

Approaches to anticipating skills for the future of work

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Executive Summary

Persistent and costly imbalances between skills supply and demand are common in G20 economies

Rapidly evolving skill needs raise challenges for labour market and training policies in all G20 countries and are contributing to skill mismatch and shortages. Skill needs are changing as a result of the digital transformation, globalisation, climate mitigation and demographic changes. In most G20 economies, skill shortages coexist with large numbers of college graduates facing difficulties in finding job opportunities matching their qualifications.

Some degree of misalignment between the supply and demand for skills is inevitable, particularly in the short run and in the context of dynamic transformations. However, the costs of persistent mismatch and shortages are substantial in many G20 countries. Skill shortages can, for example, constrain the ability of firms to innovate and adopt new technologies while skills mismatch more generally reduces labour productivity. Individuals are also affected as skills mismatch can bring about a higher risk of unemployment, lower wages, lower job satisfaction and poorer career prospects.

Policy intervention to address skills imbalances relies on having good information on current and future skill needs

G20 countries take different approaches to develop qualitative and quantitative information on skill needs. Successful skill needs anticipation systems share a number of common features. They are clear about their principal objectives, whether these are to support policy formulation and contribute to strategic planning, or to provide data for better-informed career choices, or both. They are user oriented, stakeholder owned and well-coordinated.

Stakeholder engagement, notably through social dialogue, is key to ensuring that skills assessment and anticipation exercises provide information in a format and at a level that is consistent with policy objectives and which feeds into policy action.

The real challenge is turning qualitative and quantitative information on skill needs into effective policy action

Skill challenges are relevant to several policy domains, thus information on skill needs has the potential to inform various policy dimensions and contribute to developing a systematic and comprehensive policy response to imbalances. In employment policy, skill needs information is commonly used to update occupational standards and to design apprenticeships, re-training courses and on-the-job training programmes. In education policy, it is used to inform curriculum development and set the number of student places at all levels of education, including technical and vocational education and training (TVET) programmes. Skill needs information also feeds into career guidance to inform students' choice. In migration policy, this information is also used to update shortage lists and to identify fast track candidates for migration with skills that are in high demand.

The relevance to such a broad range of stakeholders calls for the results of skills assessment and anticipation exercises to be widely disseminated in order to maximise their impact on policy making. The challenge for those who lead the skills assessment and anticipation exercises is to make the results available in a useful and accessible form.

Engagement of all relevant parties and mechanisms that help reach consensus are instrumental to ensuring that the required policy responses to skills imbalances are put in place. A variety of

mechanisms have proven successful in helping to reach consensus, ranging from informal and ad-hoc consultations, to the setting up of independent bodies such as national skills advisory groups, to formal mandates to foster dialogue among stakeholders. Sectoral bodies provide the most favourable opportunities for both employer and trade union involvement in TVET and skills policy formulation and implementation.

A set of principles for effective skills assessment and anticipation systems

While most G20 economies already have skills assessment and anticipation systems in place or are in the process of setting one up, many struggle to use the information collected in policy making. The set of concrete actionable principles listed below build on inter-agency work (ILO et al., 2017) to survey countries about how they undertake skills assessment and anticipation. The purpose of these principles is to:

- Reaffirm the importance of high quality information on skills supply and demand, particularly in the context of changing skill needs brought about by megatrends such as technological change, demographic shifts and globalisation;
- Underscore the importance of stakeholders involvement;
- Identify actions that can foster the use of skills assessment and anticipation information at different levels of policy making;
- Ensure that the results of skills anticipation exercises can be accounted for in policies and programmes that foster inclusive growth and facilitate decent work.

Setting up effective skills assessment and anticipation systems

A. Identify clear objectives for skills assessment and anticipation systems

- Identify the final use of the information to be collected: policy formulation, strategic planning, career guidance
- Ensure all relevant stakeholders are involved in setting objectives
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B. Set up information systems that support these objectives

- Develop exercises that make the most of qualitative and quantitative information on skill needs
- Include sectoral and sub-national dimensions, particularly in countries with decentralised decision-making in key areas where skill needs information is used

B. Involve relevant stakeholders

- Cross-ministerial collaboration
- Social partners
- Sub-national and sectoral entities

C. Ensure effective use of the information collected through skills assessment and anticipation exercise

- Align the exercises outputs to policy needs – e.g. geographical level and coverage, occupational disaggregation and skills measurement
- Effective dissemination of the results of these exercises in an accessible and informative way
- Identify suitable co-ordination mechanisms to build consensus among stakeholders and use the stakeholders' involvement as channels for the dissemination and use of

results.

1. Introduction

New technological breakthroughs along with globalisation and large demographic shifts are likely to bring about substantial changes in the skills needed for countries, firms and individuals to prosper. The Argentinian presidency puts investment in training and skills for life and work at the top of its priorities and recognises its importance for preserving inclusiveness and preparing for change. The substantial advances that have been made recently in Artificial Intelligence (AI), robotics, the diffusion of digital technologies and the associated creation and destruction of jobs, are putting increasing pressure on the role of skill needs anticipation and forecasting. At the same time, the disruptive nature of these changes makes the task of predicting future skill needs evermore challenging. Skills supply is also evolving but takes time to adapt to emerging skill needs. The development of new training programmes, which are the main policy tools to respond to skill needs and emerging skill gaps, can take some time, particularly for programs at higher levels and of longer duration. In order to inform the education and training system far enough ahead, the systematic anticipation of skills needs is essential to enable strategic responses and prevent skill mismatch¹ (ILO, 2015; OECD, 2016).

This paper first discusses the importance of skill needs anticipation; it then looks at the qualitative and quantitative approaches across G20 countries and addresses cross-cutting issues such as labour market information (LMI) and social dialogue; and finally identifies policy principles to help implement a strategy to anticipate skill needs and use this information to better align training with the changes occurring in the world of work.

2. Why skill anticipation matters

To varying degrees, all G20 economies are experiencing gaps between the demand and supply of skills. A number of factors are influencing the global evolution of skills demand and supply, such as technology, demography, trade, climate change and work organisation. The extent and nature of change will not be the same across G20 economies, as these mega trends and local drivers of change will interact to affect local skill supply and demand in different ways.

Many issues contribute to skills imbalances. Skills supply and demand evolve at different paces. Fiscal and macroeconomic policies and credit and technology constraints can slow down demand-side changes in response to the availability of higher-level skills. The lead time for introducing changes to education and training curricula and the delivery of training may lead to individuals obtaining qualifications that are not well matched to the new skill needs of employers. Information asymmetries, limited geographical mobility, imperfect recruitment practices and barriers to training provision or participation may also generate skill mismatch. In periods of weak aggregate demand, job seekers may accept jobs for which they are over-skilled or over-qualified. In the opposite case, workers may be offered jobs for which they are under-skilled or under-qualified. Finally, skills mismatch may evolve among existing workers because of skills obsolescence, resulting for example, from the adoption of new technologies or changes in production processes. The skills of workers

¹ The term skills mismatch is somewhat misleading. It encompasses very different forms of imbalances between demand and supply, such as over/under-education (over/under-qualification, or vertical mismatch), over/under-skilling, mismatch by the field of study (horizontal mismatch), skill gaps and shortages, skill surpluses, and skill obsolesces (ILO, 2018 forthcoming).

may also erode if they suffer long-term unemployment and they are not able to use and maintain their skills.

