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Piloting a European employer survey on skill needs

Illustrative findings

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Foreword

The European economy's competitiveness is affected by its capacity to prevent skill gaps and shortages in the labour market, especially when enterprises and their investments can be the main contributors to faster economic recovery. An efficient system of skill needs identification and anticipation at European level and in Member States would greatly improve our options for coping successfully with the present situation.

The community initiative 'New skills for new jobs' has triggered activities related to analysing skill demand, supply and skill mismatch, including development of an employer survey on current and future skill needs in Europe. The initiative goes back to the Council resolution of 15 November 2007 on new skills for new jobs (Council of the EU, 2007). It stresses the need to provide European citizens with new opportunities to: improve their knowledge, skills and competences; improve matching knowledge, skills and competences to needs of society and the economy; and anticipate skill needs – and gaps – emerging in European labour markets. To pursue the effort, in 2010, 'An agenda for new skills and jobs' was launched as one of seven flagship initiatives of the Europe 2020 strategy (European Commission, 2010a).

Today, information and data on skills development come mainly from household and employees surveys: trends in the labour market, demand and supply of skills, data on skill mismatch and skills obsolescence. Recurrent analysis of individual cross-sectional data and their extrapolation into the future indicates significant structural changes over time. Despite the critical nature of such structural data, they do not allow one to understand fully the complexity of changing skill requirements and developments in occupations at the workplace.

Therefore, Cedefop, with financial support from the European Commission has taken a step forward by developing a European employer survey on skill needs. Cedefop worked, in close cooperation with experts, to develop and evaluate innovative approaches for measuring skill needs from the employers' point of view. The pilot survey focuses on testing questions on the importance of generic skill requirements and specific working tasks, as well as relevant changes in defined occupations. It also collected information on drivers of change, such as innovation, and their impact on skill requirements at the workplace to broaden the perspective on future needs. The survey also piloted questions on staff preparedness to meet new requirements, and firms' policies to address this issue.

This publication describes in brief the measurement concept and the survey methodology tested in the pilot survey to identify current and future skill needs as perceived by employers in Europe. It provides illustrative findings with some implications to be followed up in future work, as well as an assessment of the approach's practicability and options for moving to a large-scale employer survey on skill needs in Europe.

Developing an employer survey on skill needs in Europe is worthwhile as it provides a bridge between the world of employers and vocational education and training (VET). Close cooperation between employers expressing their needs and shaping VET policies and developers and implementers of VET programmes is needed more than ever.

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Executive summary

Cedefop was entrusted ([1]) to develop instruments and pilot an employer survey on skill needs in Europe (employer survey). The aim is to investigate changing skill needs of enterprises in countries, sectors and occupations, and what drives the differences.

The employer survey is meant to complement existing data sources by providing unique information on the dynamics of skill needs in enterprises. Evidence is collected from employers, who report on the change in importance of tasks and potential skill gaps for tasks increasing in importance. In the survey, employers also report on new (or emerging) tasks and preparedness of the workforce for these tasks.

Key features of piloted instruments

To provide a valid instrument close to the employer's perspective, a task-based approach is adopted. Respondents are asked about importance, change in importance and preparedness for tasks increasing in importance. Generic skills are derived from the following domains ([2]):

(a) cognitive skills: reading, writing, mathematics, problem-solving, foreign language;
(b) social/communication skills: making presentations, persuading, instructing, team-working;
(c) physical skills: manual dexterity;
(d) self-direction and learning to learn skills: planning, task discretion, learning, adapting;
(e) green skills: resource saving and anti-pollution tasks;
(f) ICT skills: level of complexity.

Several items on newly-emerging tasks are asked for all selected occupations to address emerging skill needs and possibly related training needs.

([1]) Financial support was provided by the progress programme of Directorate-General for Employment, Social Affairs and Inclusion.

([2]) The generic skills domains selected enable links and comparisons to be made with the programme for international assessment of adult competences (PIACC) and the continuing vocational training survey (CVTS).

For the pilot, one occupation in each sector has questions concerning occupation-specific skills ([3]).

Drivers of change questions explore differences among employers looking at innovation and adaptation of products, as well as new processes and services due to environmental awareness or standards/regulations. Background questions look at enterprise characteristics and whether establishments review skill and training needs, offer training or have hard-to-fill vacancies.

Seven sectors are selected for the pilot and, within each sector, the three most prevalent occupations (based on labour force data) are chosen. The pilot is carried out in nine EU Member States ([4]). One thousand local establishments are sampled per country ([5]).

Main findings

For all occupations generic tasks expressing a certain demand for flexibility seem to be among the most important. Otherwise, the relative importance of generic skills tends to vary across occupations. Examples of skills considered of high importance among most occupational groups include team-working skills (on average across occupations 89.5% of employers cite this as important), the capacity to learn new ideas, methods or techniques (88.4% important) and adaptability to new equipment or materials (81% important). However, considering ICT skills, there are still occupational groups in which ICT is not needed at all by a majority, for example sheet and structural metal workers (71.4% of employers do not consider this skill as important), building frame workers (66.3% not important) or building finishers (59% not important). In contrast, high incidences of the need for medium-level ICT skills are noted for general office clerks and for protective services workers, while complex and advanced ICT skills are predominantly required in the occupational groups of professionals across sectors. A trend to green occupations is also apparent as practices to reduce use of resources (raw materials, energy or water) are important in many occupational groups, averaging 43.6% across occupational groups. Finally, as the skill level of an occupation rises, the more important mastering a wide array of generic skills becomes. These results demonstrate that

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([3])   Developed using international standard classification of occupations (ISCO) group definitions and task lists at 3- and 4-digit level.

([4])   Czech Republic, Germany, Hungary, Ireland, Spain, France, Italy, Poland and Finland.

([5])   Except in Ireland where the sample was 500.

the survey has the capacity to identify patterns of skill demand across different occupations and is able to identify relevant clusters of skills necessary to perform, for example, managerial or green tasks.

Concerning changes in importance of both generic and occupation-specific skills and related preparedness of the workforce, the survey has the potential to capture trends and patterns of development of different occupations. Tasks which are more often rated as important tend to be more dynamic as well. However, there are also incidences of skills, although at a relatively low average level, for which demand is increasing. For instance, the importance of foreign language is increasing in some occupations: certain groups of professionals, the IT sector and to a very high degree also for personal care workers. Increasingly, adaptability to new equipment or material is required from office clerks; and the construction and health sectors appear to be demanding such skills across occupations. The latter two sectors are also seeing an increased requirement for green skills. Employers report an above average level of increasing importance of tasks linked to reducing use of resources, whether raw material, energy or water) or reducing pollution. However, demand for green skills varies across occupational groups, to the extent that for some groups they are considered almost irrelevant. Overall and across occupations, the strongest increase in demand is observed for the following skills: (a) advanced literacy, learning, adaptability, and persuasion are of high and increasing importance; and (b) ICT skills and some green skills, of relatively lower importance but for which demand is growing.

The survey also enables one to look at skill gaps in the workforce for tasks rated as increasing in importance. There are indeed skill gaps in specific sectors and occupations concerning communication skills (foreign language and capacity to delivery speeches and presentations), planning or persuasion skills, and ICT. For example, 75% to 83% of sales professionals and shop salespersons appear to be prepared to meet the changing demand for skill in planning, problem-solving and autonomy. However, this implies that a qualified minority of employers in the wholesale and retail sector might nevertheless be facing skill gaps in these three tasks analysed in the selected occupations. A preparedness gap is also evident in about 30% of the enterprises in the manufacturing sector where foreign language is increasing in importance. Lower-skilled occupations seem to be less well prepared to meet the requirement of increasing skill demand than other occupations.

In addition, the survey has the capacity to shed light on the relationship of different drivers and conditions of change with skill demand and skill gaps. Among other characteristics, innovative workplaces, those that review skill needs, train or larger enterprises see a greater increase in demand for skills.

Further, establishments which review skill needs of their employees are better prepared for increasing generic skills. The survey confirms that innovative workplaces are more skill intensive and their demand for skills changes more dynamically both in occupation-specific and generic skills.

Following a similar trend to generic skills, higher-level occupations are more dynamic than average as occurrence of newly-emerging tasks is greater (such as engineering professionals, ICT technicians, and healthcare occupations). The most dynamic sectors are IT, finances, public administration and health. Non-preparedness for newly-emerging tasks is above average for assemblers, physical and engineering science technicians, and nursing and midwifery associate professionals.

The next phase

The pilot survey successfully validated the approach taken to measuring changing skill needs from the employers' perspective in various occupations and sectors in nine countries. However, scaling up the survey to cover the whole EU requires selecting an implementation design that is cost-effective and generates robust country estimates, while retaining the approach and qualities of the pilot. For future work on employer surveys, Cedefop proposes two alternative approaches drawing upon key features of the pilot instrument using streamlined designs to ensure reliable country comparisons: (a) a sector-based employer survey, investigating changes in both generic and occupation-specific skills in four to five occupations in sectors of particular interest; (b) a European survey on generic skills, concentrates on broad occupational categories to extend coverage of the survey to the whole EU economy and investigate trends in generic skills.

For the full-scale survey, the refined survey will focus on transversal/generic skills. The pilot survey already contained seven skills domains. This list worked well across countries, sectors and occupations but needs to be refined to ensure synergies with other ongoing projects and initiatives, such as ESCO ([6]) developments and the European key competences framework. It will also increase coverage of green skills, ICT skills, and a set of social/communication skills reflecting the emphasis placed on those skills in the recent communication of the European Commission *Towards a job-rich recovery* (European Commission, 2012).

([6]) ESCO, European skills, competences and occupations taxinomy.

The principal objective of the full-scale survey is to obtain interesting, and sufficiently discriminatory, information on trends in transversal/generic skills in occupations across countries. These data will enable Cedefop and other stakeholders to carry out qualitative and quantitative analysis of emerging skill needs in organisations of different sizes covering the whole economy, (including non-marketed services) in all EU Member States.

CHAPTER 1.
Introduction

1.1. Background

Today's world is changing rapidly. Technological development and innovation, growing competition, increasing labour force mobility, internationalisation of certain jobs and sectors, and environmental change are factors that affect day-to-day existence of enterprises. The way enterprises organise and manage their work, production and services is influenced by these developments a great deal. Work becomes more demanding, some types of work are being outsourced and management structures become flatter. The pace of change at workplace level leads to emergence of new skill requirements, obsolescence of certain skills, an alteration of the skill and competence composition of occupations, and to skill shortages and gaps in some areas. Skill gaps and shortages have significant economic consequences for affected employers. They can be highly damaging to enterprise productivity, turnover and profitability, and to organisational competitiveness. Early recognition of new job demands is therefore important for maintaining and improving competitiveness of the European economy. An efficient system of skill needs identification and anticipation at European level is required.

Cedefop's analysis of skill demand and supply in Europe provides a core input to debates on future developments in European labour markets. By examining economic sectors, occupations and skills, Cedefop provides a much needed assessment of trends in skills in the EU and its Member States. In particular, Cedefop produces skill demand and supply forecasts, analyses skill mismatch and investigates skill and competence needs in sectors and enterprises.

Skills supply and demand forecasts can provide information on future trends in availability and requirements of different levels of qualification for different occupations across sectors in different countries. However, forecasts cannot provide detailed, qualitative insights into specific skill requirements or particular skill types. Nor can they explain enterprise skill needs or identify emergence and change in skill requirements. Therefore, it is necessary to collect additional data to allow a deeper insight into how and why changes in the occupational and qualification structure in various economic sectors occur.

Employers are in the best position to provide qualitative information about changing needs for particular skills on the labour market. What is meant by

qualitative information, in contrast to quantitative data, can be illustrated by a question for future-oriented research into skill needs, which has been topical since the 1990s: it is not so much 'how many people in this profession will be required in five to 10 years?' but rather 'which professions and what kind of new qualifications and skills?' and also 'what qualities of the workforce will be in demand?' (Strietska-Ilina, 2007, p. 224). So, qualitative information does not refer to numerical future skill needs, but to content of those needs. Such qualitative information can be obtained by in-depth sectoral or occupational studies. They can also be obtained by way of employers' surveys. An employer survey can essentially contribute to filling data and information gaps left by skill needs forecasting and also to verifying results, while adding data to skill mismatch analysis to complement sectoral and cross-sectoral research. In choosing a representative survey approach it becomes possible to characterise the numerical frequency of qualitative measures across occupations, sectors and drivers of change. This enables a combination of both qualitative and quantitative elements in identifying skill needs.

Hence, development of an employer survey on skill needs in Europe is considered an additional element in progress towards an integrated system of anticipation of skill needs. The main added value an employer survey can deliver is the direct voice of employers in various types of workplaces.

