COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 16.12.2008
SEC(2008) 3058

COMMISSION STAFF WORKING DOCUMENT

accompanying the

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

**New Skills for New Jobs
Anticipating and matching labour market and skills needs**

{COM(2008) 868 final}

EN

EN

TABLE OF CONTENTS

1. INTRODUCTION

1.1. Purpose of the Staff Working Document

This staff working paper accompanies the Communication on 'New Skills for New Jobs'. It presents the empirical and theoretical evidence upon which the policy messages of the Communication are based. Section 2 provides a first assessment of the skills and labour market needs of the EU up to 2020 and identifies the possible risks of mismatches between supply and demand. This first analysis needs to be followed by continuous efforts to anticipate and match future skills and labour market needs.

A decision to introduce comprehensive and regular assessments at EU level up to 2020 should take account of existing initiatives and instruments to anticipate labour market trends and skills needs not only at EU level, but also at regional and sectoral level. Section 3 presents an analysis of the state of play across Europe.

The document is based upon and has been informed by:

- The Cedefop reports, *Future skill needs in Europe: Synthesis report* and *Future skill needs in Europe: Focus on 2020*.

- The report of the European Experts Network on the Economics of Education on this topic, entitled *Origins and consequences of changes in Labour Market Skills Needs*.

- Responses from the Eurydice network on the topic and analysed by GHK during the summer of 2008.

- Responses of the European Employment Observatory's SYSDEM correspondents on the topic and analysed by GHK during the summer of 2008.

- The CEDEFOP discussion paper, *Systems for anticipation of skills needs in EU Member States*, based on the analysis of answers from various networks of national experts and policy makers (ReferNet; DGVET; Skillsnet).

- General literature and published reports on the demand for and supply of skills in the EU until 2020 and beyond and commentaries on labour market forecasting and other anticipatory tools.

- A specific report produced on behalf of the Commission[1].

1.2. Rationale

Nobody is able to predict precisely what the future will hold, but everyone has to prepare and plan in order to avoid undesirable outcomes and to make the most of the opportunities they encounter. The sum of these individual plans and choices will influence the future path taken by Europe as a whole. These plans and choices need to be guided by robust labour market

---

[1] Report commissioned from GHK with contributions from Professor Rob Wilson, Professor Klaus Schömann, Dr Frank Cörvers and Dr Sylvie-Anne Meriot.

information, including a prospective element. The key question therefore is not whether an attempt should be made to anticipate the future, but rather how to go about it[2]. Rather than relying on luck, or upon individuals' own (possibly ill-informed) judgments, those involved in producing projections argue that there is a case for the State providing such information as a public good, based on the application of transparent, systematic and scientific methods.

The essential rationale for forecasting and the basis for the public sector funding of forecasting and the associated data collection is that labour markets are imperfect and that there are long and variable lags between decisions on investment in skills and when these are finally available. Without such information there are likely to be more or greater mismatches in labour supply and demand. This is likely to be reflected in a combination of wage inflation, unemployment, unfilled vacancies and associated inefficiencies. Hence, by funding data collection and forecasting work the public sector is providing a public good available to public and private sector actors to help inform decisions to invest in improving human capital.

The assessment and anticipation of skills and labour market needs is seen as a key instrument: for the efficient functioning of labour markets and the mobility of labour within the EU; for a better match between labour supply and demand to reduce bottlenecks; and for a better definition of the content and structure of education and training systems as they seek to develop human resources, skills levels, creativity and entrepreneurship. Many Member States currently carry out such activities, but until recently little has been done at pan-European level. Given the increasing interdependency of European labour markets and the growth in cross-border mobility, the case for a pan-European assessment has strengthened.

While this approach is important for policy (especially in education and training provision), it has an equally important role in providing robust information for individual citizens and organisations. In a rapidly changing economic and social environment, policy-makers, practitioners and citizens have to be able to identify and respond promptly to new skill needs. Such decisions should depend on reliable information provided by research.

1.3. Early identification of skills needs: main concepts, strengths and weaknesses

There is a long tradition of forecasting skills needs in Europe[3]. Recently, the terms 'labour market assessment', 'anticipation' and 'early identification of skills needs' have become popular. These terms are used as umbrella concepts for the various tools and studies to better anticipate skills needs.

The earliest work in the skills area used terms like 'manpower planning', which involved estimating the numbers of scientists, engineers and the like needed to produce a unit of output in the various sectors of the economy. Many labour and education ministries across the western world were engaged in such 'manpower forecasting'. At that time, forecasters adopted scientific methods based on the assumption of fixed and invariant links between the demand for goods and services and the demand for various types of labour. It was argued that this approach could be used to predict the major skills needed to ensure economic growth.

---

[2]   Wilson, 2007a and b.
[3]   There have been many reviews of the history of skills forecasting (for example see Neugart and Schömann (2002), Wilson *et al.* (2004), Wilson (2008a) and Cedefop (2008)).

However, the first evaluations of the results of 'manpower forecasting' in the UK during the 1970s and the emerging human capital theory and its application led to criticism of this method. The main criticisms were that: the models were static; they did not take account of the interactions between supply and demand nor of wider changes and influences on skills needs; and they ignored the possibility of substitution both between different types of skills (and sectors) and between capital and labour. The models also suffered from the lack of good data.

Since these early beginnings, there have been huge improvements in the data available to undertake such work and in the methods and tools used to analyse and exploit this information. These changes have addressed many of the criticisms made of the early pioneers, for example by now permitting (where the data allow) the modelling of interactions between supply and demand and allowing for substitution possibilities and other economic links.

There is now a vast range of different tools and techniques for anticipating changing skill needs[4]. The main general approaches include:

i.   Formal, national-level, quantitative, model-based projections;

ii.   Surveys of employers or other groups (these approaches may include some quantitative aspects but are generally more qualitative);

iii.   Ad hoc sectoral or occupational studies (involving both quantitative and qualitative methods), focusing on the situation in particular areas (which may involve elements of both i and ii.

iv.   Foresight analysis using scenario development exercises based on expert opinion (including setting up 'observatories', focus groups, round tables and other Delphi-style methods, to reach a consensus view)

Each approach has its strengths and weaknesses (see Table 3.1). Ideally, a variety of different methods should be used, allowing them to inform and support each other, rather than seeing them as mutually exclusive or competing alternatives. No single approach has the monopoly on 'truth' nor can a single method provide a full and complete picture: both qualitative and quantitative assessments are needed. All such projections should be seen as part of an ongoing process rather than the final word. Together they can provide the various participants in the labour market, as well as policy makers, with useful insights into how labour markets are developing in response to various external influences.

Some critics focus on the accuracy of such projections, but this is to misunderstand the aim of much social science forecasting, which is to anticipate and avoid undesirable outcomes. Of course such work needs to be carried out in a robust fashion, but it is important to recognise that accurate and precise forecasts are not achievable. The key question to ask is not whether or not such projections are accurate, but whether or not they are useful.

The revealed preferences of national governments and other organisations from all over the world, who support such activities with substantial funding, suggest that they are considered to

---

[4]   Wilson, 2008a.

have considerable value. It is also important to recognise that such work has a wide variety of different audiences and users, including career guidance, general labour market policy formation, and the planning of education and training programmes. Few, if any, countries now regard such work as a source of information that can be used to plan the scale and pattern of education and training provision with any precision. Rather it is carried out in order to inform all those involved about how economic and other forces are shaping the labour markets, and the likely general implications for the future.

It is also important to emphasise that the different approaches may be suited to different audiences and purposes. Scenario development, for example, is ideal when the aim is to involve participants and to explore alternative possible futures. The actual process of carrying out the scenario development is often a critical output, and participation is necessary to gain the full benefits. This is ideal for situations involving small numbers of policy makers trying to explore the threats and opportunities they are facing. In contrast, detailed quantitative projections may be ideal where the prime aim is to provide useful labour market information and intelligence to support large numbers of individuals making choices[5].

---

[5]   For further details see Wilson (2008a).

Table 3.1: Comparison of the advantages and disadvantages of alternative approaches to anticipating skill requirements

Alternative approaches	Advantages	Disadvantages
Formal, national-level, quantitative, model-based projections	Comprehensive Consistent Transparent Quantitative	Data hungry Costly Not everything can be quantified May give a misleading impression of precision
In-depth sectoral or occupational studies (using a variety of quantitative (model-based) and qualitative methods)	Strong on sectoral specifics	Partial Can be inconsistent across sectors
Surveys of employers or other groups, asking questions of fact and opinion about skills, skill deficiencies and skill gaps	Direct 'user/customer' involvement	Can be very subjective Inconsistent Can too easily focus on the margins (i.e. current vacancies) rather than skill needs within the whole workforce
Focus groups, round tables Observatories Delphi-style methods Scenario development, Foresight	Holistic Less demanding data requirements Direct 'user/customer' involvement	Non-systematic Can be inconsistent Can be subjective

Source Wilson (2008a).

2. A FIRST ASSESSMENT OF JOBS AND SKILLS NEEDS IN EUROPE UP TO 2020

This section begins with an explanation of overall trends in job creation and labour supply, in order to estimate the risk of labour shortages. It then turns to the trends in skills needs, occupation structures and skills supply using both quantitative and qualitative studies. This part not only looks at the education attainment level, but also at the concrete skills, knowledge and competences required, above the formal attainment (see box 2.1 for a clear definition of each concept). The second part examines the issue of skills gaps and the related risk of rising inequalities. Skills gaps refer to qualitative mismatches between the skills supplied by the workforce and the demand for skills on the part of employers. Such mismatches can affect market prices on the labour market (i.e. the wages of workers with different skills), productivity, economic growth and job creation. This section aims to disentangle these differing but interrelated issues.

Box 2.1 Skills, qualification, competences and knowledge: definitions

The education attainment levels are formalised in the well-known ISCED levels. These levels are mostly related to the length of schooling and the institutions that deliver the diploma. On the contrary, the European Qualification Framework will try to base the qualification process on the "learning outcomes", defined in terms of knowledge, skills and competences. It provides a clear definition of all these related concepts:

- "qualification" means 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" means 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;

- "knowledge" means the outcome of the assimilation 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" means 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" means 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

Source: Recommendation of the European Parliament and of the Council (April 2008) on the establishment of the European Qualifications Framework for lifelong learning

2.1. Overall trends in job creation and labour supply

2.1.1. Sector trends: service activities still expanding

While there are many studies and research projects that identify trends in labour demand, these most often focus on specific sectors and/or a selection of European countries. The CEDEFOP publication 'Future Skill Needs in Europe - Focus on 2020' examines Europe's labour market as a whole (see box 2.2 for a detailed presentation of the data and methodology used). It argues that the general shift in Europe away from the primary sector (especially agriculture) and traditional manufacturing industries towards services and the knowledge-intensive economy is likely to continue. Although employment in many new EU Member States still relies to a great extent on agriculture and manufacturing, there are clear signs that this is changing rapidly. By the year 2020, almost three quarters of jobs in the EU will be in services.

Distribution, transport, hotels and catering together are projected to see employment grow by more than 4.5 million over the next decade, while non-market services are expected to increase by slightly more (4.7 million). Business and miscellaneous services have the best prospects, with more than 13.6 million additional jobs being created between 2006 and 2020 in CEDEFOP's baseline scenario. A more detailed picture of job creation among the service sector is available, up to 2015 (see figure 2.1). Strong positive trends are expected in business services (such as IT, insurance or consultancy); health care and social work, distribution, personal services, hotels and catering, and to a lesser extent education.

Figure 2.1 Past and future trends in employment levels in the service sector, in millions
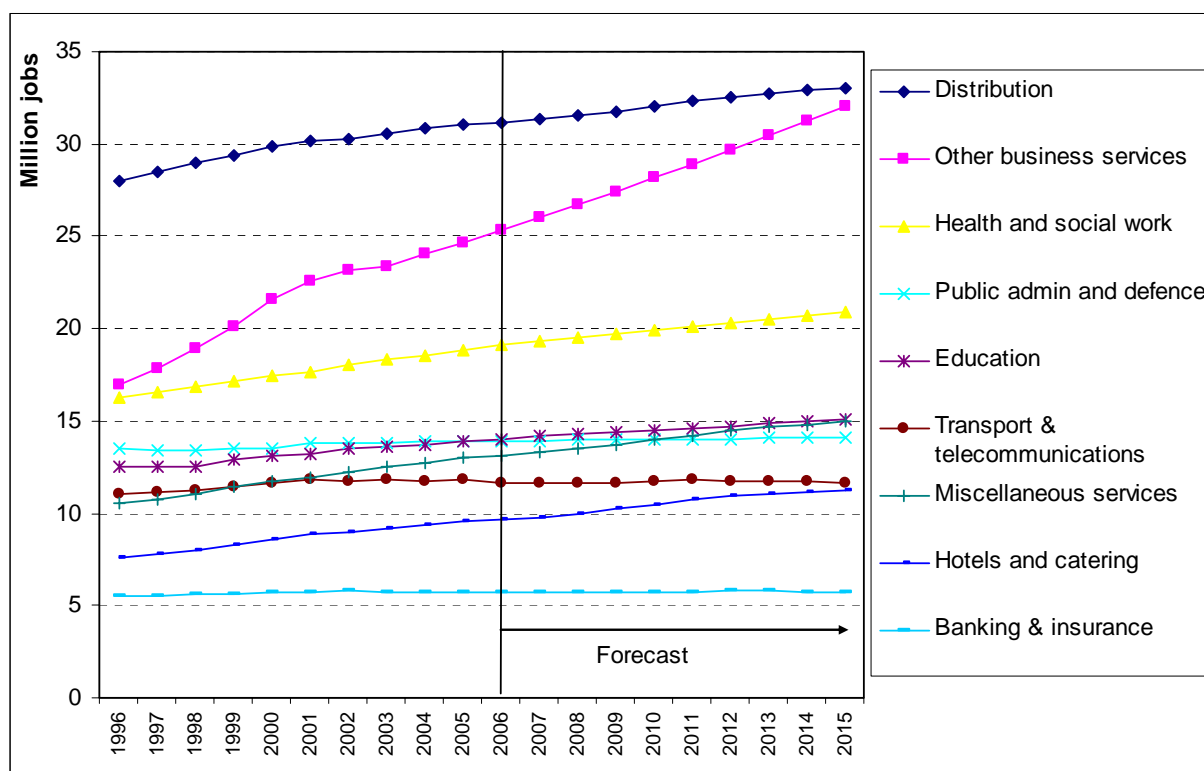
Source: Cedefop, 2008

All things considered, over 19.6 million additional jobs are expected to be created between 2006 and 2020 in the EU-25 in the baseline scenario considered by CEDEFOP. However, the actual number of jobs created will depend on the global economic environment. The current financial crisis and its impact on the real economy make the pessimistic scenario produced by Cedefop more probable. The more pessimistic scenario projects the generation of fewer jobs in the service sector, but still growth. (see figure 2.2). In this scenario, the employment decline of manufacturing will be stronger. The present crisis may accelerate the foreseen restructuring in these sectors. However, even in the pessimistic scenario, the manufacturing sector should still account for more than 33 million jobs in 2015: this sector would still correspond to an important part of jobs in some European regions. In addition, some regions would experience positive trends in manufacturing as a result of the transfer of jobs from older to newer Member States. Lastly, in some industries (for example engineering), demand will outstrip productivity gains and create new jobs. The primary sector and utilities are expected to decline significantly in all cases.

Figure 2.2 Trends by broad sectors according to different scenarios, change in 000s (2005-2015)
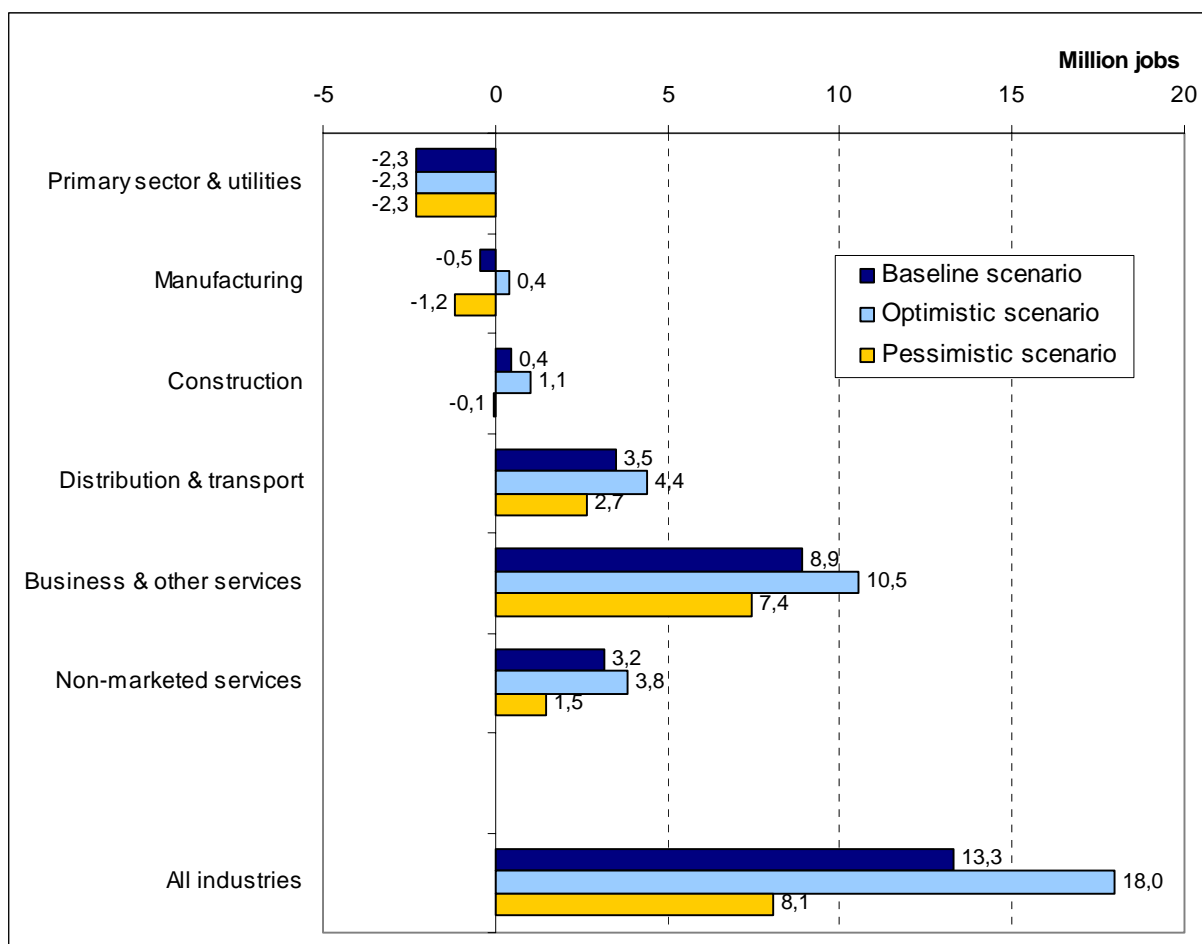
Source: Cedefop (2008).

Box 2.2: Cedefop forecasts: methodology and data

The Cedefop forecast has adopted a modular approach to exploring skill needs focusing on four key components (modules):

The first key component is a multisectoral macroeconomic model, called E3ME (Energy-environment-economy model of Europe). Using the classical Leontief input-output tables, it considers the links between economic sectors. In addition, it takes into account the interactions between the economy, energy supply and demand, and environment (E3), as well as the contribution of research and development, and associated technological innovation, and the dynamics of growth. E3ME's parameters are estimated empirically, using historical time series data covering the period 1970-2004. This means that behavioural relationships in the forecast are determined by past trends. There may be cases where this is not appropriate, in particular in new Member States where data series are shorter (1993-2004) and cover a period of transition. To compensate partially for this E3ME assumes that in the long term there is convergence between the EU's new members and the previous EU-15 in terms of the key economic relationships and parameters embedded in the model. It also uses Eurostat population projections as an input. Based on Eurostat National Accounts (NA) estimates, this model provides consistent projections of employment levels by sector/industry. Of course, in addition to providing projections of sectoral employment, such models can be used for a wide variety of other purposes, including more general macroeconomic policy analysis. E3ME has been set up to explore alternative scenarios. This includes broad assessment of the sensitivity of outcomes to some key external drivers (such as the global economic demand). A baseline forecast, constructed from a set of accepted European Commission economic projections was developed as a benchmark for two alternative scenarios, one with a positive and one with a more negative outlook.

The second key component is a module which translates the employment projections from the multisectoral model into implications for the expansion demand for occupations. The third module, very similar to the second one, focuses on the implications for formal education attainments.

A key issue is the best data to be used to measure employment structure in Europe. Historically, most countries have invested considerable resources in developing data for their National Accounts (NA). In many respects estimates of employment on this basis are to be preferred as they are consistent with other key economic indicators such as output and productivity. More recently, greater emphasis has been placed on estimates of employment based on the European Labour Force Survey (LFS). These have the advantage of being broadly consistent across countries and providing a measure of employment structure by occupation and qualification that is not available from the NA based estimates. Therefore the data from the Labour Force Survey (LFS) are used to generate the occupational and qualification estimates, but are constrained to match National Accounts based employment totals. The occupational and qualifications shares within sectors therefore reflect the patterns in the LFS data.

Ideally, the second and third module should relate occupational and qualifications structure to technology and work organisation, price (wage) and other economic factors. In practice, time is the main independent variable acting as a proxy for technological change and other factors.

The fourth module estimates the 'replacement demand'. On the demand side of the labour market it is important to make the distinction between demand that results from future changes in employment levels – expansion demand – and the so-called replacement demand, influenced

by retirement, mortality, inter-occupational, geographical mobility and migration. Obtaining robust estimates of migration flows is not straightforward, since available data are rarely adequate, but this module tries to estimate the impact of all types of mobility, including migration.

In combination, the four modules deliver a comprehensive, consistent, detailed picture of future skill needs and job openings across Europe. The latter are defined as the sum of expansion and replacement demand.
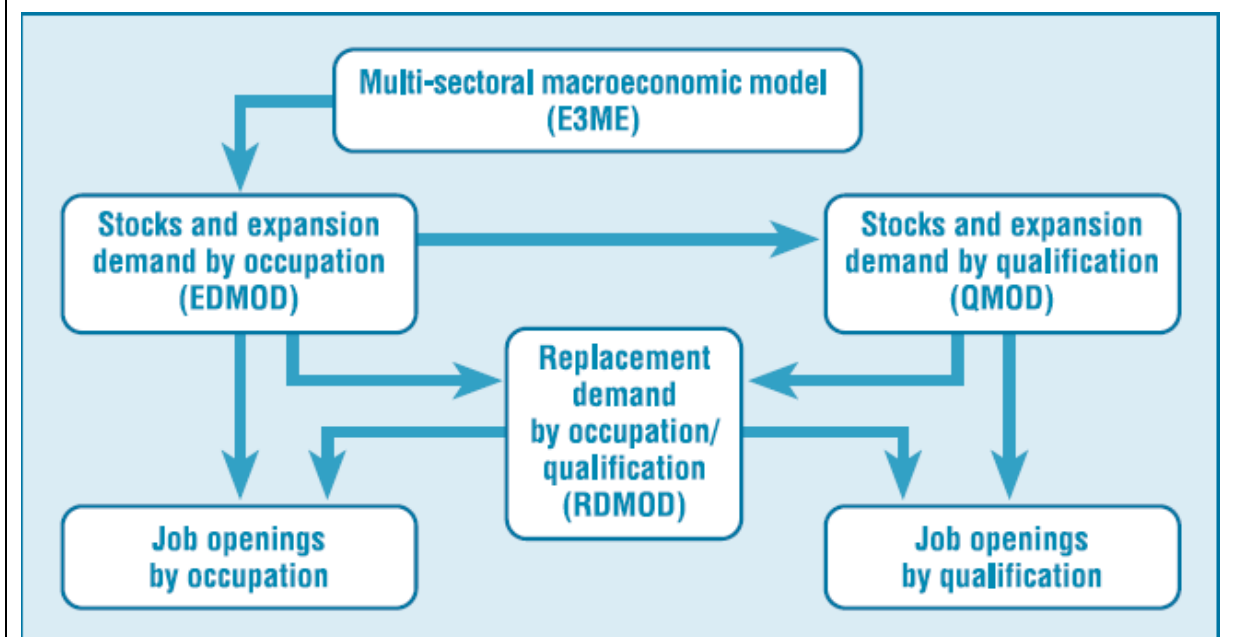
Source: Cedefop (2008).

