

Labour Market Anticipation: Lessons from around the world

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1. Executive Summary

Anticipating change in the labour market is a key feature of policy in most modern economies. This paper aims to inform UK policy makers about good practice worldwide, drawing on a range of evidence focussing on four key countries. It concludes by highlighting important lessons from each country and how the UK can learn from these.

The analysis largely draws upon four separately prepared country case studies for: the Czech Republic, Germany, the Netherlands and the USA. These have been prepared primarily by local experts.

For each case study we provide:

- A summary of relevant research work and evidence, focusing on anticipation of changes in the labour market and how this information is converted into useful labour market information and intelligence (LMII), and is used to provide career advice and guidance (CAG);
- An assessment of the value of such investments;
- Key lessons that the UK can learn from each case study.

Several common themes emerge from the case studies, chiefly that the rationale for skills forecasting has shifted from detailed top-down planning of the labour force to informing labour market actors on changes to the labour market. Investment in high quality data and forecasting capability are imperative to achieve this objective. As such, there is an emphasis on the importance of long term funding to develop research capacity. There is also a requirement for detailed occupational definitions, helped by the engagement of employers and other key stakeholders. These capabilities are highly valued in their respective countries as mechanisms to address skills mismatches.

A summary of key findings and lessons for each of the case studies are below:

The Czech Republic

Approach:

- Labour market research in the Czech Republic is led by four distinct and independent research institutions, focused on basic as well as applied research, that provide tools including job vacancy monitoring and a career guidance information portal. From 2017 a national system of labour market projections is to be developed, interlinking national and regional level, to provide practical information for decision makers and other users.

Lessons:

- The vacancy monitoring tool demonstrates the potential of 'big data', as modest upfront costs have provided a system that rapidly acquires a broad view of skills demand across the economy. However, the value of the exercise is dependent on the co-operation of data providers and system users, which is critical to the quality and reliability of the results.

Germany

Approach:

- The production of useful LMII is conducted by multiple actors, where ministries and private institutions carry out their own forecasting. Sector-specific and skills-level specific forecasts are carried out on behalf of national and sub-national authorities.
- There are two key long-term projects (QuBe - Qualifikation und Beruf in der Zukunft – Qualifications and Occupations in the future, and Arbeitsmarkt 2030 – The German

labour market in the year 2030), however, the coordinated use of their information across institutions is not yet well established.

Lessons:

- Forecasting can be used to evaluate potential policy; however, the generation of large amounts of information can overwhelm both political and economic actors, as well as other labour market participants, leading to a lack of focus. This can allow political interest groups to 'cherry pick' the instrument that backs their specific political opinions.

The Netherlands

Approach:

- The main institute responsible for labour market research is the Research Centre for Education and the Labour Market, which has a specific focus three major projects: monitoring school leavers through tracer studies; developing sectoral research; and producing regular skills forecasts.
- Surveys among different groups of schools have been integrated into a single School-leavers Information System that serves to monitor the transition between education and work.

Lessons:

- Combining mixed methods analysis of several topics on skills, qualification and occupations within a single independent institute has proven successful in nurturing the build-up of organisational knowledge within that institute and in facilitating cooperation among professional stakeholders in hiring and training policies.

The United States of America

Approach:

- The USA's approach to anticipate changes in the labour market and use this information to inform all labour market participants is based on three key pillars: a general Occupational Employment Statistics Survey, models and systems for projecting labour market changes and O*NET, a system for identifying specific skill requirements within occupations.

Lessons:

- The US example shows the general benefits of investing substantially and systematically over an extended period of time in data generation, standard systems of occupational classification, as well as other models, methods and systems. It highlights the centrality of a detailed occupational analysis and the need for both quantitative and qualitative methods to project occupational employment trends.
- In order to forecast changes of occupational patterns within sectors, there is need to invest in deploying specialist analysts, concentrating on examining data for each sector combined further with multi-sectoral macroeconomic approach to take account of changing economic forces.

We conclude by discussing how the UK may begin to mirror some of the systems in place elsewhere that have yielded important labour market and economic outcomes through the generation of LMII and robust CAG.

