, G
M. Stronger co-operation between stakeholders	Yes, in order to develop flexible trainings and provide information about emerging skills	C, E, S, U, I

Notes: 1. C (company), S (sector organisations and chambers of commerce), U (trade unions), E (education & training), G (governments), I (intermediary organisation, public or private). * Updated and validated on the basis of discussions during the final workshop, February 2009.

21.11 Scenario implications, future skills and knowledge needs and possible solutions: summary and main conclusions

Implications of the scenarios in terms of expected volume changes in employment (jobs), future skills and knowledge needs as well as ways to address and solve these needs (strategic choices) have all been analysed so far at the individual job function level. This section serves to summarise the main implications and solutions for each of the job functions presented in chapters 19, 20 and 21. It serves as a bridge to the next chapter where we shift from a micro perspective (job functions) to a meso (sector and policy) perspective.

Table 21.8 Summary of job volumes, skills changes, strategic choices and main players in anticipatory action by scenario

		Mono-tech	Tech-com	Mono-tel	Tele-com
Managers	1. Employment volume change	M / I	M / I	M / M	M / M
	2. Skills changes counted	13	21	3	8
	3. Emerging skills needs	Social, Management, Problem solving, Self-Management	Entrepreneurship, Change management, self-management, problem solving	Social skills, problem solving (interdisciplinary)	Social, Self-management, Entrepreneurship
	4. Most important solutions	In-house development, recruitment	In-house development, recruitment	In-house development, recruitment	In-house development, recruitment
	5. Most important actors	C	C	C	C
Engineers & IT professionals	1. Employment volume change	II / II	II / II	I / I	I / I
	2. Skills changes counted	16	19	2	13
	3. Emerging skills needs	Social skills, Knowledge (technical), Management	Social skills, Knowledge (technical), Management	Knowledge (technical)	Social skills, Knowledge (technical), Entrepreneurship
	4. Most important solutions	Recruiting, Training, Information, Image	Recruiting, Training, Information, Image	Recruiting, Training, Information, Image	Recruiting, Training, Information, Image
	5. Most important actors	C, E	C, E	C, E	C, E
Technicians	1. Employment volume change	D / D	D / D	D / D	D / D
	2. Skills changes counted	6	8	1	8
	3. Emerging skills needs	Social, Self-management, Technical Knowl, Multi-skills	Self-management, Social Technical Knowl, Multi-skilling	Knowledge	Self-management, Social, Technical Knowl, Multi-skilling
	4. Most important solutions	(Re)training, Information	(Re)training, Information	(Re)training, Information	(Re)training, Information
	5. Most important actors	C, E, S, U	C, E, S, U	C, E, S, U	C, E, S, U

		Mono-tech	Tech-com	Mono-tel	Tele-com
Sales & marketing professionals	1. Employment volume change	M / M	I / I	M / M	I / I
	2. Skills changes counted	5	16	2	12
	3. Emerging skills needs	Social, technical knowledge, entrepreneurship, management	Entrepreneurship, Social, Knowledge, Self-management, Problem-solving	Problem-solving, entrepreneurship	Entrepreneurship, Problem-solving, Self-management, knowledge
	4. Most important solutions	Re-training	Re-training, Recruiting	Re-training	Re-training,
	5. Most important actors	C, E	C, E	C, E	C, E
Sales personnel	1. Employment volume change	D / D	M / M	M / M	M / M
	2. Skills changes counted	5	12	0	7
	3. Emerging skills needs	Knowledge, Problem-solving	Social, Knowledge, Problem-solving, self-management, entrepreneurship	-	Social skills, Self-management, Entrepreneurship, Problem-solving,
	4. Most important solutions	(Re)training, Information	(Re)training, Information	(Re)training, Information	(Re)training, Information
	5. Most important actors	C, E	C, E	C, E	C, E
Other professionals	1. Employment volume change	M / I	M / I	M / M	I / I
	2. Skills changes counted	7	11	3	10
	3. Emerging skills needs	Social skills, Knowledge, Problem-solving, Management	Social skills, Knowledge, Problem-solving, Management, Entrepreneurship	Social, Knowledge	Social skills, Knowledge, Problem-solving, Self-management, Management, Entrepreneurship
	4. Most important solutions	Recruiting, Training	Recruiting, Training	(Re)training	Recruiting, Training
	5. Most important actors	C, E, U	C, E, U	C, E, U	C, E, U

		Mono-tech	Tech-com	Mono-tel	Tele-com
Administrative personnel	1. Employment volume change	M / M	D / D	M / M	M / D
	2. Skills changes counted	10	13	4	11
	3. Emerging skills needs	Knowledge (e-skills) , Social skills, Self-management, Problem Solving, Change Management	Knowledge (e-skills), Social skills Self-management, Problem Solving, Change Management	Self-management, Change Management	Knowledge, Social skills, Self-management, Change Management
	4. Most important solutions	(Re)training, Information	(Re)training, Information	(Re)training, Information	(Re)training, Information
	5. Most important actors	C, E	C, E	C, E	C, E

C=Companies; S=Sectoral organisations, U=trade Unions; E=Education and training institutes; G=Government (EU, Member State, regional, local)

22 Conclusions and recommendations for education and training

22.1 Introduction

This chapter presents the main conclusions and recommendations for education and training; chapter 23 presents the main other conclusions and recommendations. Whereas the earlier chapters very much take a micro perspective by focusing on job functions in terms of expected volume changes, skills and knowledge needs and ways to address and solve these needs (strategic choices), chapter 22 takes a *meso* or *sector* perspective. It addresses a number of issues, part of which coming already to the fore in earlier chapters, and part being ‘new’ issues although much related to those already raised. The conclusions and recommendations are mostly based on the results of the preceding chapters. They were discussed during the final workshop with social partners, the industry and other experts.

The recommendations contained in this chapter should not be seen as fully exhaustive. They rather form the basis for further discussion and elaboration at various decision-making levels, ranging from the European Union and the Member State to the regional and local level. Industry itself – firms – have an important role to play, as do education and training institutes, social partners and the government (EU, national, regional and local). In most cases action should be taken jointly, by involving various actors, sometimes even at different levels. Collaboration and co-operation as buzzwords in today’s economy are easily coined. Making collaboration work in practice is, however, a challenge which requires mutual understanding, compromise and perseverance.

One of the key findings and an issue that should be urgently addressed is that challenges for education and training in the sector cannot be solved by education and training institutions on their own. A variable set of stakeholders is requested to work together in order to provide joint answers and solutions to the range of challenges identified below.