2.1.2. The size of the workforce: current trends and anticipated developments

Different factors can influence the size of the workforce: demographic factors, participation rates, health issues, migration flows. In 2007 the active population in the EU, i.e. the total of those in employment and unemployment, was around 235 million on average[6] According to the latest population projections by Eurostat[7], by 2060 the working age population of the EU is projected to fall by almost 50 million even with continued net immigration similar to historical levels and by around 110 million without such immigration. Immigration in itself will not solve the demographic deficit, but it can cushion the impact of the demographic trends. Relying on immigration to replenish the population in Europe is a high-risk strategy as immigration is projected to decline by 2020[8]. On its own, immigration is insufficient to compensate for the decline in birth rates throughout Europe. On the other hand, the potential contribution of immigration to EU economic performance is – and will most likely continue to be – significant. As recognised by the spring 2008 European Council and by the European Pact on Immigration

---

[6]   Eurostat, population and social conditions statistics.
[7]   Eurostat population projections EUROPOP2008, 2008-based convergence scenario, convergence year 2150.
[8]   GHK (2008), 'Long-term social trends in Europe'.

and Asylum of October 2008, well managed economic immigration is one of the policies needed to help meeting the needs of the labour market and reducing present and future skills shortages.

These demographic trends are expected to have a major impact on the supply of labour in Europe. Overall participation rates (for the 15-64 age group) in the EU-25 are expected to increase over the coming decades and the overall employment rate is projected to rise from 65,5% in 2007 to 69% in 2020 (see Figure 2.3). The projected increase is mainly due to higher female employment rates, which will rise from 58,4% in 2007 to almost 63,4% by 2020. Even steeper is the projected increase in the employment rate of older workers, from 45% in 2007 to 54,5% in 2020. In many countries, the youth employment rate has been falling until 2004/2005. This trend is explained by the higher proportion of persons completing secondary education and higher enrolment in tertiary education. However, in 2006 and 2007, the youth employment rate has increased in a majority of countries and is expected to reach 40% in 2020.

Figure 2.3 Projected employment rates in the EU-27
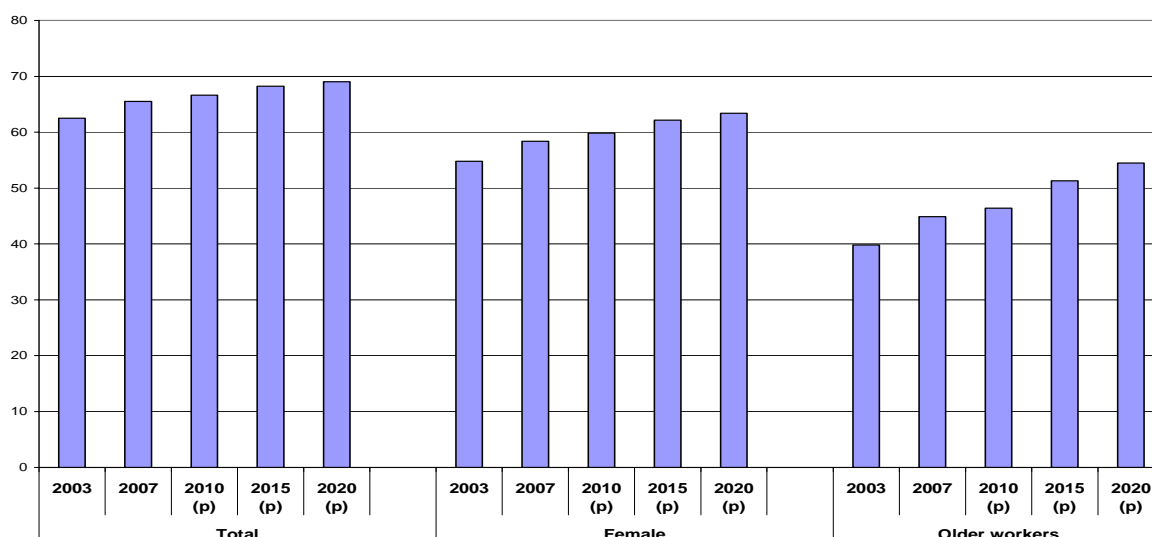
Source: European Commission and Economic Policy Committee (2008)

The total number of persons employed (15-64 years old) is projected to increase significantly up to 2019, but after 2019 the demographic effects of an ageing population will outweigh this effect. Three distinct periods can be identified[9]. Between 2004 and 2012, both demographic and employment developments will support a growing labour supply. Between 2013 and 2019, rising employment rates will offset the stagnation and decline in the working-age population: during this period, the working-age population will start to decline as the baby-boom generation enters retirement. The ageing effect will dominate as from 2020, and the number of persons employed will fall (see Figure 2.4).

---

[9] European Commission and the Economic Policy Committee (2008), 'The 2009 Ageing Report: Underlying assumptions *and projection methodologies for the EU-27 Member States (2007-2060)',* European Economy, No. 9/2008.

Figure 2.4 Projected working-age population and total employment, EU27
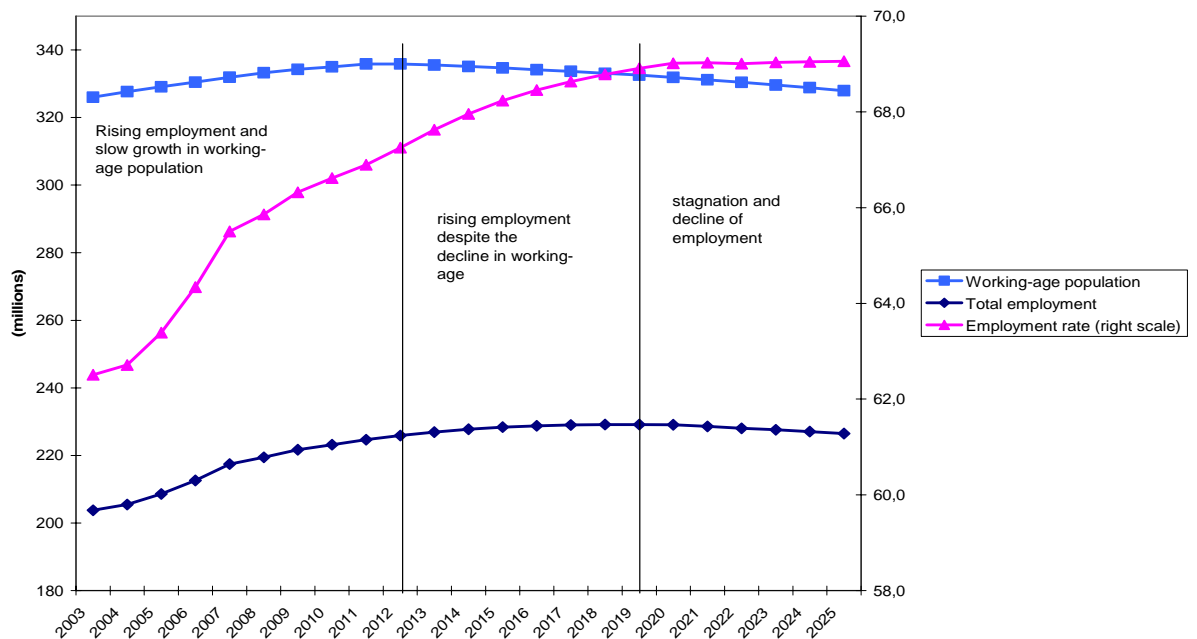
Source: European Commission and Economic Policy Committee (2008)

The challenges of anticipating labour supply in Europe

Overall population projections and estimates of future labour supply provide robust trend data that can be compared with estimates of labour demand and the need for new skills. However, there are nevertheless some important challenges:

- *Uncertainties over life expectancy*

Life expectancy projections are subject to uncertainty. Past projections from official sources have often underestimated the gains in life expectancy.

- *Labour supply is sensitive to labour demand.*

Employment rates, particularly female employment rates and rates among older and younger workers, markedly affect labour supply and associated activity rates. Employment rates are themselves sensitive to labour demand, the wage rates for different skill groups, and conditions affecting decisions to retire or otherwise become inactive.

- *Estimating third-country immigration to the EU.*

Compared to fertility and mortality, immigration flows are harder to predict and are more volatile and subject to changes in political and institutional factors. The data on immigration flows are sketchy and it is extremely difficult to project migration flows. The static snapshot of net immigration inflows on which the projections are based fails to capture the complexity of the situation, not least because gross flows (both inwards and outwards) are neglected. Moreover, immigration has a dynamic impact on the population of the host country, and account needs to be taken of factors such as the extent to which migrants return to their home

country, family reunification, and whether the fertility and mortality patterns of migrants' offspring and subsequent generations converge to those of the host country. Migration flows are also uncertain due to the influence of a variety of push and pull factors in both host and home countries. Natural disasters, war and political instability play a role, but these are too uncertain to project. Relative income disparities and public policy towards migrants are the major determining factors of migration over the long run. Finally, approaches to modelling migration flows vary widely across official agencies throughout the EU, notwithstanding the progresses in the common EU immigration policy.

- Estimating intra-EU migration.

There has been a long tradition of intra-EU economic migration although the absolute numbers of workers involved have been low relative to the size of national labour markets. Enlargement has significantly affected these trends. The single market and efforts to encourage mobility may increase mobility and hence affect labour supply. However, anticipating the potential scale of such changes is problematic.

- Estimating intra-Member State migration flows.

Labour markets are to a large extent local and regional rather than national, and there have been and continue to be marked inter-regional and rural/urban (and urban/rural) migration movements within European countries. Data on such trends are poor. However, such trends have important consequences for effective levels of labour supply. Employers, dependent upon the local and regional labour supply, have a strong interest in anticipating such trends.

- Estimating the characteristics of labour supply.

While the characteristics of age, educational level, gender, and to a lesser extent origin of labour supply are relatively easy to forecast, some of the characteristics associated with likely success in the labour market are more difficult to identify, as formal occupational qualifications and experience become less relevant than generic competences that are more important for an individual's competitiveness in the labour market, and as career paths become more complex.

2.1.3. *Quantitative imbalances in labour demand and supply*

Imbalances in labour supply and demand are expected if the employment rate does not increase in the future. The CEDEFOP report *Focus on 2020* anticipates that 19.6 million new jobs will be created by 2020 and 80 million jobs will become available as workers retire or leave the labour market for other reasons. The Eurostat baseline scenario estimates that the working-age population (15-64 years) for the EU-25 will decline from 308.6 million in 2006 to 302.5 million in 2020. These figures imply that Europe will need an employment rate of almost 74% to satisfy labour market demand[10]. It has to be said that this is still a very preliminary estimation, as CEDEFOP will carry out its own forecasting of labour supply to allow better comparability between demand and supply forecasts. Furthermore, upgrading skills can increase the productivity of workers, and thus limit labour demand (in quantitative terms).

---

[10]   The forecasts of supply and demand used here are based on the same data, namely LFS. However, Cedefop will produce its own forecast of the supply side, to ensure a better comparability and to focus on the skills and education matters, so that imbalances can be analysis for each education attainment.

Imbalances already exist in European labour markets, which face high unemployment levels but at the same time a non-negligible number of unfilled jobs. The so-called 'Beveridge curve' can indicate the state of current balances and thus the quality of matching. It represents the relation between the unemployment rate (on the X axis) and the job vacancy rate (on the Y axis), which is defined as the proportion of unfilled jobs in the labour force (see Figure 2.4). The curve usually slopes downwards, as higher unemployment rates normally go in hand with lower job vacancies. It normally shows different values across time, but data on job vacancies at European level have been gathered only very recently. Figure 2.9 presents data across countries in 2007. In countries where unemployment and job vacancies are low (LU, SI, SE, LT), the matching process seems very good. In contrast, the matching process is not satisfactory when both rates are high (e.g. DE).

Figure 2.4: Job vacancy and unemployment rates in European countries

Job vacancy rate and unemployment rate in different countries
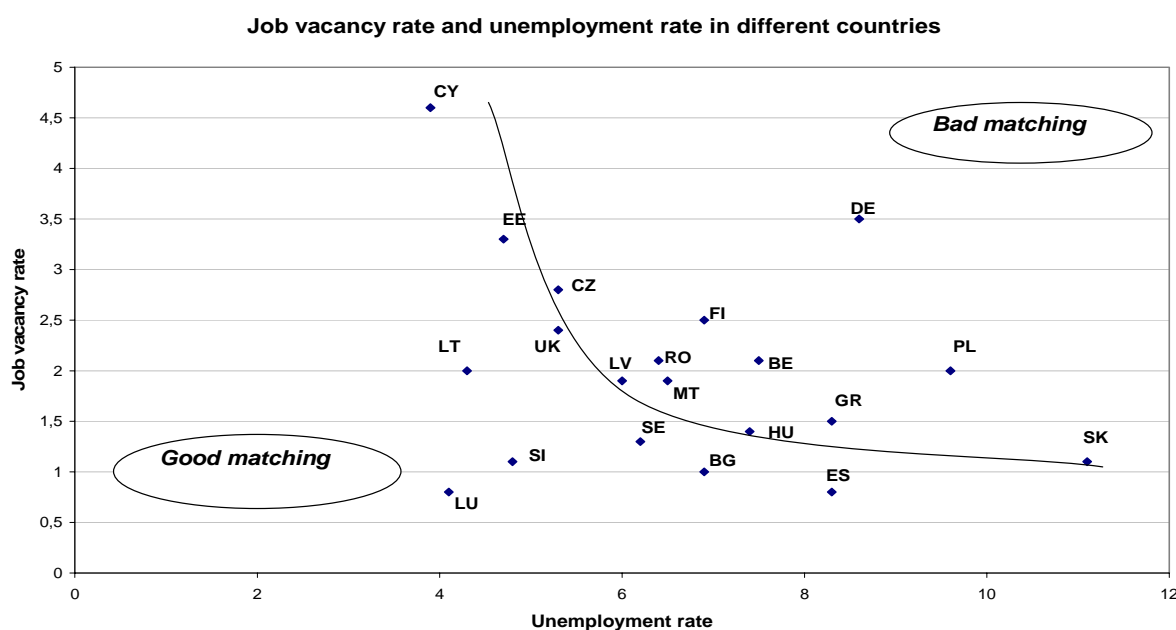
Source: Eurostat, 2007 data

A high job vacancy rate could reflect a shortage of some kinds of skills, in particular higher skills. Shortages of technical skills have also been reported by micro and small enterprises[11]. These shortages hamper the competiveness of these enterprises. It could also be the result of bad working conditions in some sectors. For example, the job vacancy rate is higher in the hotels and restaurants sector, which does not offer enough good jobs (6.6% in BE, 6.4% in CY, 4.9% in DE, 3.9% in ES, 3.1% in FI, 2.9% in UK and CZ, 2.8% in PL). More qualitative studies of the commerce and tourism sectors also show that employers in these sectors will face shortages unless they improve the working and wage conditions of workers who have acquired

---

[11]   Communication from the Commission on the European Competitiveness Report 2008 COM(2008) 774 final - 28.11.2008

general skills (communication, foreign language) also valuable in other sectors[12]. Thirdly, tensions on the local labour markets and lack of mobility can cause higher job vacancy rates in some regions[13]. Lastly, it has to be said that the current data on job vacancies and unemployment are contingent on the economic cycle. The 2007 data may be driven by short-term imbalances, resulting from market rigidities or slow adjustment processes, but not affecting the labour market in the long term. Therefore, the current data may over-estimate imbalances, and long-term structural imbalances are probably less pronounced.

The same caveat also applies to the unemployment and employment rates. According to an updated forecast, the current financial crisis will weaken employment development, notwithstanding the structural reforms. Unemployment rate is expected to increase in 2009: 8.4% compared to 7.5% in 2007[14]. However, looking beyond short-term imbalances, a permanent feature of the labour market seems to be the lower unemployment rate and higher employment rate among the high-skilled (see Figure 2.6). As a consequence, educational upgrading seems to be the most relevant solution to current and anticipated imbalances on the labour market.

Figure 2.6: employment rate and educational attainment for 15-64 year-olds (2007)
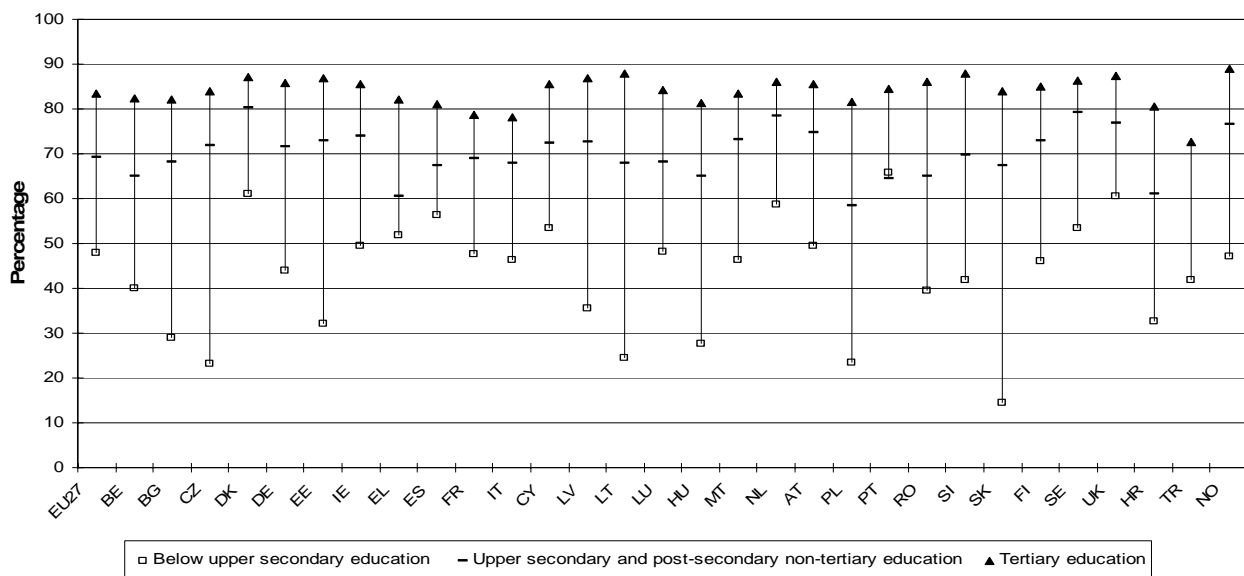
Source: European Commission, 2008a

---

[12]   CEDEFOP (2005), 'Trends and skills needs in Tourism'; Eurofound, European Monitoring Centre on Change (2007), 'Trends and drivers of change in the European commerce sector: Four scenarios'.
[13]   DARES (2002) and Conseil d'analyse stratégique (2007).
[14]   European Commission (2008), "Economic Forecast. Autumn 2008", European Economy, No. 7/2008.

2.2. Evolving skills demand and supply: risks and opportunities

2.2.1. Higher skills requirements: the result of various factors

Several factors have influenced the trends and shifts in skills demand. The main factors driving these trends are: technological change; organisational change; and globalisation and international trade. Climate change and environmental challenges will also have a major impact across the economy. The changing characteristics and upgrading of the workforce may also reinforce the trends. The pace of change may also be influenced by institutional factors in the labour market. The relative importance of these factors is the subject of research and debate. Each factor is considered in turn below.

Technological change

Technological change influences the demand for skills and workers with different levels of education. The so-called Skill-Biased Technological Change (SBTC) thesis is a common approach to explaining the shift in labour demand towards high-skilled workers in Europe. The basic idea is that new technologies that improve the effectiveness of the production process, for example information and communication technology (ICT), are 'skill-biased'[15] and that technological change increases the demand for higher-educated workers. At the same time, less-educated workers become relatively less productive, and are less in demand, which reduces their wages or increases their likelihood of unemployment.

There is considerable evidence[16] that adopting ICT reduces the labour input for routine cognitive and manual tasks and increases the input for non-routine tasks that require higher skills. Studies (mostly for the US and the UK) have tried to relate shifts in skill structure in several industries to indicators such as computer use, R&D intensity or innovation counts. The findings tend to support the SBTC thesis by showing that demand shifts are stronger in industries making intensive use of ICT. Apart from ICT, biotechnology and nanotechnology are identified as likely to have a major impact on the economy and the labour market over the next decade[17].

Organisational change

Technological change also influences the organisation of work, which affects the demand for different levels of skills. ICT has contributed to the shift from the so-called 'Taylorist organisation of labour', characterised by mass production and bureaucratic controls, to more flexible forms of work[18]. Work organisation is now characterised by decentralised decision-taking, just-in-time operation, job rotation, teamwork and multitasking. The OECD has paraphrased this as 'high-performance work practices', emphasising that these new requirements lead to higher skill needs[19]. This process is termed Skills Biased Organisational Change (SBOC).

---

[15]   Machin and van Reenen, 2007.
[16]   Autor, Levy and Murnane, 2003.
[17]   IPTS (2008).
[18]   Caroli and van Reenen, 2001.
[19]   OECD Employment Outlook 1999.

US data on the internal structure of firms that have adopted ICT show that the increase in demand for high-skilled workers can be attributed more to the requirements of new work organisation than to the introduction of the new technology itself[20]. The organisational changes possible through ICT may change labour demand in several ways. Firms that adopt ICT need workers that can get along in self-managed teams and can complete a whole process that earlier was fragmented because of the lack of centralised databases. Moreover, non-cognitive skills such as dealing with suppliers and customers or influencing team-mates and colleagues have become more important.

The finding that skill changes are strongly driven by new ways of organising work is corroborated by European data[21]. Data for France and Britain[22] show that organisational changes such as de-layering, job rotation and shorter command chains prompt an increase in relative labour demand in favour of the skilled. Higher-skilled workers more easily cope with these challenges as they are able to communicate or can be trained for multitasking at a lower cost than unskilled or low-skilled workers. The studies indicate that organisational changes have come at the expense of the employment of clerks and have mainly favoured executives.

Endogenous skill-biased technological change

Technological development has not always led to an increase in the demand for high-skilled labour. To some extent, labour demand is a reflection of labour supply. Work needs to be organised in manner that best takes advantage of and complements the skills and education of the available workforce. A well-educated and highly skilled workforce will have the effect of encouraging and enabling the adoption of technologies and modification of work organisation that can increase productivity, which will in turn reinforce the demand for high skills in successful companies and industries. Upgrading the education of the workforce may thus itself be a factor leading to increased demand for high skills. A large supply of skilled workers with relatively low wages could lead firms to introduce a technology their workforce can cope with. So, technology needs to be seen as a flexible parameter that firms can use to maximise their profits[23].

Research into technological change driven by skills supply is not widely available. A recent study in the United States compared PC adoption in different cities, finding that cities initially endowed with abundant and cheap skilled labour more aggressively adopted the new technology[24]. Also, US evidence suggests that it is reasonable to assume that innovations are at least partly the result of the available workforce[25].

Across the developed world, empirical evidence shows a correlation between the available skills and the type of technological change. A large supply of general and transferable skills provides companies with a better capacity for radical innovation, while education and training systems offering sector-specific courses and curricula favour incremental innovation[26]. It is

---

[20]   Breshanan et al., 2002.
[21]   Hujer, 2003; Greenan, 2003.
[22]   Caroli and van Reenen, 2001.
[23]   Acemoglu, 2002.
[24]   Beaudry et al., 2006.
[25]   Acemoglu, Daron, 2002.
[26]   Hall and Soskice, 2001.

argued that the US systems focusing on a more 'general' education do better in meeting the requirements of technological and organisational change. Europe, which has traditionally concentrated on 'vocational' systems, has seen less economic growth from rapid technological and organisational change[27].

Globalisation and international trade

The evolution of international trade and globalisation are other factors leading to increased demand for high-skilled workers in Europe and reduced demand for unskilled labour in developed countries. In recent years, trade between the industrialised countries and developing countries has risen. Emerging countries like Brazil, Russia, India and China (BRIC) now play a major role in the world economy. Within the next 40-50 years, the GDPs of the BRIC countries are expected to exceed those of the largest EU countries, the United States and Japan (OECD 2007).

Developing and emerging countries have a larger unskilled labour supply than developed countries. Trade liberalisation enables this supply to be utilised. The developed world is experiencing a relative decline in the demand for unskilled labour as it imports cheaper low-skill-intensive goods from the developing countries[28] and concentrates on the production of high-skill-intensive goods.

However, trade and globalisation only partially explain the relative demand shift towards high-skilled labour in Europe for several reasons. Firstly, trade flows with low-wage developing countries are not large enough to explain the shift in labour demand within the developed countries[29]. Secondly, the industries that have experienced the biggest increase in trade with developing and emerging countries are not those that have seen the largest shifts in labour market demand towards high-skilled workers[30]. Skill upgrading is also found in non-trading sectors[31] like the retail trade, suggesting that globalisation and trade cannot by any means fully explain these trends. Finally, work specialisation among developed and developing countries is evolving very quickly. Skill upgrading is also taking place in developing and emerging countries[32], and these countries are now competent and competitive in knowledge-intensive sectors. The import of low-skill intensive goods has remained rather stable whereas the import of medium/high–skill intensive goods from low/medium income countries has substantially increased over the last 10 years[33]. In addition, international trade in services should be also taken into account: according to statistics[34] on off-shoring, most of the jobs effectively transferred abroad from EU Member States are in manufacturing or production - 51.5% -, but a significant proportion is in other areas of activity such as services. The increasing international trade in services is likely to develop over the next 10 years and to influence the EU labour market and skills requirements

---

27   Krueger and Kumar, 2004.
28   Cahuc and Zylberberg, 2004.
29   Machin, 2004.
30   Machin and van Reenen, 2004.
31   Desjonqueres et al., 1999.
32   Berman and Machin, 2000.
33   Landesmann et al. (2007)
34   European Restructuring Monitor Database (ERM); see in particular the ERM report 2007 "Restructuring and employment in the EU: the impact of globalisation".