A degree of “frictional” skill mismatch and skill shortages is to be expected in any dynamic economy. However, persistently high skill mismatch and skill shortages over the longer term can have adverse economic consequences for individuals, firms and the economy as a whole. At the individual level, skill mismatch has a negative impact on job satisfaction and wages (Montt, 2015; OECD, 2014; ILO, 2018 forthcoming). At the firm level, skill mismatch has been associated with lower productivity, and increased on-the-job search and turnover, while skill shortages have been shown to increase the cost of hiring and hinder the adoption of new technologies (OECD, 2012). At the macroeconomic level, mismatch increases structural unemployment or under-employment, reduces economic growth and has equally adverse effects on labour productivity (Sattinger, 1993; Adalet McGowan and Andrews, 2015; OECD, 2012; ILO, 2018 forthcoming).

Anticipating skill needs assists informed and strategic choices by policy makers as well as labour market participants, and improves the functioning of the labour market. Availability of skills and access to training relevant to labour market needs are important factors for enabling productivity, economic growth and social inclusiveness. The results of skills needs analysis and anticipation are used widely: by vocational guidance and career counselling; for budget allocations for education and training programmes; in the design of occupational and competency standards and training programmes; in informing human resource development decisions by enterprises; in targeting retraining programmes offered through employment services; in informing policy decisions on the encouragement of workforce migration; as a component of industrial, investment, trade, technology and environmental policies; as an input to national and sectoral employment and skills strategies; and as a mechanism for evaluating training programmes and measuring the impact of skills policies (ILO, 2015).

3. Skills anticipation and forecasting methods

3.1 Is there an ideal method?

There are a number of available skill needs assessment and anticipation tools and instruments that can steer skills development and matching policy more effectively (ILO et al., 2017; OECD, 2016). There are many approaches and methods developed to identify and analyse current and future skills needs. All methods have their own data and technical expertise requirements and are feasible to varying degrees, depending on the context (Table 1). Each method also has its own strengths and weaknesses (Table 1). Their use largely depends on the study objectives (qualitative or quantitative), level of analysis (national, sectoral or local), and availability of data and analytical capacities.

Table 1. Skills anticipation and forecasting methods, their requirements, advantages and disadvantages

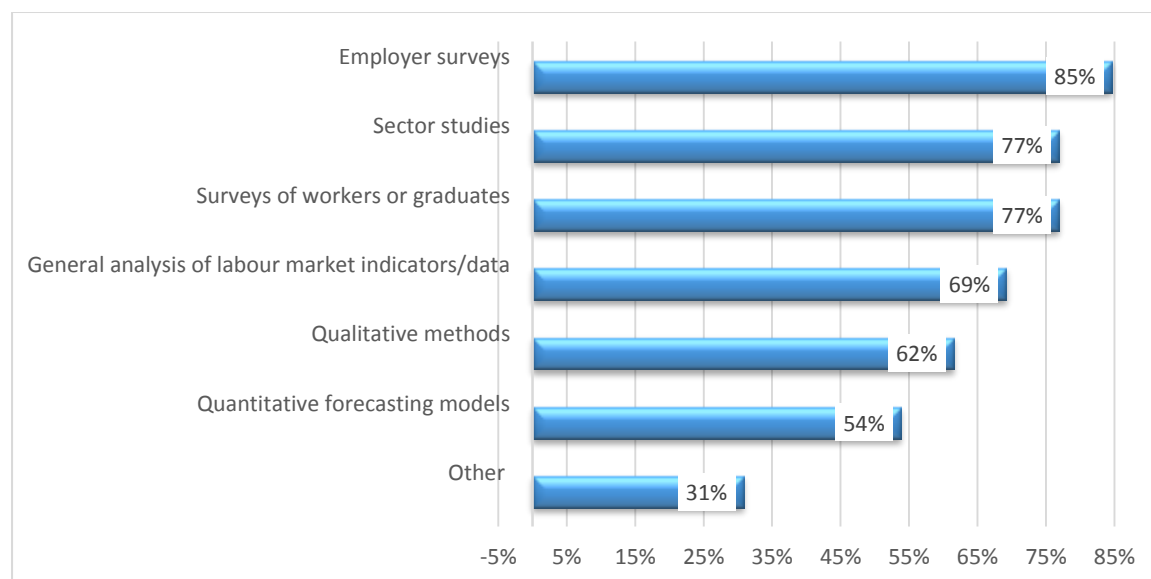
Instrument	Data Requirement	Technical Expertise	Advantages	Disadvantages
Focus groups, round tables, expert workshops, expert opinion surveys and Delphi style methods	<ul style="list-style-type: none"> No specific data requirements. 	<p>Technical expertise in qualitative methods is required:</p> <ul style="list-style-type: none"> Expertise in preparation of (structured) interviews, focus groups, Delphi methods, etc. Synthesizing qualitative outcomes often proves to be challenging in new contexts. 	<ul style="list-style-type: none"> Holistic. Direct user involvement. May be able to address problems in greater depth. Useful mechanisms for exchanging views. 	<ul style="list-style-type: none"> May be non-systematic. May be inconsistent. May be subjective. May be non-representative and provide a partial view. May be anecdotal, not grounded in reality.
Sector studies	<ul style="list-style-type: none"> Some data requirement (depending on methods used within sector). Sector based data from statistical surveys; employer-employee surveys, etc. 	<p>Technical expertise required:</p> <ul style="list-style-type: none"> Understanding sector based labour markets, occupations and skills requirements. Analysis of primary and secondary data. If primary data has to be collected: survey methodology skills 	<ul style="list-style-type: none"> Holistic (for the sector). Strong on sectoral specific, including detailed information on capabilities, competencies and skills. 	<ul style="list-style-type: none"> Partial (beyond sector). Potentially biased. May introduce inconsistency across sectors.
Employer-employee skills surveys; enterprise/ establishment skills surveys	<ul style="list-style-type: none"> A firm registry from which the sample frame will be formed. No further data needed for the primary data collection survey. 	<ul style="list-style-type: none"> Survey design and conduct (representativeness, weighting, questionnaire design, interviewer training). Analysis of survey outcomes. Methods to ensure representativeness. 	<ul style="list-style-type: none"> Direct user involvement. If the survey is factual, focuses on how people behave, not on what they perceive. In case of opinion surveys, allows direct skills measurement. 	<ul style="list-style-type: none"> Response rates are often too low Large samples are needed to get robust data, therefore may be expensive May be subjective and inconsistent
Quantitative forecasting models	<ul style="list-style-type: none"> Reliable and consistent time series on labour markets (sector, occupation, qualification) and population (age, gender, labour market participation) is necessary. 	<ul style="list-style-type: none"> Expertise in modelling. Statistical and programming experience. Several years of experience (with a new model) is required to produce sensible analyses. 	<ul style="list-style-type: none"> Comprehensive. Consistent. Transparent an explicit Measureable. 	<ul style="list-style-type: none"> Data hungry. Costly. Not everything is quantifiable. May give false impression of precision.
Foresights and	<ul style="list-style-type: none"> May use a number of input data 	<ul style="list-style-type: none"> Foresight sessions require 	<ul style="list-style-type: none"> Holistic. 	<ul style="list-style-type: none"> May be non-systematic.