This demand is a result of the main driving forces of the sector development the increasing competition and the emergence of new technologies which will even become more pressing in the high competition and technology scenario ‘Tech-com’.

There are five main challenges affecting the education and training system:

- Ongoing technological change and competition leads to profound changes in business strategies and occupational functions in quality and quantity (and training systems have to react to these changes) (see Part 1 and 4 of this report);
- Ongoing technological change leads to new and ever shorter product cycles and tough national and European competition makes more flexible, fast adapting and efficient training forms necessary as well as specialised training;
- A predominant male and ageing workforce, particularly in technical and engineering occupations and expected high demand for engineering professionals;
- An ongoing blurring of technical, business management knowledge and soft skill in several occupations where education and training system still has to react to (ILO, 2002: 96 ff.; e-skills, 2008);
- To keep up a comparatively good IVET and CVET sector system under the above mentioned circumstance and to adapt this for the emergent skill needs.

22.2 Conclusions and recommendations for education and training

1) Adapt and modernise vocational education and training (VET) and general education systems

According to the fast paced scenarios expected technological change will lead to profound changes in both business strategies and occupational functions. The half-life period of skills and knowledge is getting shorter and shorter due to changes in business models and customer demand. However, the precise extent of the impact of these changes is hard to predict. The education and training system will have to cope and adapt to this uncertainty by a transition to flexible training (e.g. modularisation) and by offering new content. To keep up pace with sector developments they need to provide the latest technology, the latest knowledge about emerging business possibilities and training for the skills of tomorrow. This challenge cannot be met by one actor alone. This leads to several implications for education and training systems on the level of both the nature and the content of the trainings provided. In the telecommunications sector most employees have medium qualification level. A majority of occupational functions are still trained either at schools, in apprenticeships or on the job. Therefore, the initial vocational training system has not lost its importance for most of the job functions, be it technicians, administrators or sales personnel. Before outlining the possibilities to improve Initial Vocational Training (IVET), different systems will be described.

Box 6. Vocational education and training– rich variety between Member States

A number of different systems in Vocational Education and Training (VET) as well as Initial and Continuing Vocational Education and Training (IVET and CVET) can be observed throughout the European Union. Various characteristics of these systems have to be taken into consideration when discussing possible specific implications for education and training. Existing VET-systems can be grouped into three main categories ('idealtypes'), (i) liberal, (ii) state-controlled and (iii) corporatist VET-systems, each having a different underlying rationale and distinguishing characteristics. Key in this distinction are those who decide about the structure and content of VET: business itself, the state or the state together with social partners (see Table below). The three VET-systems of Germany, France and the United Kingdom are of special importance as they can be taken as representative for each of the three 'idealtypes' categorisations. They are evidence of the rich variations in existing VET systems and their implementation in Europe. The enterprise-based training system of Germany (the 'Dual System') is implemented by the social partners and the state. Next to this prevailing system other forms of VET exist. In France, a school-based training system is established and implemented by the state. Even though the full-time school-based training system competes to some extent with an upcoming apprenticeship training system, it is still the dominant form of vocational training in France. The system implemented in the UK, the national vocational qualification, is regulated and driven by market forces in several important segments. Although national vocational qualifications (NVQ) and general national vocational qualifications (GNVQ) are regulated at national level, the implementation of training is not yet regulated at national level. Commercial certification systems are still competing with national ones. Work-based, as well as full-time school-based training can be found. Special training schemes for unemployed, such as school-based schemes for unemployed youths or work social enterprises for long-term unemployed, are present in several European Member States. Besides these 'idealtypes' several mixed forms in Europe exist. In Spain, for example, one finds more informal forms of VET and in Central and East European countries the trend can be detected, that VET moves from a state centred model to a stronger corporatist model, while also business driven approaches exist in some sectors.

Table to Box 6. Three ‘ideal-type’ VET-models (elaborated from Clematide, 2005)			
	A. Liberal	B. State-controlled	C. Corporatist
Decision maker	Business (and individuals)	State	State and social partner organisations
Rationale	Liberalistic competitive	Centralistic state-centred	Corporative – social consensus
Programmes	Business and individual	Education and citizen	Occupation
Content	Needs of business and individual, utility oriented, short term and specific	Politically determined, general knowledge, course-oriented, academic	Determined by social partners, occupation centred, traditions
Labour markets VET relates to	Internal (business) labour markets	Occupational and internal labour markets	Occupational labour markets
Strengths	Flexible, cheap for the state, close to the needs of production	Strong linkage to the education system, no lack of training places	Broad vocational educations with status equal to general education
Weaknesses	Under-investment in training and education	Weak linkage to the labour market	Inertia in the institutions
Representatives	United Kingdom, Ireland	France	Germany, Austria, Denmark
Trends	Stronger state involvement in certification and quality	“Dual system” emerging and stronger orientation on business needs	Internal labour markets Marketing of VET

2) Modernise VET by enhancing flexibility and addressing emerging training needs by modularisation

Several implications arise due to the strengths and weaknesses of the different VET systems in place, sector specific challenges and employer needs. Firstly, an enhanced flexibility in education and training of technical occupations is needed. Flexibility refers to the capability of the VET System to adapt effectively to new training needs in terms of quality and quantity. A flexible VET-System is particularly required in circumstances in which profound changes take place and job functions and occupational profiles alter quickly; which definitely is the case in this sector. In order to achieve more flexibility and to respond in-time to altering training contents and enhanced quantity of training needs a modularisation of education and training is recommended. Even if problems might occur because of the modularisation of training in some IVET-Systems, more modular systems will facilitate the building up of competences and ease the interaction between IVET and CVET Systems. Flexibility is also required for different forms of education and training. Enhanced flexibility and a modularisation of IVET might be a big challenge for some state controlled and corporatist systems. Liberal systems will probably find their ways easier. However, the liberal market driven systems with their strong focus on technical on-the-job skills have a tendency to lag behind in general education, which in turn will be an obstacle to the up-skilling of the individual and to a higher permeability of the education system in general. Besides, general and generic skills are not obsolete but become more important as a basis for the ability to react to new training demands emerging from new technologies and changing production processes.

More important and sometimes presenting a deadlock is the consequence following from different VET systems for individual life long learning. Corporatist and school based VET Systems guarantee a more universal initial vocational training and in the case of combined apprenticeships also a practical training on the job (dual system). However, continuing training is mostly disregarded by the systems. Qualification levels once acquired lead to reposing on the achieved and Life Long learning is not given a key focus. VET structures are not capable of adapting quickly to new skill needs. Thus, better and solid co-operation between VET suppliers and companies is required to better match skills needed by industry with supply throughout the working life cycle.

