Cedefop employer survey on skill needs in Europe

Approach proposed for skill needs measurement in the pilot survey

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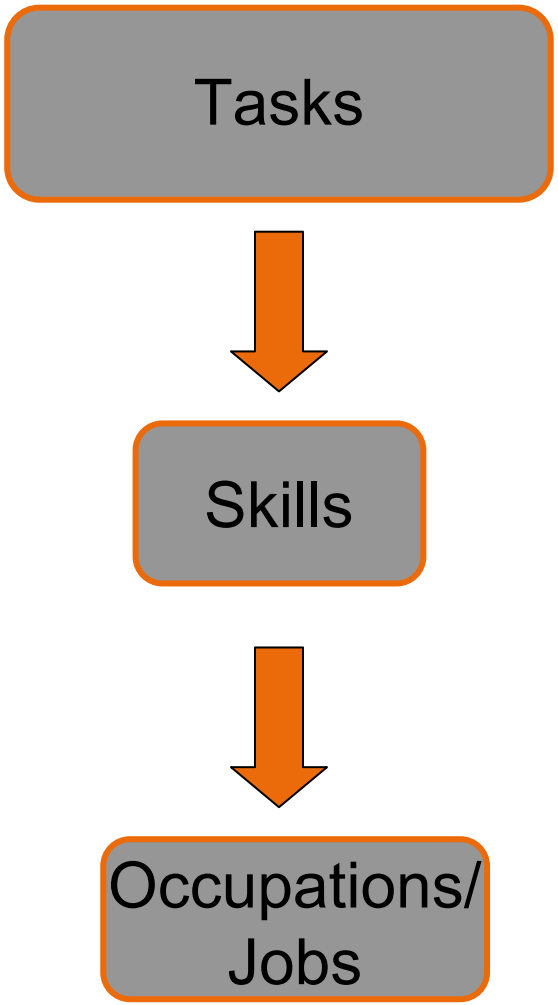
The „terminological universe“ of early identification of skill needs

The employers‘ perspective: „Focuses at work“



Possible scope of the pilot survey

Item/category/ variable	Range of definitions		
„Tasks“	„Core tasks“ Microcensus	„Sector-specific tasks“	„Occupation-specific tasks“ (O*Net, EUROccupations)
„Skills“	„Generic skills“ PIAAC, NESS	„Sector-specific skills“ DG Sector studies	„Occupation-specific skills“ (O*Net)
„Occupation“	ISCO 1-digit	ISCO 2-digit	ISCO 3-digit
?			

Possible scope of the pilot survey: Tasks

Item/category/variable	Range of definitions		
„Tasks“ ■ Existing classifications ■ Evaluation ■ Current & future tasks?	„Core tasks“ Microcensus	„Sector-specific tasks“	„Occupation-specific tasks“ (O*Net, EUROccupations)

Core tasks (Microcensus)

Main tasks e.g. according to German micro census 2004

1 to setup, manage, control and inspect machines and technical equipment
2 to cultivate, breed, foster, harvest or fish
3 mining, digging and extraction of raw materials
4 to manufacture, convert and treat something, building, installation and assembly
5 to buy, sell, mediate and encash
6 to repair, renovate, overhaul and remodel something
7 writing, calculation, data processing, bookings and preparation of drawings
8 to measure, verify, test and control something along given operations
9 research about, design, consruction and configuration of products, concepts and agendas
10 advertisement, marketing, public relations
11 to manage, direct and lead someone/ something
12 catering, accomodation and cooking
13 to apply laws, regulations and administrative orders
14 education, training and teachings
15 to give advise and informations
16 health and social care, medical or cosmetic treatment
17 doing artistics, journalism or entertainment
18 to trade with vehicles, packing, loading, sorting and delivery
19 to clean, clear waste and recycle
20 safeguarding, to protect or guard, regulate the traffic

Occupation-specific tasks (O*Net)

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O*NET OnLine

Occupation Quick Search:

Help | Find Occupations | Advanced Search | Crosswalks | O*NET Sites

Summary Report for:

17-3023.03 - Electrical Engineering Technicians

Updated 2008

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Apply electrical theory and related knowledge to test and modify developmental or operational electrical machinery and electrical control equipment and circuitry in industrial or commercial plants and laboratories. Usually work under direction of engineering staff.