scenario development	and reports, such as results of quantitative forecasts, labour market information, sector studies, but it is not compulsory.	<p>skilful moderators.</p> <ul style="list-style-type: none"> • Expertise in compiling diverse qualitative information into a report. • Expertise in engagement of all stakeholders. 	<ul style="list-style-type: none"> • Direct user involvement. • May be able to address problems in greater depth. • Useful mechanisms for exchanging views. • Takes into account uncertainties for the future. 	<ul style="list-style-type: none"> • May be inconsistent. • May be subjective.
Graduate surveys / Tracer studies	<ul style="list-style-type: none"> • Primary data collection. • Tracer studies require the contact details of recent graduates. • Additional administrative data from the education institutions can be used to enrich data. 	<ul style="list-style-type: none"> • Survey design and conduct; (representativeness, weighting, questionnaire design, interviewer training). • Analysis of survey outcomes • Methods to ensure representativeness. 	<ul style="list-style-type: none"> • May provide useful information for improving quality of training programmes. • Relatively low cost, easy execution. 	<ul style="list-style-type: none"> • Difficult to establish detailed information and contacts for forming a sample / population for the survey. • Confined to workers' early market experience and findings may be biased and subjective.
Vacancy surveys	<ul style="list-style-type: none"> • Primary data collection. • Vacancy surveys can either use existing administrative data or processes of PES, or they can be conducted as employer surveys. Using administrative data requires adequate processes ensuring consistency and representativeness of data. 	<ul style="list-style-type: none"> • Survey design and conduct (representativeness, weighting, questionnaire design, interviewer training). • Analysis of administrative data and survey outcomes. • Methods to ensure representativeness. 	<ul style="list-style-type: none"> • Direct user involvement. • Targets jobs actually available - demand proxy. • Objective. 	<ul style="list-style-type: none"> • Partial coverage, non-representative for all demand. • Short-term demand only. • Data processing takes time while part of vacancies may be already taken.

Source: Based on ILO et al. (2017) and the ILO training materials.

A recent stakeholders' survey implemented jointly by the ILO, OECD, Cedefop and ETF revealed that, though the countries surveyed use a wide range of methods for their skill needs assessments, countries tend to use more elaborate approaches or a combination of approaches. Some sort of employers' skills surveys, not necessarily systematic, were the most commonly used method across the G20 countries that took part in the survey, followed by sectoral analyses and surveys of workers and graduates. Quantitative forecasting models were also used by over half of the G20 countries (ILO et al. 2017). (see Figure 1).

Figure 1. Methods most in use in G20 countries



Note: The following G20 countries participated in the survey: Australia, Brazil, Canada, Germany, France, India, Indonesia, Italy, Japan, Republic of Korea, Turkey, UK, US.

Source: Joint OECD-ILO-Cedefop-ETF stakeholders' survey (ILO et al., 2017).

The disadvantages of each method are best compensated by combining different approaches, such as foresights and establishment surveys, or surveys and focus groups. The involvement of social partners along with relevant ministries is essential at all stages of data collection to ensure that the information collected is fit for purpose and in a format that suits the final users.

3.2 Quantitative forecasting methods by sector and occupation

Quantitative forecasting methods vary by the coverage of the exercise (e.g. national, regional or by sector/occupation), the frequency and the time span, and also by the type of modelling approach and related data requirements. Because of their complexity, these exercises tend to be carried out predominantly in high-income G20 countries. Some of the quantitative approaches can be simplified and combined with qualitative information to make implementation possible in emerging economies. These different options are discussed below.

The **coverage** of the forecasting exercise is often determined by its policy use. National-level exercises are useful for informing broad education and training policies, migration policies, as well as for monitoring the labour market more generally. On the other hand, regional and sector-specific exercises can facilitate more targeted policy making, since national-level assessments may overlook specific skill needs in a particular region or sector (Shah and Burke, 2005). National-level forecasting

or projection exercises exist in many countries, including Canada, Australia, the United Kingdom, Italy, France and the United States. Several countries also undertake forecasting exercises at the regional or sectoral level. However, data availability and the availability of skilled personnel sometimes hampers such exercises. For example, in Canada, the small population size of certain regions limits the capacity to anticipate skill needs in these sparsely populated areas.

Box 1. Quantitative occupational skills forecasts at various levels

- The **United States** Bureau of Labour Statistics carries out national-level occupational demand forecasts. Each region (state) also carries out their own, independent exercises to anticipate occupational demand within the state. The Projections Managing Partnership serves as the central hub for supporting and coordinating state and local employment projections.
- In **France**, a national forecast is carried out jointly by the Prime Minister's office and the Ministry of Labour (*Prospective des Métiers et des Qualifications*) while region-specific exercises are carried out by the regional development agency. The public employment service (*Pôle Emploi*) also provides projections at the national, regional and sector levels.
- In **Germany**, the long-term forecasts provide sector-specific results, yet sector-specific employer organisations also regularly carry out their own skills assessments. Germany has also recently begun forecasting at the regional level through the QuBE project.
- In **Europe**, since 2008 the Cedefop has produced regular pan-European forecasts of skills supply and demand available for the EU as a whole and each Member State. It uses the multi-sectoral macroeconomic model E3M3 to derive detailed projections of employment by sectors, occupational clusters and countries. The forecast uses data inputs from Eurostat as well as national data and other national information that may influence the pan-European result, such as policies and regulations.

Sources: OECD (2016), *Getting Skills Right: Assessing and Anticipating Changing Skill Needs*, Getting Skills Right, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264252073-en>.

While all forecasts are forward-looking, the **time span and frequency** of forecasting varies. Exercises to anticipate future skill needs can anticipate short (generally 6 months to 2 years), medium-term (2-5 years), or longer-term scenarios (5 years or more). Most forecasts cover a medium-term time span of 2-5 years, as with Australia's employment projections (5 years). Short-term anticipation exercises are less common, perhaps because they overlap in purpose with assessments of current skill needs. Nevertheless, the Italian Chamber of Commerce (*Unioncamere*) leads the Excelsior Project (*Progetto Excelsior*) which provides one-year employment forecasts by sector and occupation. Longer-term forecasting anticipates skill needs more than 5 years ahead of time. A time horizon of 5-10 years is generally perceived as ideal for longer-term forecasts, as beyond 10 years the assumptions are more likely to prove incorrect (Thomas, 2015). Both Canada and the United States carry out 10-year national-level forecasts.

Long-term forecasts are useful for medium-to longer-term planning, but they require a more sophisticated statistical infrastructure because they require longer time series data and micro-data sources, which may not be easy to implement in all countries or regions. Cedefop's E3M3 forecast

model for EU countries, for example, draws on employment trends by economic sectors, national accounts, and economic and demographic projections (Cedefop, 2008, 2012; Wilson, 2012). Long-term forecasts are also limited by the difficulty of estimating future skill demand, as the latter is sensitive to random shocks (e.g. unpredictable technological or economic changes (Wilson and Zukersteinova, 2011), which reduces the reliability of such exercises. The fear of inaccuracy of longer-term forecasts due to a lack of economic stability or disruptive nature of changes on the labour market can hinder the development and use of such exercises. While shorter-term forecasts may provide more accurate scenarios, their policy usefulness may be restricted to short-term skills policies (e.g. temporary migration, active labour market policies). In view of the limitations associated with each type of exercise, countries often have multiple types of exercises in place, with varying time spans. For example, Germany complements its long-term forecasts (BIBB-IAB-Qualification and Occupational Fields) with short-term forecast exercises that feed specifically into the planning of vacancies in apprenticeships. Korea carries out 1-year, 3-year, 5-year and 10-year forecasts that are aligned to national strategic development plans.

