

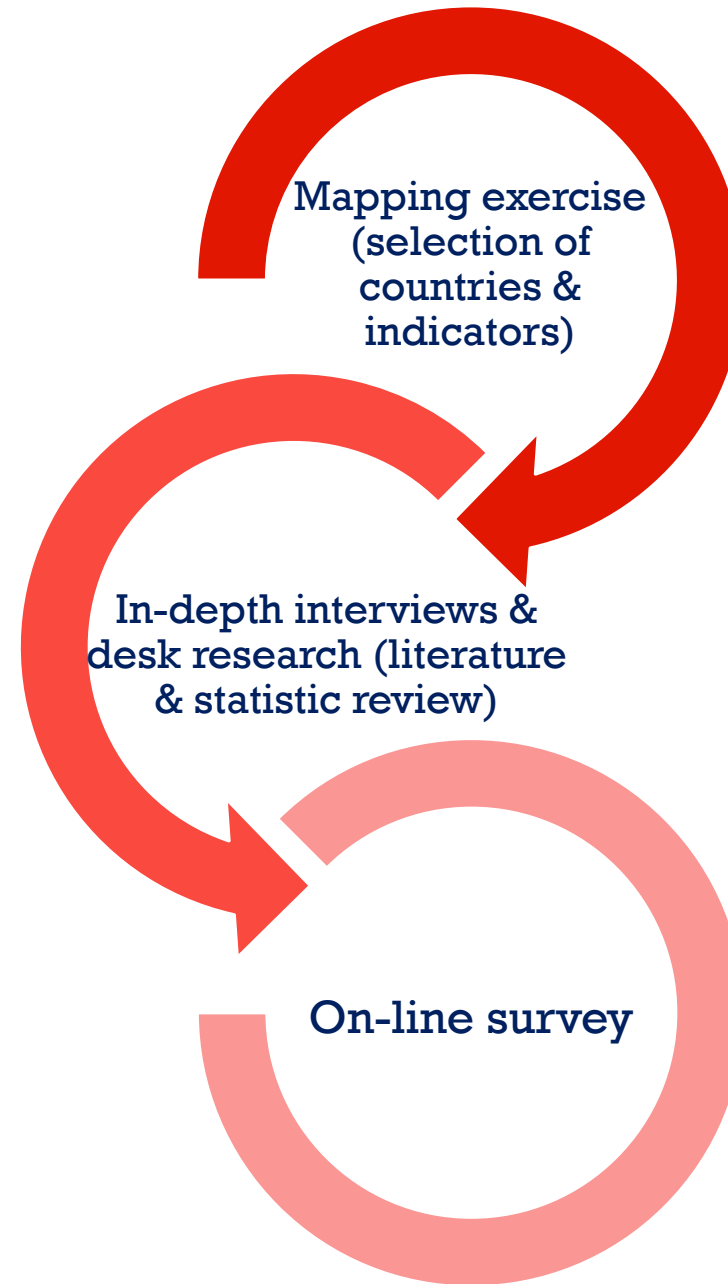


Game changing technologies and innovative approaches to the identification of new skills - Preliminary findings of the project

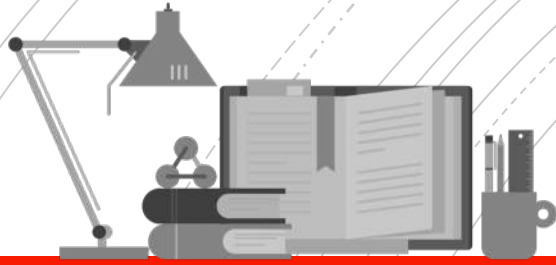


# Research: state of play

March 2021



## What the desk research shows



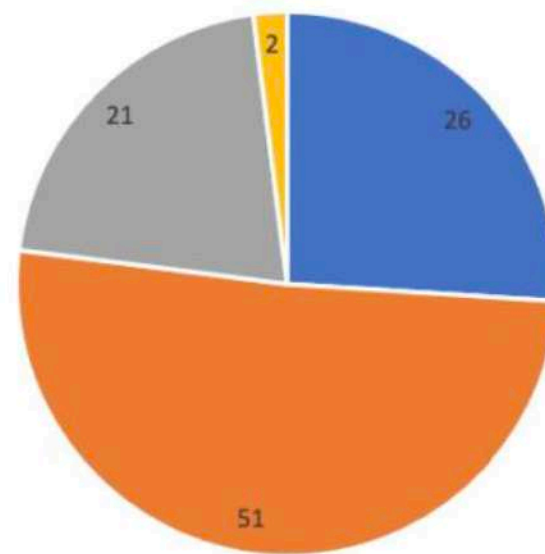
Game changing technologies and innovative approaches to the identification of new skills

Main findings/1

*Skill imbalances represent an impediment to investment for the great majority of European businesses and could hamper their competitiveness in the medium and longterm.*

- **Ongoing megatrends (the digital and green transitions, globalisation, ageing societies) are affecting jobs and skills in different ways, from workers' displacement, to growing skills shortages and the demands for a more adaptable workforce. The need for reskilling and upskilling is greater than ever and will continue to intensify.**
- **Today, regardless of their size, EU companies are already facing some skills shortages.**

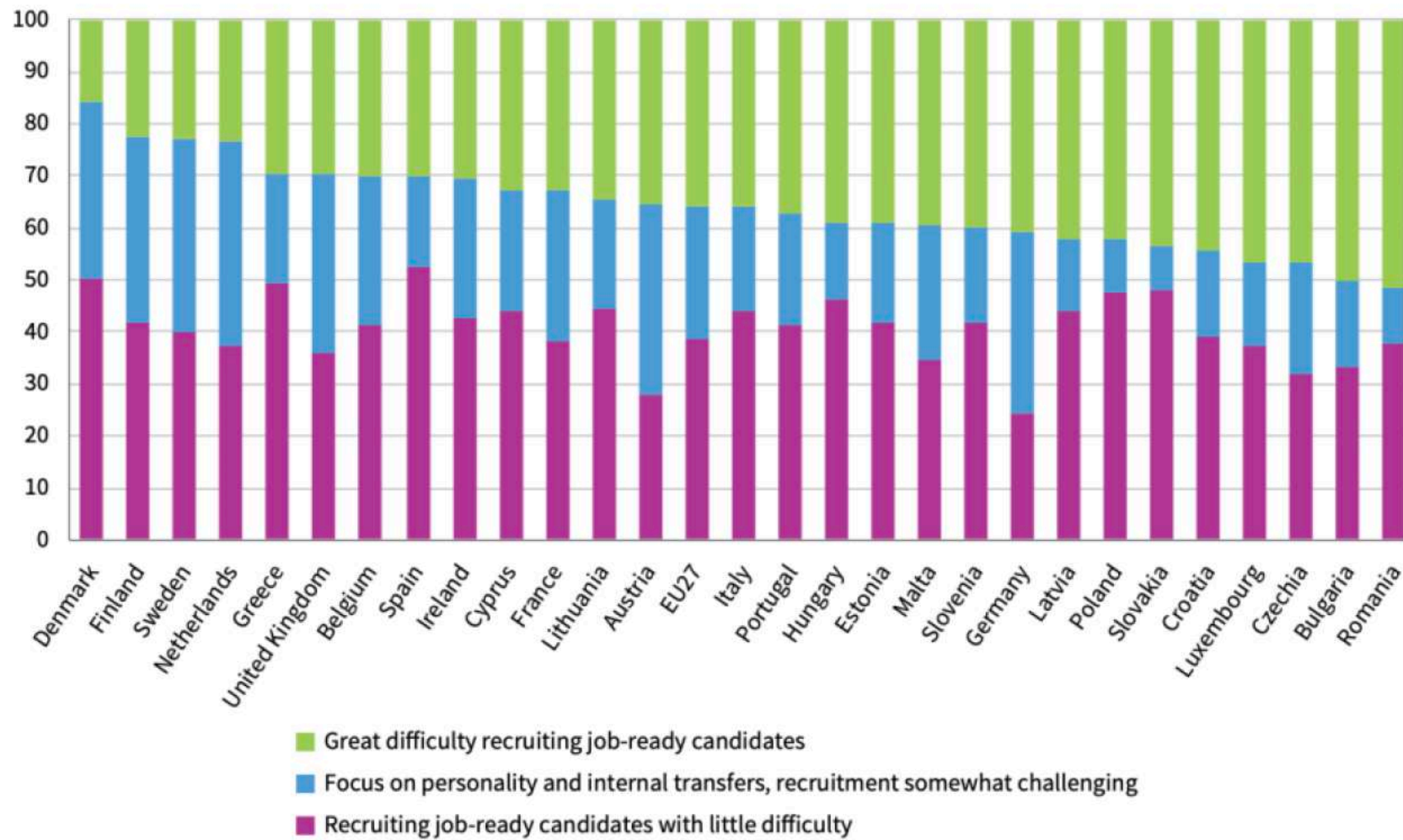
## Difficulty in finding employees with the required skills (EU-27;%)