Sample of reported job titles: Electronics Technician, Engineering Technician, Engineering Assistant, Test Technician, Electrical Design Technician, Electrical Engineering Technician, Electrical Technician, Engineering Lab Coordinator, Engineering Lab Technician, Equipment Engineering Technician

View report: Summary | Details | Custom

Tasks | Tools & Technology | Knowledge | Skills | Abilities | Work Activities | Work Context | Job Zone | Interests | Work Styles | Work Values | Related Occupations | Wages & Employment | Additional Information

Tasks

- Provide technical assistance and resolution when electrical or engineering problems are encountered before, during, and after construction.
- Assemble electrical and electronic systems and prototypes according to engineering data and knowledge of electrical principles, using hand tools and measuring instruments.
- Install and maintain electrical control systems and solid state equipment.
- Modify electrical prototypes, parts, assemblies, and systems to correct functional deviations.
- Set up and operate test equipment to evaluate performance of developmental parts, assemblies, or systems under simulated operating conditions, and record results.
- Collaborate with electrical engineers and other personnel to identify, define, and solve developmental problems.
- Build, calibrate, maintain, troubleshoot and repair electrical instruments or testing equipment.
- Analyze and interpret test information to resolve design-related problems.
- Write commissioning procedures for electrical installations.
- Prepare project cost and work-time estimates.

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Possible scope of the pilot survey: Skills

Item/category/ variable	Range of definitions		
„Skills“ ■ Existing classifications ■ Evaluation ■ Future skills & future tasks?	„Generic skills“ PIAAC, NESS	„Sector-specific skills“ DG Sector studies	„Occupation-specific Skills“ (O*Net)

Generic skills (PIAAC, NESS)

Table 6: Main skills lacking by occupation where skill-shortage vacancies exist

	Overall	Managers	Professionals	Associate prof.	Administrative	Skilled trades	Personal service	Sales	Operatives	Elementary
Unweighted base (SSVs)	*5,118*	*300*	*1,035*	*1,098*	*328*	*614*	*585*	*356*	*331*	*440*
Weighted base (SSVs)	*63,089*	*3,735*	*8,303*	*12,693*	*4,573*	*8,908*	*9,123*	*5,480*	*2,908*	*6,932*
Unweighted base (employers with SSVs in occupation)	*2,450*	*243*	*338*	*542*	*231*	*394*	*294*	*215*	*156*	*233*
	%	%	%	%	%	%	%	%	%	%
Technical and practical skills	62	60	76	55	51	73	60	51	73	59
Customer-handling skills	41	40	37	36	49	28	45	56	24	60
Problem-solving skills	38	39	45	28	39	42	38	41	21	45
Team working skills	37	25	31	31	33	41	42	41	26	54
Oral communication skills	35	27	17	26	46	38	46	49	27	44
Written communication skills	34	29	19	29	47	39	40	45	22	36
Management skills	32	63	29	33	30	37	24	34	11	32
Literacy skills	30	30	14	26	39	35	35	41	20	28
Numeracy skills	26	23	11	21	40	34	27	31	18	29
Office/admin skills	18	19	11	24	40	11	17	22	7	12
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General IT user skills	16	18	9	16	31	13	15	22	9	11
IT professional skills	15	13	13	15	28	10	12	20	6	19

Base: All skill-shortage vacancies.
Note: Column percentages add to more than 100 since multiple responses were allowed.