Short- and medium-term forecasts are generally carried out (or updated) on an annual basis, while longer-term forecasts are run less frequently. However, countries still update longer-term forecasts every couple of years in order to take into account new developments and ensure that forecasts draw upon the most up-to-date information and past and present trends (2). Maintaining a regular long-term national forecast exercise with results published every two or three years is generally viewed as best practice, since this ensures that major structural changes in the economy are captured in the time trends used in the model's estimation process, and that assumptions can be altered in the face of new economic or social developments (Thomas, 2015).

Box 2. Examples of regular longer-term forecast exercises

- In **Canada**, the Canadian Occupational Projection System (COPS) projections identify the potential level, composition and source of labour demand and labour supply in the future Canadian labour market, and highlight occupations where potential labour market imbalances may arise. Every two years Employment and Social Development Canada (ESDC) publishes detailed 10-year labour market forecasts at the national level. Projections are made for 140 occupations at the 3-digit National Occupational Classification (NOC) level. Both expansion demand and replacement demand (including retirements, deaths, voluntary quits and involuntary firings) are modelled to arrive at a predicted path of labour requirements for each occupation. The COPS model also estimates occupational supply by combining projections for immigrants, graduates, dropouts and re-entrants with forecasts for labour force participation rates. The model has large data requirements due to the detailed nature of the work.
- The **United States** Bureau of Labor Statistics (BLS) undertakes occupational forecasting every 2 years through the Employment Projections (EP) programme. The EP programme develops 10-year forecasts of industry and occupational employment, covering 334 occupational profiles which represent approximately 84% of available jobs in the United States. Unlike Canada's COPS, the BLS projections do not carry out supply side estimations, choosing instead to focus on demand side estimation. EP also assumes a labour market in equilibrium where total labour supply meets labour demand except for some frictional unemployment, so it is not possible to predict where future labour market imbalances may arise.

Source: (Thomas, J. (2015), "Review of Best Practices in Labour Market Forecasting with an Application to the Canadian Aboriginal Population." *Centre for the Study of Living Standards*).

Modelling approaches for quantitative forecasting can be produced using macro models that enable to calculate the effects of changes in key parameters and endogenous reactions based on economic theory or historic data estimates, for instance the German "Inforge" model or the European E3M3 model. The availability of such models and related techniques may be an issue for emerging economies. A simplified approach is the structural Hermin model developed by Bradley (2000). The Hermin model has proved its flexibility and applicability to many emerging economies lacking statistical data. The model has four main sectors (manufacturing, agriculture, market and non-market services) and covers both supply and demand side of the economy (Bakule and Kriechel et al., 2016). Computable General Equilibrium (CGE) models enable a deeper understanding of the underlying reasons behind the change in skills demand. Simpler models, such as input-output (IO) tables or social accounting matrices (SAMs), are also used in many developing countries and compensate for data unavailability and quality. The IO models are used to demonstrate how a change or shock on the demand side will influence the structure and volume of employment and skills demand (Bakule and Kriechel et al., 2016).

In addition, using qualitative inputs in quantitative forecasts can be a valuable approach for robust modelling to address data problems such as missing data, insufficient coverage and breaks in time series. An example is the E3M3 model for which qualitative inputs are used when the initial forecasts are shared with a group of national experts to provide their feedback. The experts may also bring information on likely future trends which the model was not able to produce. Another example can be provided on the Canadian COPS model which uses a number of different qualitative inputs in its different components. For instance, expert inputs are used in the vetting of projected trend in

expansion demand of the COPS model. In the US, the Bureau of Labour Statistics uses its occupations expert evaluations in individual occupations. Based on the experts' judgements, the occupation shares in sectors are adjusted for the further projection (Bakule and Kriechel et al., 2016).

3.3 Some examples of qualitative and combined approaches

Guidelines for developing skill assessment and anticipation systems recommend adopting a holistic approach to the measurement of current and future skill needs and advise the use of a combination of various methods to achieve robust and reliable results. It is generally viewed as best practice to use both quantitative and qualitative sources in a country's assessment of current and future skill needs (ILO, 2015; OECD, 2016a).

Foresight exercises are a type of qualitative approach which provides a framework for stakeholders to think in a collaborative way about future scenarios. Foresight involves stakeholders in setting priorities about skills-related issues in a structured and constructive way in order to develop a common policy vision. A key distinction between forecast and foresight exercises is that foresight exercises go beyond exploring future scenarios by promoting decision-making and mobilising action to shape the future and realise these scenarios.

In Brazil, for example, foresight is becoming part of strategic thinking. The Brazilian SENAI² foresight demonstrates good practice not only in dealing with the capacity and resource deficiencies but also in integrating sector foresights for technology, production organization, occupational and educational aspects under one institutional setting both at the regional as well as at the national level (see Box 3) (Bakule and Kriechel et al., 2016).

The Skills 2030 Foresight in the Russian Federation was developed under the Ministry of Education and Science Agency of Strategic Initiative and the Moscow School of Management Skolkovo. It produces skills foresights for sectors and takes a broader multidisciplinary and ecosystem approach to understand the future challenges to education. The key problem identified through this experience is lack of "translators" that could help connect strategic planning, technological development and human resource preparation in the industry domain (Bakule and Kriechel et al., 2016). The popularisation of the foresight exercises helps to develop the future thinking where participants create a shared vision and jointly plan the implementation of measures accordingly. (see Box 3).

Box 3. Examples of qualitative approaches at sectoral level

- **In Brazil**, SENAI's foresight model was initiated in 2001, and is a good example of an integrated approach to skills anticipation. The model develops sectoral prospects at national level. It captures industrial, technological and organizational change and the impacts on employment. The process is lead and managed by an executive group formed by SENAI technical experts, academia and business representative, who are both the producers and users of the results. The model coherently integrates activities focused systematically on two main questions: how many workers by occupation and industrial sector will be demanded in the near future? And what changes to the professional profile will be required in terms of knowledge, skills and abilities? It combines different foresight and forecast methods and approaches, both quantitative and qualitative, and produces information to feed into occupational analysis and subsequently into a thematic workshop, where the executive group discusses and analyses the outcomes. Recommendations produced for SENAI concern the provision of vocational training and of technical and

² SENAI is a Technical and Vocational Education Training Institution that provides vocational training and technological services for industry.

technological services for the sector in focus. The recommendations often include such measures as changes in curriculum design, provision of new courses, and up-skilling trainers.

- **In Russia**, the Skills 2030 Foresight was conducted for a number of high-tech sectors and technology-dependent industries where technology is the primary driver of change in skills demand. The foresight's main focus is to assess how key trends and new technologies change the nature of work tasks, and in turn how they change the demand for skills. The core of the exercise is a series of foresight sessions which focus on the collaborative design of the industry "map of future" through structured discussion. The foresight final results include new competency maps for the sector in focus and measured to close the skills gap.
- **The ILO's Skills for Trade and Economic Diversification (STED)** programme is a sector based approach developed to help developing countries and emerging economies to identify the skills development strategies required for future success in international trade. The approach is designed to support growth and decent employment creation in sectors that have the potential to increase exports and to contribute to economic diversification. The programme works with national and sectoral stakeholders in tradable sectors to understand the challenges facing the sector, and the contribution that skills development can make to address those challenges. It enhances coordination between trade, development and skills policies. STED approach takes a forward-looking perspective, analysing a sector's development and growth opportunities, and anticipating the skills implications of participating more effectively in international trade. Together with an analysis of current skills supply and demand, the approach generates an overview of existing and future skills gaps. In doing so, it combines an establishment survey, an expert workshop and other qualitative and quantitative approaches to skills analysis and anticipation.