■ Very difficult ■ Fairly difficult ■ Not very difficult ■ Not at all difficult

Source: Eurofound and Cedefop (2020), European Company Survey 2019: Workplace practices unlocking employee potential, European Company Survey 2019 series.

## Establishment type–recruitment, by country(%) (EU-27;%)



Source: ECS 2019 management questionnaire

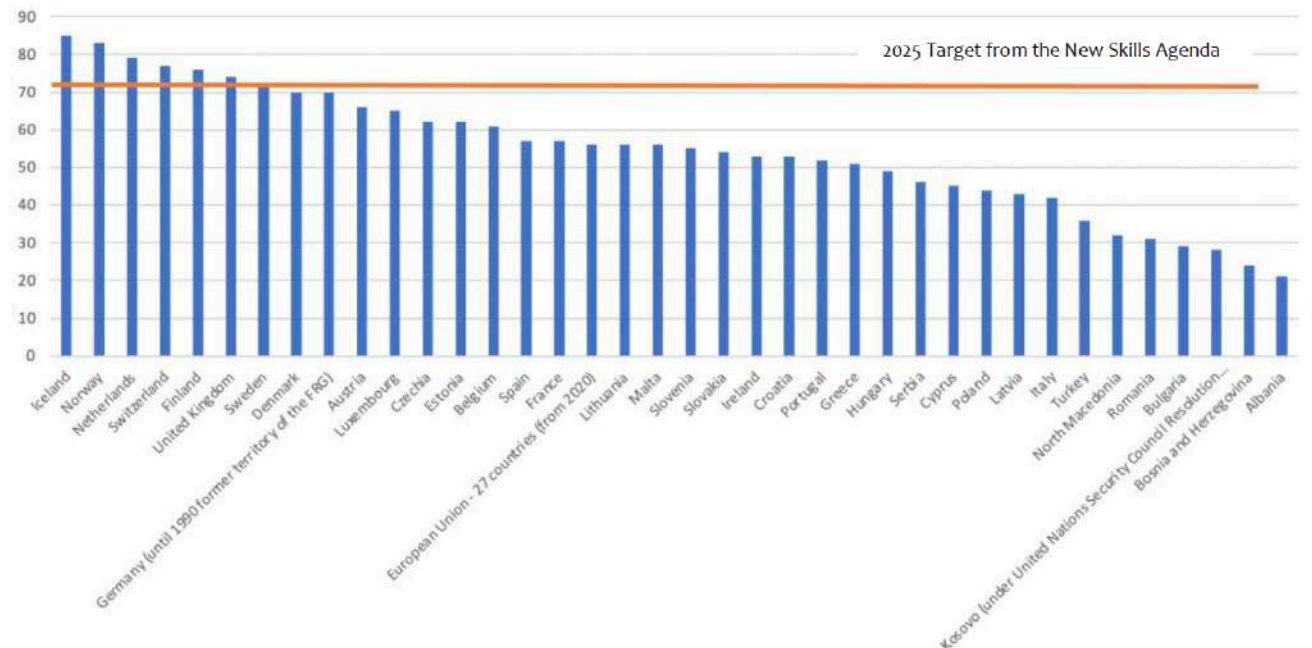
The critical skills to be developed should therefore be related to specific current and future in-demand occupations

Game changing technologies and innovative approaches to the identification of new skills

Main findings/2

- Skills related to specific current and future in-demand occupations, especially those linked to the **green and the digital transitions promoted by the EU's new growth strategy.**
- While digitalisation has intensified, and with it the needs for **digital skills**, individuals in many member states still do not possess **basic digital skills.**

Individuals who have basic or above basic overall digital skills (% , EU-27)



Source: Eurostat [isoc\_sk\_dskl\_i]

Game changing technologies and innovative approaches to the identification of new skills

Main findings/3

- Critical skills encompass **transversal skills**, strategic to ensuring the required adaptability and flexibility of workers throughout the changes in European economies and in the nature of jobs.
- Transversal skills are not only useful in people's professional lives, but also in their **personal development**.

Game changing technologies and innovative approaches to the identification of new skills

Main findings/4

More concretely, these **labour-market relevant skills should be identified at several levels**: through the European Skills Panorama and also through more local and industry-specific skills intelligence defined in cooperation between the relevant stakeholders.

At European level, this identification could be facilitated through the **Skills Pact** that notably builds on the Blueprints for Sectoral Cooperation on Skills.

**Companies have a crucial role to play in defining and expressing their current needs**, especially since workers may, and legitimately so, not be aware of these needs or have difficulties identifying them.

However, it would be of strategic importance **promoting the development not only of the skills defined and identified by companies in order to meet their short-term needs, but also of those skills that will be needed tomorrow and in the longer term.**

**The skills anticipation could also be carried out by public employment services as well as local and regional authorities** which will respectively ensure that the training is in line with territorial current and future demand on the labour market, as well as with a more coordinated national strategy.



Game changing technologies and innovative approaches to the identification of new skills

Main findings/5

**Qualitative foresights** require less formalised (data) inputs and are easier to set up initially. They do not require extensive data series or quantitative modelling of labour market relations.

Foresights depend on the inputs from key experts and stakeholders and on the way which they are combined in methodology.

Foresight is a visionary tool which provides incentives for participating stakeholders to come up with the future they want and commit themselves to the implementation of the vision.

**Foresight is a highly interactive tool of social dialogue with representatives of the private sector.**

Game changing technologies and innovative approaches to the identification of new skills

Main findings/6

**Quantitative skills forecasts** offer a consistent and detailed picture of future developments by sector, occupation, qualification or skills. They are more demanding in terms of the availability of adequate labour market data, both in quality and in the data series length. Building and interpreting quantitative models takes time and expertise, even if they are based on established principles. On the basis of the review international experience, a good way to carry out skills forecast is to **combining (modules generating) supply by qualification, demand by sector, occupation, and possibly skills or qualification .**

## Foresight methods

Game changing technologies and innovative approaches to the identification of new skills

### Main findings/7

Method	Type	Country examples*	Suitability for skill needs anticipation**	Usually used together with	Important features of method
Backcasting	Normative	–	+++	Literature and statistics review	Provides a clear path forward
Brainstorming	Supplementary	Japan, the US	++++	Expert panel, Delphi method	Can reveal unexpected developments
Cross-impact analysis	Exploratory	–	++	Literature and statistics review, Delphi method	Evaluates the probabilities of the occurrence of a set of events
Delphi method	Exploratory	Brazil, Germany, Finland, Japan, Korea	+++++	Literature and statistics review, brainstorming, scenarios	Good for spotting the unexpected, and for engagement of stakeholders
Expert panel	Exploratory	Brazil, Canada, Germany, Finland, Japan, Korea	+++++	Scenarios, brainstorming, SWOT analysis	Eliciting expert knowledge, helping to identify priorities
Focus group	Supplementary	–	++++	Scenarios	Improving or generating ideas
Horizon scanning	Exploratory	the UK	+++	Scenarios	Identifying future challenges and trends
Literature and statistics review	Supplementary	Korea	++++	Scenarios, backcasting, Delphi method	Evidence-based
Morphological analysis	Normative	–	++	Scenarios	Breaks down a system and identifies important factors
Scenarios	Exploratory	Brazil, Germany, Japan, Korea, the UK	+++++	Literature and statistics review, SWOT analysis, science and technology roadmapping	Good for spotting the unexpected, and for engagement of stakeholders
S&T roadmapping	Normative	Russia	+++	Scenarios, brainstorming, expert panel	Provides a clear path forward
SWOT analysis	Supplementary	–	++++	Scenarios, expert panel, Delphi method	Lists factors with impact on issue

Game changing technologies and innovative approaches to the identification of new skills

Main findings/8

## Working at sectoral level

A sectoral approach to such matters is defined as one which looks at changing skills needs from the perspective of a particular sector.