In the fast paced high tech and competitive scenarios a broader set of skill needs for all occupational functions as well as the ability of individual workers to choose between the right ones are expected. But as competition leads to greater cost awareness of all market participants, this will affect also initial and continuing vocational training and IVET and VET will have to meet this demand. Two major trends result out of the developments of these scenarios: First, a general demand on employees to have excellent skills from different disciplines, in particular technical knowledge, business knowledge and social skills nearly in equal proportions, and, second, targeted and efficient training. Therefore stronger modularisation and flexibility in IVET and also in CVET together with the development and introduction of web-based learning will be needed.

In some Member States it could be useful and sensitive to think about a new division between some types of training courses and apprenticeship models to adapt to the demand for multi-skills in the sector to integrate more social and business skills to technical trainings and more technical knowledge to administrative or business functions. This implication can be derived from chapter five, several older studies (ILO, 2002: 104; Latniak, 2000) and more recent studies from the United Kingdom (e-skills, 2008) as well as from the modular build Diplomas in the United Kingdom which can also be seen as a promising attempt to combine different skills of school education and initial vocational training at an early stage. On the other hand training should balance the need for general skills (e.g. to rapidly adapt to new (technological) developments) and expert knowledge in an environment which ever reduces the half-life of knowledge (Praml, 2004).

3) Increase flexibility by promoting e-learning and blended learning and other learning forms

A stronger use of e-learning - also in apprenticeships - could help to reduce training costs and to give employees the possibility to learn whenever they can and to reduce absence from work. In nearly almost all European countries telecommunications companies have developed web-based training modules, training cd-roms combined with coaching and off-the job training for nearly almost all occupational functions (ILO, 2002: 107). A future challenge will be to keep modules up-to-date and to strengthen e-learning and blended learning also for 'newer' telecommunications companies and regional telecommunications providers. Another important aspect is to improve the training content of e-learning, to precisely define for which skill needs and occupational functions this constitutes the best training method and how employee's participation in e-learning can be improved according to the results of e-learning of Deutsche Telekom (Ihm, 2004). The company reacted to this problem and developed a learning management system which is now merchandised to other telecommunications enterprises but also to companies in other sectors.²⁴

²⁴ <http://www.training.telekom.de/Internet/telekom-training/index.jsp>

As already mentioned, ICT based training media are already widely used by the sector's big players throughout Europe to reduce the cost of vocational training and to strengthen self directed and flexible learning. One best practice example is the e-learning programme of Deutsche Telekom (learning management system). One of the challenges ahead is to use and apply the good practices to 'new' market entrants and smaller regional service providers. To meet this challenge not only companies but also sector social partner organisations should work together to develop and promote such instruments. Flexibility in learning, life long-learning and constant knowledge and skills updates will become a major issue, especially in the high technology scenario, because of the assumed rapid changes in technology and the faster product cycles.

4) Improve information provision on skill needs and job requirements: essential for training and education as well as for finding employment

Information gaps between present and future education and training needs and their supply are still evident. The sector is still in a phase of restructuring and different pathways are possible. Consequently, a mismatch between actual VET supply and demand in quality as well as in quantity is observed for some occupational functions. Information systems on the sectoral- as well as on regional, national and European level assist in minimising information asymmetries in order to overcome skill gaps resulting from information deficits. Close collaboration between all relevant stakeholders, companies, education and training organisations, social partners, research institutions and public authorities, will help to reduce information deficits on current and emergent skills needs. In the United Kingdom the sector skill council 'e-skills' is such a promising co-operation. It commissions studies and surveys and amongst others tries to assess ICT skills and to redirect training towards promising pathways. Also private initiatives are conceivable; France Telecom is an example for this²⁵.

5) Provide better career guidance for those in search of a job

In most countries career guidance for pupils is undertaken by a number of different actors such as schools, training organisations, public employment services and related career information centres, trade unions, universities, sector organisations and companies. To enhance career guidance better and solid regional co-ordination between these actors could help to counsel and direct pupils and students into professions suitable for them.

In the United Kingdom the sector skill council 'e-skills', started several initiatives for different age groups to make the sector more visible, to inform about career perspectives and to bring ICT closer to the young by playful workshops and competitions.²⁶ Additionally, 'e-skills' also provides support to teachers. Further offers are short term placements for pupils provided by companies – e.g. German telecoms is providing placements from one to three weeks for pupils.

Career guidance can be supported by user friendly online-tools, also enabling for self orientation. A good example is the German website <http://www.think-ing.de/> (October 2008) which provides information about educational and training pathways, and the relevant occupations they lead to. In addition, other information about the sector is published online. The website is targeted at higher educated pupils and students rather than primary school attendants and published by the federation of German employers' association in the metal and electrical engineering industry.

²⁵ http://www.francetelecom.com/en_EN/responsibility/stakeholders/employees/training.html

²⁶ <http://www.e-skills.com/e-skills-UK-in-schools/2195>

Career guidance can of course also be used to support the placement of those mature workers which are threatened of or becoming unemployed. In some of the sector scenarios it is expected that technicians and administrative staff will be reduced in the future, either by natural fluctuation or by layoffs. Career guidance assists in finding new job possibilities within or outside the sector. In combining career guidance with skills assessments (e.g. potential analysis) as well as with programmes for the recognition of softer skills the scope for placements can be expanded. As in the postal sector, also in telecommunications the former monopolists have already a broad experience in assessing workforce potentials and in re-training and up-skilling of employees whose occupational functions are threatened by unemployment. It would be important and is conceivable to extend these programmes and trainings to employees of regional operators and smaller companies in the sector; and social partner organisations and public authorities should contribute to this.

6) Promote European-wide recognition and transferability of skills

The formal recognition of in-house trained skills and knowledge is still underdeveloped in the sector. While continuing vocational training is quite common at monopolists, the formal recognition of these trainings is not in all cases at hand. This relates mainly to ICT or e-skills (European Commission, 2007), but is also true for social, self-management and other skills. Transferability or ‘portability’ of skills from company to the other and between Member States is an important issue and should be further supported at EU-level level. A better recognition of these skills would help to enhance internal career development in companies which are becoming less hierarchic and could support (transnational) mobility of workers. An adaptation of the European Qualification Framework by the European telecommunications sector to their training would be helpful to support mobility within the sector. It could also open up the possibility to combine informal in-house training with formal continuing vocational qualification and thus facilitate up-skilling and career development. In addition exchange and training programmes offered to employees from ‘new’ companies of the telecommunications market could be a way to address the expected skill shortages.