NESS 2009, Key findings, Evidence Report 13, March 2010, p. 25

Sector-specific skills (DG Sector studies)

In service sectors	All sectors	Production sectors
• Intercultural skills	• ICT and E-skills (both at user and expert level)	• Skills/knowledge related to new materials
• Conflict solution	• Health and green skills (related to health and climate and environmental solutions)	• Skills/knowledge related to new processes
• Multiskilling	• Entrepreneurship and innovativeness	• International value chain management
	• Team work	
	• Self management	
	• New combinations of skills and competencies	

Example: DG Employment, Social Affairs and Equal Opportunities: Sectors‘ New Skills for New Jobs. 19 Sector Studies.
http://ec.europa.eu/social/BlobServlet?docId=4687&langId=en

Occupation-specific skills (O*Net)

Basic Skills
Developed capacities that facilitate learning or the more rapid acquisition of knowledge

Complex Problem Solving Skills

Developed capacities used to solve novel, ill-defined problems in complex, real-world settings

Resource Management Skills

Developed capacities used to allocate resources efficiently

Social Skills

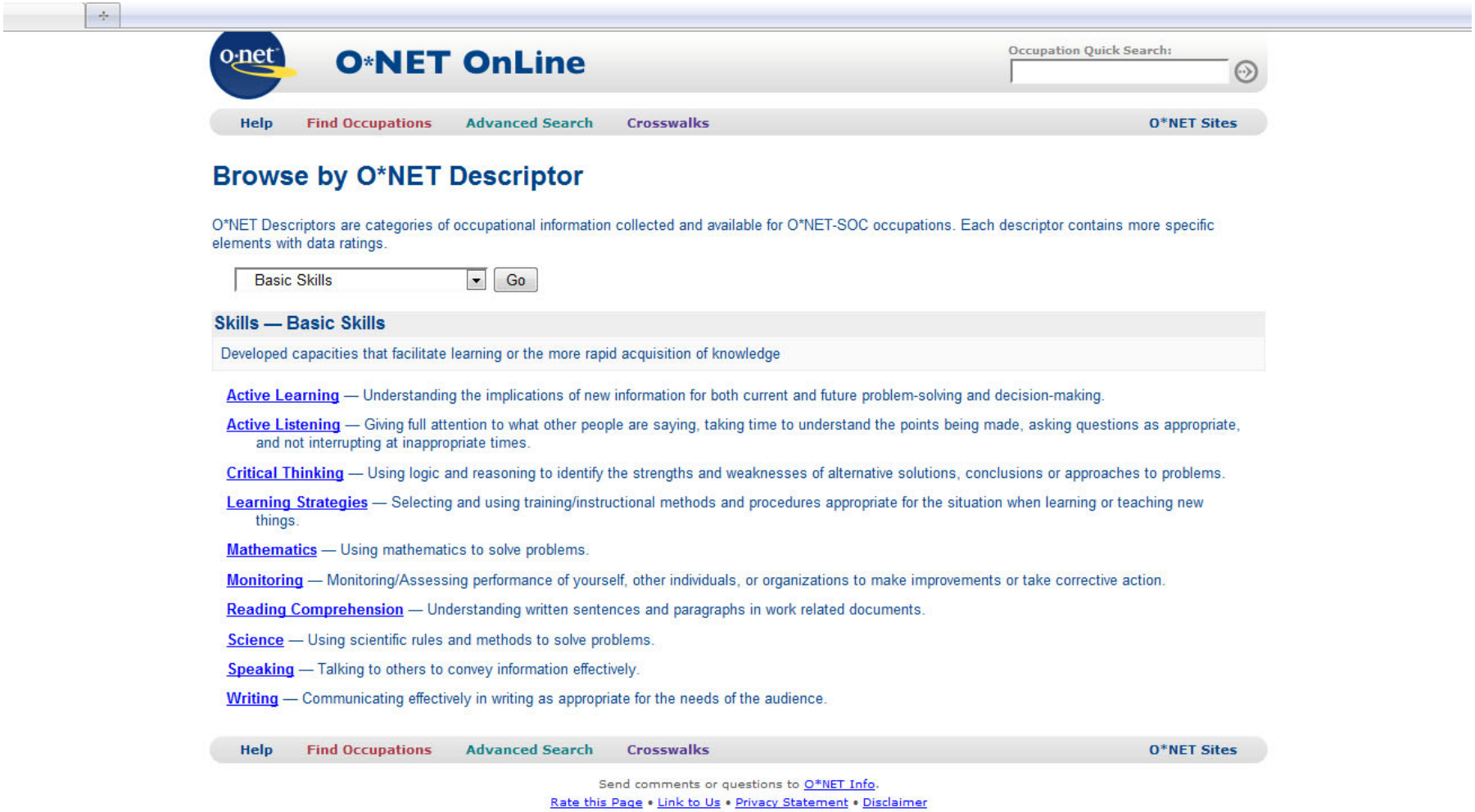
Developed capacities used to work with people to achieve goals