EN 21 **EN**

Labour market institutions

Labour market institutions are often cited as an explanatory factor for the relative shifts in labour demand. Indeed, there is an interesting association between labour market institutions and new forms of work organisation: countries with relatively restrictive labour market institutions and collective regulation (for example Germany but also the Scandinavian countries) are predominantly characterised by work forms that require high skills such as problem solving and, especially, worker autonomy[35]. In countries with more flexible labour markets (for example the UK and Ireland), however, work organisation takes greater advantage of the relative cheapness of less skilled labour. Other things being equal, the reduced wages for the low-skilled should raise the demand for them[36]. This explanation is mostly cited with respect to the US and UK labour markets, as they have seen a reduction in the role of labour market institutions. In particular, minimum wages fell in the US during the 1980s and unionisation declined sharply in both countries. However, there is still debate among researchers as to how the evolution of labour market institutions has accounted for the shifts in labour and skills demand and wages[37].

Climate change and environmental challenges

Lastly, efforts to mitigate and tackle climate change and environmental degradation (pollution of water, land and air) can create a new 'green economy', with millions of new jobs across the world[38]. The market for environmental products and services is projected to double. The shift to a low-carbon economy could benefit Europe, which already has a leading position in some of the technology required for renewable energy, for example[39]. Environmental concerns not only prompt the growth of new green sectors, however. They also require the development of new competences in more traditional sectors (agriculture, transport, buildings). Consequently, increasing environmental concerns can have an impact on all sectors of the economy and require not only the development of education and training programmes for emerging new professions, but also new skills to be taught as part of changing job profiles within existing professions[40].

Summary: factors affecting shifts in demand for skills and challenges for anticipating future requirements

The increased demand for high skills and educated workers is a consequence of the following factors: the application of technology, especially ICT; changes in work organisation that are themselves in part made possible by technological change; globalisation and increased international trade; and the upgrading of the workforce in Europe, which itself influences how technology is used and work organised. The parallel increase in wage differentials between the highly skilled and low-skilled may have been affected by labour market institutions. Lastly,

---

[35]   Lorenz and Valeyre, 2004.
[36]   Machin, 2004.
[37]   EENEE, 2008.
[38]   UNEP, 2008.
[39]   Eurofound, 2008c, 'Trends and drivers of change in the EU transport and logistics sector: Scenarios', European Foundation for the Improvement of Living and Working Conditions, European Monitoring Centre on Change.
[40]   Nicaise, 2008.

climate change and environmental concerns are a new factor that may have a significant impact on our economies and labour markets.

Because the factors affecting skills demand are closely interrelated, and because the evidence available to measure their influences on each other and labour market demand as a whole is poor, it is difficult to assign weights to their relative importance. Improvements in data allowing for a better longitudinal and cross-sectional analysis of trends would yield insights that could in turn improve the reliability of forecasts and anticipatory measures.

Furthermore, there is a need to carefully assess the extent to which the relative influence of these factors in the past is a good guide to their future influence on the demand for skills. For example, the next generation of technological change could have different impacts compared with the advent of computerisation; the effects of globalisation and international trade could change as the BRIC countries themselves become developed; the continuing upgrading of the educational levels of the workforce could be associated with pressures for further but different changes in work organisation; and labour market institutions could have different influences, with for example more emphasis on creating good working conditions and opportunities for work–life balance, encouraging lifelong learning and prolonging working life than on monetary rewards.

Finally, aggregate labour demand could be affected by different developments, so there is a need to consider alternative scenarios in order to distinguish between the changes that are robust and those that may be affected by wider socio-economic developments. Furthermore, quantitative projections should be complemented by a more qualitative analysis of skills needs by sector, under different scenarios.

A need for higher education attainment levels

As a result of technological change, globalisation and new forms of work organisation, education requirements are increasing in all occupational categories — including those at the lowest rung of the occupation ladder. Following this trend, the quantitative projections published by Cedefop point to an increase of almost 18.7 million jobs at the highest education level (ISCED levels 5 and 6) and almost 13.3 million jobs at medium level (ISCED levels 3 and 4) (see box 2.2 above for details on methodology and data used). This would be offset by a sharp decline of almost 12.5 million jobs for those with no or low formal diploma(ISCED levels 0 to 2)[41]. As a consequence, higher education level will be required overall from the working population (see Figure 2.7).

---

[41]   CEDEFOP (2008), EU-25 data.

Figure 2.7: Past and anticipated employment shares by education attainment level
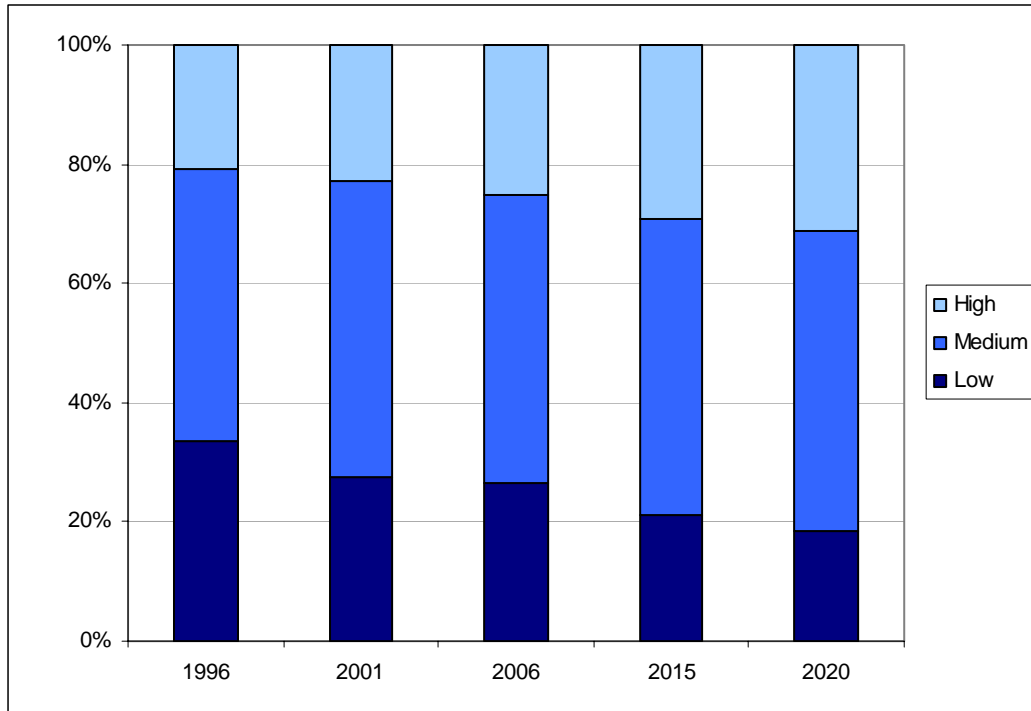
Source: CEDEFOP (2008), EU25

While there is no simple one-to-one relationship between occupations and formal qualifications, it is possible to explore how this is changing over time (see figure 2.8). The general increase in qualification levels across most jobs — including those at the lowest rung of the occupation ladder — can be the result of two phenomena. Firstly, underutilisation of skills may partly explain the shift to higher skills in jobs at the lower rungs. Secondly, the nature and skill requirements of jobs at these lower rungs are changing. They are more and more demanding[42] and require competences to deal with non-routine tasks.

---

[42]   Green, 2006.

Figure 2.8: Education requirements across occupations
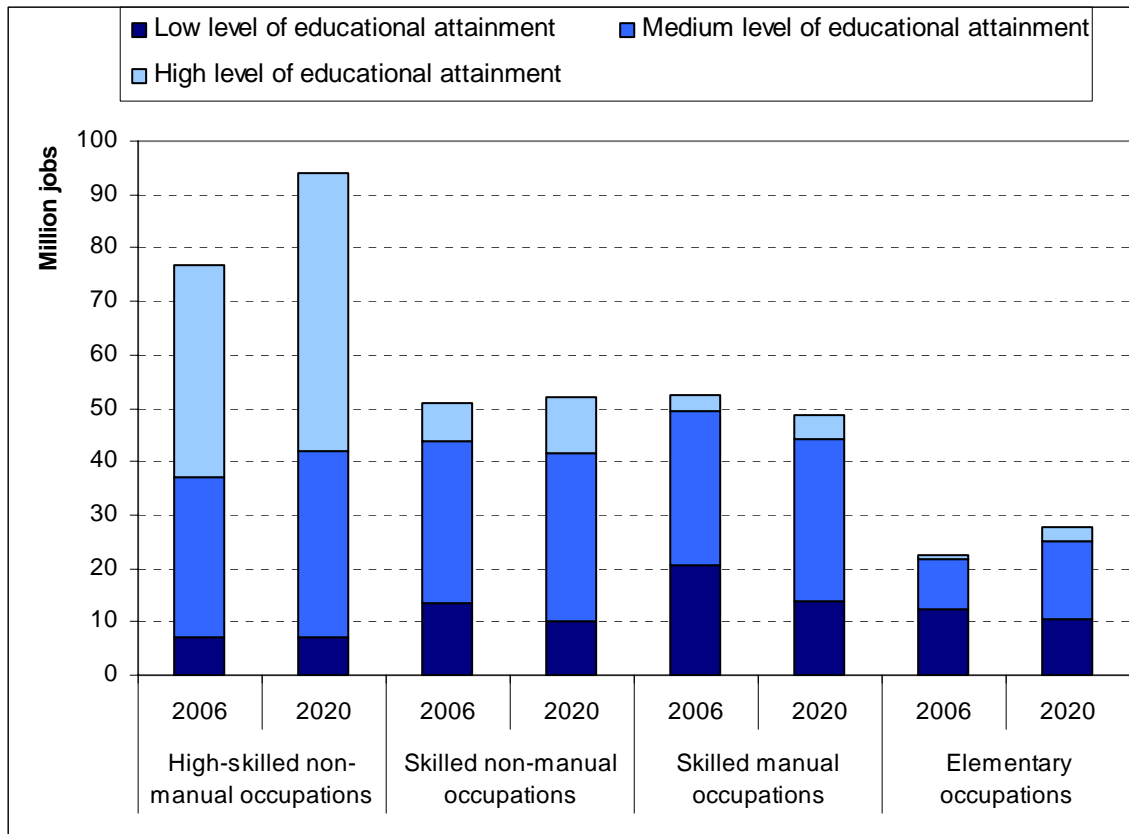
Source: Cedefop (2008)

Above the formal education attainment, it is possible to explore the evolution of skills, competences, knowledge and qualification (see box 2.1 for a clear definition of these differing but related concepts).

The crucial skills needed in sectors: qualitative analyses

As stated above, technological change and in particular ICT explain the shift towards higher skills[43]. Typical analytical and interactive tasks associated with ICT are hypothesis testing and formal and legal writing, but also tasks requiring 'soft skills' like persuading, selling or managing others. Demand for problem-solving and communication skills has increased, and these capacities are mainly found in the high-skilled workforce. Across Europe, the proportion of workers undertaking non-routine tasks is already very high (see Figure 2.9 below).

---

[43]   Autor et al., 2003.

Figure 2.9: Proportion of workers undertaking non-routine tasks

Proportion of workers (%)...
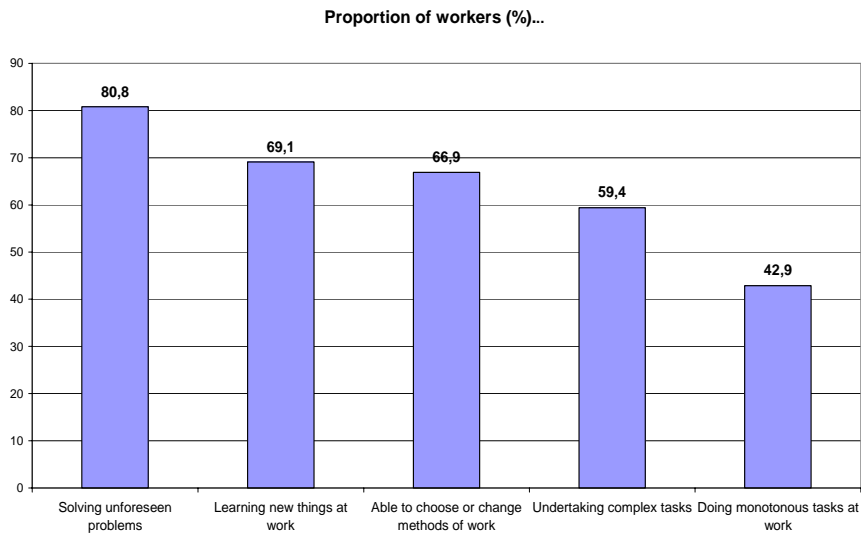
Source: European Survey on Working Conditions, 2005, EU-27
Note: workers can have several characteristics (figures not cumulative)

Further exploration of skills shifts in specific sectors and occupations using qualitative methods can provide a deeper understanding of the crucial skills required for labour market success. Several sectoral studies have been undertaken at European level. Studies by the CEDEFOP Skillsnet are already available for two specific sectors in Europe: tourism and nanotechnology. The project 'Work Organisation and Restructuring in the Knowledge Society' (WORKS), funded by the Socio-economic Sciences and Humanities programme under the Sixth Framework Programme of the European Union, has also studied how restructuring is changing occupations in the public sector and in the clothing, food, and IT sectors[44]. The European Foundation for the Improvement of Living and Working Conditions and its European Centre for Monitoring of Change (EMCC) have also studied trends in demand in specific sectors: biomedical healthcare, commerce, energy, textiles and clothing, transport and logistics, and childcare services. The European Community Programme for Employment and Social Solidarity (PROGRESS) also supports a comprehensive analysis of the evolution of jobs and skills in 16 sectors (including the automotive industry, textiles and clothing, and chemicals[45]).

A general trend towards demand for a broader portfolio of skills is perceptible across sectors. For example, the WORKS project confirms that designers or ICT researchers have to develop skills in marketing or management, software professionals have to develop skills in public relations, and logistics managers are developing a new professional work profile. This extension of skills beyond traditional occupational boundaries is very often left to the individual responsibility of the worker, through self-training or on-the-job training.

In knowledge-intensive and growing sectors such as nanotechnology and biomedical healthcare, there will be even greater demand for scientists skilled in more than just one area of research. The shortage of European scientists may hamper growth in these sectors and result in

---

[44]   All the outputs and conclusions of the project are available at: www.worksproject.be
[45]   See a detailed presentation of the methodology in section 2.2.

the relocation of knowledge-intensive activities[46]. The studies in this area[47] point to the urgent need to further develop scientific education and training with a particular stress on interdisciplinarity. As the number of companies that develop and manufacture nanotechnology and biotechnology products in cooperation with research institutes is growing, the demand for personnel qualified in both R&D and business is increasing. Managerial skills are also needed in addition to scientific knowledge.

In more traditional sectors such as the automotive sector, the commerce sector or the tourism sector, existing jobs will tend to change in terms of the skills and competences required. In the automotive sector[48], for example, emerging technologies and changing demand (greater diversity, urbanisation, pressure from energy prices, etc.) will increase the demand for skills in design, marketing, and research. The tourism[49] study has found that in order to face increasing competition in world tourism and keep its position as a favoured destination, it is crucial for Europe to respond to general trends, such as customised holidays or language and educational holidays. These require customer handling/service, a knowledge of foreign languages, skills to identify opportunities for cross-promotion and cross-selling, and communication and marketing skills. In sectors said to be declining, such as textiles, there will still be a great need for 'hard' scientists in order to develop and use new technologies that are more environmentally friendly and that will enable the industry to offer products tailored to the individual wishes of customers[50].

Across sectors, transversal and generic skills such as problem-solving and analytical skills, self-management and communication skills, linguistic skills, digital competences are more and more valued on the labour market[51]. Furthermore, the key competence of learning-to-learn, the skill for recognizing one's learning needs and finding opportunities for learning, is essential for everyone, in a changing economy where some jobs will disappear while others will appear. . From the REFLEX survey, there is evidence that graduates are expected to be more or less competent in at least the following five areas: professional expertise, functional flexibility, innovation and knowledge management, mobilisation of human resources, and international orientation. International mobility during studies is an added value for graduates and has a significant impact on labour market success[52]. There is still a need to acquire professional expertise, but training in a specific field of knowledge also provides a basis for building other, more general skills, such as communication or problem solving. It is a context in which more generic skills can be developed[53]. Surveys for the Tuning Educational Structures in Europe project also offer insight into perceptions of the competences needed by tertiary education

---

[46] Eurofound, European Monitoring Centre on Change (2008), 'The future of the European biomedical healthcare sector: Four scenarios'.
[47] See in particular CEDEFOP studies on the nanotechnology sector.
[48] 'Comprehensive Analysis of the Evolution of the European Automotive industry', Alphametrics, report produced for the European Commission, Lot 1 of Comprehensive Analysis of Emerging Competences and Economic Activities in the European Union.
[49] CEDEFOP (2005), 'Trends and skills needs in Tourism'.
[50] 'Skills scenarios for the textiles, wearing and leather products sector in the European Union', report produced for the European Commission, Lot 2 of Comprehensive Analysis of Emerging Competences and Economic Activities in the European Union.
[51] Dickerson and Green, 2004; Kriechel and Pfann, 2005.
[52] 'Learning Mobility, an Opportunity for all'; report of the High-level Expert Forum on Mobility; Evaluations of Erasmus studies.
[53] Cf. conclusions of the REFLEX project, Allen and van der Velden (2007).

graduates, including to what extent and in which areas the perceptions of students, graduates, academics and employers coincide or diverge. They all agree that the ability to apply knowledge in practical situations is very important, as are the abilities to identify, pose and resolve problems and to communicate both orally and in the written word. In contrast, employers rate the ability to work in a team as very important, whereas academics and students do not pay too much attention to teamwork ability.

2.2.2. *Rising inequalities as a consequence of shifts in skills demand?*

Occupation trends: a polarisation of jobs?

Sectoral changes will have significant implications for the occupational skills needed in the future. These will be reinforced by changes in how work is organised and how jobs are performed within sectors. Currently, almost 40% of people are employed in higher-level jobs such as management, professional work, or technical jobs. An increase is projected in these higher-level jobs, but also for some jobs in 'elementary' occupations. In contrast, there would be fewer jobs for skilled agricultural workers, clerks and craft workers. Changing sector and occupational structures may lead to some job polarisation (i.e. job growth at the higher and lower levels with demand for jobs in the medium-level occupations falling somewhat).

New technologies often cannot replace 'non-routine' work typically done by low-skilled workers. 'Non-routine' tasks also cover things like truck driving or bibliography searches, services typically delivered by the low-skilled. 'Routine tasks' involving repetitive and predictable work, however, have usually been replaced by automation and computerisation. These tasks include calculation work or repetitive costumer services that have in the past been undertaken by middle-skilled workers. New technologies (especially ICT) not only increase the productivity of high-skilled workers but also eliminate work traditionally done by intermediate-level occupations. Therefore, technological change (especially ICT) and organisational change can partly explain the job polarisation phenomenon.

European evidence tends to confirm the increasing demand for non-routine tasks at the lower and higher rungs of the jobs ladder. In the UK for example[54], there has been a growth in high- and low-wage jobs where it has been difficult to replace human capital by machines or computers over the last few decades. Non-routine manual tasks done by hairdressers or kitchen porters are as much in demand as non-routine cognitive and interactive tasks performed by care assistants or software engineers. Routine-task jobs, normally found in the middle of the wage distribution, have however decreased. Data from Germany also show that since the end of the 1970s occupations requiring routine manual or clerical skills have declined considerably whereas jobs needing interactive and non-routine skills have experienced the highest growth rates[55]. The French report on occupations in 2015 by the "Centre d'analyse stratégique" emphasises that job polarisation is strongly associated with the expansion of the service sectors. This means that job increases, for both the low- and high-skilled, are mainly to be found in these sectors. The routine-task jobs of the middle-skilled that have been eliminated by the adoption of new technologies have predominantly been in the manufacturing sector. A number of national studies thus corroborate the job polarisation hypothesis.

---

[54]   Goos and Manning, 2007.
[55]   Dustman et al., 2007; Spitz-Oener, 2006.

While polarisation exists in some countries it is not a uniform phenomenon across Europe, as employment change has also involved upgrading and growth in the middle occupations in some countries. The recent report of the European Foundation for Living and Working Conditions entitled 'More and better jobs: Patterns of employment expansion in Europe'[56] highlights five categories of change: polarisation (evident in CY, FR, HU, NL, SK); hybrid polarisation / upgrading (AT, BE, DE, SI, UK,); upgrading (DK, FI, IE, LU, PT); hybrid upgrading /growth in the middle (CZ, ES, IT, SE); and growth in the middle (EE, EL, LT, LV). Few countries are thus experiencing a clear job polarisation.

Furthermore, in intermediate occupational categories where job losses are projected, these losses are more than offset by the estimated need to replace workers leaving the labour market. Figure 2.10 illustrates that, despite a net loss of skilled manual jobs, close to 20 million jobs will still need to be filled in this category. Many of those intermediate occupations will remain crucial components of the economy and viable sources of jobs, but the nature of these jobs and their skill requirements will change.

Figure 2.10 Decreasing demand for skilled manual occupations
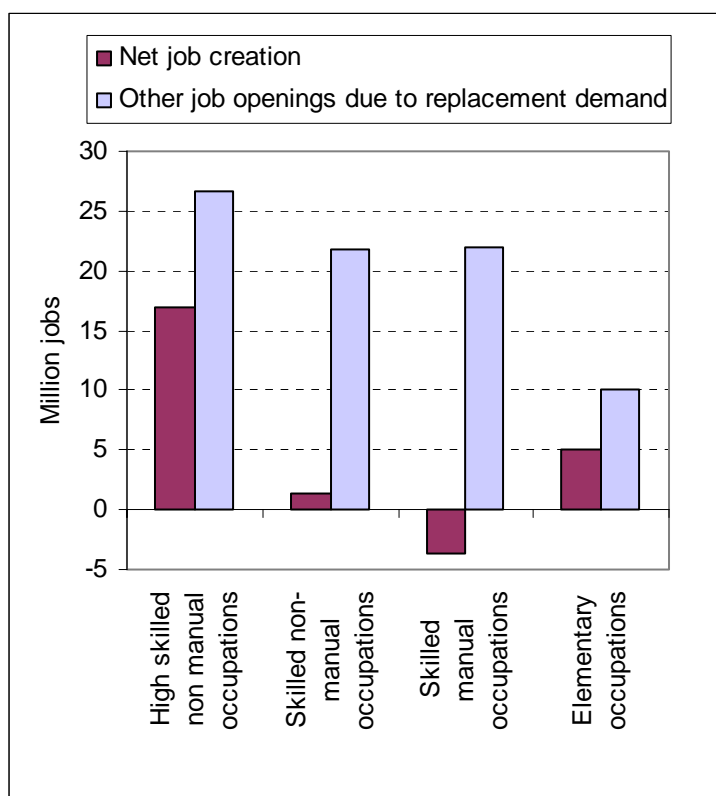
Source: CEDEFOP (2008). Data cover EU 25.

Wage inequality as a consequence of skills demand shifts?

---

[56]   Eurofound, 2008d.

There has been an increase in wage inequality in Europe during the last few decades. Certainly, measurements of wage inequality should always be considered in the light of the transfer and tax systems of the respective economies. But the patterns of wage inequality also reflect job polarisation and shifts in skills demand. Bottlenecks in segments of the labour market may exert upward pressure on wages for workers where demand exceeds supply.

Various studies provide evidence of an increase in the wage premium for high-skilled workers during the last four decades, though not for all countries nor across the whole time period[57]. The rising ratio of high-skilled people coincides with an even higher demand for their skills on the labour markets, so earnings differentials between low- and high-educated workers have been increasing. The labour income share of unskilled workers has decreased both in Europe and in the USA, while the share of high-skilled workers has increased (see Figure 2.11). In Europe, the results for the medium-skilled are more mixed. In the USA, the income share of the medium-skilled has clearly decreased. In this case, the potential impact of job polarisation is illustrated by the convergence of the wages of the middle-skilled and the low-skilled workforce. Middle-skilled workers have thus lost ground in relation to the high-skilled and their convergence towards the low-skilled is reflected in the wage distribution[58].