7) Prepare for training, re-training and up-skilling

Technological developments in the telecoms sector, along with further market liberalisation, deregulation and privatisation – all stimulating further competition - have caused and will continue to cause dramatic change in the sector. This change will come with significant job cuts, especially at the low- and medium-skills job levels. At the same time, the demand for traditional services will continue to drop and the evolution of differences in lifestyle will ask for new and more flexible, service-oriented services. Virtual communication and digitalisation will continue as dominant trends requiring a different skills set as well. Take together, these changes call for a strong emphasis on training, re-training and up-skilling, both of workers having to leave the telecoms sector because of being redundant and of workers entering new business domains, requiring different skills and knowledge. Think for instance of skills such as database management and advertising needed in the communication business domain. These will become more relevant as telecoms and communications converge further.

Technicians and to some extent administrative staff and sales personnel are low to medium-skilled job functions expected to decrease in the future. These occupations possess important sector specific knowledge and low to medium skilled level which makes re-training and up-skilling to more secure occupations desirable. Re-training and up-skilling of promising employees therefore onto higher skilled and increasing occupational functions such as engineers or sales professionals will be of great importance in the coming years. Public authorities such as the public employment service or communities (in their responsibility for

regional development) should engage and support companies and individuals in their training efforts and prepare these groups for the future.

Companies can draw on employees who already have sector specific knowledge and employees thus keep or re-gain employability. The former monopolists such as France Telecom (EMCC, 2005) but also other European companies, gained quite good experience with continuing vocational training for re-training and up-skilling their employees in the last years. Major players within the sector undertake an annual assessment of employees, subsequently their qualification needs are defined and training plans developed. But this is not state of the art in smaller companies. For re-training, not only companies but also social partner organisations and public employment services should work together. It would be also helpful to improve the understanding of employees regarding the need for further training.

8) Provide special courses and support for older employees

In the past early retirement of older employees was used as a restructuring tool to reduce the workforce in the sector without firing people. Due to costs and political changes this is not pursued anymore. At the same time fewer job market entrants especially in engineering functions have led to labour shortages. Companies therefore have to increasingly harness the potential of older workers. Nonetheless, their participation in training is below average (Healy et al., 2007). As fast technological developments outdate specific skills within an ever more quickly, continuing vocational training for older workers is essential. Furthermore, special part time retirement schemes could be developed to keep older workers in the job market. Changes in the work organisation should cater for the needs of older workers. Already existing examples of good practices should be made available within the sector.

Some major companies have already recognized the need for continuing vocational training of older workers and for career planning as well as for specific forms of work organisation. In others, vocational training for some occupational functions is limited by age, which shows a general less positive attitude towards older employees (Tenckhoff, 2006: 358 ongoing). In this respect still enlightenment is needed, but there are some sector specific projects trying to improve the situation²⁷. But not only training of the employees will be important in the future but also to attract older workers to the sector, especially to avoid skill shortages. In particular this should be applied for the ageing occupations of the sector. Hence, age sensitive recruiting strategies should be expanded, as France Telecom did.²⁸

9) Stimulate multi-skilling

Multi-skilling – training employees to master different skills in order to fulfil a range of tasks – is becoming increasingly important. Multi-skilling applies across job functions, but is especially relevant in the medium skilled job segment. Generally, less purely technical skills and more service related skills are required (Deutsche Telekom, 2007: 3). IT skills will also become more important across job functions. While some major players (the former monopolists) are aware of this development and have already adapted their training accordingly, new telecommunications companies and regional providers still have to react to this development. For companies without a strong in-house training tradition this might be quite difficult, as external training providers in the sector might not fulfil all current technological business needs. This argument is also supported by the key finding of a British survey (e-skills 2008 b: 10). External education and training institutions have to react on these

²⁷ <http://www.it-50plus.org/index.html> December 2008; <http://www.wane.ca/whatsnew.htm> (e-skills is a partner of wane) December 2008

²⁸ <http://www.efa.org.uk/goodpractice/downloads/Innovation%20-%20Orange.pdf>

developments which will be only feasible within a strong partnership with companies from the telecommunications value chain.

Multi-skilling is also in demand because of the disappearance of clear traditional divide between telecommunications, media and communications recently. Multi-skilling is needed to further enable and foster the idea of being able as a company to offer total business communication solutions, involving database management, advertising and more traditional telecoms services.

10) Increase attention for interdisciplinary, social, problem-solving, self-management and service-related skills

Closely related to multi-skilling is the need for more interdisciplinary skills. With convergence and open innovation as major trends in telecoms, the premium put on interdisciplinary skills across the sector (i.e. telcos, but also Internet Service Providers and media/content delivery companies) is big. Interdisciplinary skills are especially valuable in open innovation. Already now companies experiment with interdisciplinary teams engaging in brainstorming sessions. For example, British Telecom talks about ‘agile working’ groups drawing on technical, development, marketing and sales skills in one room to increase flexibility in its development programmes (EIU, 2008: 8). By 2005, agile working accounted for less than 15% of the development prospects. By January 2008, this figure had risen to 70%. External expertise is tapped in a similar way in ‘hothouse’ discussions, involving teenagers at schools in the vicinity of its main UK labs. Thinking outside the box, with or without engaging customers in the innovation process, requires considerable social skills as well.

Service-related skills related to customer contact, soft skills and change management are skills that need attention in particular in the coming years, with the industry further changing, converging, integrating and possibly consolidating even more.

23 Main other conclusions and recommendations

23.1 Introduction

This report concludes with a number of ‘other’ (i.e. going beyond education and training) conclusions and recommendations based on the results and insights gained during the course of this study. They include the results of an intensive two day workshop with various stakeholders and the European Commission during which the draft final results, including preliminary recommendations, were discussed. The conclusions and recommendations apply to the sector at large (including individual firms, sector organisations, chambers of commerce, social partners), intermediary organisations, education and training institutes, as well as policy-makers (EU, Member States, regions).

The recommendations point into viable and useful directions rather than that they represent ready-made proposals for change. Reflection and debate, and finding creative answers to plausible futures in skills and jobs is, in the absence of a crystal ball, the way forward. The bandwidth between the expected developments in the most extreme scenarios is indicative for the degree of uncertainty by which the future should be approached. Solutions to future skills

needs should therefore be flexible, smart and encompassing enough to address the differences between the various scenario outcomes, not knowing what real future will eventually emerge.