The plan to complement skills supply and demand forecast activities of Cedefop by an employer survey on skill needs gained momentum in 2007, when Cedefop launched a series of workshops to discuss employer surveys' potential as a tool to identify skill needs and skill gaps with experts. The objective was also to reflect upon a common European approach for obtaining information and data from employers on their skill needs. Discussions were followed by a feasibility study carried out in 2009 which concluded that the only option that allows full comparability of results across countries is a new survey at European level dedicated specifically to identification of skill needs in enterprises.

The central question to be answered by the European employer survey on skill needs is: what are current and future skill needs of enterprises in various sectors and countries, within and between different occupations; and how (and why) they are changing over time.

In 2010-12, Cedefop's mission was to develop and pilot a survey instrument to investigate changing skill needs of enterprises in countries, sectors and occupations, and what drives the differences. This included development of the whole survey approach and its practical testing in a form of a pre-test and a pilot survey. It also included development of an adequate statistical methodology and assessment of relevance of the survey questions and availability of the requested data in enterprises.

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The full-scale version of the survey under preparation will be an adaptation of the present pilot that takes into account the strengths and weaknesses of the questionnaire instrument and survey design. The revised version will be pre-tested across eight countries in 2013 and a decision made on whether a full-scale survey will be carried out in all 28 EU Member States.

1.2. Policy context

Developing an employer survey on changing skill needs in Europe, forecasting skill demand and supply, and analysing skill mismatch are closely associated with the EU initiative 'New skills for new jobs', which was initiated by the related *Council resolution of 15 November 2007* (Council of the EU, 2007). This resolution stresses the need to: provide European citizens with new opportunities to improve their knowledge, skills and competences; improve matching knowledge, skills and competences with needs of society and the economy; and anticipate the skill needs – and skill gaps – emerging in European labour markets.

In response to this resolution, the European Commission submitted communication *New skills for new jobs: anticipating and matching labour market and skills needs* (European Commission, 2008). The communication focused on ensuring that assessment of skills and labour market needs becomes a permanent part of the EU's policies for employment and growth, and on strengthening the Union's capacity for skills upgrading as well as for anticipating and matching labour market and skill needs.

Further to strengthen capacity for forecasting and anticipation, the communication announced provision of an analysis of skills and labour market needs of key sectors ([7]), establishment of regular supply and demand forecasts of EU labour markets up to 2020 – and development of an employer survey to improve knowledge, awareness and involvement of businesses in anticipating skill needs.

Most recently, the flagship initiative 'An agenda for new skills and jobs' within the European 2020 strategy aims at modernising labour markets with a view to raising employment levels and ensuring sustainability of our social models. It calls for continuing investment in education and training systems, anticipation of skill needs, matching and guidance services as fundamentals for raising

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([7]) Finished and published in 2009 as a series of forward-looking studies on new skills and new jobs (Sectors' new skills for new jobs)
http://ec.europa.eu/restructuringandjobs [accessed 3.9.2013].

productivity, competitiveness, economic growth and ultimately employment (European Commission, 2010b).

Improving VET's capacity to respond to changing requirements of the labour market is also emphasised as a priority in the communiqué of the European Ministers for Vocational Education and Training, the European social partners and the European Commission, meeting in Bruges on 7 December 2010 ([8]) which reviewed the strategic approach and priorities of the Copenhagen process for 2011-20. Investing in skills by ensuring better recognition of skills and qualifications and anticipating skill needs as well as coping with skill mismatches has been recently endorsed by the employment package launched in April 2012 by the European Commission. The package consists of the Commission communication *Towards a job-rich recovery* (European Commission, 2012) accompanied by a series of policy documents looking into how EU employment policies intersect with some other policy areas in support of smart, sustainable and inclusive growth.

To equip people with adequate knowledge, skills and competences in dynamic economies is a challenge for both policy-makers and businesses. Vocational education and training (VET), and in particular apprenticeship, has an important role to play in linking more closely the worlds of education and work. Boosting attractiveness and quality of VET, and involving social partners in planning and provision of VET is one way to ensure an adequately skilled workforce, and promote successful transition from school to working life. Valid and comparable data on skill needs in the European labour market should contribute to formation of effective education and training policies, at both national and European levels. Timely and reliable information is particularly needed on likely developments in the coming years.

1.3.   Expected value added

The employer survey on skill needs is meant to provide additional information on labour market trends and complement existing data sources by providing unique information on the dynamics of skill needs in enterprises. The evidence is collected from employers, who report on the change in importance of tasks and potential skill gaps for tasks increasing in importance. In the survey, employers also report on new (or emerging) tasks and preparedness of the workforce for these tasks.

([8]) Council of the EU and European Commission (2010).

Compared to the continuing vocational training survey (CVTS), the employer survey focuses extensively on skill needs, the link between tasks and occupations, newly-emerging tasks and preparedness for changing needs, drivers of change and enterprises' strategies to cope with new or emerging tasks in occupations. In particular, the employer survey seeks to measure abstract skills in terms of one or more concrete tasks or applied skills, the aim being to develop an ecologically valid measurement instrument close to the employer's perspective linked to occupations through the international standard classification of occupations (ISCO). In comparison to the programme for international assessment of adult competences (PIAAC), which asks individuals about the generic skills required in their jobs ([9]), the new employer survey provides the employer's perspective as well as a possibility of analysing dynamics and changing skill needs in relation to enterprise characteristics and practices (the drivers of change). The new employer survey also proposes a broader coverage of tasks than PIAAC, to include occupation-specific and newly-emerging ones.

The employer survey on skill needs is designed to be part of a comprehensive system of tools and research on various aspects of skill needs, together with Cedefop activities on forecasting skill demand and supply, analysing skill mismatch and on (cross-)sectoral skill needs. As part of such a system a regular European employer survey can give additional information on labour market trends. Hence, the results would support interpretation of quantitative results on skills development available at a more aggregated level, such as provided by Cedefop's forecast. The new employer survey data would also complement views of employees on skills use in their jobs to be gathered in the OECD/PIAAC survey.

In countries where no similar or comparable surveys have been conducted, the European employer survey can be used or adapted as a (starting) point for developing a national information system.

1.4. Benefits for employers

Availability of qualified and skilled employees is a major issue for businesses. Education and training needs to be informed about skill requirements at the workplace and about trends at an early stage. Thus, the added value of the survey for employers lies in helping to meet labour market and in particular

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([9]) The job requirement approach is the basis for a module in PIAAC focused on a selection of generic skills. Individuals are asked to report on frequency of their use of these skills in their jobs, together with some characteristics of their workplace.

employers' requirements more adequately in the future. According to the European HR barometer (AON Hewitt, 2011), the mismatch in workforce skill levels and difficulty in finding the right talent emerges as a most pressing issue influencing human resources policies in an organisation. Though participation of employers in surveys is often a critical issue, their participation specifically in this survey would contribute to a more adequate skills supply from the education and training systems in future. Further, employers can also adjust their skill needs when no adequate supply is foreseen.

It is also possible that results might help companies to benchmark themselves using the data for internal analysis on current skill needs but also current and upcoming changes in occupational profiles across countries and sectors. So far, such comparative data have been rare. Within a forward-looking human resources development concept, such data might also help to design and organise on-the-job training in a timely manner.

Additionally, the survey will provide information on drivers of change, training provision in general, skill need identification processes and measures to respond to emerging needs. This complex information across countries, sectors and occupations will help employers to get a more detailed overview of key issues for European businesses.

CHAPTER 2.
Survey concept

2.1.   Selection of a measurement approach

A feasibility study carried out in 2009 evaluated the potential of existing national and European surveys to identify and measure skill needs in enterprises (with results presented in *Employer surveys on skill needs in Europe: results of a feasibility study* (Cedefop 2010, p. 34). Three main options were identified:

(a) modifying an existing European employer survey by including questions or a section on skill needs;

(b) adjusting national surveys in selected Member States to achieve comparability of results;

(c) launching a new European employer skill needs survey aimed primarily at identifying skill needs.

The study concluded that the only option that allows full comparability of results across countries is a new survey at European level dedicated to identification of skill needs in enterprises. However, use, harmonisation and adjustment of existing EU or national surveys should be further explored in parallel. Therefore, the proposed new survey should serve primarily as an independent tool but might also be the basis for specific modules to be used in existing EU or national survey(s) by Member States. The companion volume to the present work, *User guide to developing an employer survey on skill needs* (Cedefop, forthcoming), aids the latter aim.

The analysis performed in the feasibility work showed that, except for the surveys conducted in the UK countries, no surveys designed to assess directly skill needs are conducted in Member States or at European level. Development of a new survey, therefore, represents the complete approach to bridging this gap.

How to measure skill needs is one of the central research challenges recognised by the feasibility study. The feasibility study proposed three approaches to identify skill needs: collecting data and information on occupational structure, vacancies and training. For developing the pilot employer survey, these approaches were critically reviewed and an alternative approach was proposed.

2.1.1. The occupational structure approach

The approach on occupational structures includes two elements:

(a) analysis of the occupational structure in terms of workforce composition;

(b) analysis of the occupational structure's evolution over time.

'Since the change in the occupational structure of the workforce over time responds to structural factors such as technological progress, trade (globalisation), work and firm organisation, etc., it is essential to be able to estimate such factors as these will affect future skill needs' (Cedefop, 2010, p. 34). This approach has the following advantages. It allows for a wide range of comparison throughout EU-27 and has been tested in a series of surveys at national, international and European levels (Cedefop, 2010, p. 34). It is very useful for quantitative monitoring of the workforce composition. Also, the category 'occupation' as defined in ISCO or in national classifications is known and most respondents understand the term. Differences in national classifications, though linked to ISCO, might hamper comparability across countries.

'Occupation' is however a rather inflexible category, in particular when qualitative changes are under consideration; such changes cannot be derived from occupational statistics. 'Occupation' is a traditional, and to some extent, static concept. Of course, contents (working tasks) of occupations change over time but this cannot be drawn from occupational statistics. In this sense, the concept of occupation always lags behind actual developments in skills and competences embodied in the concept, and cannot anticipate future developments. At most, occupational structures can be analysed over time.

Regarding qualitative changes, it has to be taken into account that occupations are only a proxy for skills: '[…] occupations, even though duly classified (through the ISCO classification), are an indirect and generally weak measure of skills and competences, which typically are of a more transversal nature' (Cedefop, 2010, p. 29). More importantly, competences and skills required for a specific occupation change over time, involving a continuous change of links between occupations and skills. This complexity is not mirrored in the category occupation and therefore in the occupational structure.

The concept of occupational structure would bring added value in terms of data collected directly from enterprises for skills forecasting for which currently only data collected via household surveys (such as labour force survey) are available in Europe. However, it would not provide the qualitative information needed to assess changes and identify new requirements in skills and competences.

2.1.2. The vacancies approach

As the feasibility study points out (Cedefop, 2010), 'vacancies' provide timely information on employer skill needs and are the most immediate way to assess current needs of enterprises. In addition, government policy and regulatory changes are likely to have a direct impact on the type of vacancies to be filled. To separate the skill needs from the business cycle impact, surveys generally focus on hard-to-fill vacancies, which are more precise indicators of those areas where the mismatch between employers' demand and the supply is the most acute. Nevertheless, information on hard-to-fill vacancies alone merely points to possible mismatch in the labour market where the unsatisfied demand for skills can be only one reason. Frequent reasons for vacancies (and this is also valid for hard-to-fill vacancies) are low wages and poor working conditions; skill needs are not necessarily a major issue in this context.

The vacancies approach is also very susceptible to general business fluctuations. Temporary economic crises within a branch influence results of vacancy surveys considerably and can easily lead to wrong assumptions for the future. An example is the engineering sector crisis in the mid-1990s which led to a situation with only very few vacancies for occupations such as engineers or technicians in this sector. As a result, students were deterred from these professions, leading to pronounced skill shortages a few years afterwards when the sector had overcome the crisis.

The feasibility study (Cedefop, 2010) defines two approaches that can be adopted to assess enterprise vacancies:

(a) the first aims to investigate solely current vacancies (vacancies open at the time of the survey/interview). This approach has limitations because it is unable to anticipate directly future skill needs through future vacancies. Nevertheless, it has the benefit of being completely objective: employers are not asked to make a judgement, but merely to state their current needs which can then be extrapolated to the future (such as the UK national employer skill survey);

(b) the second aims to investigate both current and future needs by asking employers about any future vacancies they plan to advertise. Generally, the time horizon of future vacancies is restricted to between a-few-weeks and a-year-maximum because employers usually cannot give accurate forecasts for periods longer than one year. Compared with (a), this approach has the advantage of providing a basis for investigations into future skill needs. However, it introduces a certain degree of subjectivism, given that it requires employers to formulate expectations about the future (such as the excelsior information system in Italy and the panel enterprises forecasts in France).

There can be other ways to meet skill needs of employers than recruitment via job advertisements. Besides, even if there are innovative and/or new elements in job advertisements, the difficulty is to separate them from traditional elements of a job.