**Sector matters: to understand the key drivers of change in skills demand, it is critical to have a sectoral focus and perspective.** Sector lies at the heart of most approaches to skills anticipation and matching. Understanding technologies and markets at the detailed sectoral level, and involving representatives of employers and workers at that level, are crucial. **Different sectors have very different skills needs because of the different economic activities they pursue and the technologies associated with them. It is essential to have a sectoral focus and perspective as defined above.**

## Comparison of tools and techniques used in skills anticipation and matching/1

Game changing technologies and innovative approaches to the identification of new skills

Main findings/9

Approach	Advantages	Disadvantages	Use in sectoral context
<b>Primary data collection <sup>(a)</sup></b>			
Factual surveys directed at employers (or other groups such as households) containing questions about employment levels, pay, unfilled vacancies, for example	Direct 'user' or 'customer' involvement Focuses on how people behave, not what they say or perceive	Getting responses could be problematic Need large samples to get robust data, therefore may be expensive	Most useful for sectoral approaches if the surveys are economy-wide and allow a breakdown by sector. Then they can provide comparisons across sectors and also reveal which sectors may compete for people with the same qualifications
Surveys of opinion directed at employers (or other groups) containing questions about skill deficiencies and skill gaps, for example	Direct 'user' or 'customer' involvement	May be subjective and inconsistent May focus too much on the marginal and ephemeral The respondents may not necessarily be knowledgeable about future skills needs	Can be both economy-wide as well as sector-specific. The sector-specific surveys can focus on more sector-specific problems or even selected occupations in the sector. However they may lack information on the more general context
Interviews and related techniques	May be able to address problems and concerns more subtly and in greater depth	May be unrepresentative	Very useful for sectoral approach, especially to address 'key players' in the sector (main employers, main vocational institution).
Workshops	Useful mechanism for exchanging views	Can provide a partial view	At the sectoral level the participants, who use a common language and often share common interests, can be brought together relatively easily for workshops
Other informal contacts	Useful mechanism for exchanging views	May be anecdotal and not grounded in reality	Informal contacts and networking are an important background for sectoral platforms where information can be shared
<b>Analysis <sup>(b)</sup></b>			
General synthesis and critical assessment of available evidence			Necessary for any analyses. Useful for analyses of drivers of change in the sector – new trends in technology, trends in international business and the context in which the sector operates

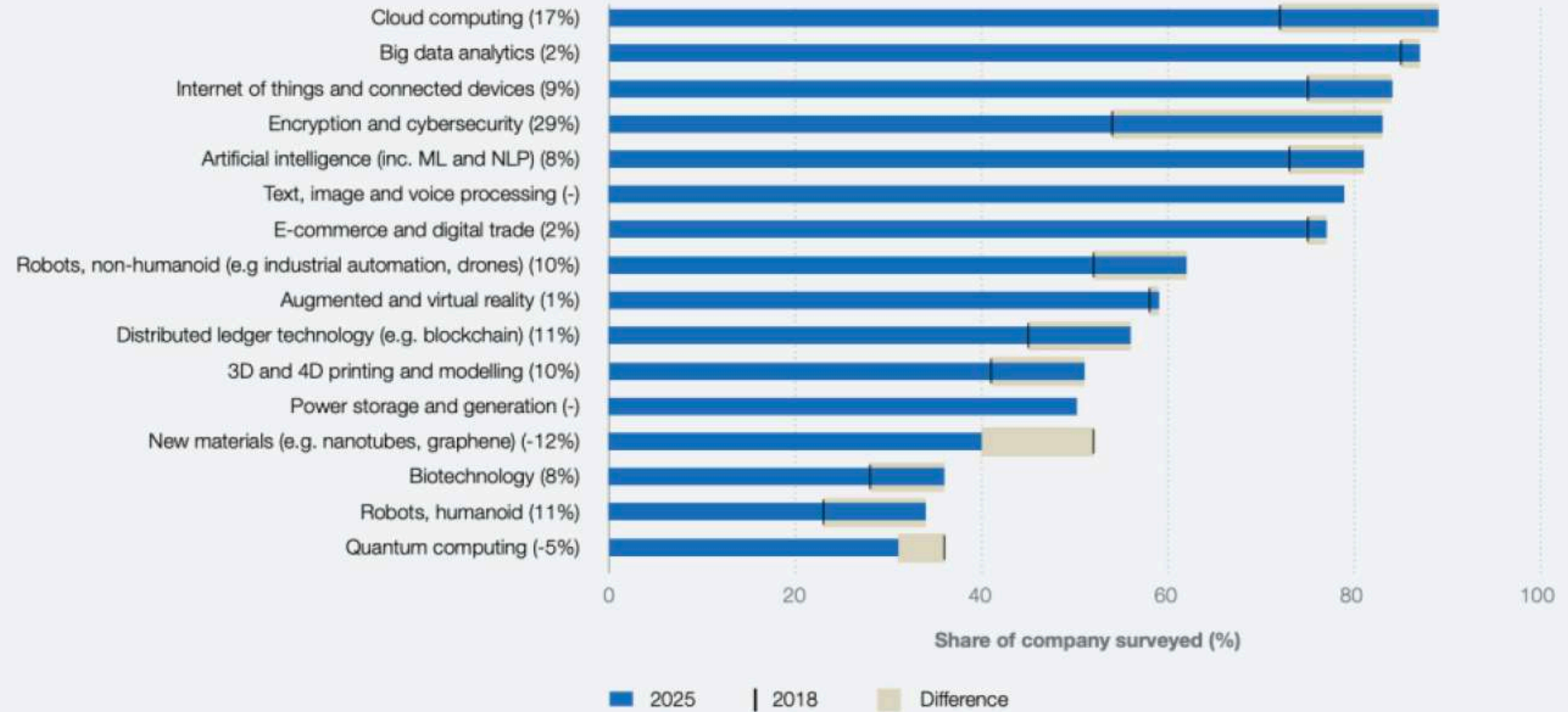
## Comparison of tools and techniques used in skills anticipation and matching/2

Game changing technologies and innovative approaches to the identification of new skills