Systems Skills

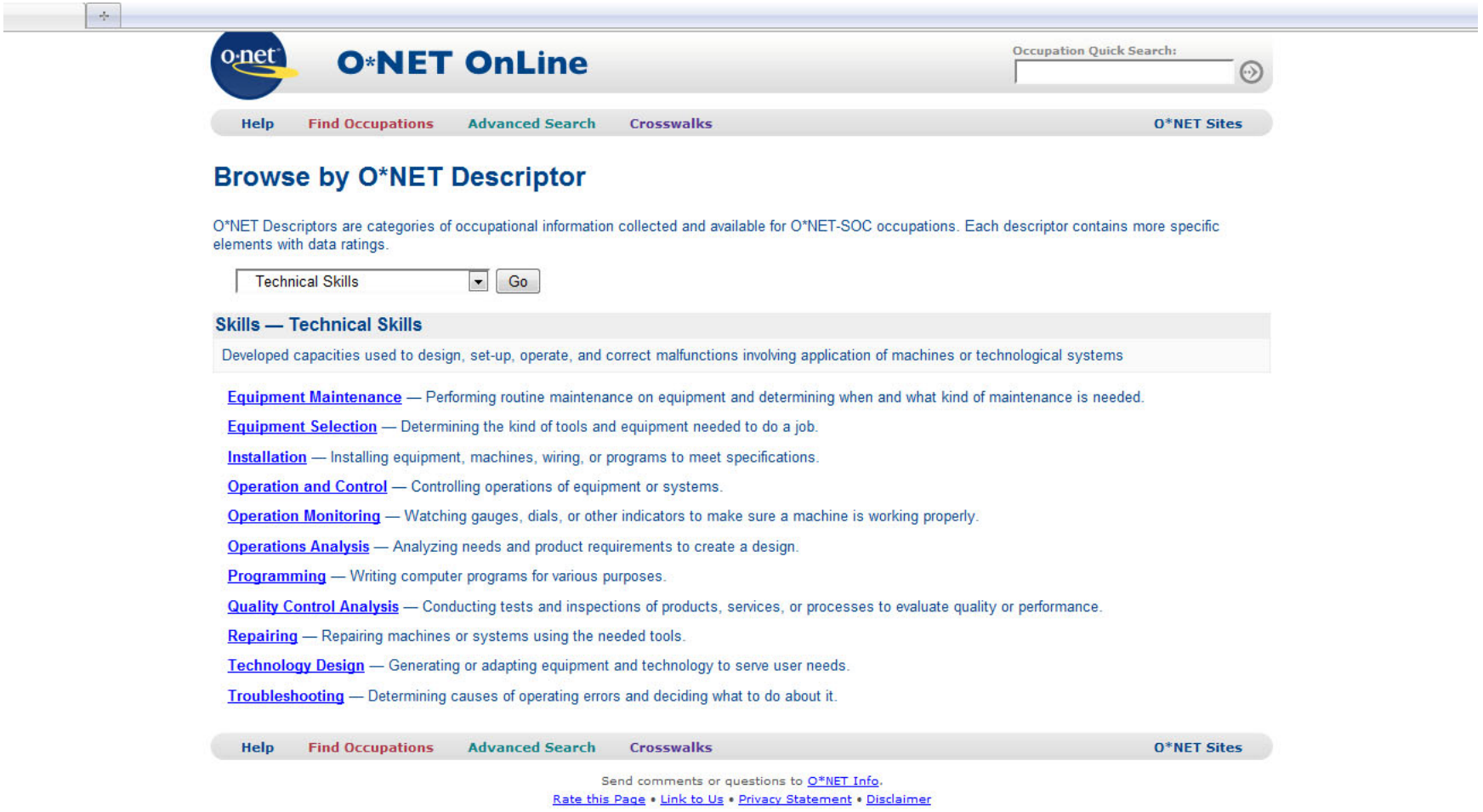
Developed capacities used to understand, monitor, and improve socio-technical systems