It is crucial for the assessment of future skill needs whether or not relative demand shifts towards the high-skilled really are persistent and can explain increasing wage inequality and/or unemployment. Technological change explains a substantial part of these trends[59]. Recent studies, however, mostly agree that there are also other factors inducing wage inequality. They argue that the observed wage patterns are not necessarily the result of a relative shift in skill prices but can also be explained by the changing composition of the workforce[60]. The argument is that there are considerable wage differentials within skill groups. Hourly wage dispersion is typically higher among the group of high-skilled workers than in the low-skilled group. The wide variations in the earnings of workers with a higher education level may be due to many factors. Intrinsic ability or even effort could matter more within this group than among the lower-skilled. Moreover, within given skill groups work experience reduces earnings dispersion, meaning that an older workforce could also lower wage inequality.

Lastly, lower wages at the bottom of the job ladder in the service sector raise the issue of the recognition of competences and skills necessary for these jobs. As stated above, these jobs require dealing with non-routine tasks and are more and more demanding[61], which would need to be rewarded. The recognition (including financial recognition) of the skills required in the service sectors is closely related to the issue of gender equality on the labour market, as the majority of jobs in the service sector are held by women[62].

---

[57]   EENEE, 2008.
[58]   EENEE, 2008.
[59]   European Commission, 2007.
[60]   See Autor et al 2005, Dustman et al. 2007; Lemieux 2006.
[61]   Green, 2006.
[62]   Conseil d'analyse stratégique, 2007.

Figure 2.11: Income share by level of skill

Chart 31: Share in total labour compensation in Europe (10 Member States)

Chart 32: Share in total labour compensation in the United States
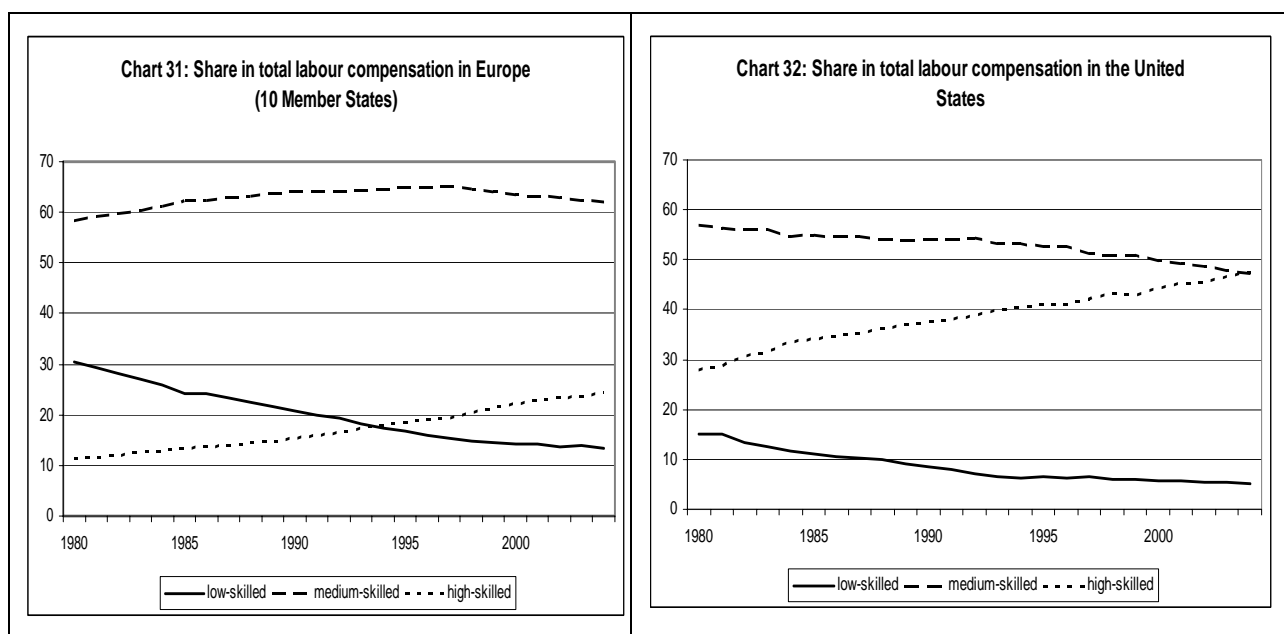
Source: EU KLEMS[63] database and European Commission, 2007.

Note: the 10 countries for which the data are available are BE, DK, DE, ES, FR, IT, NL, AT, FI and UK.

To sum up, while job polarisation is perceptible in some Member States, the current trends point towards increasing labour market requirements, including higher formal qualifications, but also a need for job-relevant skills (non-routine skills, analytical skills, communication skills, etc.). To assess the risk of skills mismatches, these trends in skills demand have to be compared with the current trends in skills supply.

2.2.3.   Skills matches and mismatches

Educational upgrading

In addition to the quantitative evolution of the labour supply, qualitative trends are also perceptible. Currently, the EU employed population aged 15 to 74 years with tertiary education level is 56.7 million, while there are 107.4 million people in employment with ISCED level 3 and 4, and another 53.5 million with ISCED levels 0 to 2[64]. Overall educational attainment rates have increased in recent years, as compulsory schooling has expanded in many countries and older age cohorts (with lower education levels) are retiring from the labour market. Increasing graduation rates from tertiary education across European countries indicate that this process is ongoing and widespread. In almost all countries, the proportion of the population with tertiary education level is much higher among the younger than the older cohorts (see Figure 2.12). As a consequence, the proportion of the working-age population with low educational attainment is

---

[63]   The EU KLEMS project "Productivity in the European Union: A Comparative Industry Approach" was funded by the Socio-economic Sciences and Humanities programme under Sixth Framework Programme of the European Union. All the outputs and conclusions of the project are available at: www.euklems.net

[64]   Source: Eurostat, LFS.

decreasing (see Figure 2.13). This educational upgrading of the European population implies that there will in future be a higher supply of workers with higher education levels.

Figure 2.12 Percentage of persons with tertiary qualifications by age (2007)
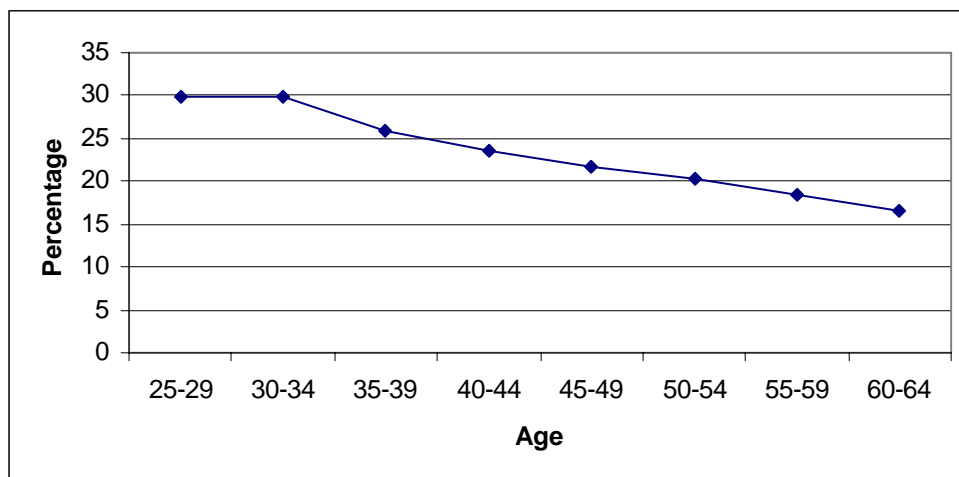
Source: Eurostat (LFS), from European Commission (2008a), Progress Towards the Lisbon Objectives in Education and Training. Indicators and benchmark — 2008

Figure 2.13 Percentage of persons having attained a tertiary education level, 15-64 year-olds
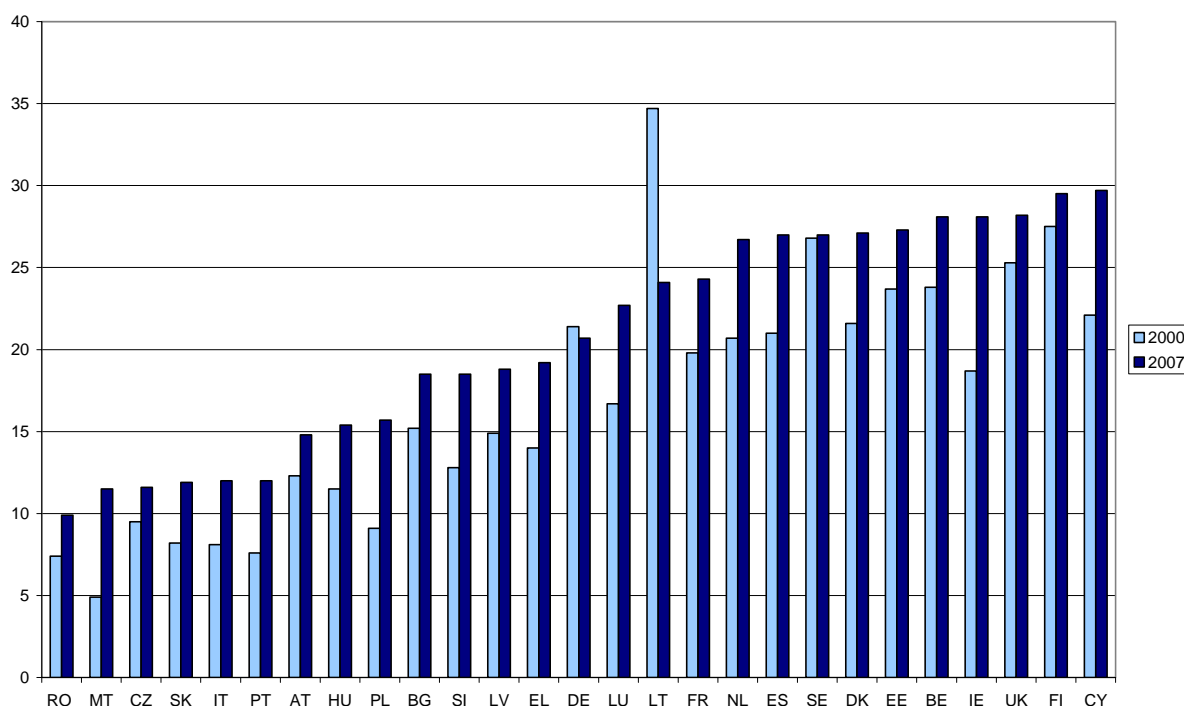
Source: Eurostat (LFS), from European Commission (2008a), Progress Towards the Lisbon Objectives in Education and Training. Indicators and benchmark — 2008.

Trends in skills acquired over and above formal educational attainment can be measured by surveys. For competences in reading, mathematics and science, data are provided by the OECD PISA survey. According to this survey; the number of low achievers in reading in the EU increased from 21.3% in 2000 to 24.1% in 2006[65]. However, a majority of countries (13) reduced their share of low-performing students in mathematics between 2003 and 2006. Furthermore, the teaching of foreign languages in lower and upper secondary education is strongly increasing. Therefore, trends are not obvious, with improvements in acquiring skills, but also deterioration in such a basic skill as reading.

Changes by fields of study are also observed. For example, the number of graduates in maths, science and technology has increased (686 000 in 2000 and 872 000 in 2006). But gender segregation by field of study and occupational training is changing very slowly. At EU level, the female share of math, sciences, and technology graduates increased slightly from 30.8% in 2000 to 31.2% in 2005[66]. This may result in shortages in scientific and technical skills required by the labour market.

The digital competence, the skill for confident and critical use of ICT, is now taught, but progresses are insufficient. ICT is both a topic and a new means for learning new skills for new jobs, providing multiple routes and tools for learning within organized education and through informal peer support with internet-based networking approaches[67]. The opportunities of new technologies have been recognized within educational institutions, but the extent of how business, services and jobs have transformed through ICT is not yet reflected in educational systems. Recent Commission Staff Working Paper encourages member states to deploy ICT for pedagogical, technical and organizational innovation in developing lifelong learning[68].Lastly, participation in lifelong learning has increased slowly, but relatively few countries are moving towards making lifelong learning a reality (Denmark, Sweden and the United Kingdom, along with Norway and Iceland)[69]. In these countries, the transition from education to work and back again may occur more often in an individual's life cycle.

The upgrading trend observed among the younger cohorts may only partly respond to the skills needs in the labour markets. 70% of the labour force in 2020 have already left the education system and are already working. Therefore, to avoid qualitative imbalances in the labour market, lifelong learning is required. ICT have an important role to play in developing learning opportunities for older people in an ageing society. In this respect; a recent report from IPTS points to both obstacles (e.g. not user-friendly ICT) and opportunities: new social networks and communities emerging with technologies provide opportunities for learning and upgrading these skills with the support of peers, even for groups under risk of exclusion, such as senior workers[70].

---

[65] See Progress toward the Lisbon objectives in education and training. Indicators and benchmark 2008, and OECD (2007), PISA 2006: Science Competencies for Tomorrow's World.

[66] Progress toward the Lisbon objectives in education and training. Indicators and benchmarks 2008.

[67] IPTS EUR report 22218

[68] SEC(2008) 2629 final

[69] Progress toward the Lisbon objectives in education and training. Indicators and benchmarks 2008.

[70] IPTS report 23414

A risk of skills mismatches?

On top of quantitative imbalances, education and skills mismatches occur when there is a difference between the skills a worker provides and the skills necessary for the job. In particular, working in a job below an individual's level of skills limits individual productivity and leads to 'underutilisation of education'.

Mismatches are usually explained by information asymmetry between employers and employees, incomplete information on the labour market, heterogeneity among agents, and transaction costs[71]. Job matching is particularly affected by problems of incomplete information and transaction costs. An individual looking for a job will not have full information about the job, and a firm wanting to fill a vacancy will not have full information about the individual, and both parties will have to devote resources in order to search for a job and select among candidates, respectively. These imperfections result in the simultaneous existence of unemployment and vacant jobs in equilibrium, but also the existence of skills mismatches.

Measuring 'underutilisation of education' is a rather difficult task and most of the approaches do not deliver satisfactory results. For empirical research, skill mismatches are normally measured using either 'objective' or 'subjective' definitions[72]. Subjective measures rely on what individuals report themselves on the utilisation of skills. Normally, workers are directly asked whether they feel under- or over-educated or what the minimum educational requirements are for the job. Sometimes they have to answer whether 'their current job offers sufficient scope to use their knowledge and skills'. The 2005 European Survey on Working Conditions provides a broad picture, by asking a question about current skills and job matching: only 52.3% of workers declare that 'their duties correspond well to their present skills'; 13% 'need further training to cope well with their duties'; 34.6% estimate that they 'have the skills to cope with more demanding duties' (with differences between countries, see Figure 2.14). From graduate surveys, there is evidence that at individual level supply does not always match demand. According to the REFLEX project for example, some 10% of graduates indicated that their own competence level was lower than that required of them in the job and around 15% reported that their competence level exceeded the requirements of their current position.

More objective measures usually compare the years of schooling attained by a worker with the average level of schooling within the worker's occupation. Others look at the educational level of the worker and compare this to the requirements of a specific job. However, apparent mismatches between occupations and formal education attainment may reflect ability differences between workers with the same level of formal education[73].

---

[71] Borjas, 2008; Cahuc and Zylberberg, 2004.
[72] Groot and Maassen van den Brink, 2000.
[73] Sloane, 2003; EENEE, 2008.

Figure 2.14 Skills mismatches: a subjective measure
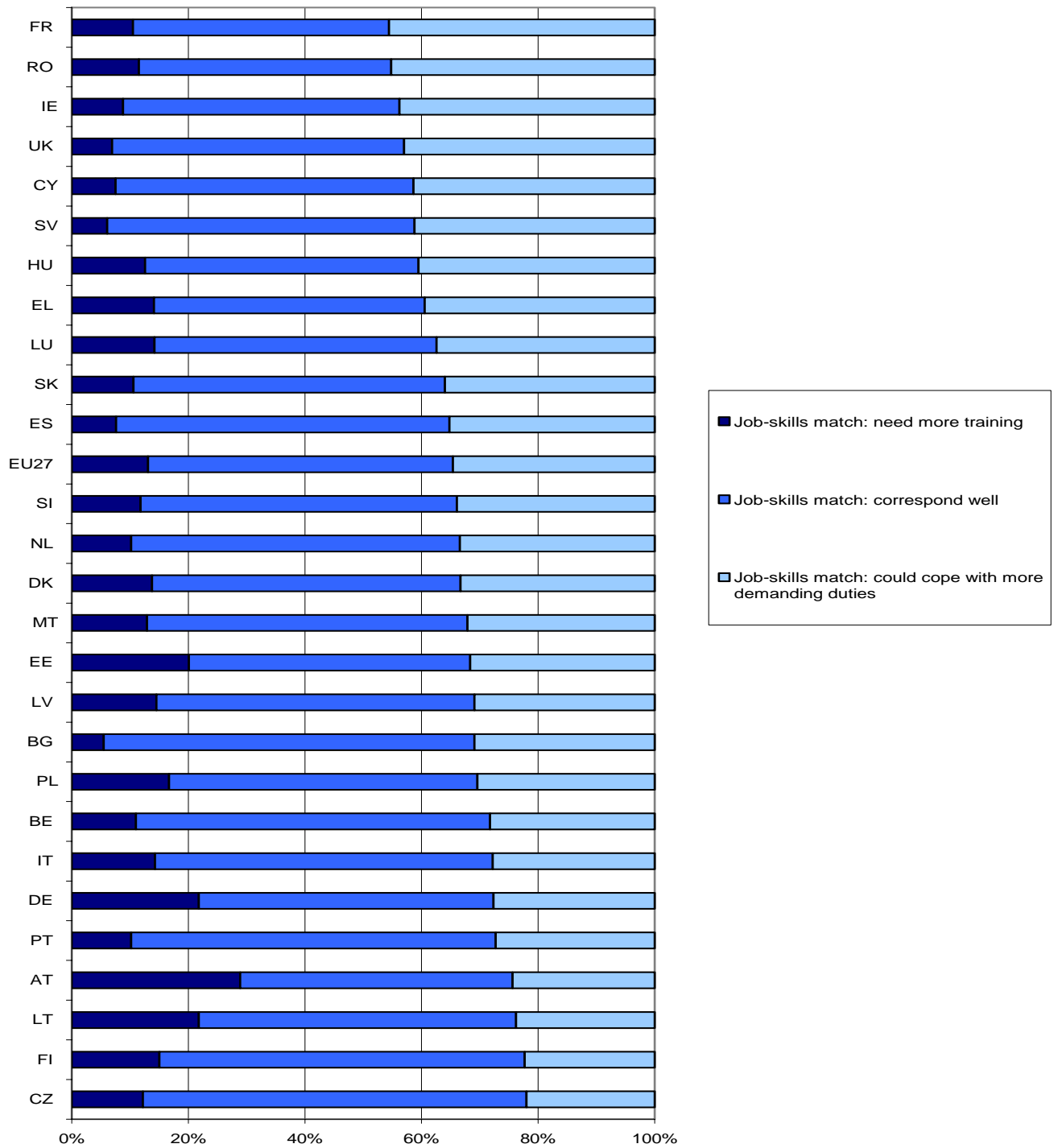
Source: European Survey on Working Conditions (2005).

Empirical evidence usually considers the wage differentials and differences in job satisfaction that are due to mismatches. 'Underutilisation of education' has an overall effect on productivity levels as the allocation between jobs and workers is not efficient. On the other hand, individual

outcomes such as wages and job satisfaction can be affected as over-educated workers are not paid according to their marginal productivity, and do not feel satisfied in jobs that do not correspond well to their competences.

Besides theories that consider skill mismatches as a persistent phenomenon, other arguments indicate that it is more a transitional problem. Analysis suggests that there are different ways for workers to accumulate skills over the life cycle (e.g. formal education, vocational training, and work-related experience), which combine with different ways of gaining access to employment. Young workers may be assigned to jobs that do not coincide with their formal education because they lack experience. As they get older they become more productive and the temporary 'underutilisation of education' disappears[74]. This so-called 'waiting-room effect' implies that differences in demanded and available skills diminish over the life cycle. That is why perceived skill mismatches are often observed for young graduates. People accept jobs that do not match their educational level but can make up for their initial lack of work experience[75]. This suggests that while 'underutilisation of education' is a reality, it is only a temporary phenomenon that can be overcome by upward mobility on the labour market or inside the firm. Such transitional discrepancies primarily relate to a lack of ICT skills among young graduates at the beginning of their working career. However, underutilisation of education remains a persistent phenomenon for migrants in some countries[76]. As a result, labour markets tend to make inefficient use of the potential of immigration to help fill skills gaps.

Lastly, one could consider whether observed skill mismatches, if reliably identified, are rather the result of 'wrong education' than of 'underutilisation of education'. Evidence shows that working in another field increases skill mismatches even though the level of education is perfectly matched[77]. One important conclusion of the report on the REFLEX project by Van der Velden and Allen is the significant role of professional expertise as a determinant of labour market success. They also present consequences of these skill mismatches for wages and show different effects for different fields of study. However, they are far away from presenting any reliable patterns that could be used to derive implications for specific fields of education or study. Furthermore, employers differ in the importance they attach to fields of study. Empirical evidence highlights the existence of different 'modes' or 'pathways' for access to employment across sectors or occupations[78]. In some sectors and in some occupations, the field of study is less important for employment success.

This section provides a first estimation of existing mismatches between labour demand and supply. These mismatches are likely to both continue and change in character as a consequence of the key trends described above. Labour demand and skills needs are changing both quantitatively and qualitatively; labour and skills supply are changing too. This situation increases the need for anticipatory mechanisms so that policies for education and training and active labour market measures can be well informed, but also increases the challenges for making valid forecasts.

---

[74]   Alba-Ramirez, 1993.
[75]   Allen and de Vries, 2004.
[76]   Fernandez C. and Ortega C, 2008.
[77]   Allen and deWeert, 2007.
[78]   See Employment in Europe 2008, chapter 5.

3. **ANTICIPATION AND MATCHING: AN EVALUATION OF EXISTING PRACTICES AT NATIONAL AND INTERNATIONAL LEVEL**

This section examines existing practices in anticipating future skill needs and matching policies. Firstly, it presents international experience and the experiences in European countries. The section then moves on to consider matching policies and successful measures adopted in response to identified problems and issues.

3.1. **Mapping and evaluation of anticipatory tools at international level and in European countries**

This section examines the methods, approaches and tools used for anticipating skill needs. It is based on two main sources: CEDEFOP's Systems for anticipation of skill needs in the EU Member States, 2008, and the questionnaires completed by the SYSDEM correspondents. Where appropriate, responses to Eurydice questionnaires are used to illustrate country situations.

The practices identified in this section cover both international experience and the experience across European countries. The section then concludes with an overview of emerging holistic practices and the issues arising from the review of anticipatory tools.

3.1.1. *Measuring skill shortages*

Defining and measuring skill shortages has proved a difficult issue and there is no generally accepted measure (for a recent review see the latest report by the UK Migration Advisory Committee)[79]. The most commonly used indicators are:

- unfilled vacancies (and various related indicators), which are seen as reflecting problems in obtaining skills from the external labour market; and

- skills gaps, which reflect a lack of skills among those currently employed (reflecting skill deficiencies in the internal market).

Information on unfilled vacancies can be obtained from administrative sources. In many countries, public employment services maintain databases of this kind. However, while comprehensive for some kinds of jobs, they tend not to be representative of all employment, especially not for higher-level vacancies, which are often advertised through private rather than public agencies.

The lack of reliable vacancy statistics in most Member States means that alternative qualitative and quantitative methods, typically employer surveys, are used to measure skill and labour shortages. In a number of countries, surveys of employers have been used for a number of years to measure current imbalances in skills demand and supply. The National Employer Skills Surveys conducted for England over the past decade provide a good example of this approach

---

[79] Migration Advisory Committee (2008), Skilled, Shortage, Sensible: The recommended shortage occupation lists for the UK and Scotland. Migration Advisory Committee. ISBN: 978-1-84726-823-5 (www.ukba.home office.gov.uk/mac).

(Box 3.1). Similar surveys have also been conducted in other parts of the UK and elsewhere in Europe.

CEDEFOP's analysis of the surveys conducted indicates that while the types of questions asked in these surveys are similar, the structure, sampling techniques and methods of data collection vary, so the results are not comparable. Employer surveys are discussed in more detail in section 3.2.3.

Box 3.1: National Employer Skills Surveys (England)

These surveys have been conducted since the late 1990s following the recommendation of the UK National Skills Task Force that better measures of current skills imbalances were needed on a regular basis. Their main objectives are to quantify the scale and patterns of both internal and external skill deficiencies. They have been undertaken biennially since 2001, using broadly similar methods.

National-level surveys (over 70 000 employers) provide representative data by sector, occupational and geographical areas, at a quite detailed level of aggregation. Data are based on large-scale telephone surveys of employers (HR departments), using a structured questionnaire.