Main findings/10

Approach	Advantages	Disadvantages	Use in sectoral context
Formal, national-level, projections based on a quantitative model Uses econometric techniques or computable general equilibrium (CGE) or similar models (9)	Comprehensive Consistent Transparent and explicit Quantitative	Data-hungry Costly Not everything is quantifiable May give false impression of precision	Studies for specific sectors can gain the information from the model if these provide sufficient sectoral breakdown. Information from sectors obtained by other methods can also inform the models
Partial projections based on quantitative models, for example focusing on individual sectors or occupations	Transparent and explicit Quantitative Targeted	Not everything is quantifiable May give false impression of precision Partial analysis may be biased	Sector-specific drivers of change or more appropriate detail of jobs classification may be captured better by these models, but the interference with other sectors is missing
<b>Other foresight methods (9)</b>			
Focus groups, round tables, Delphi-style methods	Holistic Direct 'user' or 'customer' involvement	Can be non-systematic Can be inconsistent Can be subjective	Often used at sectoral level, either in a situation where the data do not allow for quantitative modelling or to validate or interpret quantitative forecasts. Useful for identifying drivers, new trends in technologies and processes, emerging occupations or skills in the sector
Scenario development analysis, encompasses many different forms	Holistic Direct 'user' or 'customer' involvement Focuses on uncertainty	Can be non-systematic Can be inconsistent Can be subjective	Very often used at sectoral level as the sector can define a reasonable scope of the scenario. The sector may also determine which people and institutions are relevant to the scenario development process
Case studies of particular sectoral, occupation or regional groups and/or observatories (using both quantitative and qualitative evidence)	Holistic (for the sector) Strong on sectoral and other specifics	Partial Potentially biased Inconsistent across sectors	This group of methods includes use of different methods applied in the context of sectoral objectives. They may be purely sectoral or cross-sectoral, e.g. aimed at one occupation across sectors

## Technologies likely to be adopted by 2025 (by share of companies surveyed)



The technological adoption issue

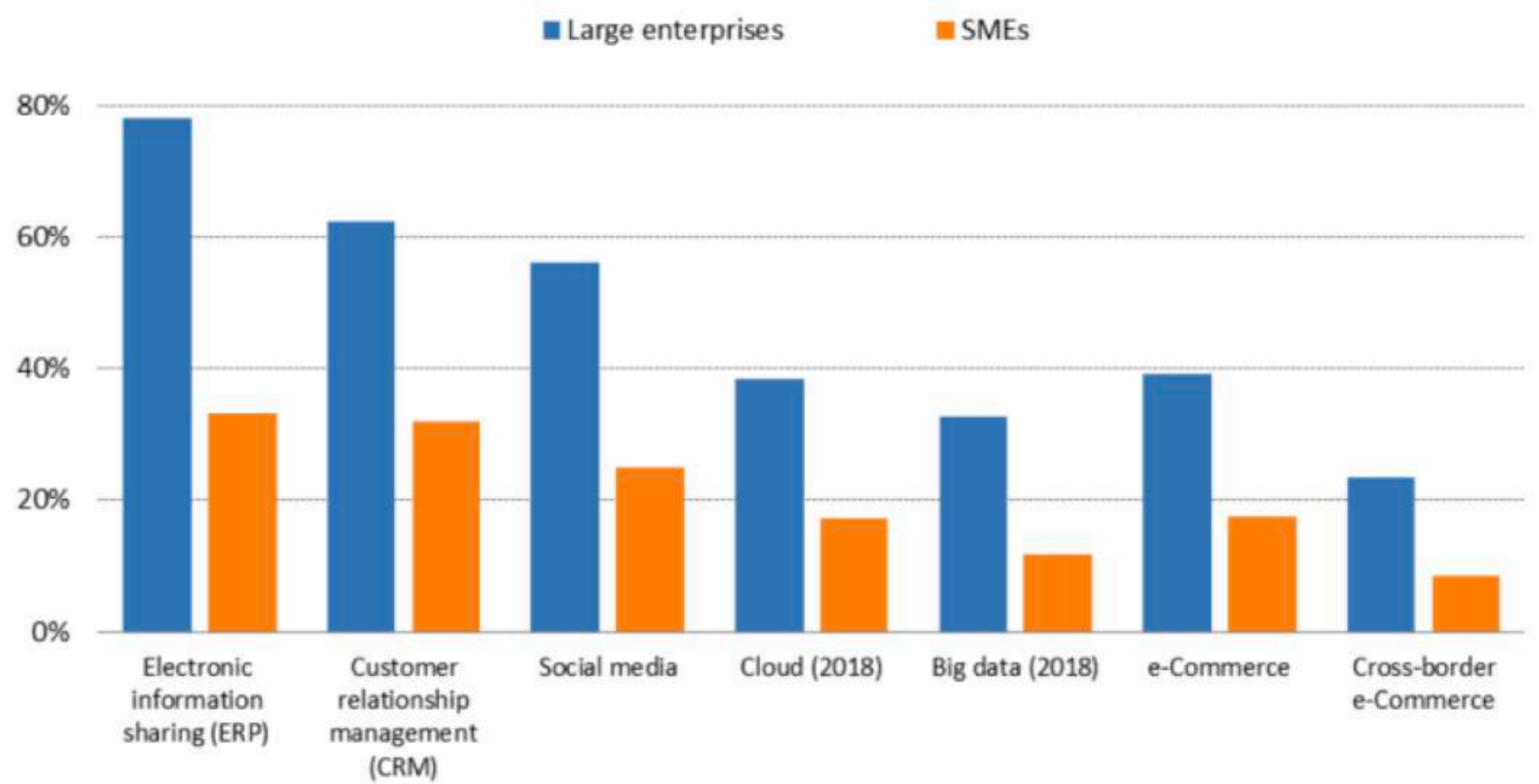
- Topic #2
- Main findings/11

## Digital Economy and Society Index (DESI) 2020, integration of digital technologies



Source: European Commission, DESI 2020





Source: Eurostat, Community survey on ICT usage and e-commerce in enterprises

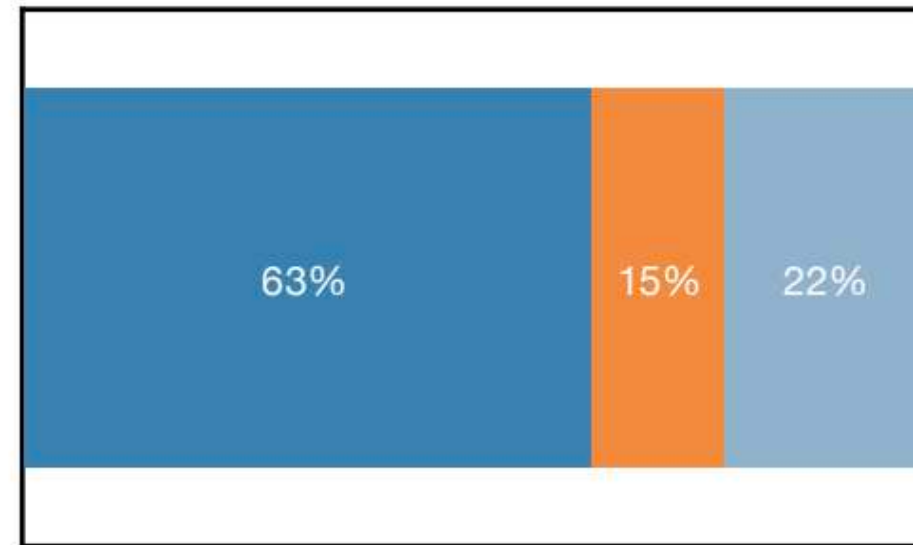
Adoption of digital technologies (%enterprises), 2019