At European level, job vacancy statistics are collected by Eurostat. The European Commission (DG Employment) regularly publishes the *European vacancy monitor* (EVM) and the *European vacancy and recruitment report* (EVRR) providing a comprehensive overview of recent developments on the European job market. Data on job vacancies, contractual arrangements, growing occupations, difficult-to-fill vacancies (bottleneck occupations) and hiring shed light on trends in occupational demand and skill requirements. The data are drawn from a wide range of sources: public employment services, temporary work agencies, online services, the EU statistics office (labour force survey, job vacancy statistics), national statistical offices and other relevant research. Therefore, there is no need to develop additional surveys on vacancies but rather improve existing ones.

2.1.3.   The training approach

The third approach to investigate employers' skill needs suggests examining their training policies and training provision. Training surveys can focus on employees already working in the enterprise or on newly-recruited ones. It is difficult to distinguish between the need for employees to acquire new skills and upgrading existing skills. A high training intensity in a sector as such is not a clear indication of the need to acquire new skills unless it is asked in the survey accordingly. It could also simply be an indicator of the obligation to update skills regularly due to legislation or of a form of benefit for employees that does not directly reflect skill needs.

National training surveys usually ask for the type of training taking place in an enterprise, the reasons for training, resources, target groups and satisfaction with the training. But instead of asking for the 'who' and 'how', these surveys should ask 'what' has been trained. However, the content of training is usually omitted in national surveys and with that the opportunity to establish a substantial link to skills. Admittedly, training is quite an interesting indicator of future skill needs, but to know about the real content of training it is necessary to bring it into a relationship with skill needs. Such a survey does not seem feasible, since it would imply a complex and rather expensive methodology.

At European level, the fourth round of the continuing vocational training survey (CVTS) was carried out in 2011 (reference year 2010). This round shifts focus from training subjects to skills and competences which are considered as important for development of enterprises in the near future, and targeted by

training courses. It contains some questions related to skill needs which were prepared in cooperation with Cedefop. These questions are only broad, do not cover skills in detail and have no link to occupations.

2.1.4. Towards a task-related approach

An alternative approach suggests using tasks as a key measurement category. 'Employers are known to find it difficult to think in terms of skills as it is generally simpler for them to think in terms of production processes, tasks to be executed and objectives to be achieved' (Cedefop, 2010, p. 101). Development of the measurement concept for the new survey focused mainly on assessing the potential of a task-related approach.

It seems reasonable to assume that survey questions in terms of tasks might result in more reliable and relevant data. Skills are used when working tasks are carried out. So, if valid indicators for working tasks performed in occupations can be developed, skills use can be characterised in this manner. Development work for the pilot survey followed this approach.

2.2.   Main pillars of the survey concept

To provide a valid instrument close to the employer's perspective, the task-based approach was adopted. It has several advantages. First, it is very close to the world of work and to the employers' perspective, so a task-related approach seems the easiest one to be implemented in an employer survey. Second, in contrast to 'skills', the term (and translation of) 'tasks' is much clearer. Further, 'tasks' have – in contrast to 'skills' – the capacity to be directly linked to occupations via ISCO.

The task-related approach as tested in the pilot survey combines generic and occupation-specific tasks and skills. A generic skill is defined as one which is used in a wide variety of occupations (though not necessarily all) across the economy (Green, 2011; 2012). Generic tasks capture use of generic skills, and are therefore one of the prime foci of the measurement concept. Collecting information on generic tasks is important as it is widely accepted, and there is mounting evidence that generic tasks/skills have become notably strong contributors to economic efficiency in the modern economy. A generic task is related to performance of a certain job or occupation as a whole, and is sufficiently similar to tasks performed in a large range of occupations. Occupation-specific tasks are related to performance of a specific part within a work or business process, and are less likely tasks performed in other occupations. While each generic task resembles a generic skill in use, each

occupation-specific task requires a different set of occupation-specific skills. Generic and occupation-specific tasks (and skills) reflect different contents of occupations, and refer to and address different levels of detail.

Generic tasks can be described in a way that is applicable across a wide range of occupations. Communication tasks, requiring use of generic communication skills, are a prominent example, and are part of generic domains to be covered in the pilot survey. The aim is not just to explore whether communication skills, for example, are somehow important – as confirmed in previous studies – but rather to quantify the relevance of each generic skill in use across sectors and occupations in countries, and to measure the direction of change accordingly. Occupation-specific skills are used in one or just a few types of occupations. There are thus as many sets of occupation-specific task domains as there are occupations.

The pilot survey also attempted to explore the extent of skill gaps in relation to any newly-emerging tasks, or to existing tasks increasing in importance. Results could provide an insight into the links between changes in particular generic or occupation-specific tasks/skills, with possible impact on training provision.

Generic tasks were derived from the following domains ([10]):

(a) cognitive skills: reading, writing, mathematics, problem-solving, foreign language;
(b) social/communication skills: making presentations, persuading, instructing, teamworking;
(c) physical skills: manual dexterity;
(d) self-direction and learning to learn skills: planning, task discretion, learning, adapting;
(e) green skills: resource saving and anti-pollution tasks;
(f) ICT skills: level of complexity.

Respondents were asked about importance, change in importance and preparedness for tasks increasing in importance.

For the pilot, one occupation in each sector had questions on occupation-specific tasks. These tasks were developed using ISCO-08 ([11]) group definitions and task lists at 3- and 4-digit level. Occupations at the 4-digit level would be more appropriate for such questions; however, the ISCO 3-digit level for the selected occupations had to be adopted in general to cope with the issues of

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([10]) The generic skills domains selected enable links and comparisons to be made with PIACC.

([11]) International standard classification of occupations, approved in 2008.

coverage and availability of occupations in the interviewed establishments. The focus on the 3-digit level poses potential problems for conducting the interviews and for meaningful interpretation of results in case of occupation-specific tasks. Since many ISCO groups at 3-digit level are quite heterogeneous, respondents might face difficulty in understanding to which subgroups they should relate their answers and the same is valid for interpreting results: we may not know for certain which group the respondent is referring to; we might receive as a result mere averages for very heterogeneous groups which cannot be easily interpreted.

Several items on newly-emerging tasks were asked for all selected occupations to address emerging skill needs and possibly related training needs.

Drivers of change questions explored differences among employers looking at innovation and adaptation of products, as well as new processes and services due to environmental awareness or standards/regulations. Background questions looked at enterprise characteristics and whether establishments review skill and training needs, offer training or have hard-to-fill vacancies.

Apart from focusing on tasks, a main characteristic of the pilot survey is its relation to specific occupational groups rather than to the whole workforce of an enterprise or establishment. The workforce of an establishment can be very heterogeneous and a task-related approach asking for an overall assessment of the whole workforce would hardly produce any useful results since the tasks and skill demands of, for example, construction labourers at a worksite have little in common with those of architects or construction engineers that might work in the same firm. The main difficulty of the chosen survey concept is, however, the huge number and variety of existing occupations. The ISCO-08 3-digit groups lists 125 occupations (minor groups, the level chosen for this survey) and even 434 occupations at the 4-digit level (unit groups). To be able to draw statistically solid conclusions on a single occupation, concentration on a small selection of occupational groups is necessary. Otherwise, many interviews would have to be conducted within each country.

Countries' VET systems are organised alongside occupations rather than sectors. Though in some cases, occupations are very closely related to a sector, normally employees of one and the same occupation can work in very different sectors of activity. Depending on the sector, the tasks to be carried out and the related skill demands may be very similar, but they may also vary considerably.

The challenge for any employer survey on occupational groups is there is no register of enterprises or local units that lists the occupations of employees working there. Thus, the only viable way to address specific occupational groups within a quantitative survey seems to be an approach via sectors of activity: many occupational groups concentrate on just a few sectors of activity. By

sampling enterprises or local units from a particular sector where the occupational group is concentrated and then asking for the existence of this occupational group in the chosen enterprise or local unit, there is a good chance to be able to 'grasp' the envisaged occupational group and collect information about it.

2.3. Scope of the pilot survey

In the survey concept, seven sectors of activity (respectively sector clusters) were selected for interviewing (Table 1). Within each of these sectors, questions focused on five most prevalent occupations (based on analysis of labour force survey data in the respective sectors). Four of the occupational groups were asked about in two different sectors, so that the overall number of different occupational groups covered by the survey is 31 groups (Table 2). The next chapter explains how the groups were identified within an establishment during the survey, and gives a summary overview of the questionnaire.

The pilot was carried out in nine EU Member States ([12]) and 1 000 local establishments were sampled per country – except for Ireland, where the sample size was confined to 500 interviews. The design and sample size of the pilot enabled assessment of the validity and feasibility of the approach across occupations in sectors. It allows for comparison of trends in occupations within sectors, but the pilot design places certain caveats on inferences drawn at individual country level.

About 14% of all sectors were covered by the survey, namely 12 out of the 88 NACE ([13]) divisions. Several of the selected sectors are, however, relatively large in terms of employment so the 12 sectors covered account for about 73.3 million employees in the EU and thus for about 40% of total employment. In absolute figures: of the about 182 million employees in the EU, 73.3 million are working in the sectors covered by the survey (according to data from Eurostat's labour force survey (EU-LFS); third quarter of 2011, calculations by TNS Infratest).

Within the chosen sectors of activity, not all existing occupational groups were selected for the survey (in some sectors, employees are working in 50 or

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([12]) Czech Republic, Germany, Hungary, Ireland, Spain, France, Italy, Poland and Finland.

([13]) NACE, *nomenclature statistique des activités économiques dans la Communauté européenne* [statistical classification of economic activities in the European Community].

even more occupational groups), but a selection of just five occupational groups is made. These five occupational groups were among the largest in the respective sector so that on average, these five groups cover about 41% of total (dependent) employment within the 12 chosen sectors. In absolute figures: of 73.3 million people working in these sectors, 30.3 million belong to one of the five selected occupational groups.

For sampling of the survey, a multistratified random sampling procedure was chosen in which the universe in each country was subdivided into 28 cells, made up by four size classes (5 to 9, 10 to 49, 50 to 249 and 250 or more employees) and seven sector clusters (12 NACE divisions). Establishments with fewer than five employees were excluded from the survey.

Table 1.   **NACE sectors of activity covered by the pilot survey**

| Sector (cluster) | NACE Rev. 2 divisions represented in the sector (cluster) | |
	Sector code(s)	Full sector description
Manufacture of machinery and vehicles	28	Manufacture of machinery and equipment not elsewhere classified
	29	Manufacture of motor vehicles, trailers and semi-trailers
	30	Manufacture of other transport equipment
Construction	41	Construction of buildings
	42	Civil engineering
	43	Specialised construction activities
Trade	46	Wholesale trade, except of motor vehicles and motor cycles
	47	Retail trade, except of motor vehicles and motor cycles
Computer programming and consulting	62	Computer programming, consultancy and related activities
Financial services	64	Financial service activities, except insurance and pension funding
Public administration	84	Public administration and defence; compulsory social security
Health	86	Human health activities

Source: Cedefop pilot survey, 2012.

In terms of occupational groups, the following 35 groups were selected for the interviews, with four of the groups being surveyed in two different sector clusters so data on 31 different occupational groups would be available.

Table 2.   **ISCO-08 occupational groups covered by the pilot survey**

ISCO-08 code	Targeted in sector(s) (NACE Rev. 2 division)	Name of the occupational group (ISCO-08 description)
121	62; 64	Business services and administration managers
214	28-30; 41-43	Engineering professionals (excluding electrotechnology)
221	86	Medical doctors
226	46-47	Other health professionals
241	64	Finance professionals
243	46-47	Sales, marketing and public relations professionals
251	62	Software and applications developers and analysts
252	62	Database and network professionals
311	28-30; 41-43	Physical and engineering science technicians
321	86	Medical and pharmaceutical technicians
322	86	Nursing and midwifery associate professionals
331	64	Financial and mathematical associate professionals
334	84	Administrative and executive secretaries
335	84	Regulatory government associate professionals
351	62	Information and communications technology operations and user support technicians
411	84	General office clerks
421	64	Tellers, money collectors and related clerks
422	62	Client information workers
431	64	Numerical clerks
432	46-47	Material-recording and transport clerks
522	46-47	Shop salespersons
523	46-47	Cashiers and ticket clerks
532	86	Personal care workers in health services
541	84	Protective services workers
711	41-43	Building frame and related trade workers
712	41-43	Building finishers and related trades workers
721	28-30	Sheet and structural metal workers, moulders and welders, and related workers
723	28-30	Machinery mechanics and repairers
821	28-30	Assemblers
911	84; 86	Domestic, hotel and office cleaners and helpers
931	41-43	Mining and construction labourers

Source: Cedefop pilot survey, 2012.