The National Learning and Skills Council is the responsible organisation. The surveys provide regular updates on the scale and patterns of skill deficiencies. In many cases, the shortages appear to be ephemeral (as might be expected if markets adjust to deal with imbalances). In some cases there are persistent problems (often in parts of the economy where market mechanisms are not working freely).

This tool provides useful guidance to policy makers and individual labour market actors about problems.

3.1.2.   Quantitative model-based projections

International experience

Forecasting the changing demand for skills has now been a regular feature in some countries for well over half a century, and for many decades in a number of others. The Bureau of Labor Statistics (BLS) in the USA was one of the pioneers of labour market projections. Originally introduced to help guide the transition of servicemen back into civilian employment following wartime service, the BLS projections are now undertaken with the aim of producing useful labour market information that can help to guide the decision-making of all those involved in the labour market (Box 3.2).

Box 3.2 Projections by the US Bureau of Labor Statistics

The BLS projections produce detailed projections of employment by sector and occupation in order to guide decision-making by policy makers and others. The first projections were published in the 1950s. They are now conducted biennially.

The use of a detailed multisectoral macroeconomic model produces very detailed quantitative projections of employment by industry and occupation, for the whole of the USA and other

geographical sub-areas, over the medium and long term.

These projections are freely distributed and used by others to develop other products and services. The USA is a market-driven economy and the work of the BLS is designed to help the labour market to work by providing participants with regular information about trends and possible future developments. The results are not intended for mechanistic planning purposes. They are complemented by other activities, including the Occupational Employment Statistics survey and the O*NET system for monitoring changing skill needs within occupations.

CEDEFOP's work on skills forecasting provides a European / international example of medium- to long-term skills forecasting. The CEDEFOP intends to produce regular forecasts of skills needs in Europe over a 5-10 year horizon. Work has already started with preliminary projections being published. This work should produce evidence on future labour-market demand for skills as measured by occupations and qualifications. In addition, it will involve comparisons between skill supply and demand to indicate possible imbalances on the labour market and an evaluation of projections against outcomes. It will provide an enriched knowledge-base on future skill needs in the European labour market for evidence-based policy making, improved labour market intelligence and informed counselling and guidance services.

The European Commission has sponsored other quantitative projections and modelling. As an example, the Institute for Prospective Technological Studies (IPTS) has also analysed the impact of technological change on employment and skills structure using quantitative projection[80]. IPTS has also developed alternative scenarios about the increases in R&D and innovation expenditures (more diversified or more concentrated on some sectors).

European experience: medium- and-long term forecasting activities

A range of medium- and long-term forecasting activities of different types are being carried out across Europe[81]. For the forecasts shown in Table 3.3 in Annex 1[82], which are illustrative of the types of activities undertaken, the forecast period varies, with the medium-term forecasts looking around five years[83] ahead while the long-term forecasts look further forward (a minimum of 10 years). In most cases, however, countries also produce a short-term profile showing how things are expected to evolve year on year.

In countries where medium- and long-term forecasting methods are not apparent, short-term 'forecasting', other surveys, studies and qualitative methods are typically adopted. Short-term forecasting complements medium- and long-term forecasts in some countries whereas it appears to be the only method used in others[84].

European experience: the orientation and scope of quantitative projections

---

[80]   See IPTS (2002) for example.
[81]   CEDEFOP's Towards European skill need forecasting (2007), Systems, institutional frameworks and processes for early identification of skills (2007), Systems for anticipation of skill needs in the EU Member States (2008, draft version); SYSDEM responses.
[82]   Based on the SYSDEM responses.
[83]   Forecasts referenced here are regional forecasts.
[84]   Based on analysis of the SYSDEM responses.

Table 3.3 in Annex 1 highlights the varied nature of forecasting activities, their purpose and scope. What is done is heavily dependent on the statistical infrastructure available in each country. More sophisticated and more quantitative approaches are only feasible where the state has made a substantial prior investment in data (i.e. National Accounts, input–output information, and consistent time series on employment and other key indicators are available). Although just one example is given in most cases, a range of activities are frequently performed (see section 3.2.5).

Forecasting activities can be demand-oriented[85], but in some cases have both a supply and demand dimension[86]. In two countries, Denmark and Germany, forecasting activities examine flows through and out of education (schools and higher education).

In terms of the scope of forecasting activities, most of those shown in Table 3.3 (in the Annex) are driven by national forecasts of employment by sector[87], which in some cases also include a regional dimension[88]. Most activities include occupational forecasts[89], others focus on educational levels or groups[90], while some do both[91].

European experience: developing and introducing frameworks for forecasting

Where there is little or no previous experience of forecasting, mechanisms are now being put in place to anticipate future skill needs (HR, LU). ESF funding has historically been used to support the development of forecasting methods (ES, FI and IT). Indeed in Finland, where there is a long tradition of quantitative forecasting, activities expanded and diversified following accession in 1994 with ESF support.

The UK helped to organise a series of international symposia and workshops in the 1980s, which resulted in an exchange of ideas between countries with well-established systems (e.g. FR and DE) and others just beginning to develop their systems (e.g. IE and NL). Subsequently, there has been a further diffusion of ideas and best practice from these countries to others. For example, the Research Centre for Education and the Labour Market (ROA) at Maastricht University works with CERGE-EI to develop forecasting in the Czech Republic, and Ireland is working with other countries in Eastern Europe to help them to establish practical and useful systems for skills needs anticipation. Many of these initiatives have been under the auspices of Cedefop.

More recently, as part of the Mutual Learning Programme of the European Employment Strategy (formerly known as the Peer Review programme), a general review of approaches to skills needs assessment was undertaken at a Peer Review meeting in Finland (Helsinki). This looked at the Finnish approach to forecasting skills and labour market needs and considered the lessons to be learned from a number of other countries[92]. The Lisbon agenda and EU-level

---

[85]   AT, CY, FR, IE, IT, LT, PL, UK.

[86]   AT, CZ, DK, EE, FI, FR, LT, LV, NL, NO, PL, RO, SE, UK, DE. Countries can appear in more than one category where multiple forecasting activities are identified.

[87]   E.g. AT, CY, EE, FI, FR, IE, IT, LT, LV, NL, NO, SE, UK.

[88]   AT, FI, FR, IE, IT, LT, NL, PL, SE, UK.

[89]   AT, CY, EE, FR, IT, LT.

[90]   DE, DK, FI, NO, PL, SE.

[91]   CZ, IE, NL, RO, UK.

[92]   For further information see the website: http://www.mutual-learning-employment.net. The final report is at: http://pdf.mutual-learning-employment.net/pdf/finland06/Summary%20report.pdf.

initiatives have contributed to the development of systems for the identification and anticipation of skill needs.

3.1.3. *Surveys*

Employer surveys

There are no international surveys directly concerned with the assessment and anticipation of skill needs. Cedefop has reviewed what is available recently and concluded that there is little prospect of any immediate harmonisation of individual country surveys[93]. The SYSDEM responses point to a number of employer surveys of various types, which are presented in Table 3.4 in Annex 2. These surveys provide an illustration of the types of survey activities undertaken, though cannot be considered a complete overview of such activities. In line with CEDEFOP's findings, the scale and scope of the surveys conducted vary as do the methodologies adopted. There are potentially many different interests and possible foci for such a survey at pan-European level. These include surveys to monitor and measure:

- changes in historical employment structure (the demand for skills);

- possible future skill needs;

- current skill shortages and skill gaps (including various job vacancy surveys);

- recruitment practices;

- adaptation to change;

- links between skills and performance;

- continuing vocational training;

- different aspects of skills (such as key, core and generic skills).

One employer survey cannot meet all these needs. There is a need to focus on what are the key questions to which answers are needed. What is most useful in terms of anticipating changing skill needs will depend on the different approaches adopted to anticipate skill needs as well as the state of the existing statistical infrastructure.

The main method used across the world for projecting future skill needs relies on quantitative analysis, based on formal econometric models. However, good basic data on occupational employment structure are an essential prerequisite for building such models. The use of employer surveys as an alternative to such quantitative methods is now being debated[94]. If the prime objective is anticipating future skills needs, then it might appear that focusing on this is the obvious choice. However, past experience suggests that employers are not very good at

---

[93]   see Wilson, 2008b.

[94]   For example at the joint Cedefop OECD workshop on the use of employer surveys, May 2008.

anticipating their future skill needs[95]. Such results have usually turned out to be biased and inconsistent.

Indeed, employers can be either too concerned by their own company and their local constraints, or find it difficult to analyse the key factors, both backwards and forwards, and to describe possible options, their more likely strategies and occupational consequences. This points to the need to organise sector councils where a genuine and collective discussion can be held, and where consensual positions can be expected, based on clear arguments that all other prospective models, especially the statistical ones, usually conceal.

However, surveys of employers in many countries are a key element in helping to anticipate changing skill needs. Such surveys can provide crucial insights into current trends, as well as providing the basic data for building quantitative models to help anticipate future change.

There are a number of examples of good and useful practice. In particular, the Occupational Employment Statistics survey (OES) conducted by the Bureau of Labor Statistics in the USA stands out as delivering robust and very detailed data on both employment and pay, which are highly valued by users. The OES started in 1968 and has gradually established a very sound statistical base to build a whole range of modelling and monitoring activities, including the anticipation of changing occupational structures as carried out by the BLS. One of its prime supporters from a financial perspective is the agency responsible for monitoring immigration flows. The survey provides crucial information on changing patterns of demand, as well as wages, which can be used to help identify occupations where there is a case for allowing inward migration. The availability of data on pay (as well as numbers) provides the basis for analysing substitution effects and developing growth accounting models.

Surveys among workers, learners and graduates

To assess trends in skills supply and occupations, some cross-country surveys among learners and workers are also relevant, including the Labour Force Survey and the European Survey on Working Conditions conducted every five years by the European Foundation for the Improvement of Living and Working Conditions. Both surveys provide a rich supply of pan-European labour market information.

A new OECD initiative, the Programme for the International Assessment of Adult Competencies (PIAAC), will assess the level and distribution of knowledge, skills and attitudes in a coherent and consistent way across countries. PIACC, which will be administered for the first time in 2011, will focus on the key cognitive and workplace skills that are required for successful participation in the economy and society. To achieve this goal, four areas of competency will be assessed — problem-solving in a technology-rich environment, reading literacy, numeracy, and mastery of the basic building blocks of literacy. Data from PIAAC will allow investigation of the links between key cognitive skills and a range of demographic variables, economic and other outcomes as well as the use of skills in the workplace and other settings. It is expected to provide a rich evidence base for policy-relevant analysis. In particular, data from PIAAC should facilitate a better understanding of labour-market returns to education, identify the role cognitive skills play in improving the labour market prospects of at-risk

---

[95]   See the review in Wilson, et al. (2004).

populations, and examine the efficiency of matching the skills possessed by individuals with the skills demanded in the workplace.

Less related to labour market needs, PISA (Programme for International Student Assessment) and AHELO (Assessment of Higher Education Learning Outcomes) can nevertheless provide insights into trends in skills supply. Every three years, PISA assesses the knowledge and skills of 15 year-old students. It can track changes in reading, mathematics and scientific competences that are useful in daily life. AHELO can help in monitoring reforms and evaluating higher education institutions, by measuring learning outcomes and the 'added-value' provided by these institutions. However, AHELO is still at a very preliminary stage, since the feasibility study is not expected until the end of 2010. According to Eurydice responses, surveys among graduates and learners are also widespread at national level. Mostly, however, they do not assess learning outcomes, but labour market outcomes[96].

At European level, the surveys undertaken for the Tuning project aim to obtain the opinions of graduates, academics and employers on skills requirements, curricula and learning outcomes. Such consultation has been undertaken twice on quite a large scale. Every university participating in the surveys had to select graduates, academics and employers known to hire graduates of the university, and ask them to fill in a questionnaire on the importance of a list of competences and the level of achievement in these competences:

- instrumental competences: capacity for analysis and synthesis, capacity for organisation and planning, basic general knowledge, grounding in basic knowledge of a profession, oral and written communication in one's native language, knowledge of a second language, elementary computing skills, information management skills, problem solving, decision making;

- interpersonal competences: critical and self-critical abilities, teamwork, interpersonal skills, ability to work in an interdisciplinary team, ability to communicate with experts in other fields, appreciation of diversity and multiculturality, ability to work in an international context, ethical commitment;

- systemic competences: capacity to apply knowledge in practice, research skills, capacity to learn, capacity to adapt to new situations, capacity for generating new ideas, leadership, adaptability to work autonomously, project design and management, initiative and entrepreneurial spirit, concern for quality, will to succeed.

Each university was then expected to do the analysis, compare its outcome to other institutions and draw its own conclusions and develop its own strategy. The Tuning project is thus developed by universities for universities in order to allow them to better adapt their curricula and define degree programmes in terms of learning outcomes, which leads to qualifications that are more transparent and ultimately better tuned to the needs of the labour market.

Lastly, the LLL2010 project, which is the acronym for " Lifelong Learning 2010 - Towards a Lifelong Learning Society in Europe: The Contribution of the Education System" will also

---

[96] See, for example, the French surveys 'Génération 92', 'Génération 98' and 'Génération 2001', undertaken by Céreq in order to analyse the labour market career of each generation three years after leaving the education and training system.

analyse and compare the point of views of individuals, education institutions and enterprises, with a focus on adult learners. Its aims and objectives are to study the effect of country-specific institutions on access of adults to the education system and to assess the effectiveness of access policies and practices in different EU member, as well as in associated countries and their implications for the creation of European knowledge society. Thirteen different European countries / regions are involved in the survey: Austria, Bulgaria, Czech Republic, England, Estonia, Belgium (Flanders), Hungary, Ireland, Lithuania, Norway, Scotland, Slovenia and Russian Federation. The study will be carried out on three levels: macro, meso and micro in order to look at the interaction and relationship between macro-structural factors, national policies, institutional factors and adults as potential learners. It is planned to collect data from three different types of sources: (a) individuals (a survey of adult learners in schools and universities, data from Eurostat driven Lifelong Learning Survey which will take place in 2005); (b) education institutions (interviews with schools' management, officials of education ministries); (c) enterprises (interviews with SME management). The methodological aims of the project are an assessment of indicators used in Eurostat driven EU Lifelong Learning Survey (2005) and an elaboration of indicators to be used for monitoring lifelong learning in formal education settings[97].

3.1.4. Foresight: examples at sectoral or regional level

In the field of anticipatory analyses, the specificities and benefits of foresight exercises are increasingly recognised. The FOR-LERAN online Foresight Guide developed by JRC-IPTS[98] underlines four characteristics that distinguish foresight from the studies mentioned above, namely quantitative projections and different kind of surveys.

- foresight activities are frequently more multidisciplinary and opened to various type of information (quantitative and qualitative).

- Assuming that alternative futures are possible, these activities include the identification and description of scenarios.

- foresight is participatory : it is built on the knowledge and intelligence of various stakeholders

- it is action-oriented : it considers the actions that should be taken to build the future.

> To sum up, foresight should not only think the future, but it should also debate the future and shape it. Various foresights activities, directly or indirectly related to jobs and skills are described and map on the IPTS website[99]. The IPTS is currently looking at how innovation in services will affect skills and knowledge[100], using foresight methodology. One of the most relevant foresight projects dealing explicitly with the future of jobs and skills is undertaken at the sector level.

Comprehensive sectoral analysis of emerging competences and economic activities in the European Union

---

[97] For further information, see the the project website: http://lll2010.tlu.ee
[98] http://forlearn.jrc.ec.europa.eu/guide/0_home/index.htm
[99] http://forera.jrc.ec.europa.eu/
[100] IPTS study for 2009 entitled "Innovation in the European Service Economy- scenarios and implications for skills and knowledge"

At European level, the European Commission has commissioned a number of sectoral studies using a common foresight methodology to identify emerging competences and changes. Studies have started beginning of 2008 and the final results for all studies are expected by May 2009. The following sixteen sectors have been identified and selected as sensitive to restructuring and skills needs:

Sectors Covered
Textiles, wearing apparel and leather products
Printing and publishing
Chemicals, pharmaceuticals, rubber and plastic products
Non-metallic materials (glass, cement, ceramic, etc.)
Electromechanical engineering
Computer, electronic and optical products
Building of ships and boats
Furniture and other
Electricity, gas, water & waste
Distribution, trade
Hotels, restaurants, catering and related services
Transport
Post and telecommunications
Financial services (bank, insurance and others)
Health and social work
Other services, maintenance and cleaning

The European cross-sector foresight methodology that underpins these studies includes the following steps:

–   mapping of a sector, including analysis of the main economic and employment trends, importance of the value chain and outsourced services, and SWOT analysis;

–   identification of the main drivers of change and the main emerging or changing skills and competences in the sector;

–   sketching the main scenarios for plausible evolution and their implications for employment trends over a period up to 2020;

–   identification of implications for competences and occupation profiles in terms of jobs expanding, transforming or declining;

–   outlining strategic choices to meet the sector's skills needs;

–   identification of specific implications of the sector's skills needs for education and training;

–   recommendations addressing the different stakeholders (social partners, public authorities at all levels, institutions of training and education).

Scenarios should reflect the foresight nature of this exercise. The studies accordingly differ from the quantitative analysis performed by the Skillsnet team together with Cedefop. The scenarios here are not based on an extrapolation of past trends into the future with a pessimistic, neutral and optimistic scenario. In this foresight exercise, they build upon drivers of the future evolution of employment. It is also important to note that scenarios should mainly be affected by structural factors rather than cyclical ones given the medium-term horizon. In that sense, the current financial crisis and the looming recession may have only limited consequences on the direction of the scenarios. This depends also on the sector studied.

The results of these studies are submitted to a panel of experts in the sectors. These panels are constituted of experts in the sectors, from the industry, social partners, academics and experts in education and training systems in order to build consensus on the findings and ensure support for the recommendations.

First results from various sectors can illustrate the methodology. The study on the shipbuilding industry identifies five key drivers. It then estimates the consequence of each key factor on the development of new skills and new jobs. One example illustrating the sketch of scenarios is is the automotive study, where two scenarios were developed according to the relative impact of the different drivers of change in the sector: a pessimistic scenario, 'Reduced attractiveness of advanced passenger cars' on the one hand, and an optimistic scenario, 'New cars for safe and sustainable transport', on the other. In both scenarios, strong demand is expected for high-skilled occupations such as managers, engineers, for more technical occupations such as electricians and for low-skilled workers, while a decline is expected for skilled manual workers such as metal moulders, tool makers or mechanics. The implications of the different scenarios in terms of jobs and skills are then discussed and estimated. As an example, the study on the textiles, clothing, footwear and leather products identifies the evolutions of skills, knowledge and competences required in different jobs.

The identification of key drivers: the example of the shipbuilding industry
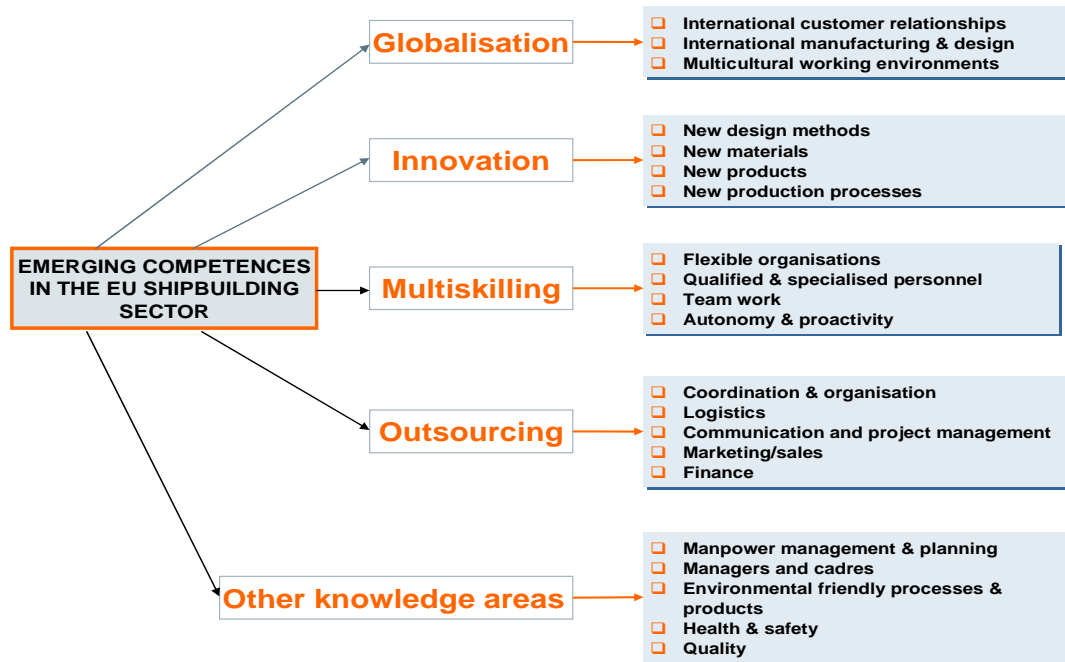
The example of the automotive sector: summary of the two European scenarios and level of impact[101]		
Level of impact	Scenario 1 '*Reduced attractiveness of advanced cars*'	Scenario 2 '*New car for safe and sustainable transport*'
OEMs	Generalist: – Massive restructuring – Consolidation, hostile takeover risk Specialist: – Continuing in niche segment and export	Generalist: – Restructuring through mergers / acquisition and purchase of new activities – Opportunity for joint ventures with Asian partners – Innovation and cost strategies – New forms of cooperation Specialist: – Continuing in niche segment and export
Equipment Suppliers	– Major restructuring: closure and voluntary liquidation – Consolidation with newcomers from emerging countries – Hostile takeover risk	– Regrouping of major system manufacturers through external growth – Creation of value chain hierarchy — systems, modules, components – Relocation of component manufacturers – Creation of large component suppliers

---

[101]   Idem.

Regional	– Major problems for EU15, incl. Germany (leading producer in EU) – Temporary resistance of NMS	– Improved transport conditions – Specialisation in Europe around high-innovation car design centres – NMS: leading equipment manufacture area
Jobs and Skills	– Restructuring – Major decline of car industry activities in Europe – Still a need for high-skilled workers	– Restructuring, but also creation of jobs – Major training needs – Major need for qualified labour (managers, engineers, computer specialists, electricians) in central and eastern Europe

Knowledge and competences required according to different scenarios; the example of the textile industry:

Function	Scenario 1 Globalisation limited	Scenario 2 Asian dominance – European excellence	Scenario 3 Advanced New Member States
General management	Change management Network management	Strategic, visionary intercultural	Quality management Market oriented
Marketing and sales	Consumer oriented Socially responsible	Client oriented Technical knowledge Trend setting Intercultural	Competition oriented Market knowledge Intercultural
Administration	Environmental legislation (REACH)	International business	International business
Research & development	Sustainable products and technologies Traditional	Interdisciplinary Multi-skilled Creative	Market oriented Efficiency oriented Creative

Process engineering	Energy and emission control Cost control	Supervision of global value chain	Cost control Quality control
Production	Small scale Specialised Crafts-oriented	Client oriented Technical knowledge	Quality oriented Mass-production
Quality control	Environmental standards	Diversified standards	Large-scale control systems
Logistics	Energy efficiency oriented	Delivery-time oriented	Delivery-time oriented

The studies will not be limited to the sectors in the narrow sense, but will also take into account the value chain and outsourced services. Furthermore, a cross-cutting analysis of the sectoral studies to identify connections between sector activities and identify the main horizontal activities is also planned as a complement to the sectoral studies. The analysis should reveal possible transfers of occupations between sectors. This study will be launched in 2009, once the sector studies have been completed.

A study on regional challenges looking ahead to 2020[102] will also use a scenario-based approach. A further study[103] will assess the impact of globalisation on regional economies with high shares of employment in sectors exposed to global competition.

At national level, table 3.5 (in Annex 3) summarises the qualitative approaches, including foresight processes, used for anticipating skill needs as identified in the SYSDEM responses. These examples illustrate the types of qualitative activities undertaken. The examples provided in the SYSDEM responses show that a variety of ad hoc studies have been conducted at sector level. A number of regional studies have been reported, while occupational profiles and qualifications also feature in the responses provided. Other sources[104] reveal many more examples in many countries.

In addition to quantitative projections of occupational demand and skill requirements, more qualitative exercises are needed, such as foresight analyses, employer surveys, case studies or job competence modelling exercises. These are essential to identifying new trends in competence requirements and changes in the content of occupations. Qualitative surveys offer insights into industry dynamics, technological developments, market and professional constraints, forms of organisation, employers' strategies and the threats they face. While this contextual information can be difficult to collect, it helps identify the evolution of occupations

---

[102]   To be launched by the European Commission at the end of 2008.
[103]   Commissioned by the European Commission.
[104]   See Cedefop (2007), Systems, institutional frameworks and processes for the early identification of skill needs, Cedefop (2008), Systems for the anticipation of skill needs in the EU Member States, discussion paper.

and forecasting scenarios. While it can be challenging to place occupations within a systemic group of related occupations, this would help to identify transferable competences and any activities in which workers could progress[105]. The development of qualification frameworks (such as those mentioned in the Spanish and Portuguese SYSDEM responses) could facilitate this process.