Technical Skills
Developed capacities used to design, set-up, operate, and correct malfunctions involving application of machines or technological systems

Occupation-specific skills (O*Net)



Occupation-specific skills (O*Net)



Occupation-specific skills (O*Net)

Skills

Troubleshooting — Determining causes of operating errors and deciding what to do about it.

Mathematics — Using mathematics to solve problems.

Critical Thinking — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.

Reading Comprehension — Understanding written sentences and paragraphs in work related documents.

Active Learning — Understanding the implications of new information for both current and future problem-solving and decision-making.

Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.

Equipment Selection — Determining the kind of tools and equipment needed to do a job.

Learning Strategies — Selecting and using training/instructional methods and procedures appropriate for the situation when learning or teaching new things.

Repairing — Repairing machines or systems using the needed tools.

Monitoring — Monitoring/Assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.

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Abilities

Near Vision — The ability to see details at close range (within a few feet of the observer).

Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.

Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense.

Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.

Possible scope of the pilot survey: Occupations

Item/category/variables	Range of definitions		
„Occupation“ ■ Tasks, Skills and Occupations ■ Discussion „Reduction of complexity“ and „loss of information“ ■ Future tasks, future skills & future occupations?	ISCO 1-digit	ISCO 2-digit	ISCO 3-digit

Occupation (1-digit)

Employment by sector, occupation and qualification, 1996-2015

	All qualifications		
All industries	**1996**	**2006**	**2015**
Armed forces	1 245	1 215	1 165
Legislators, senior officials and managers	15 394	18 405	21 076
Professionals	24 220	27 349	31 111
Technicians and associate professionals	27 643	33 952	38 691
Clerks	24 632	23 317	22 044
Service workers and shop and market sales workers	25 385	29 490	32 017
Skilled agricultural and fishery workers	9 829	7 789	6 082
Craft and related trades workers	30 641	28 845	27 420
Plant and machine operators and assemblers	17 069	17 314	17 850
Elementary occupations	16 655	22 980	26 480
All occupations	192 714	210 656	223 936

Source: Cedefop (2008): Future skill needs in Europe. Medium-term forecast. Synthesis report, Luxembourg: Office for Official Publications of the European Communities. http://www.cedefop.europa.eu/EN/Files/4078_en.pdf, p. 100.

Occupation (2-digit)