2.4.   Questionnaire structure

The master questionnaire developed for the pilot employer survey on skill needs is provided in the companion volume to the present work, a *User guide to developing an employer survey on skill needs* (Cedefop, forthcoming). It consists of the following parts:

(a) contact phase: the survey and its aims are introduced to potential target persons, the target person is identified and appointments are made;

(b) screening phase: in the Czech Republic and Hungary address registers are available only at enterprise level. Therefore a short screening interview has to be conducted in advance to choose randomly an establishment from the enterprise-based address source. For the other seven countries, this screening phase did not apply;

(c) module 1 is meant to provide a series of context variables of participating establishments. There are four subsections:

(i) module 1 collects central background information about the establishment;

(ii) core human resource activities with regard to skill management are captured, by asking questions about review of training needs (does an establishment regularly review skill and training needs of individual employees?) and participation in formal training (participation of employees in external or internal training courses) as well as in informal types of training (participation in on-the-job training, secondment and learning or quality circles);

(iii) an occupational group is selected as reference point for the questions to follow. This group is characterised further;

(iv) the educational level requested for the selected group is investigated and vacancies in the occupational group are captured;

(d) module 2 elicits responses concerning the importance of the 17 generic tasks described in Section 2.2, how that importance is changing, and whether employees (of the selected group) are mostly well prepared for any task that has been reported as increasing in importance;

(e) module 3 depicts change in importance of certain occupation-specific tasks and preparedness for tasks increasing in importance. In contrast to the module on generic tasks, these tasks are presented at a more detailed level. Individual task lists for each selected occupational group had to be generated. The respondent is also asked to indicate emergence of new tasks. This question is followed by a question on the strategy of how to address the situation if the occupational group is not well prepared to perform the task(s);

(f) module 4 first focuses on innovation activities of the establishment and their impact on the tasks of the occupational group selected. Four types of innovation are distinguished: product, process, marketing and organisational innovations. The level of innovation is thought to be a driver for changes in tasks and skill requirements. Innovative establishments or sectors can be used as an early identification indicator for future developments in an average establishment or sector.

Second, there are two questions about environmental changes and

awareness. Changes due to environmental awareness are expected to play an important role and have an impact on green tasks and skills. Probably this is a new emerging field for changes in the working process with an influence on requirements of the workforce.

Finally, there is a question asking whether there is another occupational group in the establishment which is more affected by changes in working tasks than the group the interview refers to. This question validates the process of selection of the occupational group.

Figure 1.   **Questionnaire modules**

Contact phase:
Introduction of the survey, identification of the target person

Only for CZ and HU:
Screening and random selection of one establishment per enterprise in case of multisite enterprises (use of an enterprise-based address register)

Module 1:
Background data on the establishment, identification and selection of occupational groups and questions on characteristics of the selected occupational group

Module 2:
Generic tasks/skills (importance, change in importance, preparedness of the occupational group for these tasks)

Module 3:
Occupation-specific tasks and questions on any newly-emerging tasks (for the selected occupational group)

Module 4:
Drivers of task changes: innovation in the establishment

Source: Cedefop pilot survey 2012.

2.5.   Fieldwork statistics

In general, cooperation rates for the pilot were in the range that might be expected for such a survey, namely for a computer-assisted telephone interview (CATI) survey with human resources managers as target group and with voluntary participation. Cooperation rates ranged from 14% in Germany, Italy,

Hungary and Poland to 25% in Finland, with a mean value of 18.8%. The pilot interviews took slightly less than 20 minutes on average.

In total, 8 523 interviews sufficiently complete for analysis resulted from the pilot survey, with about 1 000 interviews in each country – except for Ireland, where the sample size was limited to 500 interviews due to the size of the country. Interviews were distributed over all size-classes, with larger units being over-sampled compared to the proportion in the population to increase precision of their estimators. For each of the sectors, between 894 and 1 485 interviews were reached.

Table 3.　**Net samples achieved in the pilot survey, by country and sector cluster**

NACE Rev.2	CZ	in %	DE	in %	IE	in %	ES	in %	FR	in %
28-30	171	17.1	162	16.2	38	7.5	141	14.1	160	16.0
41-43	174	17.4	139	13.9	90	17.9	171	17.1	141	14.1
46/47	201	20.1	139	13.9	85	16.9	168	16.8	139	13.9
62	100	10.0	142	14.2	62	12.3	127	12.7	140	14.0
64	22	2.2	139	13.9	55	10.9	122	12.2	140	14.0
84	176	17.6	140	14.0	84	16.7	128	12.8	140	14.0
86	156	15.6	141	14.1	90	17.9	144	14.4	139	13.9
Total	1 000	100	1 002	100	504	100	1 001	100	999	100

NACE Rev.2	IT	in %	HU	in	PL	in	FI	in	All	in %
28-30	140	14.0	155	15.5	142	14.2	124	12.2	1 233	14.5
41-43	136	13.6	151	15.1	172	17.2	202	19.9	1 376	16.1
46/47	151	15.1	192	19.2	180	18.0	230	22.7	1 485	17.4
62	113	11.3	146	14.6	92	9.2	90	8.9	1 012	11.9
64	138	13.8	61	6.1	123	12.3	94	9.3	894	10.5
84	161	16.1	146	14.6	140	14.0	159	15.7	1 274	14.9
86	160	16.0	151	15.1	153	15.3	115	11.3	1 249	14.7
Total	999	100	1 002	100	1 002	100	1 014	100	8 523	100

Source: Cedefop pilot survey, 2012.

At occupation level, the number of achieved interviews is however considerably smaller since, within each sector, interviews were distributed over the five pre-selected groups. Thus, for most occupational groups, the number of available interviews ranges between 25 and 70 for groups 1, 2 and 3. For groups 4 and 5 which were asked only when none of the preceding groups existed, figures are considerably lower. Also for Ireland, just about half the number of interviews is available per occupational group. In consequence, the statistical sampling errors are quite large for any analyses that take the occupational group

as the unit of analysis, particularly if just looking at occupational groups within a single country. For the analysis unit of the occupational group (over all nine countries), confidence intervals mostly range between about 3 to 4% either side of a given percentage estimate, depending on the number of interviews for the group and on the percentage value of the answer given to a question. This is already a relatively high value, indicating that the certainty and generalisability of the obtained figures has notable limits. If looking at an occupational group within just one country, 95% confidence intervals reach values of around ±10% or even more.

Most questions about generic and occupation-specific tasks could be spontaneously answered by respondents, with only very low item non-response rates overall. Though some further difficulties occurred with the occupation-specific tasks, due to a larger complexity of some of the items, the occupation-specific questions also generally proved to work. Similarly, survey results suggest that answers vary between occupational groups, meaning that respondents really answered the questions with the selected group in mind rather than for the whole workforce. Item non-response is all in all low, except for the question asking about the existence of occupational groups; some occupational groups seemed to be rather difficult to grasp: on average, in 8.5% of all responses the ISCO 4-digit examples for the occupational group were needed. After having heard the examples, however, in only 0.4% of responses did definition of the occupational group still remain unclear.

However, the concept has reached a very high level of complexity regarding sampling as well as the questionnaire set-up and administration. This was possible to handle in the pilot survey, but the level of complexity should not be increased considerably in a full-scale survey. Also, some occupational groups are very heterogeneous in themselves.

CHAPTER 3.
Illustrative findings

The present results must be treated with caution as the limited sample size used for the pilot can lead to large standard errors attached to the values presented ([14]). The results presented below are, therefore, meant to be illustrative of the findings that a European employer survey on skill needs using the current instrument would produce.

3.1. Generic skills use

The approach allows investigation of the importance of generic tasks across occupations. The analysis is able to show whether estimates vary systematically according to key background variables and drivers of change (innovation, training provision, compliance with environmental regulations, establishment size, age of workforce in that particular occupation, and geographical market).

The current instrument could be used to produce robust comparisons of the importance (or increase in importance, or preparedness) of generic skills and draw respective conclusions on skill needs:

(a) between occupations across sectors (different occupations in different sectors);

(b) between occupations within sectors (different occupations within one sector);

(c) within occupations across sectors (a single occupation in different sectors, albeit with slight adjustments to the implementation design).

([14]) The pilot sampling scheme starts with 1 000 interviews per country and selects seven sectors, making only 150 observations available for inference in each sector. Further, asking about three main occupations in each sector provides around 50 interviews for looking at skills in each of the occupations in the sector analysed.

3.1.1. Importance of generic skills

Figure 2. **Percentage of establishments with generic tasks fairly or very important, all selected occupations**
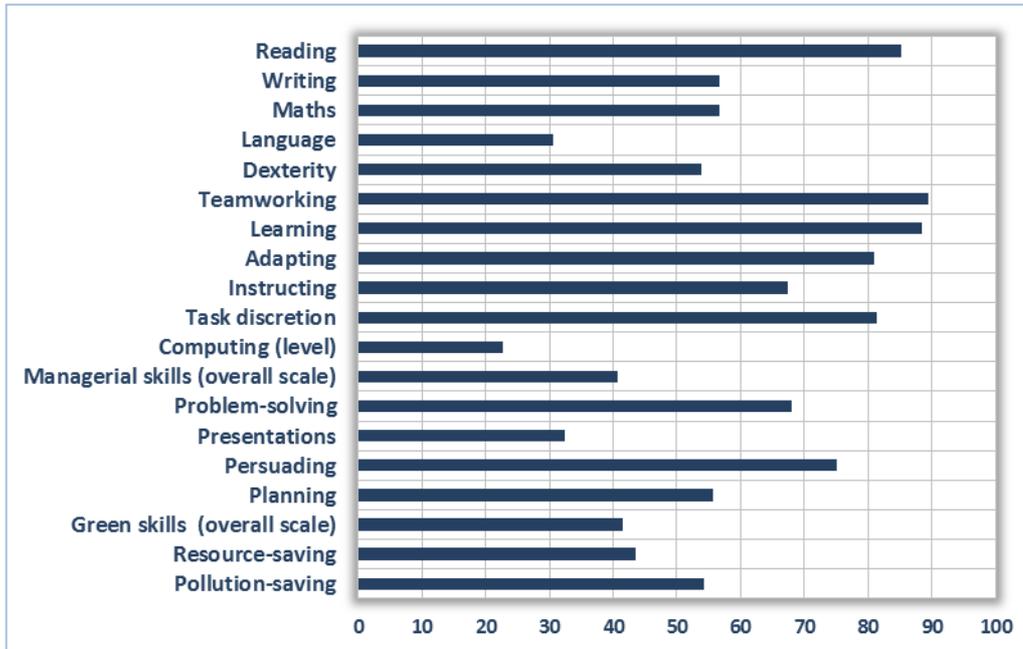
Source: Cedefop pilot survey 2012.

Following a factor analysis of the skills to identify common dimensions along which summary scales could be constructed, two groups of related items were identified: managerial skills (problem-solving, presentations, persuading, planning) and green skills (resource-saving, pollution saving). Considerable differences between occupations both concerning single generic tasks and between all the tasks of one particular occupational group can be observed. To provide some interesting examples that illustrate the utility of the survey instrument, occupations from the health and information technology sectors are presented in additional detail.

3.1.1.1. *Generic skills*

Reading and comprehending instructions, guidelines, manuals and reports (advanced reading)

In the case of advanced reading its importance seems to be quite balanced across all occupations (all about the average 85.2% for this task saying fairly or very important). Nevertheless, it can be seen that there are still some occupations where employers see advanced reading to be somewhat less

important in comparison to the other occupational groups. This is the case, for example, for shop salespersons (78.2%).

Writing instructions, guidelines, manuals and reports (advanced writing)

Advanced writing's importance seems to differ between occupational groups much more than reading. There is a clear distinction between occupational groups of professionals or technicians (such as engineering professionals: 84.1%) and occupational groups such as building frame workers (44.3%) or shop salespersons (46.6%). The average across all occupations for this questionnaire item is 56.8%.

A high level for this item can be seen across all occupational groups in the health sector (nursing and midwifery associate professionals (83.3%), personal care workers (86.6%), medical doctors (78.0%), medical and pharmaceutical technicians (moderately high at 67.1%). This task's relevance in the sector is underlined by qualitative analysis of open-ended newly-emerging tasks suggesting particular importance of documentation and reporting tasks for these occupational groups.

Using and understanding numerical or statistical information (mathematical literacy)

The average across the occupations surveyed for this item is 56.6%. As to be expected, mathematical literacy plays an important role in the financial sector (finance professionals, managers, associate professionals) and the IT sector.

Communicating in a foreign language (foreign language)

An average of only 30.7% employers considers foreign language tasks fairly or very important for the selected occupation. However, there are differences between occupational groups. Occupational groups such as engineering professionals (75.9%) or occupations in the IT sector (developers, technicians, database professionals) stand out. Occupational groups such as assemblers, machinery repairers, shop salespersons, or even material-recording and transport clerks rank around the average. This indicates possibly a need to communicate with foreign colleagues or customers. Below the average (across all occupations) are occupational groups such as building frame workers or building finishers.