Sources: Cedefop-ETF-ILO (2015); Gregg et al. (2012); ILO-WTO (2017)

Sector studies are another example of qualitative approaches to anticipating skill needs. Australia's Industry Skill Forecasts, for example, are qualitative snapshots of the current and future skill needs of a particular industry. They draw upon interviews or focus groups with experts and actors involved in developing and using skills in that sector. Ireland also carries out sector-specific foresight exercises using a similar approach.

Although adopting a holistic approach to assess skill needs is considered good practice, few countries combine quantitative and qualitative data sources in the same exercise. Korea does this, by relying on both quantitative (labour market information, employer and worker surveys), and qualitative (sector studies) data sources to develop their forecasts. Exercises in other countries draw on qualitative sources for validation, though not as an input in itself. For example, the Canadian Occupational Projection System (COPS) forecasts are primarily quantitative but rely on qualitative data sources as a second step to validate the quantitative forecasts. Germany's BIBB-IAB-Qualification and Occupational Fields long-term forecasts also use qualitative scenarios to contrast the baseline quantitative projections. The former Australian Workforce Productivity Agency (AWPA) used to conduct foresight exercises to gain insight into possible future scenarios around the demand and supply of skills which were then used to define forecast modelling exercises.

The ILO's STED programme, implemented since 2010 in a dozen countries, anticipates skills for sectors exposed to international trade by combining various qualitative and quantitative approaches: an employer survey, interviews with informants, expert workshops, analysis of labour market information etc. (Box 3). It aims to facilitate national and sectoral stakeholders in analysing their own skills needs, to develop their capacity to do so, and to support them in developing and implementing training measures and institutional arrangements (Gregg et al (2012), ILO-WTO (2017)). Other ILO tools include skills technology foresight, a practical guide to anticipating skills for

green jobs, and the inter-agency compendium of various approaches to anticipating and matching skills and jobs produced by the ETF, Cedefop and ILO. (Box 4).

Box 4. ILO tools for skills needs analysis and anticipation	
Skills for trade and economic diversification: A practical guide. ILO, 2012	Addresses anticipation of skills needs in promoting trade strategies and in exporting industries
Anticipating skill needs for green jobs: A practical guide. ILO, 2015a	Addresses approaches to analysing and anticipating skills needs for the green economy and sustainable development.
Guidelines for inclusion of skills aspects into employment-related analyses and policy formulation ILO, 2015b.	Addresses the analysis of skills barriers to employability and skills needs for employment, and how to integrate the analysis in the process of national employment policy formulation.
Skills technology foresight guide, MSM Skolkovo-ILO, 2016	Addresses a foresight approach to steer experts and practitioners in defining future technological change and related changes in work organisation, job tasks and skills needs.
Guide to anticipating and matching skills and jobs. Cedefop-ETF-ILO, 2015-2017	An inter-agency compendium of tools for guidance and assistance in designing methods, instruments and institutional solutions to meet the challenge of matching current and future skills and jobs.
➤ Volume 1: Using labour market information	Provides guidance on the principal types of data, data sources and indicators that can answer key policy questions related to overcoming or preventing skills mismatch.
➤ Volume 2: Developing skills foresights, scenarios and forecasts	Addresses quantitative and qualitative methods of anticipation and forecasting of future skills needs at a macroeconomic level.
➤ Volume 3: Working at sector level	Addresses methods, processes and institutional mechanisms of skills identification and anticipation at sectoral level.
➤ Volume 4: The role of employment service providers	Addresses the role of public employment services and private employment agencies in skills anticipation and matching, including the collection and use of relevant labour market information.
➤ Volume 5: Developing and running an establishment skills survey	Provides guidance on the implementation of surveys among employers (establishments) on skills shortages and gaps, recruitment difficulties and training measures.
➤ Volume 6: Carrying out tracer studies	Assists training providers and analysts in designing and implementing surveys among their graduates on their employability, how their skills are used, and how those skills relate to gaps on the labour market.

Source: ILO 2015; Cedefop-ETF-ILO Compendium of guides to anticipating and matching skills and jobs 2015-2017 at <http://www.ilo.org/skills/areas/skills-training-for-poverty-reduction/lang--en/index.htm>

3.4 Innovative approaches to skills anticipation

As the pace of technological innovation accelerates it makes the task to anticipate skills needs very challenging. On the one hand, skills analysts are expected to deliver timely information, but on the other, the robustness of data and quality of results should not be jeopardized. In addition, the costs of skills anticipation exercises remains a barrier to regular implementation. Big data and real time data may potentially be an answer to the time, quality and costs issues and some countries have

started to explore their use. The availability of big data and real time data enable larger sample sizes and higher frequencies compared to traditional surveys. Derived mainly from internet-based data sources and thus not requiring field data collection, the use of big-data analytics and of real-time information is becoming an important area of research and policy. Recent new developments in the field of machine learning and algorithms (text mining, web crawling etc.) have also enabled the collection, synthesis and analysis of a rich and ever growing set of data on skills needs that were previously more costly to collect. Big data analytics of vacancy data collected by online job advertisement portals have the potential to improve skills anticipation and matching capabilities in countries and enterprises and in future may become a game changer. This type of data can potentially enable countries to keep a pulse on emergent trends in demand for occupations and skills, as well as the changing composition of skills within an occupation (see Box 5).

Cedefop has started to develop a pan-European real-time job vacancy tool in 2017³ and initial results are expected to be released end of 2018 with an aim of releasing a fully-fledged and validated dataset for all EU Member States in 2020⁴.

Another example is Burning Glass Technologies (BGT) which analyses several millions of job postings in the US job market and offers crucial insights, including which jobs are most in demand, the specific skills need of employers, and the career directions that offer the highest potential for workers⁵. The company's artificial intelligence technology analyses millions of job postings to provide insights into labour market patterns and real-life career transitions. This real-time strategic intelligence also offers information on the transferability of skills between occupations for potential retraining measures offered through active labour market programmes and public employment services.

However, caution needs to be taken with the interpretation and use of big data and web vacancies as the sample may not be representative of the entire labour market. For instance, skills needs extracted from online vacancies are likely to suffer from substantial biases in terms of coverage of sectors, occupations and geographical coverage although this bias is likely to diminish in the future as Internet use increases. Skills requirements as stated in online job vacancies often reflect firms' effort to attract a desired set of skills among job applicants, rather than to genuinely reflect the required skills profiles in occupations. For instance, job-specific skills may be taken for granted and the emphasis put on transversal skills instead, potentially providing a biased view of the skills needed for the vacancy. Other limitations of these approaches include unstructured and imperfect information, measurement errors in terms of duplication or arising from a high turnover, privacy concerns and legal considerations, and the need for advanced data analytical skills to obtain and interpret the data (Kurekova, L.M. et al. (2015); Stephens-Dawidowitz, S. (2017); Deming, D and L. Kahn (2017)).