Table 3. **Employment trends by occupation, level and growth, EU-25+**

	Levels (000s)			Growth (% p.a.)	
	1996	2006	2015	1996-06	2006-15
Legislators, senior officials and managers	15 394	18 405	21 076	1.8	1.5
11 legislators and senior officials	484	495	596	0.2	2.1
12 corporate managers	8 349	9 920	12 346	1.7	2.5
13 managers of small enterprises	8 349	7 990	8 135	2.0	0.2
Professionals	24 220	27 349	31 111	1.2	1.4
21 physical, mathematical and engineering science professionals	5 518	6 401	7 452	1.5	1.7
22 life science and health professionals	3 698	3 551	3 658	-0.4	0.3
23 teaching professionals	7 862	8 464	8 736	0.7	0.4
24 other professionals	7 143	8 933	11 265	2.3	2.6
Technicians and associate professionals	27 643	33 952	38 691	2.1	1.5
31 physical and engineering science associate professionals	6 911	7 715	8 129	1.1	0.6
32 life science and health associate professionals	4 807	5 618	5 800	1.6	0.4
33 teaching associate professionals	2 126	2 660	3 315	2.1	2.7
34 other associate professionals	13 799	18 013	21 446	2.7	2.0
Clerks	24 632	23 317	22 044	-0.5	-0.6
41 office clerks	20 840	18 795	16 944	-1.0	-1.1
42 customer services clerks	3 792	4 522	5 100	1.8	1.3
Service workers and shop and market sales workers	25 385	29 490	32 017	1.5	0.9
51 personal and protective services workers	15 408	18 848	21 361	2.0	1.4
52 models, salespersons and demonstrators	9 977	10 642	10 656	0.6	0.0
Skilled agricultural and fishery workers	9 829	7 789	6 082	-2.3	-2.7
Craft and related trades workers	30 641	28 845	27 420	-0.6	-0.6
71 extraction and building trades workers	11 205	12 597	12 718	1.2	0.1
72 metal, machinery and related trades workers	11 976	10 466	9 555	-1.3	-1.0
73 precision, handicraft, craft printing and related trades workers	1 865	1 444	1 171	-2.5	-2.3
74 other craft and related trades workers	5 595	4 338	3 977	-2.5	-1.0
Plant and machine operators and assemblers	17 069	17 314	17 850	0.1	0.3
81 stationary plant and related operators	2 034	2 103	2 079	0.3	-0.1
82 machine operators and assemblers	6 622	6 498	6 596	-0.2	0.2
83 drivers and mobile plant operators	8 414	8 713	9 175	0.4	0.6
Elementary occupations	16 655	22 980	26 480	3.3	1.6
91 sales and services elementary occupations	10 408	15 568	18 630	4.1	2.0
92 agricultural, fishery and related labourers	1 269	1 249	1 116	-0.2	-1.3
93 labourers in mining, construction, manufacturing and transport	4 978	6 163	6 735	2.2	1.0
All industries	192 714	210 656	223 936	0.9	0.7

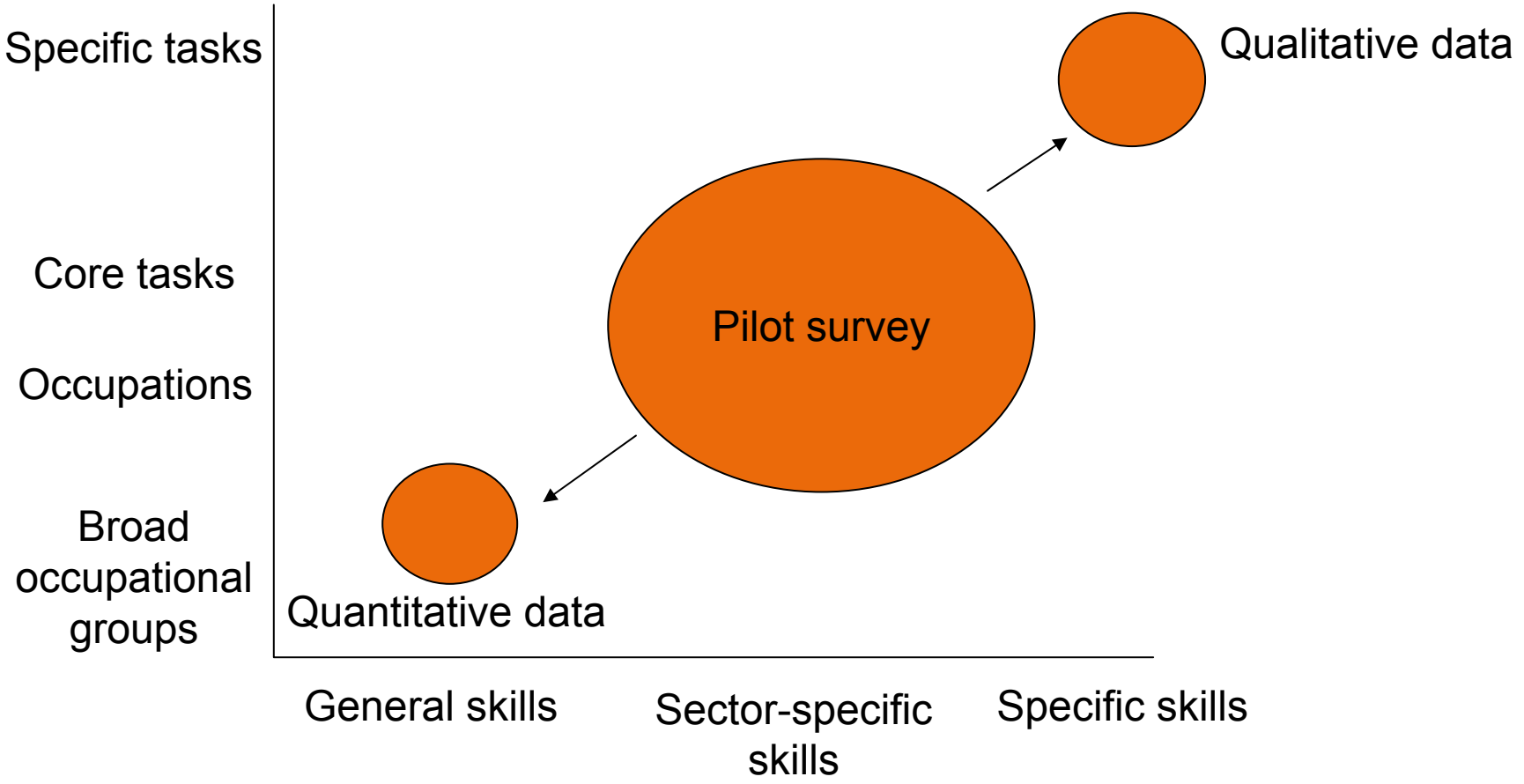
Source: IER estimates based on Cambridge Econometrics E3ME model.