High values are encountered also for some occupations in the health sector. For example, for personal care workers the importance of foreign language is ranked comparatively high (41.1%). This is also underlined by qualitative analysis of newly-emerging tasks for this occupational group, indicating a change in target groups (more migrants, etc.).

Working as a member of a group or team (teamworking)

For teamworking, high values occur across almost all occupations (average: 89.5%). They are especially high for craft trade occupations such as building frame workers or building finishers or for occupational groups of the IT sector and in particular the health sector (sometimes close to 100%).

Learning new ideas, methods or techniques (learning)

Learning requirements are rather high for most of the occupational groups (average across occupations: 88.4%). They are very high in the IT sector and health sector (almost 100%).

Adapting to new equipment or materials (adapting)

The need to adapt to new equipment or materials is also rated very highly (average across occupations: 81%). The importance is above average in almost all occupational groups in the manufacturing sector and in construction and partly also in IT and health.

Instructing, training or teaching people (instructing)

Instructing is above the average across occupations (67.4%) for all occupations of the manufacturing sector, construction and IT (also most of finance) and much above the average in the health sector (for the occupational groups included). It is below average in public administration.

Determining own tasks, working methods and speed of work (task discretion)

Task discretion is very high for some professional occupations. In comparison to the average across occupations (81%) it is high in the wholesale/retail sector for the included professionals, shop salespersons or transport clerks and very high in IT. Here health sector occupations are around average (across the occupations) but medical doctors with 57.4% scored rather low.

Level of computer use (computing)

Computing as a generic skill plays a special role in the survey since it is not measured by an importance scale but by levels of task complexity. However, as with green tasks, not every occupational group is exposed to ICT to the same extent. There are still occupational groups in which ICT is not needed at all by a majority. These occupational groups include, for example, sheet and structural metal workers (none: 71.4%), building frame workers (none: 66.3%) or building finishers (none: 59%), meaning manual occupations in manufacturing and construction, with the remaining occupational group 'assemblers' reporting no

computer use for 44.7% of establishments. Even an occupational group such as medical and pharmaceutical technicians shows a rate of 23.7% of establishments using no computer at all at work. Other occupational groups show a mix of straightforward or moderate use of ICT such as machinery mechanics and repairers, physical and engineering science technicians, shop salespersons, nursing and midwifery associate professionals, and personal care workers. High values (high incidence) of moderate computer use appeared for general office clerks and protective services workers. Complex and advanced use of ICT can be found predominantly in occupational groups of professionals of different sectors and, of course, in the IT sector itself (and in finances to some extent).

Manual dexterity (dexterity)

With 53.9% on average across occupations, dexterity is ranked as expected quite highly in manual occupational groups. Again the health sector (around 70%) shows a relatively high score and above average in comparison to all occupations.

3.1.1.2. *Managerial skills*

Solving complex problems (problem-solving)

Solving complex problems is above average (68%) for machinery repairers and engineering professionals in manufacturing, physical and engineering science technicians, sales professionals, all occupations included in the IT sector, finance sector, public administration (high for general office workers and protective services workers) and low for most health sector occupations (apart from medical doctors).

Making speeches or presentations (presentations)

As expected presentation skills are not so important in manual manufacturing and construction jobs. It seems to be an important skill (in comparison to other occupations) in the IT sector and for managers.

Persuading or influencing others (persuading)

With an average of 75.1% the task is rated as low for manual manufacturing and construction occupations. The task to persuade or influence colleagues or customers is ranked as important for all professionals or, as expected, for shop salespersons and in particular all occupations included in financial sectors indicating a special customer orientation in this sector. The value is high for protective services workers (81%) pointing at direct contact with customers at

another level. Apart from medical doctors it is not above average in the health sector (despite a lot of direct contact with patients and customers).

Setting objectives and planning human, financial and other resources (planning)

Planning skills seem to be important for all professional occupations in all sectors (average across occupations: 55.6%) especially for managers or medical doctors.

3.1.1.3. *Green skills*

Implementation of practices to reduce use of raw materials, energy or water (resource-saving)

Reducing use of raw materials, energy or water is an important task in many occupational groups averaging 43.6% across occupational groups. It is ranked around average or above average for occupations in the manufacturing sector and construction. It is below average in wholesale/retail and not really relevant in the IT sector and finance and public administration. In the health sector it is ranked above average for the occupations included. With this item we have to distinguish between different kinds of green tasks and skills. Obviously there are clear differences in performance of tasks between occupations ranging from real changes in consumption of raw materials or energy to simple measures of energy saving (in IT, finances and public administration).

Implementation of practices to limit pollution, waste, environmental degradation or biodiversity loss (pollution-saving)

Limiting pollution or waste as a task is also widespread in manufacturing and in particular construction. Limiting waste plays a role in wholesale/retail as well (such as packaging). It is not considered relevant in IT and finances; it is ranked around average in public administration. As in resource-saving, it is ranked above average for most health occupations.

3.1.2. Changing importance of generic skills

As is the case for importance of generic tasks, there are also differences in the increase in importance of different generic tasks between occupational groups. These differences for advanced reading and its assumed increase seem to confirm our expectations. Compared to the average across occupations (37.8%) of establishments reporting an increase for this generic task, the increase is above average in the finance sector, public administration (even for protective services workers) or in the health sector. In this sector the need for advanced

writing skills is also rising much above average (23.1%) for nursing and midwifery associate professionals (50.6%) or personal care workers (62.2%), which underlines an increasing need for documentation and reporting in this sector.

For mathematical literacy, importance still seems to be increasing in the financial sector. Although being at a relatively low average level (21.7%), the importance of foreign language is increasing in some occupations, for example some groups of professionals, those of the IT sector and to a very high degree personal care workers which could be related to migration. Teamworking (average: 28.7%) seems to be increasing in importance above average in particular in the IT sector, finances, the health sector and public administration (to some extent). Learning seems to be increasing in importance above average again in the IT sector, public administration and the health sector. Adapting is increasing above average in construction, for general office clerks, and in particular, in the health sector. Instructing is rated well around average in finances, public administration and the health sector. Problem-solving seems to be increasing in the IT sector, financial sector, and public administration. Presentations are still increasing in importance in the IT sector (increasing direct contact with customers). Persuading is increasing in importance above average in particular in the health sector. Planning tasks seem to increase in the health sector as well. Green tasks, resource-saving and pollution-saving seem to be increasing in importance above average in construction and in the health sector. For computing, importance seems to be increasing in particular in the manufacturing and construction sector, as well as public administration and the health sector.

As an example of how generic skill needs can be used to compare occupations, Figure 3 presents three cognitive skills for two occupations in a single sector, by looking at sales professionals and shop salespersons in the wholesale and retail sector. Planning appears to be a more important skill for sales professionals but its importance is growing faster among shop salespersons. Problem-solving is more important and its importance is growing faster among sales professionals, which implies that the dynamic of changing needs for that skill is different across both occupations. Task discretion is equally important in both occupations; however, its importance is growing faster among shop salespersons.

Figure 3.   **Wholesale and retail sector, comparison of selected generic tasks in two occupations (percentage of establishments in nine pilot countries reporting that the selected tasks are important and increasing in importance)**
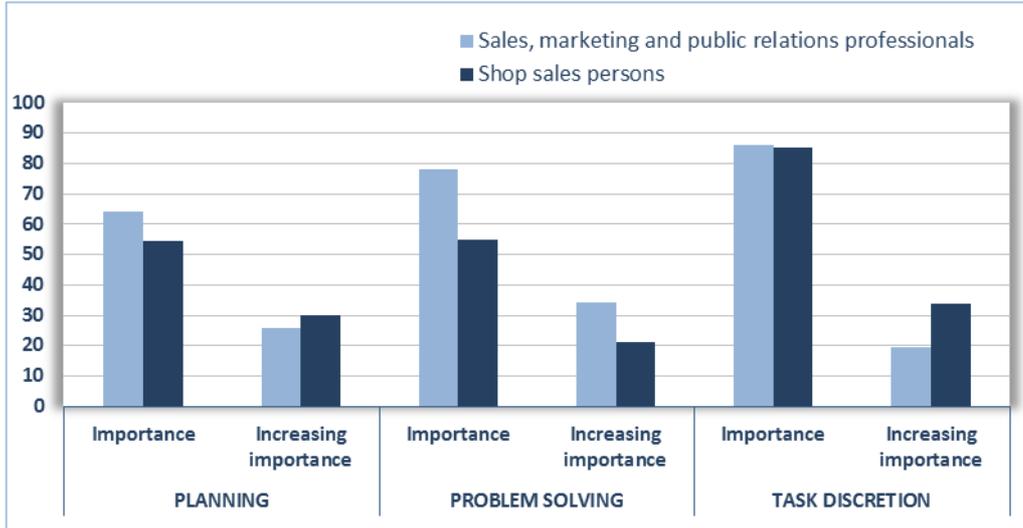
NB: Wholesale and retail sector refers to the following NACE (Rev. 2) sectors: 46 wholesale trade, excluding motor vehicles and motorcycles, and 47 retail trade, excluding motor vehicles and motorcycles.
Source: Cedefop pilot employer survey on skill needs, 2012.

Figure 4 looks at the importance and increase in importance of selected generic skills for personal care workers in health services (in Sector 86 human health services) and software and applications developers and analysts (in Sector 62 IT and other information services).

Figure 4.   **Percentage of establishments in nine pilot countries reporting that the selected tasks are important and increasing in importance for two occupations from two different sectors: personal care workers (in the health sector) and software developers (in the IT sector)**
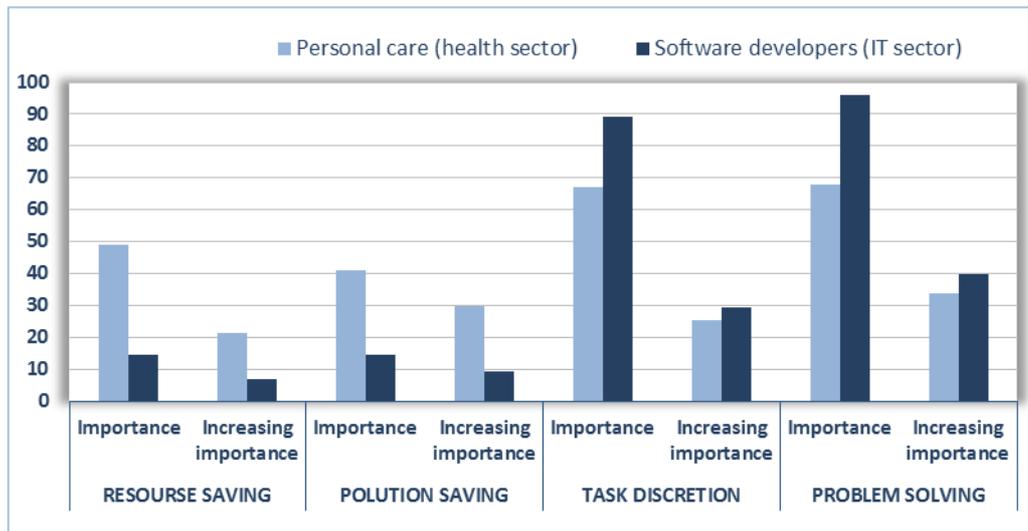

Source: Cedefop pilot employer survey on skill needs, 2012.

Clearly, green skills are more important for personal care workers and their importance is increasing at a faster pace when compared to software developers (in the IT sector). Problem-solving and task discretion are particularly important for software developers and importance of these tasks appears to be growing particularly fast compared to personal health workers. Finally, in both occupations task discretion and problem-solving are important.

3.1.3.   Preparedness for generic tasks increasing in importance

The survey also allows one to look at the level of preparedness of the workforce for given tasks rated as increasing in importance. To follow on the examples above, for sales professionals and shop salespersons (Figure 3) preparedness levels are very high, ranging from 75% to 83% in planning, problem-solving and task discretion ([15]). This implies that a qualified minority of employers in the wholesale and retail sector might be facing skill gaps in these tasks analysed for the selected occupations.

For software developers (Figure 4), the percentage of employers reporting increasing importance and a prepared workforce for task discretion, problem-solving, resource-saving, limiting pollution, are 83, 93, 37 and 40%, respectively. The corresponding figures for personal care workers are, 70, 48, 63, and 97%,

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([15]) Associated standard errors of 3.5-4.

respectively. So, it appears that there are skill gaps in green skills among software developers with a shared need to develop resource-saving skills in both occupations. Employers who experience an increase in importance in problem-solving face an acute skill gap among personal care workers ([16]).

Figure 5 contrasts the importance of tasks for the same occupation across sectors and also presents increase in importance and preparedness levels ([17]). Using engineering professionals in the construction and manufacturing sectors as an example, if the pilot results were confirmed by more robust estimates (requiring slight adjustments of the pilot implementation design), then it would be possible to state that persuading is a more important skill for engineering professionals in the construction sector. Speaking a foreign language would be a more important skill for engineers in manufacturing, where importance of the task also seems to be increasing at a fast pace. This could be possibly related to different geographical scales of the respective markets – construction establishments are mainly, but not exclusively, oriented towards regional/national markets, while manufacturing establishments tend to operate at least at the European market level. Workforce preparation for foreign language appears to be lower in the construction sector. However, a preparedness gap is also evident in about 30% of establishments where foreign language is increasing in importance in the manufacturing sector ([18]).