³ <http://www.cedefop.europa.eu/en/events-and-projects/projects/big-data-analysis-online-vacancies>

⁴ Cedefop *Big Data analysis from job vacancies project* (<http://www.cedefop.europa.eu/en/events-and-projects/projects/big-data-analysis-online-vacancies>)

⁵ <https://www.burning-glass.com/research/>

Box 5. Innovative approaches to skills anticipation

- In **Italy**, the CRISP research centre at the University of Milano-Bicocca has developed a web tool that extracts web vacancies from the largest Italian job-advertising portals. Once vacancies are collected, they are reclassified according to standard occupation and industry classifications to allow merging with statistical databases. Since the text of the vacancies can be generic, CRISP has developed software to identify keywords signalling the types of skills required by each vacancy, which allows for a comprehensive mapping of skill needs on the web.
- The **United Kingdom's** Migration Advisory Committee (MAC) recently introduced the use of online vacancy data into their assessment of which occupations are in shortage for the purposes of migration decisions. The MAC plans to use this data to “provide extra contextual data on the demand for an occupation and how it carries across the UK, across job titles within the occupation, and whether there are any specific skills that are particularly in demand within the occupation.”
- **Canada's** proposed FutureSkillsLab would act as a laboratory for skills development and measurement in Canada. One of the core functions of the FutureSkillsLab would be to suggest new sources of skills information, including using big data to extract information about emerging trends. Particular focus will be placed on building links between credentials and skills. This will add to an already advanced system of skill needs assessment and anticipation system (COPS) the results of which are used in several policy domains, notably the selection of occupations for the federal skilled work migration programme and the recognition of foreign qualifications.

Sources: OECD (2016) Getting Skills Right; Migration Advisory Committee (2017), “Assessing labour market shortages: A methodology update.” “Building a Highly Skilled and Resilient Canadian Workforce through the FutureSkillsLab,” Advisory Council on Economic Growth (February 2017).

4. From data collection and analysis to policy action: cross-cutting issues

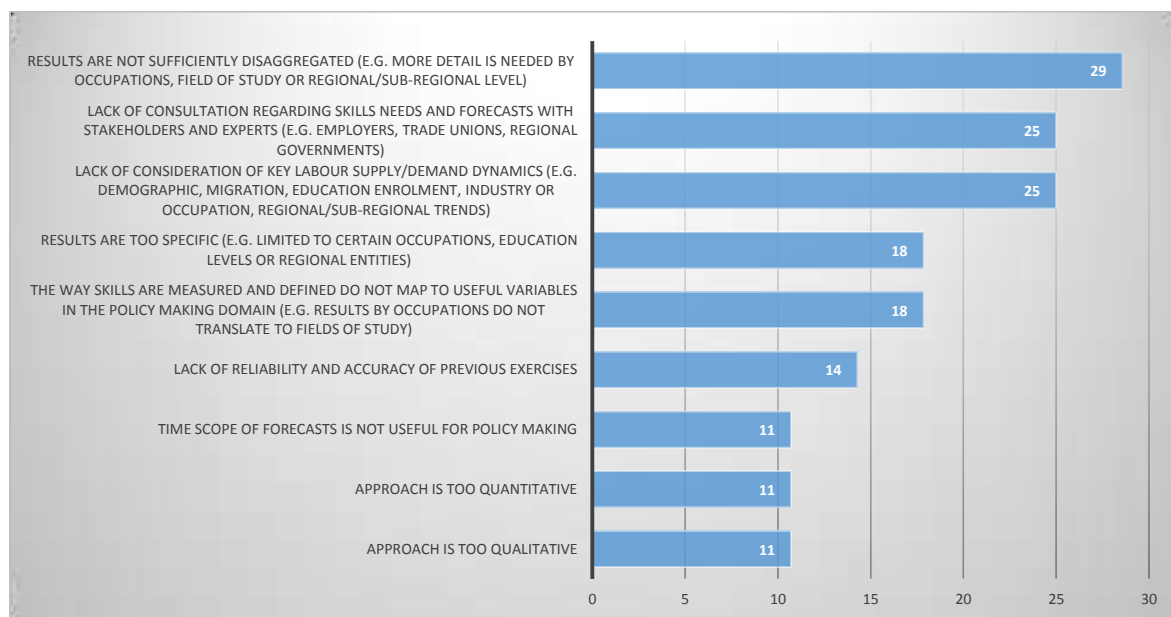
There are several pillars of well-functioning skills anticipation systems. Collecting and analyzing quality labour market information (LMI) on jobs and skills is one element. But it is crucial that this information is then used to inform policy making. The information produced by skills assessment and anticipation exercises is used in many areas of employment, education and training, and migration policy. Moreover, the information is not only used by government ministries, but also by the social partners. That said, there are significant barriers that hinder the full and effective use of information on skill needs for policy purposes. Some of these relate to methodological issues inherent to the exercises themselves, while others are concerned with a lack of stakeholder involvement, the absence of consensus around skills needs, poor dissemination to a wider audience and the scattered nature of the policy response.

4.1 Obstacles to translating information into policy action

The interagency survey on skill needs anticipation and assessment practices among ministries of labour and education, employers' associations and trade unions reported several obstacles to translating the information collected into policy action. The biggest common challenges in **the implementation** of skill needs assessments exercises seem to be the lack of stakeholders' coordination and the lack of capacity. Other obstacles include the perceived limited usefulness of results, the lack of funds and poor statistical base. The barriers that occur when **translating results of skill needs assessments into response measures** are: not enough detail for informed decisions;

lack of stakeholder consultations during the exercise; and lack of consideration of key labour market dynamics both at supply and demand side (Figure 2).

Figure 2. Barriers in translating skills needs information into policy and practice



Note: The following G20 countries participated in the survey: Australia, Brazil, Canada, Germany, France, India, Indonesia, Italy, Japan, Republic of Korea, Turkey, UK, US.

Source: Joint OECD-ILO-Cedefop-ETF stakeholders' survey (ILO et al., 2017).

In addition, the respondents to the survey reported the lack of effective **communication of results** of skill needs assessments to the stakeholders as a key barrier to their ability to influence stakeholders' decisions. Respondents pointed to the complexity of the information being shared with final users and the time lag between the production of results and their dissemination.. This points to the need of better presentation of skill needs information that is tailored to different users (ILO et al., 2017). These issues are considered further in section 4.2.

4.2 The need for labour market information

A reliable and regular skills assessment and anticipation requires reliable regular updating of key data sources (ILO et al., 2017). Good-quality data on the past is the key for building a trend and understanding the future. For instance, skill forecasting models require uninterrupted time series and regular data collection. All G20 countries use at least some basic form of LMI to inform education, training and labour market policies as ministries of labour, education, and social affairs, and other line ministries collect information in their policy domains. Statistical offices and PES contribute to labour market intelligence based on labour force surveys, household and census statistical surveys, and vacancy and job seeker data on the part of the PES. Sometimes this data can be enriched by qualitative information and appropriate administrative sources such as social insurance data, pension fund data, school enrolment and graduates (ILO et al., 2017).

The quality of LMI also depends on inter-institutional coordination, regular data collection, analytical processing of information and complementarity of different levels and types of information. The link to efficient PES and career guidance services increases chances for the use of results of skill anticipation activities.

While information on the supply and demand of skills is usually collected at national level through some form of LMI, the different methods, time frames and levels of disaggregation mean that data on various forms of skills imbalances are often not comparable. The OECD Skills for Jobs Database

produces and publishes skills imbalances information for a large number of countries, including many G20 countries (see Box 6). The database has several potential uses. At the national level, policy-makers can use the country-specific results from the OECD Skills for Jobs Database to design and implement policies that help align the demand for and supply of skills. The database can also be a useful tool for individuals wanting to re-skill or upskill. Finally, from an international perspective, the data can be used to compare the degree of imbalances in specific skills across countries and identify common determinants and policy challenges.