3.1.5.   Towards holistic approaches?

There is evidence of a holistic approach to anticipating skills needs emerging in Member States, using quantitative and qualitative methods to achieve robust and reliable results. In some countries, forecasts have become one of many pieces of information that contribute to a more detailed, consistent and plausible picture of future skill needs (see Table 3.2)[106].

Table 3.2 Towards holistic systems?

Towards holistic systems?	Characterisation	Countries
Decentralised system	The system is developed mostly at trade, sector or local level. Systematic anticipation of skill needs at national level is not very pronounced.	DK, ES, EL, HU, LT, LV, PT, SK, SI
Coordinated non-holistic system	The system is quite well-developed with quantitative forecasting being a major building block, although some qualitative elements are incorporated in the forecasts and qualitative surveys are conducted in parallel.	CY, FI, IE
On the way to a coordinated holistic system	The system is mostly based on medium-term macro-level quantitative forecasting that incorporates some qualitative elements of sectoral and/or other trend projections. A number of efforts at national, regional and sector level aim for a more systematic, complementary and holistic approach. These countries are attempting to establish permanent skill needs monitoring.	CZ, EE, IT, PL
Coordinated holistic system	Very well-developed and long-established system based on medium- and/or short-term macro-level forecasts, a system of sectoral studies, regular questionnaire-based skills surveys among employers, regular regional surveys on employment	AT, DE, FR, NL, SE, UK

---

[105]   Mériot, 2004.
[106]   CEDEFOP (2008), Systems for anticipation of skills needs in the EU, discussion paper.

Source: CEDEFOP (2008)

In both the French and UK cases, forecasting has sectoral and geographical dimensions and is supported by surveys and qualitative studies and scenarios. In the UK case, the Working Futures projections are part of a much broader holistic approach to assessing future skills needs, as set out in the Leitch report. Further information on the UK context and approach is given in Box 3.3. The recent work on 'Jobs in 2015' (Les métiers en 2015), conducted by DARES and the "Centre d'Analyse Stratégique" in France, is also a good example of a comprehensive assessment of future skills needs.

Box 3.3: UK's approach to anticipating skill needs

The establishment of the Learning and Skills Council (with its 47 local arms) and the development of the Sector Skills Councils (SSCs) signalled the UK government's intention that the anticipation of training and qualification needs should be driven largely by labour market needs at national, regional and local level.

Traditional labour market forecasting techniques have been refined and holistic approaches are also being used. Quantitative methods include extrapolative techniques, behavioural/econometric models (using the multi-sectoral dynamic model maintained by Cambridge Econometrics), employer surveys and skills audits. Qualitative approaches include Delphi techniques, case studies, focus groups and holistic modelling approaches, such as scenarios. SSCs also consult with employers and gather qualitative information from them and sector experts. They can also commission bespoke, sector-specific forecasts and, with awarding bodies, review the uptake of qualifications.

Activities anticipating skill needs are oriented sectorally and have a regional and local dimension.

Each of the 25 SSCs is required by Government to develop a sector skills agreement between employers and education and training providers in their sector. As employer-led organisations, SSCs are charged with the task of representing employers' skills needs to Government and raising employers' demand for skills. SSCs also represent the interests of other stakeholders, e.g. unions. The process of developing skills agreements starts with a skills needs assessment. In this assessment, SSCs are required to forecast employment and skills needs within their sector. This is achieved by using:

- the existing quantitative forecasts for the UK (i.e. 'Working Futures'), which provide cross-sector, consistent and comparable projections using national sources of information system and bespoke, sector-specific forecasts;

- qualitative scenarios developed with sector employers.

The sector skills agreement is now recognised as one of the mechanisms through which employer skills needs in the UK are identified and met.

The strengths of this approach to anticipating skills needs are as follows:

- it is grounded in employer consultation;

- it combines cross-sector, comparable sources of information based on robust national sources of information structured by SIC (standard industrial classification) with qualitative information gathered from sector experts and employers;

- each SSC is required to follow the same process, thus facilitating interaction with the supply side.

However, forecasts are also used for many other purposes in the UK, including careers guidance and advice, with detailed information available on-line (see: http://www.guidance-research.org/).

This detailed and sophisticated forecasting is feasible because of the substantial investment in statistical infrastructure, including: national accounts; input/output tables; the annual business inquiry; the labour force survey; and the population census.

One outcome of the skills forecasting and survey work is the development of national occupational standards. These are specified in the form of units aggregated to meet the qualification needs of specific occupations, which are identified by a parallel process of occupational mapping.

3.1.6. Issues arising from the review of anticipatory tools: is Europe lagging behind?

Statistical infrastructure is the key to what is possible. There is a need to invest in more and better data across Europe, as well as in individual Member States. The experience of countries with long-standing forecasting experience is being transferred to countries where forecasting is being introduced or at an early stage of development. A key issue at the country level is that, while there are common principles, their application varies. For example, national experiences differ in terms of the periodicity and level of detail (spatial, sectors and occupations) of the forecasting methods. A wide range of approaches and techniques have been adopted and are being used. Successful forecasting often forms part of a holistic approach where the forecasts sit alongside other complementary surveys and / or qualitative research.

Outside Europe, countries have already decided that there is a clearly established case for regular anticipation of economic and labour market change in order to deal with problems of restructuring, and to make the most of the opportunities offered by new technologies. The USA and China are investing huge sums in such work. Much is already going on in Europe, but with the exception of the countries identified as adopting or introducing holistic approaches, activities tend to be piecemeal and can be ad hoc. There is an order of magnitude difference compared with countries such as the USA. In 2005, the latest year for which data are available, the US Bureau of Labor Statistics invested almost 6 million dollars in quantitative employment projections. This compares to around 0.25 million euros spent by Cedefop on the only equivalent project in Europe. Individual Member States are doing such work, but in the US, forecasts are also conducted at country-wide level. This suggests that there is scope for Europe to do more in anticipating future skills needs. In the last three years, Europe has already started to invest more in skills needs analysis.

3.2. Mapping and evaluation of matching policies in Europe

This section considers the use and application of anticipatory methods and associated changes in policies and practice. It examines:

- Changes in policy and practice resulting from the anticipation and assessment of skill needs.

- Demand-led systems and matching processes involving employers and social partners.

The section draws on the available literature and is informed by the SYSDEM and Eurydice responses. As with section 3.2 above, the SYSDEM and Eurydice responses are illustrative of practices and do not provide a comprehensive overview of all activities.

3.2.1. *Changes in policies and practice resulting from anticipation and assessment of skill needs*

National and regional policy makers and education and labour market stakeholders are key audiences for anticipatory methods that can be used to inform policy development and associated practice (e.g. VET and higher education). The focus of this section is on anticipation /matching processes that have influenced:

- education and training policies and practice;

- active labour market policies;

- migration policy;

- processes and infrastructure facilitating matching activities.

Education and training policies and practice

The SYSDEM and Eurydice responses yielded examples of matching policies influencing planning and budgetary decisions, curriculum development, more responsive VET and higher education, careers guidance and the development of occupational standards. However, the analysis also identified cases where there is a disconnect between anticipatory methods and the policy-making process. This latter issue is explored before the examples of practice are introduced.

Even where some of the systems for forecasting skill supply and demand are well-developed and incorporate quantitative and qualitative methods, weak cross-linkages between activities (fragmentation) and the absence of any systematic use of their outcomes hamper the effectiveness of efforts to match labour supply and demand. This is particularly evident where the results of various forecasting activities are not fed into the educational policy process in a systematic manner[107].

Informing planning and budgetary decisions of Education Ministries

Anticipation results and assessment of skills needs are used by some Ministries of Education to inform planning and budgetary decisions associated with the policy-making process. Examples from Denmark, Finland and Ireland are given in the Box below.

Box 3.4: Practices in DK, FI, IE

---

[107]   SYSDEM responses.

In Denmark, labour market forecasts influence budgeting for education and training. Short- and medium-term projections (2-3 years) guide the planning and design of education and training budgets. Forecasts are also used (though not systematically) by educational establishments to anticipate student intake.

In Finland, quantitative skill forecasts have been utilised in drafting the latest Education Development Plan, which is updated every four years. The latest plan (2003-2008) includes development measures for each field and level of education, the main education and research policy guidelines and a framework for resource allocation.

In September 2005 the Irish Department of Enterprise, Trade and Employment (DETE) requested the Expert Group on Future Skills Needs (EGFSN) to undertake research to underpin the development of a National Skills Strategy, including identification of the skills required for Ireland to develop over the period to 2020 as a competitive, innovation-driven, knowledge-based, participative and inclusive economy. In 2006 the Expert Group published employment forecasts for the period to 2020 (Current Trends in Occupational Employment and Forecasts for 2010 and 2020). The results were used to inform the preparation of the 2007 report 'Tomorrow's Skills — Towards a National Skills Strategy'.

Sources: SYSDEM and Eurydice responses

More responsive VET and higher education provision

Enhancing the human capital of Europe requires Member States to develop responsive VET and higher education approaches to labour market needs. Evidence suggests that the engagement of social partners and the use of quantitative and qualitative anticipation methods are helping to make VET and higher education more responsive to employer needs. Responses from SYSDEM and Eurydice provide evidence of vocational education and training policies and practices intended to address mismatches in labour supply and demand. Examples from Denmark, Italy and Lithuania are given in the Box below.

Box 3.5: More responsive VET: examples from DK, IT and LT

The Danish Ministry of Education has established a procedure to systematically measure the relevance of VET courses using student employment rates upon VET completion. An employment rate of 75% is set as a target and programmes that do not meet this figure are required to explain shortfalls.

In Lithuania the Barometer of Employment Opportunities is a short-term (12-month) forecast of skill shortages in occupations and is used by the authorities to help plan vocational education and training.

In Italy, various regions have been carrying out projects for the early identification of employment and training needs and have used these to guide the direction and emphasis of training courses. These initiatives have been informed by surveys of employers and other stakeholders. Projects have been successfully implemented in the regions of Valle d'Aosta, Friuli Venezia Giulia, Sardegna, Liguria and Veneto, as well as in the provinces of Trento,

---

[108] SYSDEM responses.

Bolzano and Firenze[108].

The 'Mitenna' model is used in Finland to generate quantitative projections of vocational education and training needs (see Box 3.6 below). The results of these quantitative forecasts are used by various agencies for a range of different purposes at national and regional levels, but primarily to steer the development of VET and other education and training policies.

Text Box 3.6: The Mitenna project in Finland

The Mitenna project ('Project to Anticipate Quantitative Educational Needs in Vocational Education and Training') was implemented by the National Board of Education with support from the Ministry of Education and the European Social Fund at the end of the 1990s. The forecasting model was established to produce statistical and other information necessary for anticipating skill needs. Its outputs included national forecasts of educational needs, which were then analysed for different fields of study and levels of education (initial vocational education and in higher education).

The model is used for anticipating vocational training and skills needs nationally and regionally. It has been updated and, for example, provides projections on the need for vocational training places. Regions produce their own tailored forecasts of educational needs based on the nationwide forecast and on regional growth. The model provides an 'early warning system', as it recognises expanding as well as contracting sectors, occupations, skill demand, technologies, and changes in production methods. The outputs are used by the regions in their strategic planning processes and by the Ministry of Education to decide on the distribution of licences for the delivery of upper secondary VET. They also inform the negotiations between the Ministry of Education, universities and polytechnics when agreeing on their educational provision (within the performance-based management system).

Sources: The Finnish National Board of Education (www.oph.fi); SYSDEM and Eurydice responses

Turning to higher education, examples from Germany and Estonia highlight how forecasting activities have been used to inform higher education provision.

Box 3.7: Forecasting to inform higher education

In Germany, the Permanent Conference of the *Länder* Ministers for Education and Cultural Affairs (KMK, Kultusministerkonferenz) has produced statistical forecasts of student numbers and university graduates since 1992. These projections are updated every two years and cover the time period to 2020. The approach is based on a status-quo forecast for labour supply (demographic changes excepted, all parameters relating to propensity to enter university education, duration of studies and drop-out rates are kept constant). The projections provide important statistics on the number of students (entrants, students and graduates) from universities by *Länder*, nationality and type of university. They are mainly used for administrative purposes by regional authorities (*Länder*).

In Estonia, annual labour market forecasts examine the number of new jobs created, movements between economic sectors and retirement ratios. These data are used to produce predictions of future labour market needs. The work is led by the Ministry of Economic Affairs and Communications, while the forecasts are primarily used by the Ministry of Education and Research to inform funding decisions on higher education and VET.

Source: SYSDEM and Eurydice responses

Development or redefinition of national occupation and VET standards

Forecasting and associated quantitative and qualitative surveys of employers and other stakeholders play an important role in defining and redefining occupational and VET standards. Such activities are being carried out in Italy, where the national system for the permanent observation of employment needs (Sistema nazionale per l'osservazione permanente dei fabbisogni professionali) has contributed to improving occupational classifications and their descriptive structures. In the UK, one outcome of skills forecasting and survey work is the development of national occupational standards related to qualification needs. This link to qualifications is also apparent in Lithuania, where skill needs are evaluated in the course of developing VET standards and programmes as well as through sectoral studies and labour market forecasts[109]. In particular, the development of occupational standards in tripartite collaboration and their subsequent linkage to competence-based qualification profiles are recognised as a way of making VET responsive to labour market needs (e.g. Hungary, Poland, Slovenia)[110].

Most Member States point to the efficiency of accreditation, assessment and quality assurance systems in ongoing cooperation to incorporate the competence and skill needs of the labour market within VET provision[111]. Here, Member States rely on the European tools developed as part of the Copenhagen process: the European Credit System for VET (ECVET) and the Common Quality Assurance Reference Framework for VET (CQARF). Qualification frameworks and their compatibility with the European Qualification Framework (EQF) are also often mentioned as important for linking training to labour market requirements[112].

---

[109]   The first VET standards were prepared in 1999, and 86 standards had been adopted by 2006. Another 100 standards are being developed.
[110]   Cedefop (2008), Systems for the anticipation of skill needs in the EU Member States, discussion paper.
[111]   Cedefop (2008), Systems for the anticipation of skill needs in the EU Member States, discussion paper.
[112]   Cedefop (2008), Systems for the anticipation of skill needs in the EU Member States, discussion paper.

Development or redefinition of higher education standards: Bologna process and European tools

In higher education, efforts to improve the transparency of qualifications and to support mobility have been undertaken as part of the Bologna Process. This Process aims to create a European Higher Education Area (EHEA) that will facilitate the mobility of students, graduates and higher education staff, prepare students for their future careers and for life as active citizens in democratic societies, and support their personal development, by offering broad access to high-quality higher education, based on democratic principles and academic freedom. The Process encompasses 46 EU and other European countries[113] and seeks to advance reforms leading to comparable degrees organised in a three-cycle structure (i.e. bachelor-master-doctorate). A further aim is to develop quality assurance in accordance with the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG). The Process also seeks to ensure fair recognition of degrees and other higher education qualifications in the EHEA, in accordance with the Council of Europe/UNESCO Recognition Convention[114]. The recognition of qualifications falls within the competence of each country. In most cases, this means that higher education institutions are responsible for the recognition of qualifications for the purpose of further study whereas professional bodies or employers are responsible for recognition for the purposes of the labour market. Tools that facilitate the recognition of qualifications are the European Credit Transfer and Accumulation System (ECTS)[115] and the Diploma Supplement (DS)[116]. To help develop good practice and a common understanding of recognition, the Council of Europe, UNESCO/CEPES and the European Commission coordinate the ENIC and NARIC Networks[117]. The Networks develop good practice and policy

Tuning Educational Structures in Europe is a university-driven project with a concrete approach to implementing the Bologna process. Five lines of approach are distinguished:

1. Generic competences and transversal skills;

2. Subject-specific competences;

3. Role of ECTS as an accumulation system;

4. Approaches to learning, teaching and assessment;

5. Role of quality enhancement in the educational process

The surveys of skills needs and skills achievement have been used to help determine the weak and strong points that could help to refine policy. The Tuning project underlines the need for consultation and constant revision of information on the adequacy of curricula and skills needs.

---

[113] Albania, Andorra, Armenia, Austria, Azerbaijan, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, former Yugoslav Republic of Macedonia, France, Georgia, Germany, Greece, Holy See, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom.
[114] http://www.ond.vlaanderen.be/hogeronderwijs/bologna/documents/LRC/Lisbon_for_pedestrians.pdf
[115] http://ec.europa.eu./education/programmes/socrates/ects/index_en.html
[116] http://ec.europa.eu/education/policies/rec_qual/recognition/diploma_en.html
[117] http://www.enic-naric.net/

It is a useful tool to help universities define and redefine qualifications, thus facilitating mobility and transparency on the labour market.

Careers guidance

Labour market information (surveys and forecasts) provide an important resource for education policy developers. It is also important for careers guidance practitioners and individuals using such services. The examples in the preceding sections have focused on how labour market information has helped in planning education and training provision and identifying opportunities for students on completion of their studies. Occupational projections also have a key role to play in helping individuals make informed career decisions. In Denmark, for example, regional and national short-term forecasts of labour demand by sectors and occupations are essential tools for job centre staff in guiding jobseekers' career choices. Similar examples can also be found in Luxembourg and Ireland (see Box 3.8 below).

Box 3.8: The use of anticipatory methods in informing careers guidance

In Denmark, the National Labour Market Authority and the four Danish labour market regions produce detailed, short-term assessments of labour demand by sectors and occupations, and associated mismatches, on a six-monthly basis. The resulting analyses provide day-to-day careers counselling and guidance tools for PES staff working with the unemployed.

In Luxembourg, a regular employer survey (approx. 200 businesses) carried out by three business organisations (the Business Federation of Luxembourg — FEDIL, the Luxembourg Bankers' Association and the Chamber of Commerce) is used to inform policy development and career planning. Young people use the results from this survey to help inform career choices.

In Ireland, the medium-term projections for employment classified by sector and occupation were initially designed for the development of medium-term training policies. The results are now being used as a careers guidance tool because they can be easily accessed via the internet.

Source: SYSDEM responses

Looking outside Europe, the American tools 'O*Net' and 'CareerOneStop' are interesting examples of the use of labour market information to inform career choices.

Text Box 3.9: The American practice: O*Net and CareerOneStop

The O*NET database (http://online.onetcenter.org), developed by the US Department of Labor, is an online database providing occupational information accessible in different ways. Users can access very detailed occupational information: a definition, tasks, knowledge, skills, abilities, work activities, work context, job zone, work styles, and finally wages and employment trends, both at national USA level, and on a state-by-state basis. For example, looking up *Business teachers or postsecondary teachers* (SOC code 25-1011.00) yields the following results:

Median wages (2007) $64 900 annual

Employment (2006)   1 672 000 employees

Projected growth (2006-2016)   Much greater than average (21% or higher)

Projected need (2006-2016)   662 000 additional employees

The website CareerOneStop (http://www.careeronestop.org/) is related to O*NET. It allows people to evaluate their skill profiles. While CareerOne Stop is a useful tool with a solid scientific basis, it has its critics. The approach is based on individuals' own perception of skill levels and is not moderated by professional guidance.

Though the methodology is different, the EurOccupations project can be considered a first step towards a European description of occupational skill needs (see Box 3.10 below). The outputs from the EurOccupations project could be disseminated and used through existing portals, e.g. EURES, the European Employment Service and PLOTEUS (Portal on Learning Opportunities Throughout the European Space).

Box 3.10: Towards a European database on occupations?

The EurOccupations project (www.euroccupations.org), funded by the Socio-economic Sciences and Humanities programme under Sixth Framework Programme of the European Union up to May 2009, is managed by the Erasmus University of Rotterdam. EurOccupations aims to build a publicly available occupational database, including information on approximately 1 500 occupations in eight European countries (Belgium, France, Germany, Italy, the Netherlands, Poland, Spain and the UK). For a selection of 150 occupations, the database also includes task descriptions, competences, education requirements, qualifications and 'on-the-job-training' for each of the eight participating countries. It thus offers an insight into the comparability of occupational structures and occupational content across Europe.

Active labour market policies

Forecasting activities allow Public Employment Services (PES) to develop anticipatory training provision. The results of an annual employer survey carried out by the PES are an important tool for the labour market authorities in Latvia. They inform the planning and organisation of PES activities and professional training for the unemployed[118]. In Sweden, the labour market surveys performed by the Swedish Labour Market Authority (AMS, Var finns jobben), and Statistics Sweden (SCB arbetkraftbarometer) constitute an efficient tool for planning and providing training as part of Sweden's active labour market policy. The Job Vacancy Survey by the German Federal Labour Agency is widely used to identify sectoral and occupational changes in labour demand. The results provide information for the Federal Labour Agency, for example on the impact of labour market policies.

---

[118]   SYSDEM responses.

A number of Member States have also re-organised or re-oriented their public employment services in an effort to match labour supply and demand. These efforts have resulted in the creation of a National Continuous Labour Exchange (Borsa Continua Nazionale del Lavoro) in Italy and the establishment of a network of Centres for Employment Promotion in Greece.

Text Box 3.11: Sharing information between public employment services

National Continuous Labour Exchange (Borsa Continua Nazionale del Lavoro), Italy

The National Continuous Labour Exchange was launched in 2003 and has been operational since 2005. The Exchange is a network connecting public and private employment services, registered employers and job-seekers. Employers can post vacancies and job-seekers can post their applications and CVs on the network. The network has regional nodes. Currently, 18 regions (out of 21) are linked to the network. It has been found to increase the efficiency and transparency of the matching process, and to favour geographical mobility.

Centres for Employment Promotion (KPE), Greece

In Greece, the implementation of a policy emphasising the matching of skills demand and supply has led to the establishment of a modern network of Centres for Employment Promotion (KPE) and the re-organisation of the public employment service (OAED). Currently, the Centres for Employment Promotion aim to incorporate three basic PES functions (a) placement and counselling services; (b) payment of unemployment benefits; and (c) management of labour market programmes.

Source: SYSDEM and Eurydice responses

Immigration policies

Some countries and regions have used the results of quantitative and/or qualitative skill assessments to re-adjust their immigration policies. For example, the Flemish government has introduced a transitional arrangement to match its immigration policy with local labour and skill shortages[119]. This arrangement is based on a quantitative analysis of hard-to-fill vacancies and additional information from an employer survey. In practice, this means that between 2006 and 2009 migration from the new Member States will be managed so that migrants can apply for 'hard to fill' vacancies.

In September 2008, the British government announced a new 'points-based' immigration system whereby workers from outside the EU are only allowed to take up jobs in skill-shortage occupations. The list includes skilled nurses and consultants, engineering jobs, and maths and English teachers. Currently the UK Migration Advisory Committee does not use projections as a direct input into its thinking, mainly because they are not detailed enough, but it is planning to explore this further in future work.

Processes and infrastructure to facilitate matching

In order to unify forecasting methods and practices and make use of the results in a more systematic manner, several Member States have implemented structures such as multi-

---

[119] SYSDEM response.

stakeholder steering committees or appointed specific institutes to oversee development work in a more coherent manner. Recent examples of such practice can be found, for example, in Germany, Greece, Italy, Finland, Ireland and Latvia. In the UK, foresight activities have been linked to science and technological developments. These use scenario development methods to harness insights from a multidisciplinary range of experts.

Text Box 3.12: Developing infrastructure

Activities for the early identification of skill needs are being re-organised in Germany by the Federal Ministry for Education and Research (BMBF), the Federal Institute for Vocational Training (BiBB) and the Institute for Employment Research (IAB). The approach is based on the experience of FreQueNz, the network for the early identification of skill needs managed by the Fraunhofer-Institut für Arbeitswissenschaft und Organisation (Fraunhofer Institute for labour science and organisation) since 1999. The new approach is intended to integrate existing data sources and develop methods for long-term forecasts of skill needs that go beyond the models hitherto recommended by the Permanent Conference of the *Länder* Ministers for Education and Cultural Affairs (Kultusministerkonferenz).

In Finland, a range of structures have been put in place to utilise the results of both quantitative and qualitative forecasting activities in a more coherent manner, including:

The establishment of a Foresight Network, which functions as a coordination network and discussion forum for the various ministries engaged in forecasting. The Network's tasks are to coordinate forecasting activities, improve forecasting skills and enhance interaction between central, regional and local administrations. It also monitors the use of anticipation results in decision-making. The network is currently led by the Ministry of Education.

The operation of 34 tripartite National Education and Training Committees. The task of the Committees is to follow, evaluate, anticipate and analyse the development of skills needed in the labour market, to make suggestions for the qualitative and quantitative development of training, to define the core curriculum and qualification requirements and to highlight challenges in their sector. Recently, the Ministry of Education together with the National Board of Education has set up a specialist coordination group for the anticipation of skills and training needs. Its task is to reconcile and develop anticipation work done by the sector-specific National Education and Training Committees.