([16]) The large standard errors attached to the figures imply, for example, that the 48% of employers reporting a prepared workforce of personal care workers for task discretion is embedded in a confidence interval of 32 to 64%.

([17]) Figure 5 should be considered with additional caution. For the pilot, engineering professionals were investigated in the manufacturing sectors and only a smaller number of interviews were carried out for engineer professionals in the construction sector.

([18]) The caveat about the small number of observations of the preparedness data also applies here.

Figure 5. **Engineering professionals, comparing selected tasks in two sectors (percentage of establishments in nine pilot countries reporting that the selected tasks are important, increasing in importance, the workforce is prepared for the tasks increasing in importance)**
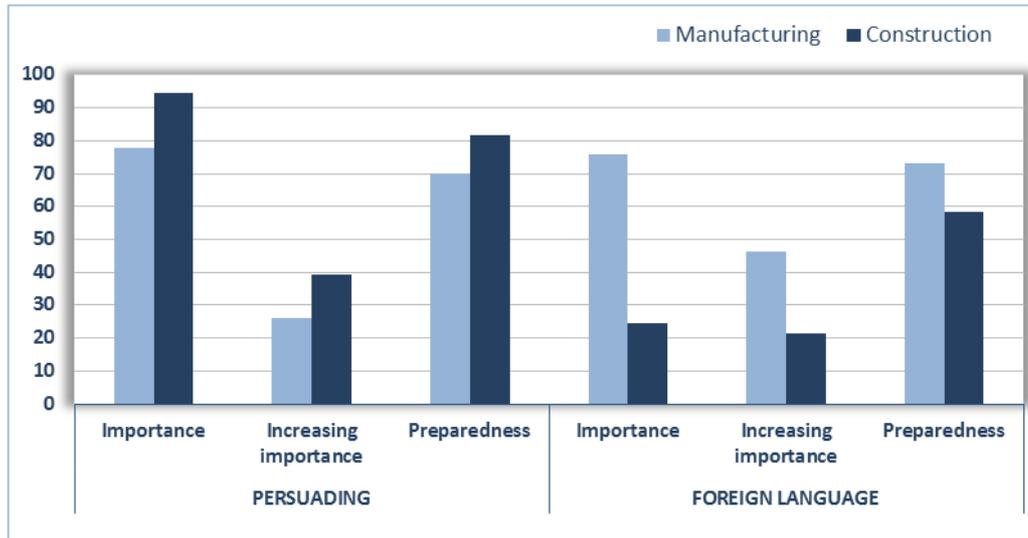
NB: Manufacturing refers to the following NACE (Rev. 2) sectors: 28 manufacture of machinery and equipment nec, 29 manufacture of motor vehicles, trailers and semi-trailers, and 30 manufacture of other transport equipment. Construction refers to the following NACE (Rev. 2) sectors: 41 construction of buildings, 42 civil engineering, and 43 specialised construction activities.

Source: Cedefop pilot employer survey on skill needs, 2012.

3.1.4. Some suggestions for policy and VET related to generic skills to be followed up in the full-scale survey

On average for all occupations, demand for flexibility seems to be high as related tasks are systematically rated as the most important (such as learning, adapting, task discretion). There are also skills which, though expressed as generic, vary in importance across occupations. These are for example, ICT skills, foreign language and the ability to make presentations and speeches.

Almost 50% of workplaces rate green skills as important which underlines their relevance. However, not every worker is required to perform green tasks to the same extent, as in some occupational groups they are quite important and, in others they are considered almost irrelevant.

In terms of tendency to change, tasks rated to be more important tend to be more dynamic as well. Skills for which demand is growing are: (a) advanced reading, learning, adapting, and persuading, which are of high and increasing importance; (b) ICT skills and tasks linked to reduction of pollution which although they have lower importance rates, on average across occupations, appear to be increasing. As a result, potential challenges for policy and VET lie in supporting and fostering those skills and attitudes that require flexibility (teamwork, learning, adapting, task discretion). In some occupations and sectors, ICT skills and green skills play an important role. Communication skills such as

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speaking a foreign language or making presentations and speeches are also occupation- and sector-specific but for those skills employers tend to experience skill gaps more often. A stronger occurrence of low preparedness of the workforce is also reported for ICT, persuasion and planning skills. However, one has to keep in mind that these are not necessarily rated as important or increasing in importance by most employers. For example, almost 70% of respondents rate foreign language skills as either not important or not applying. Nevertheless, foreign language skills are important for professionals and many occupational groups in the IT and health sectors and is increasing in importance. Making presentations and speeches is also important in IT and for managers. Advanced writing skills are relevant and increasing in importance in health. So VET in these sectors should focus on these generic skills.

Teamwork, learning and instructing are important and increasing in particular in IT, public administration, finances and the health sector. Adapting is important and increasing in manufacturing, construction and the health sector. Problem-solving and persuading also increases in health (coming from lower importance rates). And green skills are important and increasing in manufacturing, construction and the health sector.

With teamwork, learning and instructing, as well as adapting and problem-solving, we encounter skills which are difficult to teach in formal training courses and settings. Other forms of training are needed, often informally to support development of these competences. This indicates that policy and VET may need to support companies and employees to develop such kinds of competences providing financial support for target groups in need and in providing suitable measures to promote competence development. VET has to consider the specific requirements in different occupational groups and sectors. ICT skills are not rated important across the board but seem to be increasing in manufacturing, construction, public administration and the health sector. Where demand for generic skills is increasing, there are also some reported skill gaps in communications skills (foreign language, presentations, persuading) as well as planning and ICT skills for assemblers, building frame workers, building finishers and shop salespersons (nursing and midwifery associate professionals; and personal care workers, seem to be less well prepared for ICT skills). VET may need to consider that when designing offers for these target groups.

Establishments which review their employees' skill needs show high levels of increase in generic tasks. Further, establishments which review employees' skill needs are better prepared for increasing generic tasks than those which do not. This suggests that policy has to provide support to companies in terms of suitable methods and procedures for skill review. Appropriate tools and ways of identifying and reviewing skill needs of different target and occupational groups

have to be identified and developed. VET has to provide appropriate training for those responsible in companies for reviewing skill needs.

However, there is a relation between informal training and high intensity of change. Some of these occupational groups with informal training also seem to be better prepared than the others. So, a possible implication of this analysis is that some generic skills are mainly connected to informal training. Policy and VET then would have to find and offer appropriate ways of learning beyond classical training courses. For example, much more differentiation according to different informal learning approaches for different occupational groups and target groups. Clearly this is a topic for future analysis using the EU-wide data set of a full-scale survey.

3.2.   Occupation-specific tasks and skills

This part of the survey captures occupation-specific skill profiles for the selected occupational group. It provides details regarding occupation-specific skills by exploring the direction of change of single tasks and (as in the part on generic tasks) whether employees are well-prepared for the tasks gaining in importance. The selected strategies to address lack in preparation are captured. Taken as a whole, the occupation-specific part of the survey concept corresponds to and enlarges the generic tasks and skills part with a concrete occupation-specific perspective on current developments. Moreover, it provides at aggregated level additional information for employers and their human resources strategies.

This survey tries to reveal some aspects, lacks and gaps not only in generic skills but also at occupation-specific skill level.

This chapter summarises challenges based on findings of the occupation-specific skill demands in the pilot survey. Occupation-specific skill information is available for the chosen occupations. Much information may appear to be common sense but in this way ISCO information on the occupational group has been validated empirically.

Figure 6 illustrates results for assemblers (in Sectors 28 to 30). Importance of reviewing orders is increasing in 30% of establishments. However, few of these establishments also report a lack of preparedness of the workforce in this task. In addition, the number of skills increasing in importance (together with emerging new tasks) in establishments can be used to infer whether changes in skill needs in occupations and sectors are widespread or concentrated in a limited number of dynamic establishments.

Figure 6. **Assemblers, comparing selected occupation-specific tasks (percentage of establishments in nine pilot countries reporting that the selected tasks are increasing in importance and that the workforce is prepared for carrying out these tasks)**
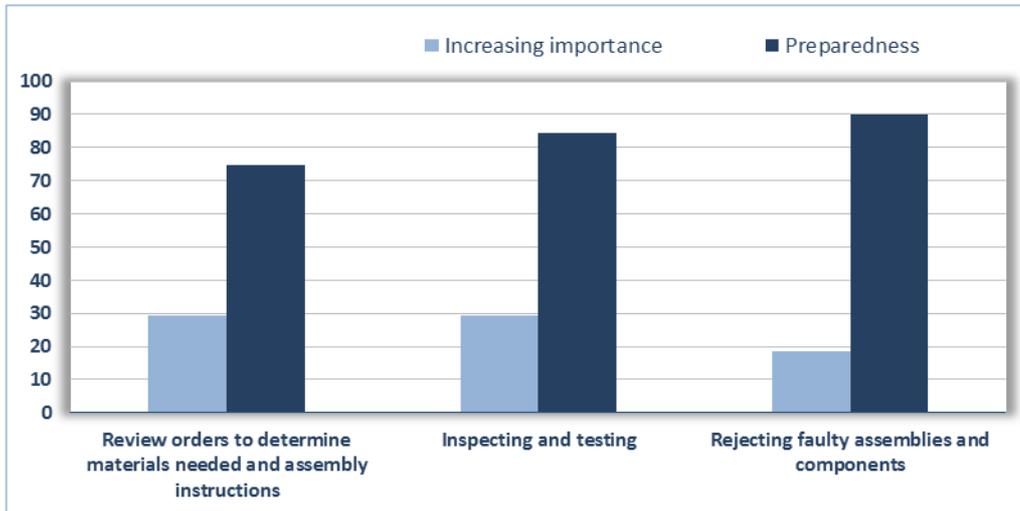
Source: Cedefop pilot employer survey on skill needs, 2012.

As mentioned above preparedness rates are slightly lower for reviewing and recording tasks of assemblers. These are also mentioned in detail in newly-emerging tasks of this occupational group. VET therefore might focus on these kinds of tasks within this occupational group.

Other examples include sales, marketing and public relations professionals which are obviously well prepared for sales tasks. However, some challenges exist concerning preparedness in public relations tasks' planning and organising publicity campaigns, and in particular in appraising and selecting material submitted by writers, photographers, illustrators and others to create favourable publicity, alluding to competences and skill improvements for joint creativity processes and customer-specific needs to be the major objective of training in this occupational group.

When looking at results for general office clerks, tasks dealing with preparing reports and handling documents might be especially relevant for skill improvement by specific training. Almost two thirds of establishments report response to telephone and electronic enquiries and checking figures, invoices and financial transactions to increase in importance. This might indicate an increase in computer work for this occupational group. Increase in importance of computer-related work has been a key finding of analysis of generic skills of this occupational group. However, for this task, general office clerks seem to be well prepared.

The occupational group 'nursing and midwifery associate professionals' seem to be quite well prepared for the tasks that are increasing in importance. However, for the task 'providing advice to individuals, families and communities on topics related to health, contraception, pregnancy and childbirth', which shows the highest increase in importance, it seems less well prepared. The provision of advice can be regarded as a key element and challenge in the tasks of the group. Within the section on newly-emerging tasks, advisory tasks for different target groups and patients play an important role for the skill profile of this occupational group.

The results also show that innovative workplaces are more likely to show a higher intensity of changing skill needs, both occupation-specific and generic, than low-innovative ones. However, and this has been the case with generic tasks also, they are not necessarily better prepared than low-innovative establishments.

Workplaces were skill needs are reviewed show higher intensity of changing skill demand but they are not necessarily experiencing less skill gaps. Establishments which train employees tend to show higher intensity of change rather than non-training establishments. For some occupational groups, they seem to be better prepared than non-training establishments.

3.3.   Newly-emerging tasks

Newly-emerging tasks, as found for generic skills, indicate the pattern that higher-level occupations seem to be more dynamic than the average (such as engineering professionals, ICT technicians, healthcare occupations). Again, the IT sector, finances, public administration and health sector are the most dynamic sectors.

3.3.1.   Some challenges for policy and VET related to newly-emerging tasks

Manufacturing and wholesale/retail establishments have some problems in finding courses or trainers for newly-emerging tasks. Small establishments tend to report more of these problems than larger ones. Non-preparedness for newly-emerging tasks is above average for assemblers, physical and engineering science technicians, or nursing and midwifery associate professionals.

Difficulties in recruiting staff for newly-emerging tasks are reported predominantly by establishments from construction and the health sector. Difficulties seem to occur with building finishers and personal care workers.