Source: Cedefop (2008): Future skill needs in Europe. Medium-term forecast. Synthesis report, Luxembourg: Office for Official Publications of the European Communities. http://www.cedefop.europa.eu/EN/Files/4078_en.pdf, p. 48/49.

Occupation (3-digit)

	MAJOR GROUP 2: PROFESSIONALS
21	**Physical, mathematical and engineering science professionals**
211	**Physicists, chemists and related professionals**
2111	**Physicists and astronomers**
2112	**Meteorologists**
2113	**Chemists**
2114	**Geologists and geophysicists**
212	**Mathematicians, statisticians and related professionals**
2121	**Mathematicians and related professionals**
2122	**Statisticians**
213	**Computing professionals**
2131	**Computer systems designers, analysts and programmers**
2139	**Computing professionals not elsewhere classified**
214	**Architects, engineers and related professionals**
2141	**Architects, town and traffic planners**
2142	**Civil engineers**
2143	**Electrical engineers**
2144	**Electronics and telecommunications engineers**
2145	**Mechanical engineers**
2146	**Chemical engineers**
2147	**Mining engineers, metallurgists and related professionals**
2148	**Cartographers and surveyors**
2149	**Architects, engineers and related professionals not elsewhere classified**

Possible scope of the pilot survey



Possible scope of the pilot survey

Item/category/ variable	Range of definitions		
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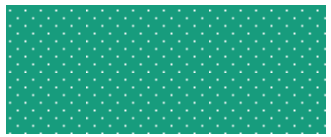
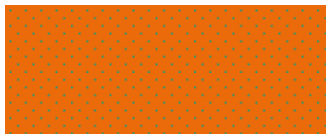
„Occupation“	ISCO 1-digit	ISCO 2-digit	ISCO 3-digit

Possible modules of the pilot survey

(0) Classification variables: industry/sector; size
Innovation, technological, organisational changes





(1) Tasks and skills

(2) Skills needs identification processes

Option: Sector-/Occupation-specific tasks and skills: Skills audit – the procedure

- Select the broad occupational groups (ISCO 1-digit) relevant for the respective sector
- Select within each selected broad group the most relevant occupation (or most relevant 1-2 occupations) (ISCO 3-digit)
- Matrix for each occupation to be completed by the respondents
- Pre-coding (classifications) or post-coding of tasks and skills