# Presentation of national cases

Comprehensive overview based on desk research and online interviews

SWEDEN

## Qualification mismatch



■ Matched    ■ Overqualified    ■ Underqualified

OECD (2018), *Skills for Jobs*

## Presentation of national cases

Comprehensive overview based on desk research and online interviews

SWEDEN/2

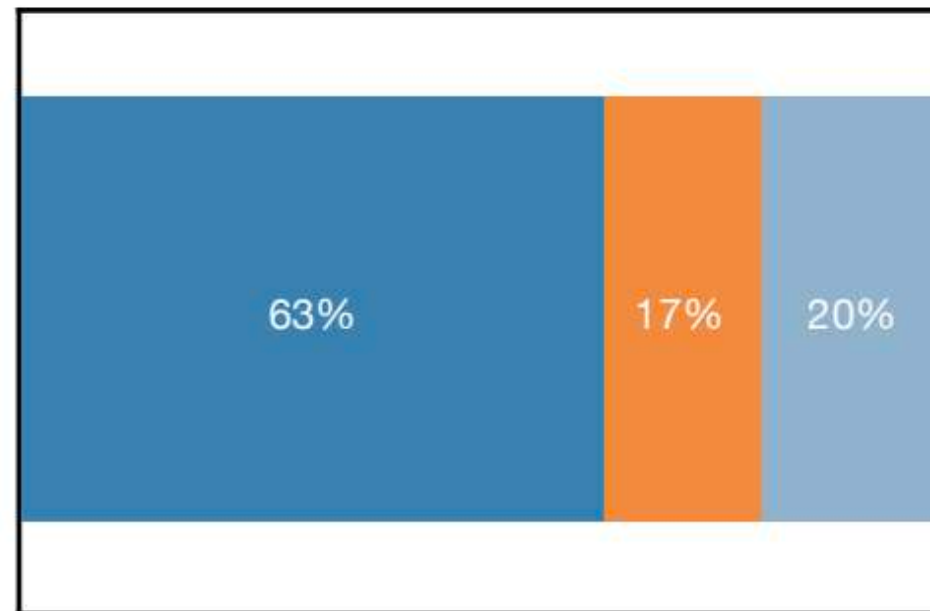
- Fully operational since 2017, the “**Matching Map**” (Matchningskartan) is a tool explicitly designed to address skill mismatch and consists of around 17500 combinations of 123 educational and 143 occupational groups, with detailed codes for the level of match for each combination.
- The codes show the match both in regard to level of education, field of education and future labour market demand.
- The extensive work that lies behind the Matching map is made in an attempt to develop the method for measuring skills match, taking it beyond direct comparisons between the classification of educations and the classification of occupations.. **The objective with the Matching map is therefore to provide policy makers, employers, labour market analysts etc. with better statistics on skills match, in relation to a wide range of policy areas.**

# Presentation of national cases

Comprehensive overview based on desk research and online interviews

GERMANY

## Qualification mismatch



■ Matched    ■ Overqualified    ■ Underqualified

OECD (2018), *Skills for Jobs*

## Presentation of national cases

Comprehensive overview based on desk research and online interviews

GERMANY/2

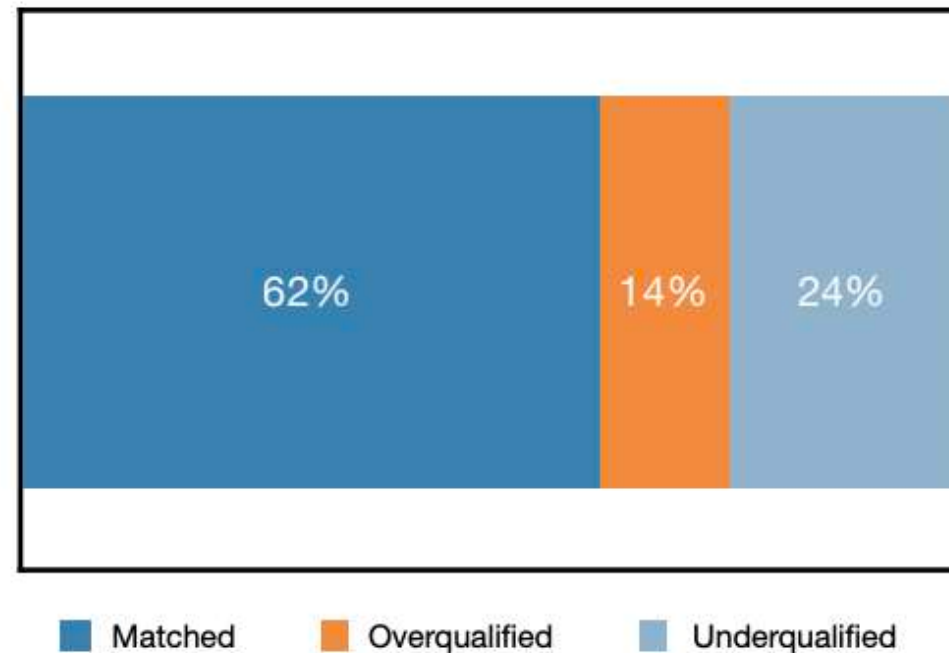
- **With specific reference to a tool explicitly designed to address skill mismatch, the “*Skilled workforce bottleneck monitor*” (Fachkräfte radar) should be mentioned. It is fully operational since 2012 and its goal is to enable different stakeholders (employers, employees, public stakeholders) to react to future skill mismatch.**
- The instrument provides information on which occupational groups are already affected by skill shortages and where bottlenecks are likely to occur. The results are broken down by province.
- Together with the Arbeitsmarktmonitor (Labour Market Monitor), it features various functions, e.g. regionalised data on industries and occupations, visualisations of regional structural data, an overview of labour market relevant networks throughout Germany, success stories and contacts with experts in various labour market issues. Skilled worker shortage indicators by occupation, age, or gender presented on the website are calculated twice per year.

# Presentation of national cases

Comprehensive overview based on desk research and online interviews

ESTONIA

## Qualification mismatch



OECD (2018), *Skills for Jobs*

## Presentation of national cases

Comprehensive overview based on desk research and online interviews

ESTONIA/2

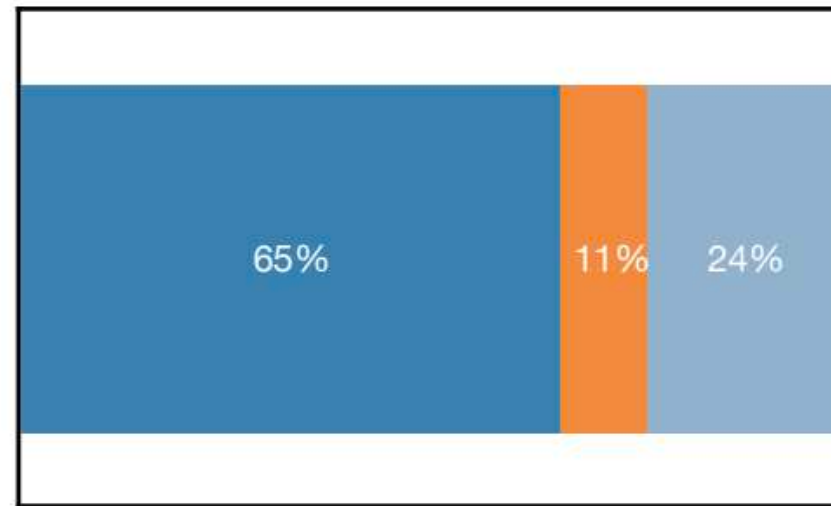
- **The general aim of OSKA is to teach and learn about the right skills relevant in the society. The OSKA system creates a cooperation platform, which enables the exchange of information between employers and training providers and educational institutions to comprehensively analyse the growth potential of different economic sectors and their needs, and to facilitate the planning of education provision at different levels of education and by types of school, as well as in the fields of retraining and in-service training.**
- The OSKA system is designed to analyse and forecast (over a 5-10 year horizon) the labour market needs, both quantitatively (how many employees are needed in key occupations sector-wise) and qualitatively (which are the expected competence profiles in key occupations), and to recommend necessary adjustments in the education and training offer.
- The programme is governed by the Coordination Committee. The members of this Committee are representatives of principal stakeholders.