The National Board of Education coordinates the regional forecasting activities regarding labour and educational needs carried out by the Regional Councils and their partners.

In Greece, the establishment of a national system for linking vocational education and training with employment (ESSEEKA) ensures a holistic approach to the assessment of labour supply and demand — through better definition of roles and responsibilities, enhanced provision for collaboration and cooperation between institutional agents, and the inclusion of stakeholders in this process. The system provides a forum for concerted action that is expected to contribute to defining future skill requirements more rapidly and

effectively and to making the Greek education and training system more responsive to the challenges faced[120]. ESSEEKA was established by law in 2003 and aims to match VET provision with labour market needs by better defining and assessing the links between the two and developing them within an integrated framework[121].

Sources: SYSDEM and Eurydice responses

3.2.2.   Matching processes involving employers and social partners

Employers have a vested interest in the quality and standard of education and the availability of labour. Training costs for new staff depend on the extent to which educational systems provide qualifications that prepare workers to perform more or less immediately without any further training. Evidence from the literature[122] and SYSDEM/Eurydice responses suggests that employers (and social partners) are increasingly involved in the planning and implementation of education and labour market policy, mainly through the involvement of their representative organisations (employers' organisations and confederations at national, sectoral and local levels) in:

- tripartite councils on labour, education and training matters at national, regional and local levels;

- consultation procedures for education-related legislation and policies;

- tripartite sector committees;

- collective bargaining at cross-sectoral, sectoral, regional and local levels.

As a result of increased employer involvement in tripartite councils concerning labour, education and training matters, they are also better placed to contribute to and make use of the various different forecasting methodologies employed by national education, training and labour market authorities. Examples of the involvement of employers in such tripartite structures can be found in Denmark and Ireland, among others. There are also examples illustrating the involvement of employers in the implementation of matching policies, including the German National Training Pact and the French agreement with social partners on "*Gestion Prévisionnelle des Emplois et des Competences* (GPEC)". These are illustrated below in Box 3.15.

Box 3.15: The increasing involvement of employers

In Denmark, six Regional Growth Fora were created as part of the regional and local government reform at the beginning of 2007. The fora bring together representatives of the business community, knowledge and educational establishments, labour market stakeholders as well as local and regional authorities — actors with first-hand knowledge of the challenges

---

[120]   Survey of national Eurydice units for New Skills for New Jobs, 2008.

[121]   Note: Some of the activities under the system are not yet operational.

[122]   For example, Winterton, J. (2006), Social dialogue and vocational training in Europe. Journal of European Industrial Training; Heideman, W. (2002), 'Current developments within social dialogue in selected European countries' in Lifelong Learning, Hans Böckler Stiftung; CEDEFOP survey on the nature and extent of social dialogue around VET.

of the business community and the regional conditions for growth. One task of the regional fora is to strengthen the ties between regional educational institutions and regional employers so as to boost the development of human resources and the competitiveness of regional companies.

During their first year of operation, the regional growth fora produced regional development plans analysing the challenges of each region and outlining a number of activities to be encouraged in order to stimulate growth and employment. Part of this work analysed the future skills needs and education systems of each region.

The Expert Group on Future Skills Needs (EGFSN) was established in Ireland in 1997 in response to increasing concerns about labour and skills shortages in Ireland. The Group comprises representatives of employers, employees, the education sector, government departments and state agencies. The Group acts as the central national resource on skills and labour supply for the enterprise sector. The Group conducts systematic and detailed analyses to:

- Advise Government on skills and labour supply issues for the enterprise sector;

- Advise Government on projected requirements and make recommendations on the actions required to address identified needs;

- Regularly follow up these recommendations with the bodies responsible for implementing them, to facilitate and assess progress in implementation;

- Consider strategic issues in developing partnerships between business and the education and continuous training sectors for meeting the skills needs of business.

National Training Pact (Nationaler Pakt für Ausbildung und Fachkräftenachwuchs), Germany

In 2004 the main labour market actors in Germany signed a national training pact. In the agreement, the employers agreed to offer 30 000 additional dual training places every year until 2006 and an additional 25 000 initial qualification places. The Pact has been extended to 2010 and the employers' associations agreed to create 60 000 additional training places each year and 40 000 initial qualification places per year.

Aided by growing labour demand, the Pact has increased the number of dual training places (by nine percent in 2007) and helped integrate disadvantaged young people within the labour market. Two thirds of the young people who obtained initial qualifications found permanent training places.

The Pact has also had wider implications, as the employer's associations have encouraged more companies to provide dual training and motivated companies to extend their training. Strong efforts have also been made to motivate non-German employers in Germany to provide dual training.

In France, GPEC (Prospective Management of Jobs and Skills — Gestion Prévisionnelle des

---

[123] OREFs were established by the State and Regional Authorities in 1993 while OPMQs were set up in 20004 and are closely linked to the training insurance funds (OPCA).

Emplois et des Competences) is both a legal obligation (through the 2005 Social Cohesion Act) and a tool for enterprise development. A GPEC is an agreement between social partners at enterprise level to anticipate the impact of external and internal changes and take appropriate action to minimise their effect on the company. Around 205 agreements have been signed since the initiative was launched and forecasting is at the heart of these activities.

Regional Observatories of Employment and Training (OREFs) and Sectoral Observatories (OPMQs) are other data sources utilised by French employers (and social partners)[123]. The studies carried out by the Observatories help sectoral social partners to decide on employment and training policies. Small and medium-sized companies, which have no GPEC obligations, also make use of these studies in order to anticipate short- and medium-term skill needs and labour supply.

Source: Eurydice responses

European employers, together with the unions, have developed a wide range of strategies to deal with sector-specific skill gaps and shortages. In the UK, the Skills for Business network aims to boost national productivity and profitability by identifying and tackling skills gaps and shortages on a sector-by-sector basis. The Skills for Business network comprises 25 Sector Skills Councils (SSCs)[124], which are employer-led, independent organisations established to improve learning supply, including via apprenticeships, higher education and National Occupational Standards (NOS), for each of the sectors covered. The Canadian sector councils also have a prospective dimension, since they try to find solutions to future challenges by building consensus among employers, employees, education and training providers and other key stakeholders (see Box 3.15). Lately, similar sectoral councils have been piloted in the Czech Republic with support from the European Social Fund[125]. They are country-level partnerships, with sector-oriented structures consisting of experts appointed by employers and their associations in close cooperation with the central administrative authorities. The councils are expected to have a considerable impact on the overall development and definition of jobs and skills in the Czech Republic in the future and in helping to anticipate the need for new competences and skills.

Particularly in the UK, educational reforms are being implemented to move away from a government-led, centrally planned approach to a flexible system intrinsically responsive to the needs of employers and individuals. However, this does not mean that there is no need to anticipate the future, but simply that this should be done by many actors, not just central government.

Box 3.15: The UK Leitch review: promoting a demand-led system

In June 2007 the UK Government published 'World Class Skills', setting out how the Government will create a world-class skills base by 2020. The document was endorsed by the Chancellor of the Exchequer and the Secretaries of State for Innovation, Universities and Skills; Children, Schools and Families; Business Enterprise and Regulatory Reform; and Work and Pensions. A central element in the new approach is to move to a demand-driven

---

[124]   Further information on Sector Skills Councils and Sector Skills Agreements is given in Box 3.4 on the UK's approach to anticipating skill needs.
[125]   Eurydice response.

skills system, in which the provision available responds to the needs of individuals and is delivered through a market system. To achieve this, the Government is, for example, directing funding increasingly through 'demand-led' routes, for example, by expanding the Train to Gain initiative and developing Skills Accounts.

The Train to Gain brokerage system is the fulcrum of the UK's move to a demand-driven skills system. It was set up to ensure that training responds to the needs of employers by allocating funding according to their market choices.

Employers can contact a Train to Gain broker, who puts together a tailored package of support to meet their needs, identifying the most suitable provision, and matching it with available Government funding. Providers then respond by developing training to meet market demand. The brokerage service was launched nationally in August 2006. Since then, 97 000 employers have benefited, leading to 490 000 learner 'starts' with almost 213 000 employees gaining a Level 2 qualification to date. Funding for Train to Gain will increase from £520 million in 2007-2008 to over £1 billion by 2010-2011. The Government's plans for expanding and developing the Train to Gain service were set out in Train to Gain: a Plan for Growth, published in January 2008.

Authorities are also working to make it easier for employers to have their own training programmes nationally recognised and accredited. More than 30 employers have had their training accredited and a further four employers, including Network Rail and FlyBe, have been accredited as awarding bodies in their own right. Further information about Sector Skills Councils and Sector Skills Agreements is found in Box 3.4 on the UK's approach to anticipating skill needs.

Source: Eurydice response

Box 3.15: The Canadian Sector Councils

Conscious of the need for cooperation on the part of all players in the labour market to improve its competitiveness and efficiency, the Canadian authorities have put in place Sector Councils covering almost thirty sectors or cross-sectoral groups of the Canadian economy. Sector Councils are permanent, consensus-building organisations comprising business, labour, education and other key stakeholder groups. Their objectives are to improve the quality of the Canadian labour force and to help firms to be more flexible in meeting changing competitive demands by:

- examining current and projected human resource challenges (including how training is viewed, developed and delivered to a diverse workforce);

- identifying solutions, and

- coordinating and implementing strategies, from the development of occupational standards and certification programmes to new career information products.

Core activities to meet these objectives include developing national occupational standards and certification programmes, identifying and preparing new entrants in the labour market, and improving career and occupational information. Sector Councils address a wide range of issues related to technological change, quality standards, planning, and human resource development.

They do not expect to find a single approach to address all the potential issues for all sectors of the economy — the demands are far too varied. Instead, Canada's Sector Councils focus on what works for their sector. They have implemented programmes as diverse as the sectors themselves.

3.2.3. *Issues arising from the review of matching policies*

Identification of mismatches between labour supply and demand is important to policy makers as they can, potentially, be very costly to the economy by restricting productivity growth (especially when they occur in key sectors of the economy).

While in some countries the results of forecasts appear to be more widely disseminated and used (e.g. Finland, France, Ireland, Netherlands, UK), they appear to be under-utilised in some Member States[126]. In brief, this overview provides examples that illustrate the direct contribution of anticipation results to policy. But there is scope for better utilising forecasting results.

For forecasts to be of value, policy makers and other key stakeholders need accessible data that can be interpreted and applied to their current circumstances.

4. REFERENCES

Acemoglu, Daron (2002). Technical Change, Inequality and the Labour Market. Journal of Economic Literature (XL): pp. 7-72.

Alba-Ramirez, Alfonso (1993). Mismatch in the Spanish Labor Market: Overeducation? The Journal of Human Resources 28 (2): pp. 259-278.

Allen, Jim and Egbert de Weert (2007). What Do Educational Mismatches Tell Us About Skill Mismatches? A Cross-country Analysis. European Journal of Education 42 (1).

Allen, Jim and Robert de Vries (2004). Determinants of Skill Mismatches: the Role of Learning Environment, the Match Between Education and Job and Working Experience. Research Centre for Education and the Labour Market (ROA), Maastricht.

Allen J., Van der Velden R. (2007, The flexible professional in the knowledge society, REFLEX project report; (http://www.fdewb.unimaas.nl/roa/reflex/).

Alphametrics, Groupe Alpha 'Comprehensive Analysis of the Evolution of the European Automotive industry', report produced for the European Commission, Comprehensive Analysis of Emerging Competences and Economic Activities in the European Union.

Autor, David H., Frank Levy and Richard J. Murnane (2003). The Skill Content of Recent Technological Change: An Empirical Exploration. The Quarterly Journal of Economics 4: pp. 1280 – 1333.

---

[126] SYSDEM and Eurydice responses.

Autor, David H., Lawrence F. Katz and Melissa S. Kearney (2005). Rising Wage Inequality: The Role of Composition and Prices. NBER Working Paper 11628.

Autor, David H., Lawrence F. Katz and Melissa S. Kearney (2006). Measuring and Interpreting Trends in Economic Inequality: The Polarization of the U.S. Labor Market. AEa Paper and Proceedings: pp. 190 – 194.

Beaudry, Paul, Mark Doms and Ethan Lewis (2006). Endogenous Skill Bias in Technology Adoption: City-Level Evidence from the IT Revolution. Working Paper Series. Federal Reserve Bank of San Francisco.

Berman, Eli, John Bound and Stephen Machin (1998). Implications of Skill-Biased Technological Change: International Evidence. The Quarterly Journal of Economics 113 (4): pp. 1245-1279.

BIPE (2008), 'Anticipating restructuring in the European defense industry', report produced for the European Commission, Lot 1 of Comprehensive Analysis of Emerging Competences and Economic Activities in the European Union.

Bresnahan, Timothy F., Erik Brynjolffson and Lorin M. Hitt (2002). Information Technology, Workplace Organization and the Demand for Skilled Labour: Firm Level Evidence. The Quarterly Journal of Economics: pp. 340–376.

Borjas, G. (2008), Labor economics, 4th ed., McGraw-Hill/Irvin, New York.

Cahuc, P. and Zylberberg, A. (2004), Labor economics, MIT Press, Cambridge.

Caroli, Eve and John van Reenen (2001). Skill-Biased Organizational Change: Evidence From A Panel Of British and French Establishments. The Quarterly Journal of Economics 116 (4): pp. 1449–1492.

CEDEFOP (2008a), Future skill needs in Europe. Focus on 2020.

CEDEFOP (2008b), Future skill needs in Europe. Medium-term forecast. Synthesis report.

CEDEFOP (2007a), Towards European skill needs forecasting. Luxembourg: Office for Official Publications of the European Communities.

CEDEFOP (2007b), Systems, institutional frameworks and processes for early identification of skill needs, Luxembourg: Office for Official Publications of the European Communities.

CEDEFOP (2005a), Identification of skill needs in nanotechnology, Luxembourg: Office for Official Publications of the European Communities.

CEDEFOP (2005b), Trends and skill needs in tourism, Luxembourg: Office for Official Publications of the European Communities.

Centre d'analyse stratégique (2007), Les métiers en 2015, rapport disponible sur internet: http://www.strategie.gouv.fr/IMG/pdf/rapport_metiers_2015.pdf.

DARES, Direction de l'Animation de la Recherche, des études et des statistiques (2002), 'Les difficultés de recrutement à l'été 2001', *Premières Synthèses*, n°23.2, juin.

Desjonqueres, Thibaut, Stephen Machin and John van Reenen (1999). Another Nail in the Coffin? Or Can the Trade Based Explanation of Changing Skill Structures Be Resurrected? The Scandinavian Journal of Economics 101 (4) Industrial Policy in Open Economies: pp. 533-554.

Dickerson A. and Green A. (2004), 'The growth and valuation of computing and other generic skills', Oxford Economic Papers, vol. 56, 371-406.

Dustmann, Christian, Johannes Ludsteck and Uta Schönberg (2007). Revisiting the German Wage Structure. IZA Discussion Paper No 2685, Bonn. Forthcoming in The Quarterly Journal of Economics.

Economix (2008), "Comprehensive Analysis of Emerging Competences and Economic Activities in the European textile, clothing and leather products sector", Lot 2 of Comprehensive Analysis of Emerging Competences and Economic Activities in the European Union

Eurofound (2008a), 'The Future of the European biomedical healthcare sector: Four scenarios', European Foundation for the Improvement of Living and Working Conditions, European Monitoring Centre on Change.

Eurofound (2008b), 'Trends and drivers of change in the EU energy sector: Scenarios', European Foundation for the Improvement of Living and Working Conditions, European Monitoring Centre on Change.

Eurofound (2008c), 'Trends and drivers of change in the EU transport and logistics sector: Scenarios', European Foundation for the Improvement of Living and Working Conditions, European Monitoring Centre on Change.

Eurofound (2008d), 'More and better jobs: Patterns of employment expansion in Europe', European Foundation for the Improvement of Living and Working Conditions, European Monitoring Centre on Change.

Eurofound (2007), 'Trends and drivers of change in the European commerce sector: Four scenarios', European Foundation for the Improvement of Living and Working Conditions, European Monitoring Centre on Change.

European Commission (2008a), Progress Towards the Lisbon Objectives in Education and Training. Indicators and benchmark — 2008, Commission Staff Working Document.

European Commission (2008b), Employment in Europe 2008. (Chapter 5: Education and employment: relation of fields and paths of study to occupations).

European Commission (2008c), "The use of ICT to support innovation and lifelong learning for all – A report on progress", SEC(2008)2629 final

European Commission (2008d), "Economic Forecast. Autumn 2008", *European Economy*, No. 7/2008.

European Commission (2007), Employment in Europe 2007.

European Commission and the Economic Policy Committee (2006), "The impact of ageing on public expenditure: projections for the EU25 Member States on pensions, health care, long-term care, education and unemployment transfers (2004-2050)", *European Economy*, Special report, No. 1/2006.

European Commission and the Economic Policy Committee (2008), *'The 2009 Ageing Report: Underlying assumptions and projection methodologies for the EU-27 Member States (2007-2060)',* European Economy, No. 9/2008.

European Employment Observatory (2008) Ad-hoc request for SYSDEM experts concerning New Skills for New Jobs.

European Expert Network on Economics of Education (EENEE) (2008), Origins and Consequences of Changes in Labour Market Skill Needs, Analytical Report for the European Commission.

Eurydice, Survey among national units concerning New Skills for New Jobs, 2008.

Fernandez C. and Ortega C. (2008), 'Labor market assimilation of migrants in Spain: employment at the expenses of bad job-matches?', Spanish Economic Review, vol. 10, No 2, pp. 83-107, June.

GHK (2008), Long Term Social Trends in Europe, Final report to the European Commission on Research on long term social trends in Europe, on related future societal needs and on the potential social policy responses to them, June.

Goos M; and Manning A. (2007), 'Lousy and lovely jobs; the rising polarization of work in Britain', Review of Economics and Statistics, 89 (1), 118-133.

Greenan, Nathalie (2003). Organizational Change, Technology, Employment and Skills: An Empirical Study of French Manufacturing. Cambridge Journal of Education 27: pp. 287–316.

Green F. (2006). *Demanding Work. The paradox of job quality in the affluent economy*. Princeton and Oxford: Princeton University Press.

Hall Peter and David Soskice (2001), Varieties of Capitalism: the Institutional Foundations of Comparative Advantage, OUP.

Hujer, Reinhard, Marco Caliendo and Dubravko Radic (2002). Skill Biased Technological and Organizational Change: Estimating a Mixed Simultaneous Equation Model Using the IAB Establishment Panel. IZA Discussion Paper No 566, Bonn.

Heideman, W. (2002) 'Current developments within social dialogue in selected European countries' in Lifelong Learning. Hans Böckler Stiftung.

Institute for Prospective Technological Studies (2002), 'Impact of technological and structural change on employment: prospective analysis 2020', Joint Research Centre, European Commission, Study for the Committee on Employment and Social Affairs of the European Parliament.

Institute for Prospective Technological Studies (2008), "Active Ageing and the Potential of ICT for learning", EUR report 23414

Institute for Prospective Technological Studies (2006), 'The Future of ICT and Learning in the Knowledge Society", EUR report 22218

Johnson, W. (1978), 'A theory of job shopping', Quarterly Journal of Economics, 92(2), pp. 261-278.

Jovanovic, B. (1979), 'Job matching and the theory of turnover', Journal of Political Economy, 87(5), pp. 972-990.

Kriechel B. and Pfann G. (2005), 'The role of specific and general human capital after displacement'; Education Economics, vol. 13, issue 2, June.

Krueger, Dirk and Krishna B. Kumar (2004). Skill Specific rather than General Education: A Reason for US-Europe Growth Differences? Journal of Economic Growth 9 (2): pp. 167-207.

Landesmann L; and Stehrer R. (2007). "Income Distribution, Technical Change And The Dynamics Of International Economic Integration," *Metroeconomica*, Blackwell Publishing, vol. 58(1), pp. 45-73, 02.

The Leitch Review (2006), Prosperity for all in the global economy — world class skills, Final report, December.

Lemieux, Thomas (2006). Increasing Residual Wage Inequality: Composition Effects, Noisy Data, or Rising for Skill? American Economic Review 96 (3): pp. 461-498.

Levy F. and Murname R. (2005), The New Division of Labour: How Computers Are Creating the Next Job Market?, Princeton University Press.

Machin S. (2004), 'Skill Biased Technology Change and Educational Outcomes', in G. Johnes and J. Johnes (eds.), International Handbook of the Economics of Education, (2004).

Machin, Stephen and John Van Reenen (2007). Changes in Wage Inequality. Special Paper No 18. Center for Economic Performance.

Mandon N., 1998, 'Analysis of work: describing competences through a dynamic approach to jobs', Training & Employment, n°33, Céreq, 4 p.

Meriot S.-A. 2004, 'Competency Descriptions: Towards One or Several Models?', in Human Resource Development: Cross-Cultural Comparative and International Perspectives, Inter-source Group Publishing, Dublin, 206 p.

Neugart Michael, Schömann Klaus (2002), 'Why forecast and for whom? Some introductory remarks', in Neugart Michael, Schömann Klaus (eds), Forecasting Labour Markets in OECD Countries — Measuring and Tackling Mismatches, Cheltenham: Edward Elgar, pp. 1-26.

Nicaise Ides (ed) (2008), European Education and Training Systems in the second Decennium of the Lisbon Strategy, Joint Analytical Report for the European Commission prepared by the

European Expert Network on Economics of Education (EENEE) and the Network of Experts in the Social Sciences of Education (NESSE).

OECD (2007), PISA 2006: Science Competencies for Tomorrow's World, Paris.

ReferNet (2004-2007) 25 National reports on Vocational Education and Training systems (0701 Mechanisms for the Anticipation of Skills Needs).

Sloane, Peter J (2003). Much aDo About Nothing: What Does the Over-education Literature Really Tell Us? in: Büchel, Felix, A de Grip and A. Mertens (eds.). Overeducation in Europe. Current issues in theory and policy, Edward Elgar.

Spitz-Oener, Alexandra (2006). Technical Change, Job Tasks and Rising Educational Demands. Journal of Labor Economics 24 (2): pp. 235-270.

TNO - SEOR - ZSI, "Comprehensive Analysis of Emerging Competences and Economic Activities in the European chemicals, pharmaceuticals, rubber and plastic products sectors", Lot 4 of Comprehensive Analysis of Emerging Competences and Economic Activities in the European Union.

United Nations Environment Programme (UNEP) (2008), 'Green Jobs: Towards Decent Work in a Sustainable; Low-Carbon World', report commissioned and funded by UNEP.

Wilson R. A. (2008a). UK approaches to Skill Needs Analysis and Forecasting: Lessons for the Czech Republic, (Contribution to Key activity No 5: Proposal of a system for regular analyses and forecasts of skills needs in the labour market and its use by employment services in the Czech Republic), Institute for Employment Research, University of Warwick, Coventry.

Wilson R. A. (2008b), 'Using the European LFS to anticipate changing skill needs', paper presented at the ISA-RC33 7th International Conference in Naples, 1-5 September 2008; Session Title: Comparative Analysis of European Microdata from Official Statistics.

Wilson, R.A. (2007a) Anticipating Changing Skill Needs in Europe: The Case for a Major Improvement in Capacity (paper prepared in support of the Portuguese Presidency). Institute for Employment Research, University of Warwick, Coventry, and Institute for Employment Research, University of Warwick, Coventry.

Wilson, R.A. (2007b) 'Trends in Employment Creation in Europe' in Perspectives On Employment and Social Policy Coordination in the European Union. Ministério do Trabalho e da Solidariedade Social, Lisbon. paper prepared for the Portuguese Presidency Conference on Employment In Europe — Prospects and Priorities, Lisbon, 8-9 October 2007.

Wilson, R. A., I. Woolard and D. Lee (2004), 'Developing a National Skills Forecasting Tool for South Africa', South African Department of Labour: Pretoria. (50 pages plus extensive Annexes) (see especially Annex B: Labour Market Projections: A Review of International Best Practice).

Winterton, J. (2006) Social dialogue and vocational training in Europe: are we witnessing the emergence of a European model?, *Journal of European Industrial Training*, v. 30, No 1, pp. 65-76.