Box 6. The OECD Skills for Jobs Database

The OECD Skills for Jobs Database provides timely information about skills shortages and surpluses, as well as qualification and field-of-study mismatch, for Argentina, Australia, Brazil, Canada, Chile, Mexico, Peru, South Africa, Turkey the United States and all European countries.

The *Skill Needs indicators*, the indicators measuring skill shortage and surplus, are constructed on the basis of five sub-indices: wage growth, employment growth, hours worked growth, unemployment rate and under-qualification growth. These sub-indices are calculated at the occupational level, and are then compared to the economy-wide average. For example, when wages of science and engineering professionals grow faster than the average wage across occupations, this signals shortages, as employers raise wages to attract scarce talent. Similarly, when average hours worked in a given occupation grow faster than the country average, this signals that employers might be increasing the work intensity of their employees because of increased demand and the scarce availability of workers with the required skill level. By combining five sub-indices into one final indicator, the impact of confounding signals is minimised and the power of the final indicator amplified. The indicators of surplus and shortage at the occupational level are translated into skill needs by mapping the occupations in demand/surplus to their skill requirements. The final skill needs indicators provide information about the direction (surplus or shortage) and size of the need for a range of skills.

The *Mismatch indicators* compare each individual's qualification level and field-of-study to the level or field generally required in the occupation. The most commonly required qualification level in an occupation is defined as the qualification level that is most observed among people employed in that occupation. People can be over-qualified, when their qualification level exceeds the one that is usually required in their occupation, or under-qualified, when they possess a qualification below the most commonly observed level in their occupation. Field-of-study mismatch is defined in a normative way, attaching to each occupation the fields of study that best match the jobs in that occupation.

Source: OECD (2017), *Getting Skills Right: Skills for Jobs Indicators*, OECD Publishing, Paris.

4.3 Aligning the information collected to policy objectives

A common issue limiting the usefulness of skills assessment and anticipation exercises is that the resulting information does not always fully meet the requirements of policy makers. Results are not sufficiently disaggregated, such as when national-level results are not useful to make decisions at a local level; or when broad occupational categories do not provide evidence to make decisions about specific training programmes. Similarly, the way skills are measured and defined does not always easily map to concepts and variables in the policy-making sphere. For example, for education and training providers, information about trends for specific occupations may not translate directly into the specific skills and courses/fields-of-study to be promoted. In addition, labour supply/demand dynamics are often not sufficiently considered to give an adequate picture of present and future skill

needs. An example of this last point is from the United States, where there are currently good occupational forecasts translated to skill needs using occupational surveys like O*NET, but where there is insufficient consideration given to components of the skill supply (e.g. migration projections or projections of graduation by fields of study).

4.4 Disseminating results to wider audiences

The results from skills assessment and anticipation exercises are generally relevant to several audiences: policy makers, stakeholders, social partners, sectoral organisations, practitioners and the individuals themselves. The challenge for those who lead the skills assessment and anticipation exercises is to capitalise on this potential interest and make the results available in a useful and accessible form. In general, the stakeholders involved do share the results from skills assessment and anticipation exercises with the broader public, primarily by developing reports and websites. A majority ministries and social partners take advantage of public media (TV, radio, newspapers or magazines) to disseminate findings and analysis but rarely rely on social media to disseminate such information.

Despite these dissemination efforts, more remains to be done. There is a need for the developers of skills anticipation exercises to engage their audience more effectively. One way to do this is to recognise that the “wider audience” is a constellation of users, each valuing the information from skills assessment and anticipation exercises differently and each expecting it to serve different uses. Canada's Department of Employment and Social Development has centralised the dissemination of labour market information and skills assessments on a single platform (Job Bank). Job Bank provides an interactive experience for users, tailoring the information to users' interests. Additionally, through a modernised platform, the enhanced Job Match service for employers will strengthen the role that Job Bank plays in providing detailed and timely labour market information. Another successful Canadian initiative tailored to a particular audience has been the development of a seminar, the Skills Summit, specifically tailored to business, education, labour and policy leaders where the results of skills assessments are.

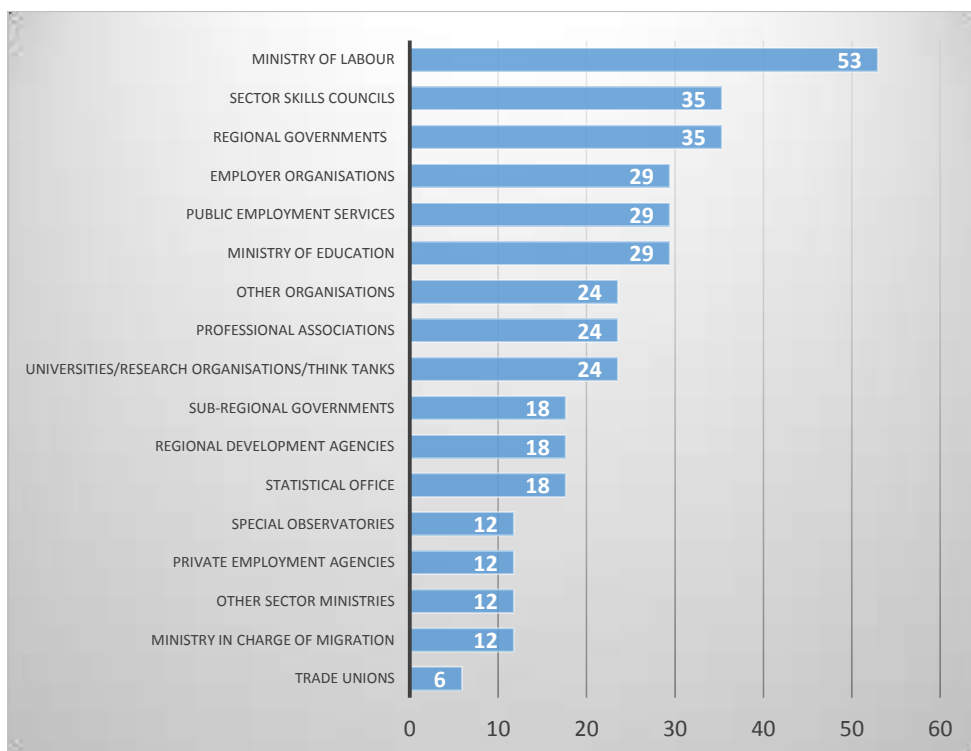
Beyond dissemination to broad audiences, the use of information from skills assessment and anticipation exercises in career guidance is inadequate. This is another major shortcoming which reduces the potential of these exercises to steer education and career choices towards skills and occupations in high demand.

4.5 Stakeholder involvement and co-ordination mechanisms

Collaboration among ministries and government agencies, social partners and other stakeholders directly and indirectly involved in policy making is a key to translating skill needs assessments into adequate policy responses. However, this collaboration brings with it significant challenges, notably the difficulty of coordinating contributions and the building of consensus when views differ.

According to the inter-agency stakeholders' survey, in G20 countries the ministries of labour, sectoral skills bodies and regional authorities generally take the lead in skills needs assessments and anticipation exercises most often (Figure 3). Other bodies include employer organizations, PES, ministries of education, professional organizations, universities and think tanks, sub-regional governments and statistical office.