# Presentation of national cases

Comprehensive overview based on desk research and online interviews

FRANCE

### Qualification mismatch



■ Matched   ■ Overqualified   ■ Underqualified

OECD (2018), *Skills for Jobs*



## Presentation of national cases

Comprehensive overview based on desk research and online interviews

FRANCE/2

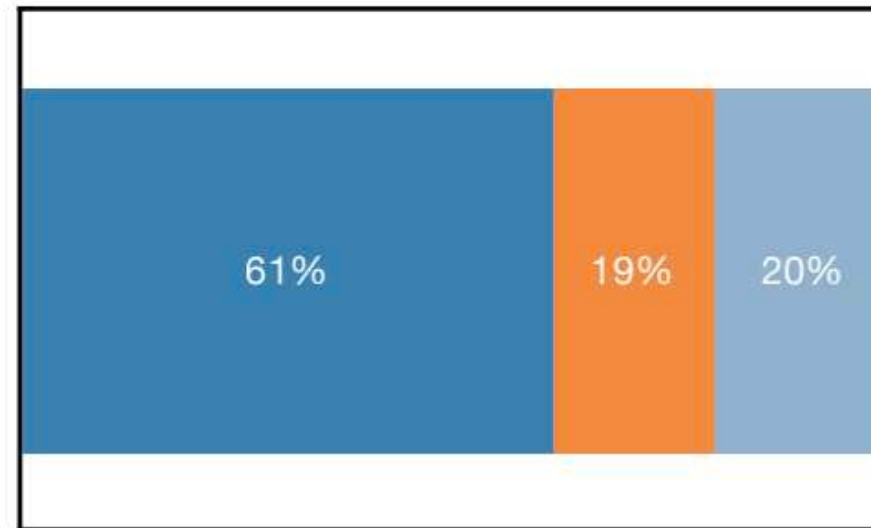
- **Recently France launched the “*Transitions collectives*” tool.** Since January 15, 2021, the so-called Transco system makes it possible to anticipate economic changes of companies by supporting volunteer employees towards a “*serene, prepared and assumed retraining*”.
- This new system aims to protect low-skilled employees whose jobs are threatened, by offering them certifying training for up to 24 months or validation of prior learning preparing them for promising jobs or jobs in sectors that are struggling to find their way.
- While retaining their remuneration and their employment contract, employees benefit from training funded by the State, with the aim of accessing a promising profession in the same territory (employment pool). This new tool foresees the active involvement of social partners: employers must engage in social dialogue to identify weakened jobs in the company and include them in a **GEPP-type agreement** (management of jobs and career paths).

# Presentation of national cases

Comprehensive overview based on desk research and online interviews

ITALY

## Qualification mismatch



■ Matched    ■ Overqualified    ■ Underqualified

OECD (2018), *Skills for Jobs*

## Presentation of national cases

Comprehensive overview based on desk research and online interviews

ITALY/2

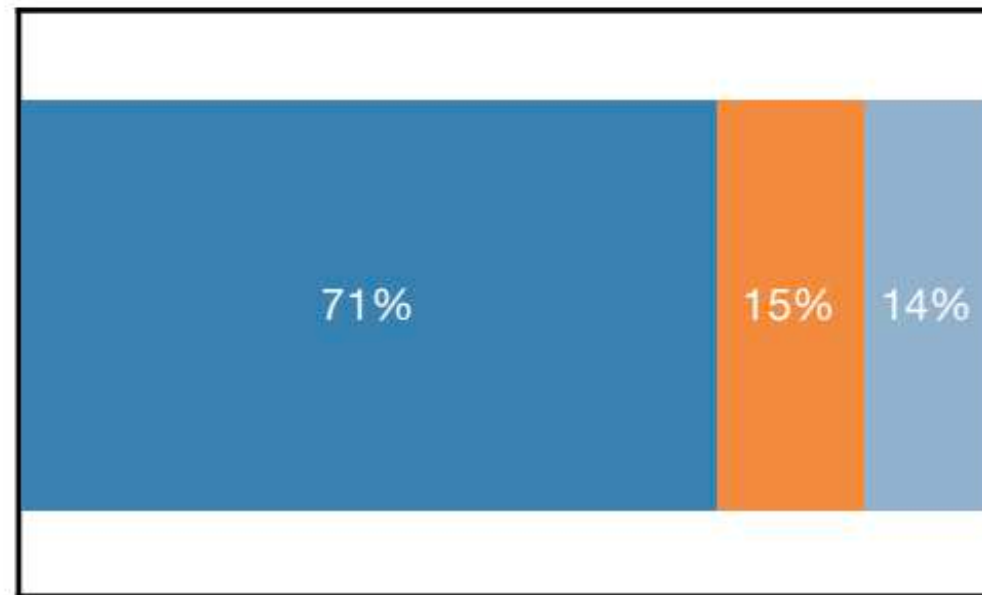
- The “**Permanent National Information System for occupational needs**” (Sistema nazionale permanente per i fabbisogni professionali (per le professioni) implemented by INAPP (National Institute for Public Policies Analysis, once ISFOL) and Istat (the National Institute for Statistics), **provides data and information about professions' contents, quantitative relevance-, short- and medium-term trends, characterising competences and vacancies. The available data and information are targeted to the general public, but also to policies' decision makers.**
- The system provides qualitative and quantitative information about economic trends, labour market forecasting and professional trends and provides information about the features of the so-called "professional unit" (unità professionali), professional needs, classified into professional units, linked to labour market trends; mid-term professional needs stimulated by new trends in sectoral economies, mid-term economic trends at the national level; economic trends at the local level; and employment forecasts for professional categories, both nationally and locally.
- The other involved stakeholders implement surveys, research, studies and analysis, which are integrated by INAPP within the Sistema Informativo sulle Professioni and made visible through its dedicated website. The stakeholders are: Istat (National Institute of Statistics); INPS (National Institute for Social Security); INAIL (National Institute for Safety at Work); Unioncamere (the national network of the Chambers of Commerce); the Ministry of Education, University and Scientific Research; the Ministry of Labour and Social Policies; and the association of temporary work agencies.

# Presentation of national cases

Comprehensive overview based on desk research and online interviews

ROMANIA

## Qualification mismatch



■ Matched    ■ Overqualified    ■ Underqualified

OECD (2018), *Skills for Jobs*

## Presentation of national cases

Comprehensive overview based on desk research and online interviews

ROMANIA/2

- The “**Partnership analysis and labour market forecasting system with continuing adaptation to economic dynamics**” since 2015 is used to better inform employers in the labour market and to assist in targeting the interventions of the National Agency for Employment. The aim is to respond to a growing need of updated information from employers, social partners and other stakeholders of the labour market, in order to improve access to labour market information, to deal with mismatches, as well as to enhance the capabilities of the National Agency for Employment to provide and elaborate labour market analyses and forecasts.
- The National Research Institute in the field of Labour and Social Protection of Romania (INCSMPS) has been the main partner that has designed the technical part of the instrument and supplied the methodology for the forecasting instrument, as well as performing regular updates upon request. However, monitoring, evaluation and maintenance are entirely the responsibility of the National Agency for Employment (NAE). The other stakeholders have been involved in the testing of the instrument, as well as in the validation of the data from forecasting

**What interviewees said -  
Insights from interviews and  
online survey**

Game changing technologies and  
innovative approaches to the  
identification of new skills



**To what extent do workers/people entering the labour market for the first time have these skills in your Country/Sector/Company? (i.e. Mismatches between the skills offered and those required on the National/Sectoral/Company level job market)**