23.2 Main other recommendations

1) Invest strongly in human capital – and put skills and knowledge more upfront

In order to meet future skills and knowledge needs, enhanced investment in human capital is required. This not only includes support to those working in telecoms and better equip them to withstand the dramatic changes facing the sector. It also relates to support and assist those to those who will have to leave the sector (i.e. redundancies) in finding suitable re-training trajectories and in finding appropriate jobs (reintegration). Cost sharing mechanisms between actors, such as public authorities, companies and individuals, need to be developed and lifelong learning throughout the lifecycle promoted: learning must be made more attractive to all, e.g. via tax incentives, a change of attitudes in order to integrate learning into all phases of life need to be initiated, and a lifecycle approach to work implemented. In addition, the training and education systems in the Member States need to be improved. There is a tendency in the sector to focus on the current economic crisis and to put technology first, while ignoring skills and training issues. Yet without the appropriate skills and knowledge base, change in an increasingly competitive environment will become even more difficult. Also for this reason, adequate attention is needed now to address the skills and knowledge needs and solutions for the future.

2) Improve the image and attractiveness of the sector to technical, engineering and IT professions and actively bring engineering and science to the classroom

In several Member States, for example in the United Kingdom, France and Germany, different initiatives have been set-up to improve the visibility of the sector and its image in schools. These initiatives especially focus on the image of technical, engineering and IT occupations among the young in the general, and girls in specific. These initiatives are arranged and supported either by sector organisations, by companies or by public authorities or by several of these actors together. France Telecom²⁹, for example, is supporting the ‘Sci tech girls’ an approach to attract more females to technical and engineering professions. In Austria and Germany ‘Girls day’ is an initiative where female pupils can inform themselves about technical occupations. It is supported by the major sector players of the countries and by the ministries of education.³⁰ Such approaches should be supportive to attract more women to the technical occupations of the sector and thus help to diversify the labour force.

Raising interest in science at an early age is vital. Initiatives of this kind should be elaborated, expanded, and disseminated across Europe. New ways of learning combining basic education and scientific knowledge are required to enable the workforce in ICT-related sectors to better understand and manage challenges brought forward by new technologies in the emergent knowledge-based economy of the global information society.

3) Improve diversity in the sector, especially in technical occupations, keep older workers in the sector, and improve the organisation of work

To improve diversity in the sector, most importantly by attracting more women to technical and managerial occupations, improvement of the current work organisation is needed. This will have to involve discussions on work – life balance, improved maternity leave and child

²⁹ http://www.francetelecom.com/en_EN/group/latest_news/women-forum/index.html

³⁰ <http://www.girls-day.de/>

care programmes and flexibility to make the combination of family life and a professional career more attractive. Various initiatives by telcos throughout Europe are taken to encourage and increase diversity on the work floor. Several initiatives have already been taken (see ETNO-UNI, 2007): France Telecoms operates so-called ‘diversity charters’, Orange Spain introduced flexible attendance for nursing mothers, BT’s Women’s Network (BTWN) already since 1986 aims to increase women’s sense of involvement within BT and encourage them to develop career potential by sharing experience, information and advice; BT also has Senior Diversity Champions – operational managers whose role it is to ensure diversity is aligned and reflected in strategic operational decisions. Magyar Telekom in Hungary promotes flexible working options and staying in touch with the business while on maternity leave for young mothers; and Eircom facilitates term-time working, i.e. working during school terms but not during the holidays.

Changes in the work organisation will also be necessary to keep *older workers* in employment. With the baby boom generation about to retire soon, it is especially crucial to keep and save their often tacit knowledge and experience to the company, and with a lot of competition on the labour market between telcos and other ICT companies, to avoid quantitative skill gaps. Corresponding part time retirement schemes and accompanying tax and/or pension measures should be developed by the responsible authorities and applied by the companies.

4) Expected: strong competition on the labour market for young talented professionals

Convergence is to be seen as one of the main and continuing trends in the sector. As a result telecom companies, Internet Service Providers and media/content delivery companies are and will increasingly compete for market shares in products (goods and services) markets, but will also be faced with strong competition in certain segments of the labour market. This holds especially for the technical, engineering and IT professions. Multi-skilled and interdisciplinary high-educated will be in strong demand. Attractive competitive pay and career perspectives for this internationally mobile group of workers can help to continue to guarantee the influx of this category of workers in view of competitors both in Europe and elsewhere.

5) Attract talent from outside the European Union

To meet the rising demand of engineering and IT professionals it could be necessary to take more action than today to attract high skilled talented workers from abroad. National governments should think about a more proactive strategy to attract these experts and the EU together with the sector social partner organisation could think about a corresponding European campaign.

6) Collaborate with all relevant stakeholders and intensify co-operation

A main general recommendation to better meet emergent skills and knowledge needs is to intensify co-operation between all relevant stakeholders in the sector, and especially between industry, social partners, education and training institutes and policy-makers. The challenge to overcome sectoral skill gaps and shortages will only be met sufficiently if stakeholders act in close concert, with sufficient interaction also between the regional, national and the European level. Multistakeholder partnerships and collaboration are needed not only on various aspects concerning the matching of future skills demand and supply and support in developing sectoral learning strategies but also to stimulate innovation (viz partnerships for innovation, skills and jobs). Social dialogue at the sectoral level – as already in place with the Sectoral

Social Dialogue Committee (SDC) for Telecommunications - is one of the ways to make collaboration happen.

Annex I. Contributors to this study

This report appears in a series of 11 sector reports on the future jobs and skills commissioned by the European Commission and executed by a core consortium of TNO (Delft/Leiden, the Netherlands), SEOR Erasmus University (Rotterdam, the Netherlands) and ZSI - Zentrum für Soziale Innovation (Vienna, Austria). The consortium was led by Dr F.A. van der Zee (TNO Innovation Policy group; TNO Innovation & Environment).

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Annex III. Strategic options – a detailed description

A. Recruiting workers from other sectors

A possible solution to meet skill needs is to recruit workers from other sectors, which have and can provide the skills and knowledge needs of the sector and more specifically the firm. Whether or not this is a desirable option depends, amongst others, on the job function under consideration. For managers of large corporations it is quite usual to bring their general know-how to bear in different sectors. Also for business professionals (e.g. financial analysts, software engineers) sector specificities are of lesser importance. Sector mobility of low skilled workers is much more limited than the mobility of higher educated employees. The lesser the grade of sector specialisation of the occupational profile, the easier employees are able to change between sectors. In other cases recruiting workers from other sectors will need training of sector specific skills. In some cases it will also be possible for highly specialised workers to change sectors.