Figure 3. Institutions taking the lead in skill needs assessments and anticipation



Note: The following G20 countries participated in the survey: Australia, Brazil, Canada, Germany, France, India, Indonesia, Italy, Japan, Republic of Korea, Turkey, UK, US.

Source: Joint OECD-ILO-Cedefop-ETF stakeholders' survey (ILO et al., 2017).

The mechanisms to facilitate inter-ministerial collaboration vary across countries and range from inter-ministerial skills committees to informal consultations. In Australia, collaboration is not systematic but occurs through informal meetings and on an ad hoc basis. For instance, the Department of Jobs and Small Business set up a Future of Work Taskforce in 2016 made up of champions across ministries who meet to build a knowledge base and to reach a consensus across government about the future of work. In Canada and the United States, discussions take place in the context of inter-ministerial skills committees (e.g. the Skills Working Group in the United States and the Economic Trends and Policies Committee and the Social Trends, Policies and Institutions Committee in Canada). In other countries, inter-ministerial collaboration takes place more indirectly through a third party who leads or coordinates the discussion around current or future skill needs, such as Turkey's Vocational Training Council and Italy's Higher Technical Institutes (*Istituti Tecnici Superiori*), or Germany's national skills advisory group (Box 7).

The inclusion of social partners in analysing skills needs, formulating or reviewing policy options is instrumental in including the full breadth of opinions (ILO et al., 2017). However, unfortunately, this does not appear to happen regularly in practice. As reported by the G20 countries' employer and worker organizations surveyed, their involvement both in the discussion on results and policy response formulation are rather limited – only a half of these countries involve these stakeholders in discussing the results and even a lesser number of countries consult them in formulating policy responses. The involvement of social partners happens mainly at national and sectoral level, whereas only a few countries have adequate size and resources to gather inputs at a sub-regional level (Box 6).

An ILO study (ILO, 2017) found that trade unions are involved in a range of bodies at the national and sector level including those that collect data and information on skills demand. The study

suggests that sectoral bodies, in their different manifestations, provide the most favourable opportunities for trade union involvement in TVET and skills policy formulation and implementation.

Most countries also involve regional players in the discussion about skill needs and the appropriate policy response. For example, in Canada, the Forum of Labour Market Ministers is chaired by the Minister of Education and Skills Development Canada (ESDC) and includes ministers from all provinces and territories. The Forum discusses the results of skill assessments and forecasts, among other related issues.

Box 70. Mechanisms for stakeholders co-ordination around skill needs assessments and anticipation

- **France's** *Réseau Emploi Compétences (REC)* aims to bring together different providers of skills needs exercises and decision makers from related fields. The objective of the REC is to create a dialogue between the different players at the national, regional and sectoral levels, in order to strengthen the diffusion of knowledge between the players and to reinforce cooperation through joint projects.
- In **Australia**, social partners lead skills anticipation exercises (Industry Skills Forecasts) and provide direct input for policy action.
- **Italy's** *Instituti Tecnici Superiori (ITS)* establish a systematic consultation with social partners and other stakeholders which is regulated and ensured by an inter-ministerial decree.
- **Japan's** Central Training Council articulates discussions about skills anticipation in the context of the training system across ministries, regional/sub-regional administrative levels and stakeholders.
- **Canada's** initially invited professional associations to discussions about the results of the Canadian Occupational Projection System (COPS) forecast, but given their low engagement, the invitation was discontinued. The agency leading COPS recognises the need to promote social partners' engagement and creates opportunities for interaction through workshops like the "Skills Summit." In response to the perplexities expressed by employers regarding the forecasts, the agency engages with stakeholders directly or in ad-hoc workshops to provide a better understanding of the forecasts and what they can and cannot do.

Source: OECD (2016), *Getting Skills Right: Assessing and Anticipating Changing Skill Needs*, Getting Skills Right, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264252073-en>

Notwithstanding the existence of these coordination mechanisms, it can sometimes still be difficult to reach consensus about what the skill needs are and what the appropriate policy response should be, given the diverse interests of stakeholders. Stakeholder involvement works best when high-level political engagement underpins the discussions (as in the United States), or when there is a national skills strategy to centre the discussion (as in the United Kingdom). Discussions about skill needs can also be facilitated by an independent and well-reputed organisation producing information on current and future skill needs. For instance, the Australian Work and Productivity Agency (AWPA) and the UK Commission for Education and Skills (UKCES) used to carry out independent assessments of skill needs in Australia and the UK, which assisted tri-partite discussions about skill issues. France envisages a similar role for the Réseau Emploi Compétences (REC), to bring together different providers of skills needs exercises and decision makers from related fields. The objective of the REC is precisely to create a dialogue between the different players at the national, regional and sectoral

level, to strengthen the diffusion of knowledge between the players, and to reinforce co-operation through joint projects.

Several countries have put effort into informing stakeholders about the data sources themselves, in order to facilitate discussions about skill needs. In Canada, and in response to the perplexities expressed by employers in response to official forecasts, the Department of Employment and Social Development (ESDC) has engaged with stakeholders directly or in ad-hoc workshops to provide a better understanding of the forecasts and what they can and cannot do. The Italian Institute of Statistics (ISTAT) and ISFOL has also recently put major efforts into developing an inter-institutional partnership with the intent of improving synergies across different data sources that, directly or indirectly, can provide key information about skill needs in Italy. This Sistema *Informativo sulle Professioni* (Information System on Occupations) aims to aggregate labour market intelligence from several institutions.

Finally, in some countries, formal mandates are issued through specific legislative acts to foster dialogue among stakeholders. In the United States, the Workforce Innovation and Opportunity Act (WIOA), signed in 2014, consolidates job training programmes into a single funding stream. Among other provisions, it promotes greater and better consultation among federal agencies, in particular the Department of Labor and the Department of Education, and requires collaboration between agencies at the state level through joint strategic planning efforts. Similarly, in Italy, legal norms which govern inter-ministerial agreements make provisions for the systematic consultation with stakeholders in the definition of skill needs and in the development of policies.

5. Policy conclusions

The experience of G20 countries suggests that, despite the large cross-country differences, successful skills needs anticipation systems tend to share a number of common features. They are clear about their principal objectives, whether these are to support policy formulation and contribute to strategic planning, or to provide data for better-informed career choices, or both. They are user oriented, stakeholder owned and well-coordinated. They effectively use institutional platforms for social dialogue on education and training at all levels, and they can rely on competent institutions and expert networks. Such systems enjoy good data coverage and complementarity of LMI. They produce skills needs assessments and anticipation for all relevant levels (macro, sector, subnational) in a coordinated and complementary way. Such systems are well linked to labour market institutions and counselling and guidance services. The results of skills anticipation activities help labour market participants to make informed choices about their career paths, help to formulate active labour market and skills development policies and contribute to the design and update competency standards and curricula.

Strong partnerships between government, employers and workers is an essential feature of the effective and enduring bond between the world of learning and the world of work (ILO, 2011). Sectoral approaches and tripartite sector skills bodies in particular are important mechanisms to match sector demand for skills training provision, anticipate future labour market and skill needs, and assess the quality and relevance of training programmes.

At the same time, skills assessment and anticipation is a process in which continuous, gradual improvement is needed (ILO et al., 2017; OECD, 2016). This improvement should not only be in the underlying data or the methodology to provide evidence, but should also include collaboration in analysing and discussing the results, as well as in improving the process of policy formulation and implementation based on the evidence. (ILO et al., 2017; OECD, 2016)

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