*These skills are difficult to find.: 32/63*

*These skills are available, on average: 24/63*

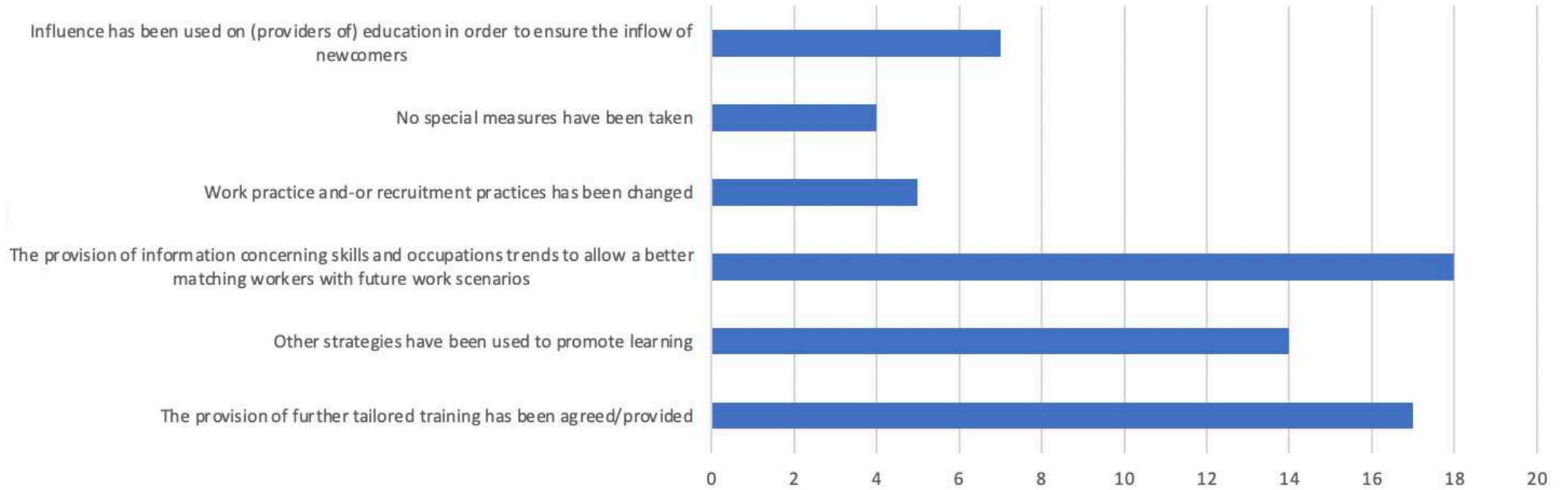
*I don't know: 4/63*

*These skills are fully available: 3/63*

**To what extent is workplace training important to develop such skills? 4,57/5**

**With reference to workplace training (as for respondents' knowledge)**

- there is a validation process (internal):30/64
- **there isn't a validation process: 21/64**
- there is a validation process (external validation solutions): 13/64

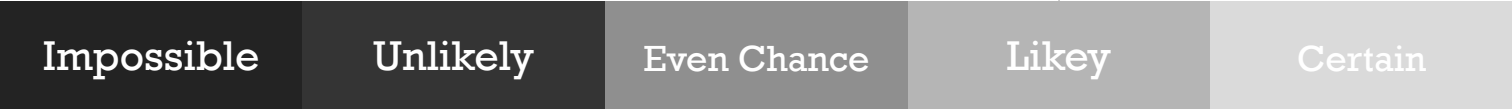


Measures undertaken to overcome skills imbalances

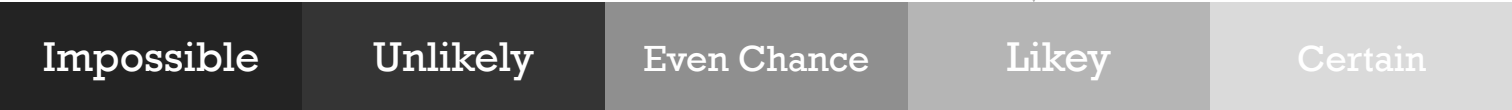
Game changing technologies and innovative approaches to the identification of new skills  
**Topic #2**

# Expected technological developments [5-10 years]

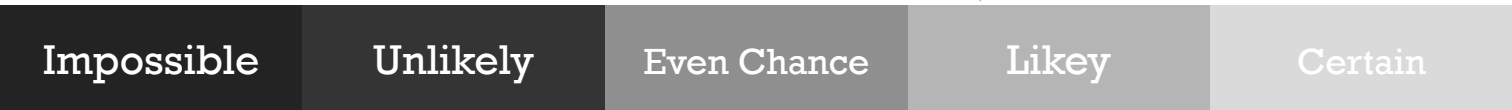
***Changes to the technologies used by workers (e.g. machinery, ICT systems)***



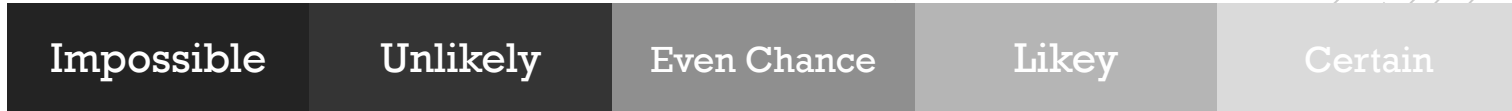
***Changes to working methods/practices***



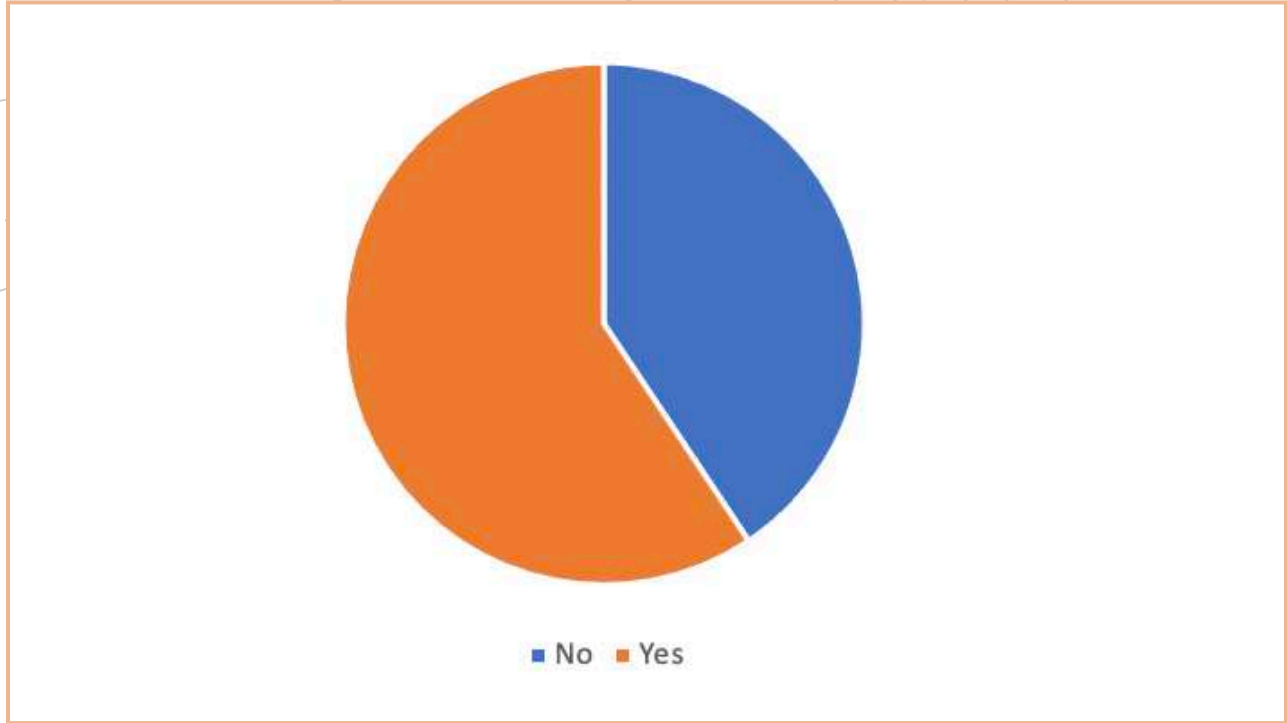
***Changes to the products/services produced/provided***