B. Recruiting workers from other Member States

Recruiting workers from other Member States could be in some cases a possibility to overcome skills problems. However, owing to language, cultural and other problems, including certain entrance barriers left to the Member States, mobility within the European Union is still underdeveloped. Border regions are attracting workers from other countries mainly because of wage advantages and in this way can succeed in solving their skills shortages and gaps. However, regions that face such outward migration (e.g. Poland, East Germany, Parts of Austria, Hungary, Czech Republic, Slovenia, Bulgaria) at the same time face serious problems in meeting their labour market demands. Some have responded by recruiting workers from non-Member States. Even if this might appear a temporary problem, from a longer term perspective, such developments could have serious consequences for the growth of the regional economy – in what might be termed a ‘skills drain’ (cf. ‘brain drain’’).

C. Recruiting workers from non-Member States

Recruiting workers from non-Member States is not a zero-sum game for the European economy. Yet this strategic choice is as limited in its overall impact as the strategic choice that proposes to recruit workers from other Member States. On top of this, such recruitment is much more difficult than recruitment from within the EU. In all Member States significant barriers for entering the labour market for workers from outside the EU exist, even for temporary workers. To increase the influx of these workers by, e.g. increasing the immigration quota several political hurdles have to be mastered. Action can be taken here at Member State as well as at EU level, the recent ‘blue card’ proposal and negotiations serving as an example.

D. Recruiting unemployed workers with or without training

Recruiting unemployed workers without training is a strategic option, especially in case of skill shortages if there are not enough skilled workers to meet the employers demand). This option should in these cases be combined with adequate training. Unemployed workers might have various placement handicaps, especially skills deficits and poor levels of basic qualifications. Low educated groups are still representing the majority of the unemployed labour force, but also highly skilled workers like engineers could be threatened by unemployment.

E. Recruiting young people coming from the education system, with or without re-training

This strategic choice is always a possibility to overcome skill shortages as well as skill gaps. But demographic change should be taken into account too. While in the next few years, until around 2015, there will be a continuous inflow of students entering the labour market, a significant reduction is expected in 2020. In some EU regions there is already a need for young qualified and skilled workers and apprentices. Even where sectors may pay relatively high wages and offer stable career prospects, it is not easy to attract enough labour in critical occupational functions. While in the last years labour in business and finance professionals as well as administrative staff and customer services could be attracted the situation in technical occupations (engineers/technicians, construction workers, plant operators) is still critical. Hence, the recruiting of young people can only be successful, if this measure is supported with the other strategic options such as “Improving the image of the sector” and “Stronger cooperation within the industry”. To be more precise, a stronger cooperation between schools, university, training organisations, career managers on the one hand and the industry on the other is needed. The principal aim should be to overcome the mismatch of requirements and wishes of individuals on the one hand and the economy on the other.

F. Training employed workers

In some cases training and re-training could also constitute a strategic choice to meet skill demands. In this case, the employee will be trained for a new working place or task. In general, re-training ends with a formal graduation or certificate. Re-training is an option if the work place or the occupational function is not needed any more. But re-training is only one option. Further education or further training, refresher training and updating courses, or advanced vocational qualification to adapt the workforce to emergent skills needs are also options, which should be taken into account. Re-training or further training of employees can encompass all levels of skills. Training and qualification could be done in-house and on the job as well as by an external education institution. It is more likely that less fundamental variations of up-skilling or re-training will be a strategic choice because re-training has to be regarded as a long term and quite expensive measure compared to the other vocational education forms.

G. Changing the work organisation

Work organisation can be defined in different ways. First, it can be defined as a system of work organisation (e.g. Taylorism, Fordism and Post-Fordism) and second, as a form of division of labour and specialisation. In modern economies productivity is based on the division of labour which by definition implies also a division of skills. There are several instruments of work organisation to react on skill shortages and gaps. Thus, changes in the work organisation can help to overcome skill gaps. In general, work can be reorganised in the following possible ways:

- Group work: A group is a limited number of people who work together over a longer period with a frequent, direct interaction. A group is defined through the differentiation of roles and joint values. Groups are able to produce better results than single persons due to the combination of different competencies and experiences, the reduction of wrong decisions, stronger work motivation, the direct use of information, new insights and creativity and a better acceptance of decisions, just to mention a few of the many advantages. There are several kinds of group work, like project groups, quality groups and learning circles, as well as committees.
- Job rotation: Within this type of work organisation several people change their work places in a planned alteration. Job rotation enhances the overview of the different

production processes, the understanding of different tasks and the feeling for group work. Additionally, monotony and dissatisfaction are reduced.

- Job enlargement: Extension of the scope of work through the combination of several structurally equal or similar tasks. It can produce similar effects as job rotation.
- Job enrichment: Extension of the scope of work through the combination of several structurally different tasks. The scope of decision making and self-control increases, as well as the quality and quantity of work. In general, up skilling of the employee is necessary, but this is also implemented on the job.

Under the influence of new technologies, like information and communication technologies, virtual forms of work organisation, which substitute hierarchies through a horizontal network co-ordination, are also possible. In this sense, mergers and acquisitions as well as project based business collaboration are also available options to change the work organisation. Both measures are strategic possibilities to get access to needed resources or to incorporate new skills. Modern (communication) technology can support the co-ordination and co-operation of labourers working at different places and in combining their respective strengths.

H. Outsourcing and offshoring

In public discussion the terms outsourcing and offshoring are mainly used together, yet it must be emphasised that they describe different technical approaches. While outsourcing means the transfer of management or day-to-day execution of business functions or processes (production, manufacturing, services) to an external service provider, offshoring describes the relocation of business functions or processes from one country to another. Both could be applied as a strategic choice on company level to meet skill needs, by integrating the knowledge, experience and competences of the other firm in the production process.

Outsourcing of personnel as a result of technological change and economic pressure was and still is an ongoing trend. Due to de-regulation and privatisation several tasks and with it skills and competences in the sector were outsourced and in some countries dislocated to other countries to increase labour productivity. Several occupational functions in the production chain have been outsourced nowadays. Skill gaps can be closed by hiring subcontractors with the needed knowledge and competences. If one considers this strategic option to meet skill needs, it has to be taken into account that for subcontracting firms, freelance or contractual workers continuing vocational training often plays a marginal role, because employees are all too often indispensable. One should also bear in mind that freelancers are not available at any time and in unlimited numbers. Outsourcing and offshoring is therefore a limited strategic option to overcome skill gaps. It seems to be more adequate to overcome skill shortages.