At policy level, conditions for these sectors and measures to support recruitment in them should be considered. Political support on this question is in

particular relevant for small and medium-sized enterprises (SMEs). Difficulties in recruiting staff for newly-emerging tasks seem to be more of an issue in Germany.

The following examples from qualitative analysis of the survey on newly-emerging tasks for the IT and health sectors illustrate richness of information of this part of the survey. It details and extends the ISCO-08 group definitions (ILO, 2009).

Box 1.   **Newly-emerging tasks of software and applications developers and analysts**

Software and applications developers and analysts are programming, implementing and designing software systems and applications. They are developing new and individual solutions for customers. They are coordinating more closely networked systems and are networking with other units internally or at the customer's site.

Customers expect more advanced, accurate and faster programming. This includes work at the human machine interface, mobile technology apps, mobile phones/tablets and applications technology (including integration across business systems) cloud computing (cloud environment solutions, cloud application development), software architecture, social media and networks, e-commerce, conflict resolution, moving software to the web, mobile devices, 3-d modelling, processing and analysing of large amounts of data, operating an the customer's interface, automated/systematic software testing, acceptance tests (programming validation), notion of adopting and introducing standards, new sectors and development of new business areas, adapting existing software to customer's systems, integration of social networks with company systems (ERP software – enterprise resource planning) and new methods of information processing.

Apart from mathematics proficiency (incorporation of algorithms into programming) and learning new programming languages, project management skills are required.

When looking at newly-emerging tasks within sectors, an example of summary findings for all four surveyed occupational groups of the health sector can be shown. Developments concerning newly-emerging tasks in the health sector can be summarised as follows:

(a) new equipment is a major change that lead to skill improvements and skill changes;

(b) use of new ICT technologies seems to be more important in their every-day work;

(c) skills to improve client-orientation on different levels are requested;

(d) skills for reporting and documentation are becoming more important as an integral part of their work;

(e) to a certain extent, skills that go beyond their traditional occupational profiles, towards an interdisciplinary focus, have been mentioned.

Box 2.   **Newly-emerging tasks of nursing and midwifery associate professionals**

Apart from dealing with new information technology for which they need to be more computer literate and require more up-to-date keyboard skills, nurses have to operate new equipment (such as automatic pumps and oximeters), deal with new surgical techniques, new methods (new sampling techniques, cryotherapy), new drugs or new materials.

Also described as new are, for example, growing hygiene requirements and changing forms of care or more specialised care such as activating care, dementia care (Alzheimer's disease sufferers), chronic care management (diabetics, asthma, haemodialysis, mental diseases), psychosomatic care or palliative care.

Employers also mention growing documentation and reporting requirements (some related to the coding of activities or services provided which is also relevant to invoicing, medical documentation, patients' computerised files, accounts of the results of analyses), often by means of electronic documentation.

Related to increase of other duties of the doctors (compare newly-emerging tasks of medical doctors, see below), associate professionals take over many tasks from physicians offering more and more services, such as the midwife will carry out postpartum education after delivery; nurses carry out independent evaluation of patient status, take overall responsibility for patient care, prescribe medication or carry out intravenous medication (especially scrub nurses working in the country-side or in an ambulant situation at the patient's home).

Nurses and midwives are working in a changing social and family environment and have to deal with changing target groups or changing compositions of patients (heroin addicts, drug addicts, more elderly, migrants) requiring special skills concerning interpersonal communication (languages) and are also dealing with lack of family support or support of other communities. Advisory tasks include caries prevention in primary schools, disease prevention, health education, information about health programmes, dietary consultancy or new-born infant care. For the midwives, tasks include analgesia in childbirth, NST examinations (fetal non-stress tests), cervical screening, smear taking, and handling of Implanon (implant in the arm, for contraception).

Nurses and midwives are also involved in strategy development (merging of wards; managing more with less resources, health economics, controlling orders and purchases) and the compliance with directives and legal regulations, such as the patient's consent to treatment, traceability, drugs. Other tasks are related to handling the ISO system (quality management system; health and safety systems). A special requirement seems to be the adaptation to increasing speed of treatments (such as one-day surgery treatments).

3.3.2.   How employers address newly-emerging tasks

Establishments are addressing newly-emerging tasks by training existing staff, internal organisation or by recruiting new staff with the required skills. For larger establishments all these measures seem to be more common than for smaller ones. Differences between size classes of establishments occur in particular for recruitment of new staff with the required skills. Here less than half the small establishments mention that measure while almost three quarters of large establishments do, perhaps because smaller establishments simply do not have

the same opportunity to recruit labour to the same extent as larger establishments. Therefore, smaller establishments need support in focusing on other measures such as training and internal reorganisation by policy and VET providers.

The question on other measures applied to address newly-emerging tasks offers insight into the wealth and diversity of measures. Concerning training of available staff, these measures include a portfolio of different forms of learning such as:

- internal and external training,
- formal and informal training,
- on-the-job training,
- off-the-job training,
- learning at work,
- self-learning,
- e-learning,
- meetings (team, group, with external experts from market organisations or associations for exchange and discussion of ideas or experiences regularly or temporarily),
- quality circles,
- coaching, mentoring, tutoring,
- reading literature, publications and press,
- searching information on the Internet,
- using scholarships,
- train-the-trainer concepts,
- orientation trainings (working at another location, in another team, externally),
- seminars, lectures, conferences and trade fairs,
- audits,
- supervision,
- job sitting (watching others at work),
- work-pair-systems (master and apprentice).

Concerning internal reorganisation, measures include:
- job/work/task rotation,
- redefinition of job roles,
- changed division of labour,
- regrouping of work tasks,
- reassignment or repositioning of staff.

Other genuine measures to address newly-emerging tasks, however, are rare. Apart from training, reorganisation or recruitment measures, other

measures focus on any kind of external support or outsourcing and a set of management activities to address these newly-emerging tasks. VET then has to support these activities especially the management side in developing competences.

3.4. Cross-cutting indicators

3.4.1. Human resources activities and strategies and their impact on preparedness of the workforce

About two thirds of establishments regularly review skill and training needs of individual employees. However, in Hungary and Poland results are far below the average: less than half the establishments regularly do so; and participation in paid continuing vocational training is less common than in other countries. Informal training, which on average is lower than expected (43.9% say yes) seems to be most common in Ireland and Spain. These results might be attributed to structural and cultural differences across Europe. However, the large standard errors at country level suggest that these differences be treated with caution until further detailed information is obtained in a full-scale version of the survey.

Reviewing skill and training needs of employees is in particular common in the health sector and not so widespread in the wholesale/retail sector. Participation in paid continuing vocational training is very common in the IT, financial, public administration and health sectors. Informal training is above average in the financial and health sectors.

Larger establishments tend to review skill and training needs of employees more than smaller ones. Further, they are much more active both in formal and informal training.

3.4.2. Drivers of change: innovations and environmental awareness and their impact on tasks

Innovative changes have an impact on employees' tasks as most respondents answer. Apart from Hungary, which is below average for all innovative items, distribution among other countries seems to be quite equal. The IT sector seems to be the most innovative of the examined sectors. Smaller establishments seem to be less innovative than larger ones. The full-scale survey will have an expanded set of innovation driver questions that will allow more detailed exploration of the relationship between innovation and skill needs.

A little more than half the establishments report changes (practices, products or services) due to environmental awareness or regulations. Again, a bit more than half of all establishments report that adjustments had an impact on the selected occupational group. It means that greening the economy is an issue for half the establishments. Nevertheless, for the other half it is not an issue and has no consequences for the tasks. Changes due to environmental awareness or regulations play a predominant role in the construction sector in which they have an impact on the selected occupational group. Larger establishments more often report changes due to environmental awareness or regulations.

CHAPTER 4.
Conclusions and the way forward

4.1. Added value of an employer survey on skill needs based on experiences from the pilot

Differences in importance of generic tasks enable ranking of generic skills. In doing so, the survey depicts considerable variation between occupations. For all occupations generic tasks expressing a certain demand for flexibility seem to be among the most important, while other types of generic task seem to be regarded as more important among particular occupations. Further, the number of important tasks tends to increase with the ISCO level of the occupation. The higher the level of the occupation in terms of skill requirements, the more important generic tasks can be observed. As a conclusion, the survey has the capacity to identify patterns across different occupations and is able to identify relevant clusters of tasks such as managerial or green skills. Green tasks apply to almost all occupations at a middle level which underlines the importance of green skills in general and justifies the discussion at policy level. At the same time, however, the results on green tasks bring back the debate on green skills to a realistic level in differentiating the importance (or unimportance) across occupations.

Concerning changes in importance of both generic and occupation-specific skills and related preparedness, the survey has the potential to capture trends and patterns of development of different occupations. As a trend, for example, tasks which are rated to be more important tend to be more dynamic as well. Differences within and between occupations can be measured. The survey also enables exploration of skill gaps in the workforce and in specific sectors and occupations. Further, the survey has the capacity to shed light on the relationship between different drivers and conditions of change and increase in importance of tasks and preparedness. Among others, innovativeness, reviewing skill needs, training or establishment size belongs to these drivers and conditions.

By means of analysis of the sectors, general developments in task profiles consisting of generic, occupation-specific and in particular newly-emerging tasks can be identified. Especially the latter has the potential to derive future trends concerning developments of tasks and skills. The questions on generic and occupation-specific tasks provide basic information about central developments within respective occupational groups and sectors. With the questions on newly-emerging tasks this information can be extended and detailed. Further, gaps in

preparedness for specific occupational groups can be identified at different levels. While occupation-specific information details generic tasks and profiles in general, newly-emerging task results detail the generic tasks, in particular 'learning' and 'adapting' with further information on specific requirements and future competences for the corresponding occupational group. Newly-emerging tasks mentioned by establishments for each occupational group can usually be attributed to a set of generic tasks. This enables analysis of newly-emerging tasks in terms of their composition of generic tasks.

The added value of the survey refers to different levels: policy; intermediary (for social partners and other intermediaries such as sector associations); enterprise (for designing human resources development concepts); and individual level. Qualitative, content-related data on particular tasks as well as on emergence and change of tasks can be used to compare skill requirements of occupations. One of the first results for the policy level is, for example, that lower-level occupations seem to be less well prepared for changing skill demand than other occupations or empirical evidence of the importance of green skills in a wide range of occupations. However, the employer survey on skill needs in Europe is not able to consider all structural differences in the EU such as VET systems, labour markets, regional and cultural differences, etc., in its survey design. This is additionally prevented by lack of consistency of qualification levels across Member States. Levels (and lack) of preparedness for certain generic, occupation-specific and newly-emerging tasks provide information for policy-makers, intermediaries and employers. Information on drivers of change might be of particular interest to employers (different forms of innovation, skill reviews, forms of training and other variables).

4.2.   Lessons learned from the pilot survey

The methodological concept tested in the pilot phase generally proved to work in practice: the targeted number of interviews could be achieved in roughly the desired distribution among sectors and size-classes; the process of selecting a particular occupational group worked, respondents were largely able to answer the questions asked in the survey and to relate their answers to the selected occupational group as intended. Nevertheless, a couple of basic methodological issues need further reflection before using the survey concept in future.

As the first results have shown, the measurement of importance in the survey seems to be rather problematic for cross-country comparisons. It reveals a very high spread both within and between countries. With almost no exception, Poland ranks highest concerning intensity of change of generic tasks across all

occupations included in the survey. In this respect, Hungary ranks very high in some occupations as well. So far, plausible explanations for this have not yet been found. Whether there is a cultural bias in response behaviour or slight differences in translation, a different understanding of the scope of occupations or any other reason that explains these differences needs to be further investigated. It is therefore necessary to improve comparability and validity of the importance scales, for example by using a frequency scale as an alternative or as a supplement to anchor the importance scale. Another possibility is to use anchoring vignettes.

The pilot survey tested the approach on selected occupations at 3-digit ISCO-08. This has proved to work for generic tasks but became a limitation in the questions on occupation-specific tasks. The part on occupation-specific tasks produces more detailed results than the one on generic tasks, however the current form is not suitable since dropout rates for certain occupations are high and the multidimensionality of tasks is noticeable. If the module on occupation-specific tasks is used in the future a modification would be required and recommended. To arrive at more meaningful tasks lists for the occupational groups, it would be highly recommended to have expert workshops (involving social partners, occupational associations, and training providers) selecting the six most relevant tasks and reduce multidimensionality of the ISCO tasks lists. Another possibility would be, in this part of the survey, to focus on different occupations in different years (IT occupations, health occupations, green occupations, etc.), to switch therefore to the 4-digit level, and to adjust or completely rearrange the tasks lists. In cooperation with stakeholders from the respective sector, a portfolio of relevant occupations and tasks could be addressed, analysed and carried out mostly independently from other parts of the survey.