***Changes to the amount of contact workers have with clients or customers***



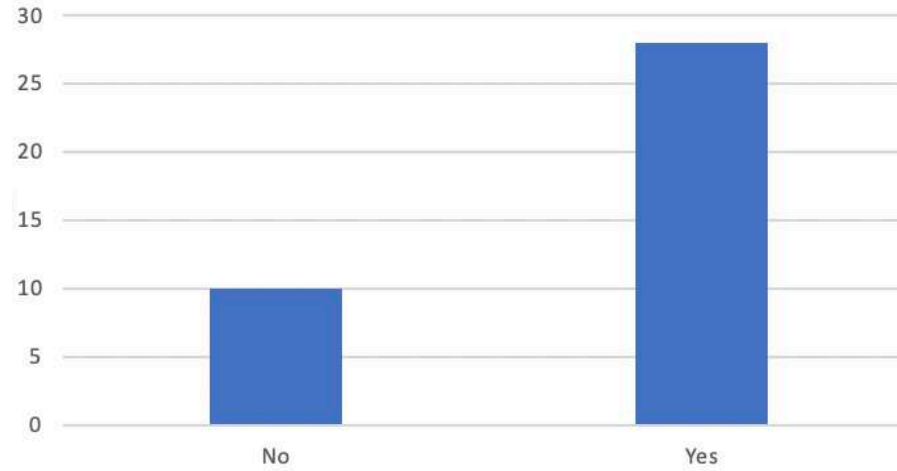




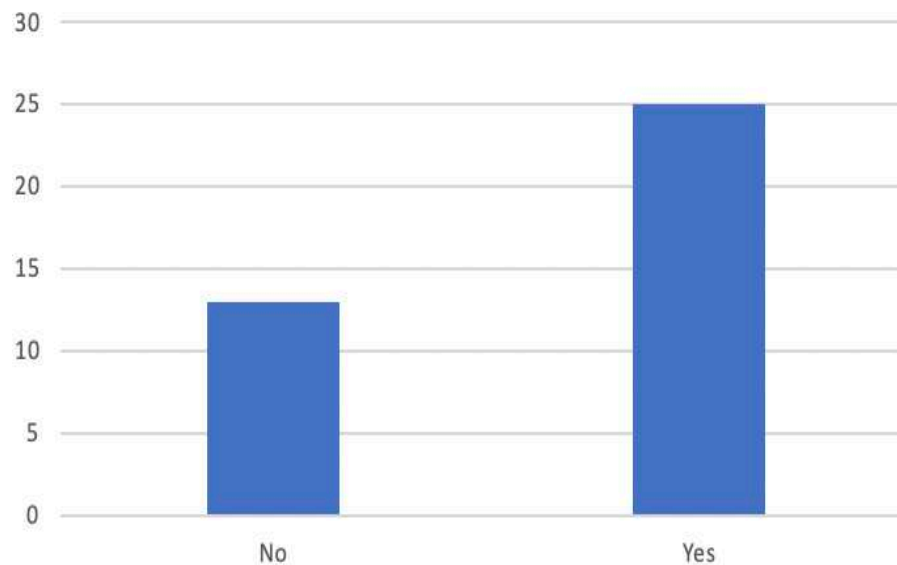
Identification of tasks and occupations highly subject to automation

Measures adopted to overcome the risk of tasks' automatability/1

### Training

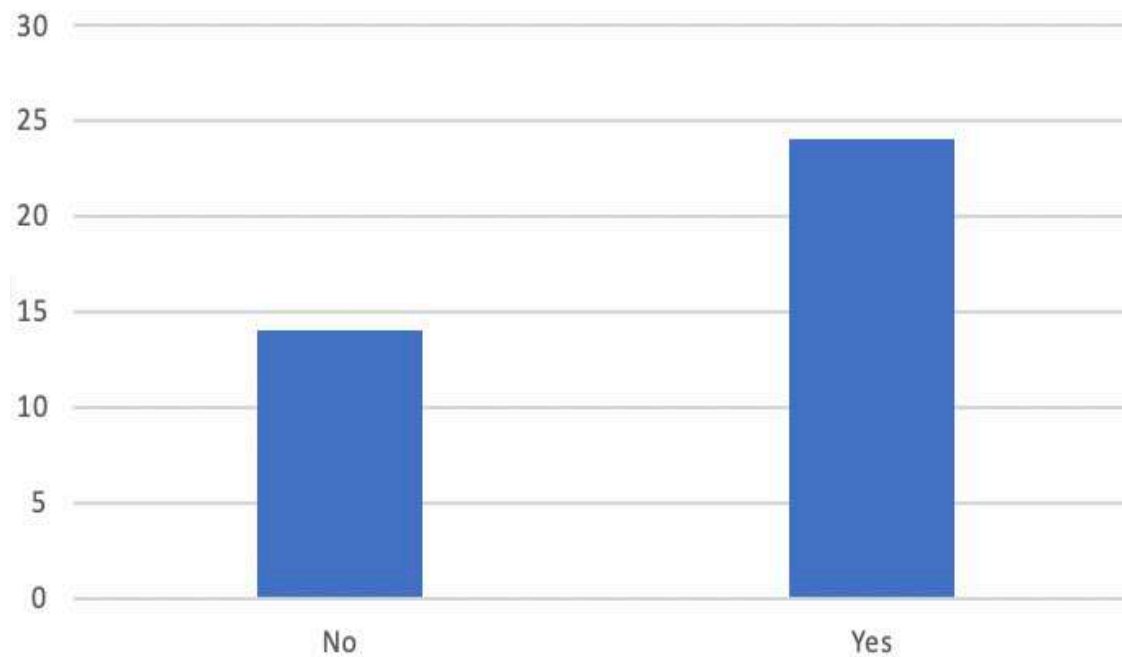


### *Specific support for employees to work alongside new technologies*



Measures adopted to overcome the risk of tasks' automatability/2

*Other types of internal or external employment transition support measures*



**Effectiveness of employment services (public and private) in fostering training opportunities to adapt to new and emerging skills needs, including skills for innovation**

2,79/5



Game changing technologies and innovative approaches to the identification of new skills

*“Currently we are waiting for a huge reform of the national system of public employment agencies. **We hope for a better engagement and involvement of private entities in the field in the coming years**”*  
[EMPL - SE]

*“**Employment agencies are the meeting points of education[system] and labour ministries.** They should communicate with both the channels, and unfortunately, in most of the countries it doesn’t happen. In this field, the **social partners play an interconnecting role**, because they have a concrete look at the labour force, and they know what the employers expect about skills. **Without the social partners and some NGOs, it is difficult for the labour agencies to fulfil their tasks**”* [TU - BG]

**Figure 5: Organizations' skills assessment and/or skills forecast/foresight exercise/s?**

	Nr. of feedback received	An Enterprise/ workers' representative	An Enterprise/ empl	An Employers' Organisation	A Trade Union
Yes	33	1	4	15	12
Don't know	18		3	5	8
No	13	1	1	5	6

Game changing technologies and innovative approaches to the identification of new skills

***“We regularly carry out skills foresight exercises (i.e. the last one supported by McKinsey), however technological changes are so fast that long term predictions could be inaccurate and already obsolete. In some industry branches, we run these exercises together with sectoral education providers, academies and relevant research institutions (i.e. building industry). ” [EMPL rep - AU]***

***“In Germany, a research institute at national level is in charge of carrying out analysis about future labour market prospects and skills forecast/foresight exercises. Social partners cooperate with the institute within a specific permanent committee and are involved in defining future occupations skills needs ” [TU rep - DE]***

***“In the Netherlands, with reference to skill foresight and forecast exercises **Social Economic Councils should be mentioned** (organizations where employers' organizations, trade unions and experts are involved) since it gives advises and recommendations to the government also on these topics ” [EMPL rep - NL]***

Game changing technologies and innovative approaches to the identification of new skills

*“Social partners are involved in the working groups to support the activity of the special department about labour market of the Ministry of Labour and Social Policy, **but they are not responsible to organize the research about skills, analysis and forecast**”*  
[TU rep - BG]

*“The most important tool for skills anticipation/forecasting is the **GPEC (gestion prévisionnelle des emplois et des compétences)** which is mandatory for big companies but can also be developed for small and medium size companies on a regional basis: **social partners should promote the shift towards a territorial dimensions and they can cooperate with observatories and bilateral/tripartite/quadripartite bodies at a local level to support these measures**”*. [TU rep - FR]

Thank you!

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