I. Changing vocational education

Changing vocational education has a long-term effect. It must be taken into account that changes will have a substantial impact in quality and quantity starting at the earliest within three years time after the changes. The process of changing initial vocational education in content or in structure takes itself several years. The process from defining the needs and problems to the implementation of a new curriculum involves several stakeholders from different expert levels like companies, social partner organisations, training institutes as well as representatives of national and regional education administration. These bargaining processes could take several years and are dependent of the VET-system of the European Member State. Hence, this strategic choice will only be drawn if major structural changes are expected.

Despite these facts, possible changes can be seen in a stronger modularisation of curricula of initial vocational training as well as in building up or strengthening interplant and interregional training infrastructure. The first option could in the long run help to overcome identified skill needs in a sound, flexible and a relatively quick way. The second option is amongst others a possibility to provide the latest high-value equipment for training quickly by sharing resources of several partners.

J. Designing and offering new courses (continuing vocational education and training)

Once it is clear that the current content of vocational training is not up to date and therefore does not address the demands, the development of new courses for continuing vocational education and training could be a strategic option with a short term impact (see also *M. Stronger cooperation between stakeholders*).

K. Providing information about jobs and (emerging) skills

There is still a lack of transparency concerning current and emerging skill needs and job opportunities in different economic sectors. Information systems on regional, sectoral, national or European level could help to minimise information asymmetries and in that way overcome skill gaps resulting from information deficits. As a consequence, it could prove highly effective in helping students to enter the labour market and find a suitable occupation, just as much as in assisting employees to find new job opportunities based on existing skills or guide them in finding the suitable vocational training course.

Career guidance impacts rather short term. Therefore, it can help to overcome the mismatch between the needs and interest of the individual and those of the prevailing economy. The basic assumption of this strategic choice is that there already exist people who are equipped with the required skills and qualifications, but, due to a lack of information about the labour market possibilities, do not apply for these jobs. Career guidance for students and employees can help to overcome this mismatch. In this respect there can be a clear connection to training. Systems for recognition of prior learning (RPL) can help to determine to what extent people possess necessary competences for a new job. Targeted training can bridge the gap for the failing competences.

L. Improving the image of the sector

Improving the image of the sector could be an easy and suitable measure especially to overcome skill and labour market shortages and attract new employees. Several instruments could be implemented by sector organisations in co-operation with different non sector actors like schools, career management organisations, training organisation, public employment services, and public administration. Instruments could be company visits for pupils, offering internships for pupils and enhanced public relation. Especially in sectors where framework conditions and occupational functions changed fundamentally, due to technological or organisational restructuring or low wage levels, this offers a possibility to overcome stereotypes as much as old fashioned views and to attract more labour. Moreover, this measure does not only provide a chance to overcome stereotypes in relation to the sector but also to some occupational functions. The effect of this strategic option is long-term. In consideration of the apprenticeship system, which can take up five to seven years (if the specialisation of high qualified jobs in the sector is taken into account) until the volume effect is reached, one must arrive at the conclusion that in some occupational functions it has to be initiated right now.

M. Stronger cooperation with the industry

A stronger co-operation between industry and training institutes on a regular basis is one possibility to meet the skill needs in the sector. In some sectors and countries training of employees does not seem to be in line with the industry's emerging needs. New training and teaching solutions are to be developed between the industry, sector representatives, education institutions and research centres, public bodies, etc. Information exchange and a stable cooperation between the relevant stakeholders could improve the matching of training needs and demands. In the long run it will enhance the efficiency of training output, strengthen the quality of training and maximize the individual potential. To build up this kind of cooperation takes time, but in the long run it might well be capable to provide accurate solutions for problems. Networks and partnerships between these stakeholders to forecast skill needs in the sectors also present a long term measure. They could help to define emergent skill needs. While knowledge about the development of skill supply is quite high, the knowledge about the development of skill demand in different sectors is still improvable. These kinds of networks can cooperatively detect the need for action and contribute to the development of recommendation of actions.

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Glossary

Apprenticeship. Systematic, long-term training alternating periods at the workplace and in an educational institution or training centre. The apprentice is contractually linked to the employer and receives remuneration (wage or allowance). The employer assumes responsibility for providing the trainee with training leading to a specific occupation. (Cedefop, 2004)

Competence. Competence refers to the proven ability to use knowledge, skills and personal, social and/ or methodological abilities, in work or study situations and in professional and personal development. In the context of the European Qualifications Framework, competence is described in terms of responsibility and autonomy;

Compulsory education. The minimal legal standards and duration of obligatory schooling. (ILO, 1998)

Concentration index. The concentration index assesses the relative contribution of a specific sector to the national economy compared to a greater entity, such as the EU, thereby correcting for the size of the country. In more general terms, the concentration index is a measure of comparative advantage, with changes over time revealing changes in the production structure of a country. An increase of the concentration index for a sector signifies relatively fast growth of that particular sector in the country concerned compared to the same sector in the EU. How does the concentration index work in practice? A few (hypothetical) examples: if sector x represents a 5% share of the German economy and a 5% share of the EU economy, the concentration index of sector x equals a 100. If sector x represents 5% of the German economy, but 10% of the EU economy, the concentration index of sector x is 50. If the same sector x represents 10% of the German economy and 5% of the EU economy, the concentration index of sector x is 200.

The concentration index concept can be applied using different indicators (variables). In our study we measure the concentration index using employment, value added and trade, in order to make a distinction between the relative performance of countries EU-wide. We distinguish between four country groupings, each signifying a different sector performance over time. If a sector in a country has a strong position (hence showing a concentration index higher than 100) and has experienced a clear index growth over the last years, the sector is defined as winning in that country. If the sector has a strong position, but experienced a decline of the concentration index, we say the sector is losing momentum. If the sector has a weak position, but gained in the past, we say that the sector in that country is upcoming. If the sector has a weak position and experienced a decline of the index, we say that the sector is retreating.

Employability. The degree of adaptability an individual demonstrates in finding and keeping a job, and updating occupational competences. (Cedefop, 2000)

European Credit system for Vocational Education and Training (ECVET). A device in which qualifications are expressed in units of learning outcomes to which credit points are attached, and which is combined with a procedure for validating learning outcomes. The aim of this system is to promote:

- mobility of people undertaking training;
- accumulation, transfer and validation and recognition of learning outcomes (either formal, non-formal or informal) acquired in different countries;
- implementation of lifelong learning;

- transparency of qualifications;
- mutual trust and cooperation between vocational training and education providers in Europe. (Cedefop)

European Qualification Framework for life-long learning (EQF). A reference tool for the description and comparison of qualification levels in qualifications systems developed at national, international or sectoral level. (Cedefop)

Full-time Employment. Traditionally means a 'regular job'. Work that is about eight hours a day, five days a week and forty-eight weeks of the year with four weeks paid leave.