5.   ANNEXES

ANNEX 1 — Table 3.3: Forecasting activities in European countries — nature, purpose and scope

COUNTRY	NATURE OF ACTIVITIES	PURPOSE	SCOPE (SPATIAL, SECTORAL, OCCUPATIONAL, EDUCATIONAL LEVEL)
Austria	Quantitative model-based medium-term projections of labour demand	To provide a basis for measures to improve the matching of labour market needs and future skill supply	National and regional forecasts of labour demand by sector, occupation and skill levels
Austria	Micro-prognosis: employment and unemployment outlook for Austria until 2011	To describe the development of employment and unemployment in Austria	National and regional level, sectoral
Austria	AMS skills barometer	To observe skill demands for individual occupations at micro level	Regional level, all sectors
Cyprus	Employment forecasts for the economy of Cyprus	To forecast employment levels and percentage changes for the economy as a whole, sectors and occupations.	National sectoral and occupational forecasts. Sectoral forecasts are made for three broad areas (primary, secondary and tertiary), then for 17 main sectors and 43 selected, finer, sectors. Occupational categories cover three broad areas (lower, middle and higher occupations), with further detailed information on 10 main categories and on 27 selected occupations
Czech Republic	Quantitative manpower requirement (supply and demand) model of	To forecast future skill needs and early identification of skill shortages	National forecast disaggregated by 27 educational and 32 occupational clusters

	the Czech labour market		
Denmark	Quantitative forecasts of flows through the educational system, supply of labour by education, and future imbalances on the labour market.	The Statistics and Analysis Unit at the Ministry of Education produces basic statistical data for the educational system as a whole and a number of quantitative forecasts on education and the labour market.	National, some regional forecasts. Divided by forms of education.
Denmark	Employment forecasts by educational levels	Medium and long-term quantitative assessments of labour supply and demand, by educational attainment	National and regional forecasts for main educational groups
Denmark	Educational forecasts	The forecasts are intended to feed into the policy debate about future imbalances on the labour market and the relevant policies to be applied.	National and regional quantitative forecasts disaggregated by educational attainment
Estonia	Regular forecast of labour market needs	To predict employment levels as well as the need for additional labour	National, sectoral and occupational (34 sectors and 5 occupational groups)
Finland	Quantitative long- and medium-term forecasts	To predict employment structure, vocational structure and education demands up to 2030. The Ministry of Labour is to draft a long-term forecast for output and employment (PTS) up to 2030	National and regional (provincial) forecast. Sectoral dimension too (12 main sectors, 51 subsectors). Also forecast with an education / vocational structure
France	GPEC (Gestion Prévisionnelle des Emplois et des Competences — Prospective Management of Jobs and Skills)	GPEC is both a legal obligation (through the 2005 Social Cohesion Act) and a tool for enterprise development. It involves an agreement between the social partners at enterprise level	Sectoral, spatial

		to anticipate change (internal / external). The main purpose is to determine action to be taken for the next 3 or 5 years	
France	'Jobs in 2015'	Occupational forecasts, taking into account supply and demand (creation and replacement)	National forecast with an occupational focus (80 occupational groups)
France	Forecasting job and training needs for 2015	Analysis to evaluate recruitment needs linked to each degree level and whether it corresponds to the forecasts provided by the Ministry of Education on student numbers. The result is a description of the academic profile needed (in terms of sector and level) in each economic field	National sectoral forecast
Germany	Forecast of the number of pupils and school leavers 2005 – 2020	Statistical forecast of the number of pupils and school leavers	Number of pupils and school leavers by type of school and regions (*Länder*)
Germany [127]	Forecast of university entrants, students and graduates up to 2020	Statistical forecast of the number of students and university graduates up to 2020	Entrants, students and graduates of universities by *Länder*, nationality and type of university
Germany	Long-term projection of labour supply	Projection to 2050 with a complementary behavioural study comparing East and West Germany	Supply

---

[127] The information provided focuses on supply forecasts. Cedefop's *Towards European skill need forecasting* (2007) finds that demand-side forecasts are linked to the supply-side forecasts presented in the table.

Ireland	FAS/ESRI (Economic and Social Research Council) Manpower Forecasting Studies (12 published between 1991 and 2007)	To forecast employment by sector and occupation	National, regional, sectoral and occupational. Level of detail varies, though typically 20 sectoral categories, over 40 occupational groups and 5 broad educational levels.
Ireland	Current Trends in Occupational Employment and Forecasts for 2010 and 2020 (published by ESRI in 2006)	To provide employment forecasts for the period up to 2020	National, all sectors
Italy	National System for the permanent observation of employment needs (Sistema nazionale per l'osservazione permanente dei fabbisogni professionali).	Analysis and forecasting of employment needs	National and regional forecast, sectoral and occupational dimensions
Latvia	Information note on estimates of labour force demand and supply match in the medium term	To estimate labour demand and supply in the medium term, to explore possible problems in the labour market and to develop possible solutions	National
Lithuania	Labour market forecasts by occupational group	To forecast labour market needs	National, regional and occupational
Lithuania	Sectoral employment forecasts	Assessment of employment dynamics in individual economic sectors over a 5-year horizon	National, sectoral
Lithuania	Development and application of medium-term (5-year) forecasting	Development of medium-term forecasting methodology for skills/qualifications	National

	methodology for skills/qualifications demand on the labour market.	demand on the labour market.	
Netherlands	The labour market by education and occupation to 2012 (periodic report)	Current and future labour market situation by occupation, sector and education level	104 types of education and 127 occupational groups at regional level across all economic sectors
Netherlands	Employment, vacancy and unemployment forecasts	Current and future labour market mismatches	Various sectors and occupations
Norway	Labour market projections to 2025	Macroeconomic projections for the supply and demand of different types of labour	National forecast covering 20 sectors. Focus on the gaps between supply and demand for 27 educational groups, including 19 groups at university level
Poland	Labour Demand Forecasting System (SPPP)	To create system / supporting database to generate labour demand forecasts (national and regional) by qualification levels	National and regional forecast, different qualification levels
Poland	Forecast of the number of employed persons and job offers in the province of Masovia	To analyse and provide forecasts for the labour market in the province of Masovia	Regional
Poland	Forecast of the number of employed persons and job offers in the province of Łódź	To analyse and provide forecasts for the labour market in the province of Łódź	Regional
Romania	Anticipating/ forecasting vocational education and training needs	To help implement the Local and Regional Vocational Education and Training Plans through forecasting of skills demand and through	Regional

		multi-stakeholder cooperation at local and regional level.	
Romania	Forecasting the demand for skills at national level and elaboration of occupational profiles for 150 occupations	To map the current demand for skills at national level and to highlight changes in occupation profiles. Also to produce a method to serve as a methodological reference for the future, thus enabling the entire exercise to be undertaken on a more regular basis	National and occupational
Slovenia	Forecast of economic trends	To provide a basis for economic policy planning and preparation of national budgets	National
Sweden	Trends and forecasts	To provide an overview of demographic developments and education and labour market trends through detailed projections of labour supply and demand and the mismatch between them	50 educational categories, 40 industry sectors; gender and age dimensions
Sweden	Education and work	Assessment of the potential mismatches between the supply and demand for education by educational groups	Not specified
UK	Working Futures 2004-2014	To provide sectoral and spatial projections of labour market needs over a ten-year horizon for broad occupational categories.

This is the main officially funded set of projections, but many others are produced at both national | 67 sectors, 47 local Learning and Skills Council areas, plus all counties, regions and home countries. The occupational analysis covers nine broad categories such as professional occupations, sales and customer service occupations, etc. |

		and sub-national level.	

Source: SYSDEM responses

ANNEX 2 — Table 3.4: National surveys identified in the SYSDEM responses

COUNTRY	ACTIVITY	RESPONSIBLE INSTITUTION	PURPOSE	SUPPLY / DEMAND ORIENTATION	SCOPE (SPATIAL, SECTORAL OR OCCUPATIONAL)
Hungary	Quarterly survey of human resource management	PES	To support operations of the PES and its local offices	Supply-demand orientation	National
Italy	Excelsior Survey	Ministry of Labour and Social Affairs, ISFOL, and the Chambers of Commerce Association (Unioncamere)	Short-term employment forecasting	Demand orientation	National, regional and local (103 provinces). Also disaggregated by profession and sector, contractual arrangement, education level, etc.
Latvia	Annual employer survey on LM trends	PES	To identify skill shortages, employer needs and readiness to be involved in PES activities	Demand	National

Luxembourg	Qualifications of tomorrow	Business Federation of Luxembourg (FEDIL), the Luxembourg Bankers' Association and the Chamber of Commerce	Not specified	Supply and demand	Information and communication needs; skills needed in the industrial sector
Malta	Business Perceptions Survey	Central Bank of Malta	Employers' business expectations, including their need for human resources, for the next quarter	Demand orientation	National, no information provided on sectors or occupations
Netherlands	Labour supply and demand panel	Institute of labour Studies (OSA)	To collect and maintain data on the (potential) labour force in the Netherlands	Supply and demand	Survey of labour supply and demand. Includes questions on workforce education and training as well as the demand for skills
Netherlands	Nationale Enquête Arbeidsomstandigheden (National Survey of Working Conditions)	TNO (research institute), Statistics Netherlands (CBS), Ministry of Social Affairs and Employment (SZW)	This survey provides structured, periodic, and consistent data on the composition of employment,	'Snapshot' of current situation — early identification / monitoring of the composition of	All sectors, all types of work

			working conditions and occupational risks	employment, occupational problems (mismatches between supply and demand)	
Norway	Enterprise Survey	Norwegian Labour and Welfare Organisation (NAV)	Survey of recruitment problems and labour needs over the next year	Labour demand	National survey of labour market needs and recruitment issues, data presented at county level with estimates for 86 occupations
Sweden	Labour market tendency survey	Statistics Sweden, Statistika Centralbyrå (SCB)	To identify the recruitment situation, the share of employers with vacancies, and the demand for labour with a particular educational background	Demand orientation	70 educational and training categories of which 56 are HE programmes
Turkey	Monthly labour force survey	Statistical office (Turkstat)	To produce timely labour market data	Supply and demand orientation	National/regional (NUTS 2) levels; all sectors

UK	National Employer Skills Survey (NESS)	Commissioned by the Learning & Skills Council (LSC), the Department for Innovation, Universities and Skills (DIUS) and the Sector Skills Development Agency — the actual survey was carried out by a private-sector company	Main aim is to provide the key government agencies involved with robust and reliable information from employers on skills shortages and gaps and workforce development that can be used as a common basis for policy development and assessing the impact of skills initiatives	Labour demand orientation	79 000 employers interviewed across all sectors across public and private ownership. NESS only concerns England, though similar surveys are being conducted in Scotland, Wales and Northern Ireland

ANNEX 3 — Table 3.5: Other approaches — sectoral, regional and qualitative approaches identified in SYSDEM responses

COUNTRY	ACTIVITY	RESPONSIBLE INSTITUTION	PURPOSE
Austria	Support ProWienII — Surveys and Delphi-style methods	Regional AMS (PES); consulting company	To provide useful sectoral and regional information on labour and skill demand
Belgium	Occupational profiles	Social partners	To develop occupational profiles for the whole economy
Belgium	Analysis of hard-to-fill vacancies ('knelpuntberoepen')	Public Employment Service (i.e. VDAB in Flanders, FOREM for the Walloon region)	Analysis and overview of the occupations with hard-to-fill vacancies
Czech Republic	Sectoral qualitative studies	National Training Fund — National Observatory of Employment and Training and relevant consultancy companies	To provide in-depth insight into ongoing trends in individual sectors and explore the impact of skills-based technologies on labour demand
Denmark	Study of future imbalances on the public labour market by the Ministry of Finance	Ministry of Finance	Due to the rapid expansion of the Danish welfare state in the 1960s and 1970s, there is a remarkably skewed age distribution among public employees. This poses a major challenge for recruitment in the coming years, when a large number of public employees will retire. The report identified the most severe problems among nurses and teachers

Denmark	Project Kvalinord	Kompetencecentre.dk	A special project focusing on methods to assess future regional imbalances for unskilled and skilled labour. The project included detailed qualitative and quantitative studies of present and future demand for competences within a number of sectors (textile industry, retail trade, etc.) in Northern Jutland
Estonia	Sector studies on future needs of the labour market (e.g.: wood and furniture; metal, engineering and appliances; IT and telecommunications)	Most of the sector studies have been commissioned by Innove — The Foundation for Lifelong Learning Development	To provide some additional information on labour market demand in specific sectors — the studies supplement information gathered through regular forecasts of labour market needs (see above)
Estonia	Ad-hoc regional studies on labour market needs	Not specified	To provide regional assessments of labour market needs
Estonia	Graduates registered as unemployed	Labour Market Board	To provide systematic information about the number of graduates registered as unemployed by school and field of study
Finland	Qualitative long- and medium-term forecasts	Ministry of Education, National Board of Education, labour market organisations and research institutes	To predict developments in the demand for skills in working life

Finland	Forecasting provincial labour force demand	Ministry of Employment and the Economy, Employment and Economic Development Centres, companies and research institutes	The objective of the forecast in each labour force area and business centre area is to recognise as early as possible both expanding and contracting sectors, occupations, skill demand, technologies and also changes in production methods
France	Regional Observatories of Employment and Training (OREFs) and Sectoral Observatories (OPMQs)	OREFs were established by the state and regional authorities in 1993, while OPMQs have been closely linked with the Branch Training Insurance Funds (OPCAs) since 2004	Regional and Sectoral Observatories have been set up to develop forecasting studies through a comprehensive analysis of the field concerned (in a region or sector) in terms of skills and jobs
Hungary	Collection of jobs requested by the unemployed	PES	Provision of data to employers about jobs demanded
Hungary	Quarterly survey of human resource management	PES	To support operations of the PES and its local offices
Ireland	Future Requirement for High-Level Skills in the ICT Sector	Expert Group on Future Skill Needs (EGFSN)	The aim of the report is to determine the future requirement for high-level ICT skills in the ICT sector in Ireland and identify actions needed to ensure that the supply of these skills is sufficient — in terms of quantity, quality and diversity

Ireland	The Future Skills and Research Needs of the International Financial Services Industry	Expert Group on Future Skill Needs (EGFSN)	To outline Ireland's current and future skills requirements in relation to the international financial services industry. The report also identifies the need to enhance provision of these skills and the importance of improving Ireland's research capacity in the area of financial services
Ireland	Other sector-specific studies	Expert Group on Future Skill Needs (EGFSN)	To provide an assessment of skill needs in specific sectors, e.g. medical devices, digital media, SME management
Latvia	Research on career plans of final-year school pupils	Hansabanka, PES	To gather information about career plans of pupils in the final year of schooling, identify the most popular professions, determine the factors affecting career choice, identify difficulties in choosing career, collect plans on working abroad
Lithuania	Barometer of employment opportunities	Lithuanian Labour Exchange (PES)	Information on labour demand (for the unemployed and new entrants)
Lithuania	Systematic assessment of supply-demand matching for persons with high-level skills (master's degree)	Všį Vilniaus verslo konsultacinis centras (research and consultancy institution)	To analyse the capacity of highly skilled persons to adapt to the needs of high-tech and innovative industries, taking into consideration Lithuanian and EU labour market trends

Lithuania	Developing a methodology for studies of the demand for experts and implementing a pilot study in high-tech areas	National Development Institute (non-governmental non-profit public organisation)	Developing a methodology for identifying the demand for experts in Lithuania
Luxembourg	Qualifications of tomorrow	Business Federation of Luxembourg (FEDIL), the Luxembourg Bankers' Association and the Chamber of Commerce	
Luxembourg	Continuing professional development in the social sector	ESF-funded project, 'Institut universitaire international Luxembourg' (IUIL), the 'Unité de Formation et d'Education Permanente' (UFEP) and the Department of Labour and Employment	Qualitative survey to identify the CPD needs of social sector employees (disability and carers)
Malta	Scoping Study on the Demand and Supply of ICT Skills in Malta	Ministry for Investment, Industry and IT and KPMG	The objective of this study is to increase ICT awareness within the local scene and to explore the measures to be implemented in order to achieve the growth that this sector is capable of today and in the future
Poland	Forecasting the number of persons	Institute of Labour and Social Studies, University of Łódź	To identify changes in demand for IT specialists

	employed in the IT industry		
Portugal	National Qualifications System (Sistema Nacional de Qualificações - SNQ) - the new regulatory framework, approved by the Government in October 2007	Government	This system brings together vocational training taking place in the educational system and vocational training taking place in the labour market, providing them with shared objectives and instruments. It aims to ensure the recognition of the standards for vocational training in view of the needs of enterprises and economy, as well as to ensure the fast and permanent up grading of the National Qualifications Catalogue (Catálogo Nacional das Qualificações– CNQ) and its diffusion through training promoters.
Slovakia	Ad hoc surveys for anticipation/forecasting of skill needs	Regions and large cities	To forecast skill needs
Slovakia	Ad hoc surveys for anticipation/forecasting of skill needs	Sectoral employers organisations	To forecast skill needs

Spain	INCUAL's Professional Observatory	Spanish Qualifications Institute (INCUAL), Ministry of Education, Social Policy and Sports	To design, elaborate and update the National Catalogue of Professional Qualifications and the National Catalogue of Vocational Training Modules. The Observatory monitors and analyses labour market trends regarding qualifications and carries out research on specific sectors of the economy, focusing on the current situation of the sector, forecasts of future trends in employment and qualifications and the education, training and experience required for those qualifications
Spain	Education and training needs and patterns among private-sector companies in the Autonomous Community of Murcia	Regional Employment Service of the Autonomous Community of Murcia	To analyses and identify current needs and future patterns in the domain of education and training
Sweden	Business Tendency Survey	The National Institute of Economic Research (Konjukturinstitutet, NIER)	The objective is to provide a quick qualitative indication of actual outcomes and expectations regarding, among other things, the employment and recruitment situation, labour market shortages, etc.

Turkey	Turkish Employment Inventory	The Gazi University of Ankara, jointly with the Public Employment Service (ISKUR), proposed this project to the Scientific and Technical Research Council of Turkey (TUBITAK)	To produce an 'inventory' of 'all' existing jobs and employer demand across Turkey so that the 'local' VET system could produce the 'required' graduates based on the current demand of 'local' employers

ANNEX 4 — Table 3.6: Approaches to anticipating skill needs in European countries

AT	The system is well-developed and incorporates several elements: qualification barometer for the comprehensive and continuing monitoring of skill demand with an on-line information system, macro-level medium-term forecasts, accreditation system for universities of applied sciences, networking of researchers in public employment services, and employer skills surveys.
BE	The Public Employment Service (VDAB — Be NL) and FOREM (Be FR) conducts an annual analysis of hard-to-fill vacancies. Research conducted by social partners to identify occupational profiles started in 1997, though it is unclear whether this process continues or has been completed.
BG	Evidence of some forecasting activities conducted by the National Centre for Professional Development on behalf of the Ministry of Labour and Social Policies.
CY	Long-established system of macro-economic medium- to long-term forecasts by sector and occupation, complemented by short-term forecasts and annual surveys of skill needs among employers in collaboration with social partners
CZ	The country has started actively developing a system for the anticipation of skill needs during the last decade. It is based on medium-term, macro-level quantitative forecasting which incorporates some qualitative elements of sectoral projections. In parallel, qualitative sectoral surveys covering several selected sectors are now planned to be linked to a more permanent system of sector councils. Although there is no developed system as yet, a number of efforts at national, regional and sector levels aim for a more systematic approach.
DE	Well-developed system based on mutual sharing of research activities and experiences by networking (FreQueNz). The system includes qualitative research into sectors, branches, occupations, econometric forecasting and qualification standards research.
DK	The system is based on the involvement of social partners in funding and in direct research collaboration, mostly at trade and local levels. Systematic anticipation of skill needs at national level is not very pronounced. Employment and education forecasts conducted by the Economic Council of the Labour Movement and the Danish Institute of Governmental Research are feeding into the policy debate on future imbalances between the supply and demand for labour.
EE	The country has started actively developing a system for the anticipation of skill needs during the last decade. It is based on medium-term, macro-level quantitative forecasting which incorporates some qualitative elements of sectoral projections. In parallel, qualitative sectoral surveys cover several selected sectors. Although there is no developed system yet, a number of efforts are aiming for a more systematic approach.
ES	Anticipation of skill needs through work on the development and updating of vocational qualifications, sector studies, permanent observatory of occupations, and the network of observatories of the labour market

FI	The system is quite well-developed. Quantitative forecasting is a major building block of the system, although some qualitative elements are built into the forecasts, and qualitative surveys and focus groups are conducted in parallel. Partnership and cooperation are important elements of the system. One product is an electronic information bank.
FR	A long-established system for the anticipation of skill needs based on macro-level medium-term forecasts, sectoral studies, regional surveys and employer skills surveys. Active involvement of social partners and regional actors. .
GR	The system has started developing only recently. It is based on local partnerships, alumni surveys and other transition-to-work type of research. Some econometric forecasting and other quantitative and qualitative surveys are under development.
HR	New forecasting models are being introduced through the guidelines for human resource development and the Education Sector Development Plan 2005-2010.
HU	Regular short-term labour market projections by PES, based on enterprise questionnaire surveys, recent development of medium- to long-term macro-level forecasting funded through the Human Resources Development Operational Programme, although the future of this initiative is uncertain as it has not led to a preferred forecasting method. No systematic anticipation of skill needs yet, but a number of efforts to incorporate continuous monitoring of skill needs into the VET system.
IE	Fairly well-established system based on a combination of sector studies, general labour market and employment trends analysis, and medium- to long-term employment demand forecasting by occupational categories
IS	Occupational Councils are responsible for providing forecasts of skill needs, and work with the Ministry of Education, Science and Culture to identify and develop the proposed education and training response.
IT	The system is based on sector and regional studies, hiring surveys and short- and medium-term econometric forecasting by sector and occupation. The country is now attempting to put in place a more systematic approach to permanent skill needs monitoring with a linked internet platform for data dissemination.
LT	Anticipation of skill needs through sector studies and development of qualification standards and forecasts based on available statistical indicators and employer surveys. No developed system of skill needs anticipation yet, though work has recently been carried out on the development and application of medium-term (5-year) forecasting methodology for skills/qualifications demand on the labour market, with reporting scheduled during 2008.
LV	No developed system of skill needs anticipation yet. Many developments are planned, including a more systematic approach and research. Upcoming projects are in the ESF pipeline. Estimates of labour supply and demand, based on three development scenarios.

LU	A Permanent Committee of Labour and Employment has been established by the Ministry of Labour and met for the first time in June 2008. The Committee is to examine employment, unemployment, working conditions and the security / health of workers. Regular employer surveys conducted in the banking sector to anticipate short-term skills requirements. .
MT	Short-term labour demand forecasting based on an employer survey was conducted by the Public Employment Service, but this survey has been discontinued. A scoping study on the demand and supply of IT skills was conducted in 2007, while the Central Bank of Malta conducts a regular business perception survey.
NL	Very well-developed and long-established system with multi-source funding and strong involvement of social partners, quantitative and qualitative information, very detailed results to support decision-making as well as to provide guidance for individuals.
NO	Statistics Norway produces macroeconomic labour supply and demand projections (current projections to 2025), while the Norwegian Labour and Welfare Organisation conducts a short-term (annual) analysis of labour market needs.
PL	The country has scaled down the interdepartmental efforts of the last decade to develop a system of labour-market skills demand forecasting. Planning to develop a new system is in place as well as efforts to establish a more holistic approach to achieve more robust and reliable results. Poland has applied an interesting method for the observation of trends and changes in skills demand in old Member States.
PT	Sectoral analyses linked to the development of professional profiles and qualification standards
RO	Two forecasts identified, though it is unclear whether these are ad hoc studies or work that will continue. The first looks at supply and demand in seven of the eight Development Regions (excluding Bucharest and Ilfov). The second forecast commissioned in 2005 is a national occupational forecast.
SK	No developed system of skill needs anticipation yet. There is awareness of the need for such system as well as planning to develop it, but there are indications of a lack of available expertise. Promising development at sectoral and regional levels.
SI	No developed system of skill needs anticipation yet, though SYSDEM data mention an annual medium-term forecast prepared by the Institute of Macroeconomic Analysis and Development. Skill needs analysis is performed for the development of occupational standards, including a few sectoral analyses. The systematic development of the anticipation of skill needs in the Podravje region is promising, with suggestions and attempts to disseminate the good practice to other territories.
SE	Very well-developed and long-established system with several complementary long-, medium- and short-term forecasts, a system of sectoral studies, regular questionnaire-based skills surveys among employers, and regular regional surveys on employment (past and planned)

TR	The Turkish Statistical Office conducts a monthly labour force survey to ascertain short-term skill needs. The public employment service (PES) collects and collates redundancy data. The PES has plans to analyse these data in the near future. A joint project between the University of Ankara and the PES is developing a jobs inventory to examine employers' skill needs: results are anticipated in the near future.
UK	Very well-developed and long-established system (although still under further development and change) based on several pillars: - well-coordinated sectoral and regional research into skill needs identification through the national Sector Skills Development Agency and a network of 25 Sector Skills Councils; - medium- to long-term sophisticated forecasting to provide the necessary level of detail at sectoral and regional level as well as implications for qualifications; - regular employer skills surveys at national and regional level.

Source: CEDEFOP[128], supplemented by SYSDEM (BE, BG, HR, LU, MT, NO, RO, TR) and Eurydice (IS) responses

---

[128] CEDEFOP, Systems for anticipation of skill needs in the EU Member States (draft version), 2008.