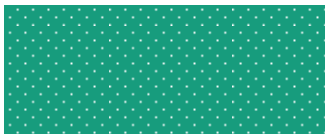
Skills audit (e.g. Automotive)

	Generic/ Core tasks (current & future)	Occupation-specific tasks: e.g. Technical/Non-technical skills use (current & future)		Degree of difficulty in sourcing (vacancies current)	Changing/new/ future tasks (skills use)*
Managers					
Professionals					
Tech. and ass. professionals					
Clerical supp. workers					
Service and sales workers					
Skilled agr., for. & fish. workers					
Craft trade					
Operatives					
Elementary o.					

* Including assessment of importance (low, medium, high)

Skills audit (Automotive x Professionals)

Occupation	Generic/ Core tasks (current & future)	Occupation-specific tasks: e.g. Technical/Non-technical skills use (current & future)	Degree of difficulty in sourcing (current vacancies)	Changing/new/ future tasks (skills use)*
Engineers				
….				
Other occupations „Job title“ (New…)				



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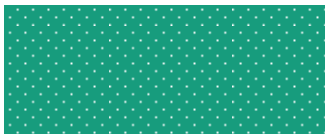
Skills audit (Automotive x Professionals)

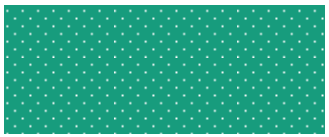
Occupation	Generic/ Core tasks (current & future)	Occupation-specific tasks: e.g. Technical/Non-technical skills use (current & future)	Degree of difficulty in sourcing (current vacancies)	Changing/new / future tasks (skills use)*
Engineers		CAD programming; recommend design modifications to eliminate machine or system malfunctions	Low/difficult	Team work with interdisciplinary teams; Fuel cell development
….				
Other occupations „Job title“ (New…)				



* Including assessment of importance (low, medium, high)

Possible classification of new tasks

- Use of new technologies (specific/general)
- Knowledge of new products or services
- Knowledge of new legal or regulatory procedures/guidelines
- Knowledge of internal procedures
- etc.



Generic tasks and skills (NESS)

Table 6: Main skills lacking by occupation where skill-shortage vacancies exist

	Overall	Managers	Professionals	Associate prof.	Administrative	Skilled trades	Personal service	Sales	Operatives	Elementary
Unweighted base (SSVs)	*5,118*	*300*	*1,035*	*1,098*	*328*	*614*	*585*	*356*	*331*	*440*
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Base: All skill-shortage vacancies.
Note: Column percentages add to more than 100 since multiple responses were allowed.

NESS 2009, Key findings, Evidence Report 13, March 2010, p. 25

Option: Generic tasks and skills

- Questions on generic level of tasks and skills (NESS: 13 skills, could be expanded to max. 20-25 skills); no sector or occupation-specific questions
- Skills audit selection procedure
- Additional dimensions: current importance, current performance, (past?) and future development of tasks and skills relating to ISCO 3-digit level
- But: detailed level of sectors and occupation available for analyses

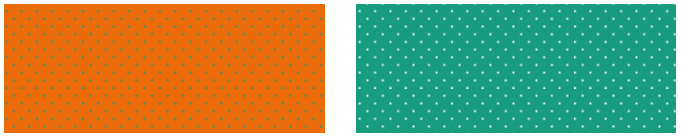
Option: Generic tasks and skills

- One standardized list of skills for all
- Covering the core occupations per sector
- Possibility to identify emerging problems, skill gaps and areas for activity on a detailed sector (NACE 2-digit) and occupational level (ISCO 3-digit)
- Implications for VET by qualitative studies (e.g. sector or case studies) in identified fields with problems

Skills needs identification processes

Issues to be investigated could be:

- Whether formal
- Who decides/ how consultative
- How far ahead
- How training and recruitment strategies are affected



Possible scope of the pilot survey

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