Informal learning. Learning resulting from daily activities related to work, family or leisure. It is not organised or structured in terms of objectives, time or learning support. Informal learning is in most cases unintentional from the learner's perspective. (Cedefop, 2008)

Interdisciplinary (multidisciplinary). Interdisciplinary refers to research or study that integrates concepts from different disciplines resulting in a synthesised or co-ordinated coherent whole. New disciplines have arisen as a result of such syntheses. For instance, quantum information processing amalgamates elements of quantum physics and computer science. Bioinformatics combines molecular biology with computer science. An interdisciplinary team is a team of people with training in different fields. Interdisciplinary teams are common in complex environments such as health care.

Job mobility. Any change of job, regardless of where the new job is located.

Knowledge. Knowledge refers to the outcome of the accumulation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the European Qualifications Framework, knowledge is described as theoretical and/or factual.

Knowledge society. A society whose processes and practices are based on the production, distribution and use of knowledge. (Cedefop, 2008)

Learning outcomes. Learning outcomes refer to statements of what a learner knows, understands and is able to do on completion of a learning process, which are defined in terms of knowledge, skills and competence.

Lifelong learning. All learning activity undertaken throughout life, with the aim of improving knowledge, skills/competences and/or qualifications for personal, social and/or professional reasons. (Cedefop, 2008)

Low, medium, high educated. See also under qualifications. The Labour Force Survey (LFS) collects data for a number of characteristics of employees, one being the level of education of an employee. The LFS is based on the ISCED 1997 classification (International Standard Classification of Education).

- Low-educated encloses all levels up to the compulsory education (ISCED 1+2). ISCED 1: primary education or first stage of basic education. ISCED 2: lower secondary education or second stage of basic education.
- Medium-educated comprises all the post compulsory education not tertiary (ISCED 3+4). ISCED 3: (upper) secondary education. ISCED 4: post-secondary non tertiary education
- High-educated comprises all tertiary education including university education (ISCED 5+6). ISCED 5: first stage of tertiary education). ISCED 6: second stage of tertiary education (leading to an advanced research qualification).

Low, medium, high skilled. In general this classification refers to the skills required for a specific occupation that an employee currently holds. In existing taxonomies skills levels are usually proxied by educational attainment (see low, medium, high educated).

Mobility, see job mobility.

Multi-skilling. Multi-skilling refers to training an employee to cover a range of different jobs in one workplace. A multiskilled worker is an individual who possesses or acquires a range of skills and knowledge and applies them to work tasks that may fall outside the traditional boundaries of his or her original training. This does not necessarily mean that a worker obtains or possesses high-level skills in multiple technology areas. However, the worker can be an effective and productive contributor to the work output of several traditional training disciplines.

Multi-tasking. The ability of a person to perform more than one task at the same time.

Profession. An occupation which requires knowledge gained through academic study, such as law, medicine or teaching.

Qualification. Qualification refers to a formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standards.

Qualifications, Comparability of -. The extent to which it is possible to establish equivalence between the level and content of qualifications (certificates, diplomas or titles) at sectoral, regional, national or international levels. (Cedefop, 2000)

Qualification, level of -. Low: at most lower secondary (ISCED 0-2); medium: upper secondary (ISCED 3-4); high: Tertiary (ISCED 5-6).

Qualification framework. An instrument for the development and classification of qualifications (e.g. at national or sectoral level) according to a set of criteria (e.g. using descriptors) applicable to specified levels of learning outcomes. (OECD, 2007a)

Retraining. Training enabling individuals to acquire new skills giving access either to a new occupation or to new professional activities. (Cedefop, 2004)

Revealed Comparative Advantage (RCA). Relative comparative advantage compares the relative contribution of sector x to the comparative advantage of the national economy with other sectors. It is calculated as follows:

$$RCA = \tanh \left(\ln \left(\frac{\text{Exports S} / \text{Imports S}}{\text{Exports C} / \text{Imports C}} \right) \right) \times 100$$

Interpretation: 0 = the comparative advantage of sector x equals the average of the comparative advantage of the entire national economy. Near -100: the sector contributes nothing to the comparative advantage of that country. Near + 100: the sector contributes strongly to the comparative advantage of the country.

The use and logic of the country groupings winning, losing momentum, upcoming and retreating in combination with revealed comparative advantage is similar to the concentration index (see above).

Skills. Skills refer to the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the European Qualifications Framework, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments).

Skills gaps. Skills gaps arise where an employee does not fully meet the skills requirements for a specific job function but is nevertheless hired. This skills gap needs to be closed through

training. Skills gaps can arise where new entrants to the labour market are hired and although apparently trained and qualified for occupations still lack some of the skills required.

Skills needs, emergent -. Emergent skills needs are defined in this study as the change in skills that is needed to adequately fulfil a certain job function in the future. Addressing emergent skills is needed in order to avoid skills shortages and/or skills gaps in the future.

Skills shortages. Skills shortages exist where there is a genuine lack of adequately skilled individuals available in the accessible labour market. A skill shortage arises when an employer has a vacancy that is hard-to-fill because applicants lack the necessary skills, qualifications or experience.

Tertiary education. Tertiary education refers, in most settings to non-compulsory education provided via a specialist institution once secondary schooling is completed, usually labelled as a college, polytechnic or university (in English) with variants of these in other languages. Tertiary education may also be delivered virtually or at a distance.

Trade balance. Exports minus imports.

Training. The development of skills or knowledge through instruction or practice; a kind of vocational learning such as an apprenticeship or traineeship which includes both formal education and on-the-job experience.

Unskilled work. Work which lacks specialist training or ability and generally involves simple manual operations which can be learned in a short time.

Up-skilling. Short-term targeted training typically provided following initial education or training, and aimed at supplementing, improving or updating knowledge, skills and/or competences acquired during previous training. (Cedefop, 2004)

Vocational Education and Training (VET). Education and training which aims to equip people with skills and competences that can be used on the labour market. (adapted from ETF, 1997).

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The seven-year Programme targets all stakeholders who can help shape the development of appropriate and effective employment and social legislation and policies, across the EU-27, EFTA-EEA and EU candidate and pre-candidate countries.

PROGRESS' mission is to strengthen the EU contribution in support of Member States' commitment. PROGRESS is instrumental in providing analysis and policy advice on PROGRESS policy areas:

1. Monitoring and reporting on the implementation of EU legislation and policies in PROGRESS policy areas;
2. Promoting policy transfer, learning and support among Member States on EU objectives and priorities; and
3. Relaying the views of the stakeholders and society at large.

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