Another issue, regarding the reference to occupations at 3-digit ISCO-08, arises when reporting on the results. The full-scale survey should cover the entire EU economy, all sectors and all occupations. Therefore to improve the survey's cost-effectiveness, it is necessary to review the level of occupational group used in the survey. To ensure meaningful responses from employers this could be done, for example, through collection of data at a lower ISCO-08 level and subsequent aggregation to ISCO-08 1-digit level. The improved design could also allow implementation of the survey instrument for repeated measures of two occupations per local establishment.

The pilot survey concentrated on a selection of sectors of activity to represent very different sectors, among them: dynamic and rather stable ones; private sectors; largely public sectors; large sectors (in terms of number of establishments and share of employment); and smaller ones. The study basically

worked in all these sectors. However, particularly for the smaller sectors and the larger size-classes, there are clear limitations as regards the number (and distribution) of achievable interviews. If the pilot survey was to be replicated on a larger scale, with more interviews and covering more sectors of activity, these limitations would have to be considered.

The questionnaire concept applied in the pilot survey proved to be very complex. The complexity results from the chosen path to relate most survey questions to a particular occupational group within an establishment rather than to the whole workforce of an establishment. This way was chosen to avoid collecting too general information to produce any meaningful additional insights. In view of the large number of occupational groups, this is however a path that inevitably leads to a large complexity of the survey concept, even if the survey (as in the pilot) is restricted just to a number of quantitatively important occupational groups. Conducting the survey in its present form in all sectors of activity would be technically feasible, but would imply a very high rate of complexity due to the large number of occupational groups that would have to be considered in the formulation, translation and programming of occupation-specific questions and in handling the data.

The number of observations obtained in the present survey, with its 1 000 cases per country and its limitation to a set of sectors, can be considered as an absolute minimum if the survey is meant to produce results on a national level and for different occupational groups. In the analysis of the survey, cells with less than 20 interviews were not taken into account because of concerns about the generalisability of these data. This implied that for Ireland, where the sample size was only 500 interviews, observations on a couple of occupational groups could not finally be considered. A solution can be to ask employers about more than one occupation in a repeated measures design, but careful control of the survey load and required interview time would be required.

In terms of data collection modes, the tested survey design requires computerised administration of the questionnaires. Therefore, any variant with paper questionnaires is not an option for replication of this survey. Realisation of the survey by CAPI (computer-assisted face-to-face interviews) or CAWI (computer-assisted online interviews) are in turn generally feasible alternatives to the telephone mode, though the former would imply considerably greater costs, and the latter problems with sampling and increased non-response. The method of choice for any replication of the survey would therefore be CATI.

The questionnaire finally used for the pilot proved to be quite challenging for programming and checking, especially in countries not used to more complex CATI survey instruments. To minimise potential errors in the script, for replication

of this survey on an EU-wide basis, centralisation of survey programming and testing would be desirable.

4.3. The way forward: organisation of a full-scale survey

Through the pilot survey an innovative approach was developed and validated for gathering information on trends in skill needs for selected occupations within selected economic sectors. The approach retains the link between occupations and skills. The instrument also includes occupation-specific tasks. Background variables capturing differences among employers are gathered as well as drivers of change. The pilot has allowed proper testing of the instrument in various countries, sectors and occupations. It appears effective, as most questions and items work well, and it generates evidence of trends in skills across the selected occupations (as illustrated in Chapter 2). The pilot also provides reassurance regarding applicability of the instrument in new contexts.

To deploy a European-level survey, it is now necessary to select a cost-effective implementation design. Cedefop proposes two possible ways forward based on lessons learned from the pilot survey using streamlined designs of 1 500-2 000 interviews per country ensuring reliable country comparisons. The first alternative entails a more focused sectoral approach to identify trends in selected occupations within sectors across Europe, but it would forsake coverage of the whole economy to concentrate on particular sectors of interest. The second approach allows for understanding trends in demand for generic skills in different occupational groups across the EU and between Member States, but it would not inform on trends in sectors (except at aggregate level) and it does not use occupation-specific tasks.

For either approach to lead to valid and robust estimates, 350 to 400 observations per cell appear a minimum ([19]) and would therefore require a sample of about 1 500 to 2 000 establishments per country. While this sample size produces robust country estimates for key variables in the survey, exploration of the detailed relationships among survey variables will require more sophisticated statistical modelling approaches.

([19]) With 400, a percentage of 50% has a confidence interval covering 45 to 55.

Table 4.   **Summary of features of the two alternative proposals**

	Sector-based survey	**Generic skills survey**
Key features added-value	• enables quantitative case studies of selected occupations in sectors of key interest; • detailed insights into changing skill needs; • covers generic skills, occupation-specific tasks and newly-emerging tasks.	• representative of entire EU economy and broad occupational groups; • looks at generic skills and newly-emerging tasks; • measures drivers of change in skill needs and provides an EU-wide overview of their impact.
Drawbacks	• does not cover the whole EU economy but a small subset of priority occupations in sectors; • broad-brush comparisons between countries are not feasible across a range of occupations.	• no detailed information on sectoral trends; • omits occupation-specific tasks; • does not provide detailed information on individual occupations (at ISCO-08 3 or 4 digits).
Next steps	• choice of sectors and occupations; • improve comparability of importance scale; streamline coding of newly-emerging tasks; • develop task lists, pre-test final instruments.	• focus the survey instruments on generic skills; • improve comparability of importance scale; streamline coding of newly-emerging tasks; • pre-test finalised instruments

Source: Cedefop pilot survey, 2012.

Both routes to scaling up the survey are feasible and one does not exclude or diminish the utility of running the other. It was decided, with the European Commission, that Cedefop will move further towards an employer survey on transversal/generic skills. In 2013, the survey instrument will be refined and tested. If the test phase proves successful, a full-scale European survey will be carried out in 2014.

Some refinements to the pilot questionnaire and survey design are required to collect representative information on skill needs in Europe. The 2012 pilot survey tested the approach on selected occupations at ISCO-08 3-digit level. However, for the full-scale survey, reporting on occupations at ISCO-08 1-digit ([20]) level is required to improve cost-effectiveness of the survey while covering the entire EU economy and broad occupational groups. The refined survey instrument will focus on transversal/generic skills.

These refinements will need to be pre-tested again in five selected countries. Based on results of the pre-test, Cedefop, with the European Commission, will

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([20]) ISCO-08 distinguishes between the following major groups at 1-digit level: (1) Managers, (2) Professionals, (3) Technicians and associate professionals, (4) Clerical support workers, (5) Service and sales workers, (6) Skilled agricultural and fishery workers, (7) Craft and related trade workers, (8) Plant and machine operators and assemblers, (9) Elementary occupations and (0) Armed forces occupations. The latter Group 0, covering the armed forces, is to be excluded from the present survey.

decide on implementation of the final survey instrument in all EU Member States in 2014.

Important issues for the survey's success include:

(a) whether coherent and meaningful information concerning skill needs can be presented at ISCO-08 1-digit level (while possibly being collected from employers for more detailed occupational subgroups);

(b) ensuring the required level of precision of standard errors can be reached with a feasible number of observations;

(c) exploring increases to the design's efficiency by using a simplified set of items with a repeated measures design without making the survey load excessive for respondents, or raising levels of unit non-response;

(d) making the task importance scale sufficiently comparable across countries by further development of the instrument, either by including some items that measure frequency of a task or by using anchoring vignettes.

The principal objective of the full-scale survey is to obtain interesting, and sufficiently discriminatory, information on trends in transversal/generic skills in occupations across countries. These data will enable Cedefop and other stakeholders to carry out qualitative and quantitative analysis of emerging skill needs in organisations of different sizes covering the whole economy, (including non-marketed services) in all EU Member States.

It is Cedefop's ambition to enrich available research and the EU's evidence-based policy-making on changing skill needs with this new survey. The data set would be made publicly available to any interested researchers in 2015.

List of abbreviations

CAPI	computer-assisted face-to-face interview
CATI	computer-assisted telephone interview
CAWI	computer-assisted online interview
ESCO	European skills, competences and occupations taxonomy
EU-LFS	European Union labour force survey
ISCO	international standard classification of occupations
ISCO-08	international standard classification of occupations, approved in 2008
LFS	labour force survey
NACE	*Nomenclature statistique des activités économiques dans la Communauté européenne* [statistical classification of economic activities in the European Community].
PIAAC	programme for international assessment of adult competences
VET	vocational education and training

Country codes

CZ	Czech Republic
DE	Germany
HU	Hungary
IE	Ireland
ES	Spain
FR	France
IT	Italy
FI	Finland

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Annex Share of employment covered by the survey

NACE Rev.2 (rough Rev.1 correspondence)	Selected group ISCO-08	Title in ISCO-08	LFS 2011 Q3	Group number	28 41 46	29 42 47	30 43
28, 29, 30	821	Assemblers	579 619	1	124 381	410 279	44 960
	723	Machinery mechanics and repairers	510 165	2	239 937	213 960	56 269
	214	Engineering professionals (excluding electrotechnology)	464 074	3	197 737	170 477	95 860
	311	Physical and engineering science technicians	505 024	4	265 528	182 811	56 685
	721	Sheet and structural metal workers, moulders and welders,	365 313	5	141 831	141 860	81 622
			2 424 196		969 414	1 119 387	335 396
			36%		34%	37%	37%
			6 810 446		2 889 563	3 015 011	905 872
41, 42, 43	711	Building frame and related trade workers	2 446 023	1	1 432 178	212 252	801 593
	311	Physical and engineering science technicians	467 606	2	135 061	82 470	250 075
	712	Building finishers and related trades workers	1 368 260	3	203 218	40 997	1 124 045
	214	Engineering professionals (excluding electrotechnology)	256 528	4	131 993	65 803	58 732
	931	Mining and construction labourers	968 548	5	454 951	169 700	343 897
			5 506 965		2 357 402	571 221	2 578 342
			47%		59%	35%	42%
			11 827 745		4 018 929	1 624 473	6 184 343
46, 47	243	Sales, marketing and public relations professionals	197 785	1	143 580	54 205	
	522	Shop salespersons	7 134 281	2	649 020	6 485 261	
	432	Material-recording and transport clerks	816 052	3	462 696	353 356	
	523	Cashiers and ticket clerks	958 527	4	34 941	923 586	
	226	Other health professionals	223 147	5	9 235	213 912	
			9 329 792		1 299 472	8 030 321	
			43%		21%	52%	
			21 549 716		6 210 862	15 338 854	
62	251	Software and applications developers and analysts	632 388	1			
	351	ICT operations and user support technicians	283 432	2			
	252	Database and network professionals	104 238	3			
	422	Client information workers	19 614	4			
	121	Business services and administration managers	43 617	5			
			1 083 290				
			50%				
			2 167 522				

NACE Rev.2 (rough Rev.1 correspondence)	Selected group ISCO-08	Title in ISCO-08	LFS 2011 Q3	Group number	28 41 46	29 42 47	30 43
64	241	Finance professionals	359 463	1			
	121	Business services and administration managers	98 344	2			
	331	Financial and mathematical associate professionals	527 131	3			
	421	Tellers, money collectors and related clerks	839 370	4			
	431	Numerical clerks	249 472	5			
			2 073 779				
			53%				
			3 876 735				
84	411	General office clerks	712 740	1			
	541	Protective services workers	1 563 031	2			
	335	Regulatory government associate professionals	1 071 929	3			
	334	Administrative and executive secretaries	1 043 359	4			
	911	Domestic, hotel and office cleaners and helpers	529 998	5			
			4 921 056				
			32%				
			15 431 284				
86	322	Nursing and midwifery associate professionals	1 754 190	1			
	532	Personal care workers in health services	1 363 774	2			
	221	Medical doctors	1 036 458	3			
	321	Medical and pharmaceutical technicians	445 105	4			
	911	Domestic, hotel and office cleaners and helpers	323 471	5			
			4 922 998				
			42%				
			11 720 650				

Source: LFS, third quarter 2011, calculations by TNS Infratest; data refer to EU-27.

Total employees in EU-27, all sectors:	182 017 284
Total employees in EU-27, sectors selected for the pilot survey:	73 384 098
Total employees in the five pre-selected groups (EU-27):	30 262 077
% of employment in sector covered by the five pre-selected groups (EU-27):	41%
% of total employment covered by the survey (EU-27):	17%

Piloting a European employer survey on skill needs

Illustrative findings

Piloting a European employer survey on skill needs
Illustrative findings

The European economy's competitiveness is affected by its capacity to prevent skill gaps and shortages in the labour market, especially when enterprises and their investments form major contributors to faster economic recovery. The European employer survey on skill needs makes an innovative contribution to linking the world of employers with that of education and training, offering skill needs identification and anticipation at European level and in Member States.

This publication presents results from a pilot survey in 2012 for identifying employers' skill needs in nine Member States. It describes the measurement concept and survey methodology, and presents illustrative findings with some implications for future work. The approach's practicability is assessed and options for moving on to a large-scale survey on employer skill needs in Europe are discussed.

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