2. Overview

2.1 Introduction

In most developed economies, regular and comprehensive skills forecasts are now a common feature of systems designed to inform labour market participants about trends and developments they are likely to face. While it is recognised that no-one can predict the future with certainty or precision, it is accepted by governments across the world that they can help their citizens by investing in high quality labour market information and intelligence (LMII). We can prepare for the future by trying to understand how the world is changing and what this may mean for the demand for and supply of skills. The preparation of an authoritative set of quantitative skill projections on a regular basis is regarded as a cornerstone of such activity.

The pioneers in this area, such as the US Bureau of Labour Statistics, started off with the idea that they could use such projections to plan education and training systems in some detail. However, the idea of “mechanistic manpower planning” from the top down has been superseded by the idea of try to inform all labour market participants (including education and training providers) about the current situation and possible future developments, leaving it to them, and to individuals having to make career choices, to make their own decisions.

Simply assuming employment structure will not change will not provide labour market participants with a reliable picture of prospects in the future. Many economic and labour market trends are quite robust and seem likely to persist for some time to come. For example, while many uncertainties remain, it is clear that the demand for farm labourers, coal pit workers, many routine, assembly and machine minding jobs, as well as (increasingly) many white-collar, clerical and related jobs, are a thing of the past. Many new jobs are emerging to take their place, mainly focussed on service activities of various kinds, especially in areas that are not easily automated. While predicting these changes precisely and in detail is an impossible task the production of a systematic set of forecast based on transparent assumptions provides a key benchmark for debate and decision making. Systematic analysis and modelling of the economy and the labour market can help us to understand the jobs at risk and the new areas of opportunity, as well as the kinds of skills and characteristics people will need to undertake them.

The various systems developed in the 4 countries in this case study (the Czech Republic; Germany; the Netherlands and the USA) are all grappling with these problems. Similar stories could be written for many other countries, both in the developed and developing world.

Although in a few cases there is still an element of top down planning involved in such work, in the great majority of countries the focus is on informing at a micro level rather than macro level planning (although this kind of LMII may be a crucial input for top level policy makers too). The key message is that investment in LMII is a public good (i.e. something that should be funded by the state), intended to help make labour markets work better.

2.2 How it is done

It is clear that there are many different approaches to this task. There are many different ways to inform citizens about the labour market they face. In most developed countries,

some kind of forward looking element is now key. This again can be accomplished in many different ways. In most countries quantitative forecasts are central. This is certainly true of the USA, which has been involved in this kind of work longer than most. This is despite the fact that top down indicative planning has largely been discarded since the collapse of most communist countries over the past few decades.

The experience of the 4 countries considered in detail here, as well as that in many other countries, suggests that such work needs sound statistical foundations and that regular, systematic and sustained **quantitative** analysis is essential, including a forecasting element. However, **qualitative** analysis is also important. There are many different methods for peering into the future; no one method has a monopoly on truth. Triangulation, using a variety of methods is most likely to ensure robust conclusions, (although there are some concerns about duplication and competing messages).

Some countries place more emphasis on short-term as opposed to longer-term analysis. The former includes the use of vacancy surveys or other methods of monitoring short-term labour market pressures. Different users also have different uses for the information. For some (e.g. Public Employment Services (PES)), short-term analysis is probably much more important than it is for those interested in longer-term investment in education and training (such as, education or training providers, government policy makers and individuals making career choices (especially young people contemplating what they would like to do in the future, as they are more likely to be concerned more about longer term-trends than the current situation in the labour market). A key issue is educating all users about the limitations as well as benefits of the LMII produced. While the aim of trying to close the gap in the demand for and supply of skills is a worthy one, the idea of perfectly matching them is a chimera that is never likely to be achieved.

Given that this kind of information is regarded as a public good, such work needs to be centrally funded by the government. However, there are many different models of how to actually undertake the analysis and disseminate the findings. In the USA this role is still taken on primarily by the (Federal) government, although increasingly there has been pressure to allow the private sector to build on the core public goods provided by the Bureau of Labor Statistics (BLS). The State therefore both funds and conducts the work. In the three European countries covered in the cases studies, while national (or in some cases supra-national) funding is crucial, some or all of the responsibility for carrying out the analysis and disseminating the findings is delegated to independent research organisations (often after a competitive tendering process).

There is no obviously correct balance between undertaking such work within government and subcontracting it to the private sector or independent research organisations. The US model has given the BLS a central role in providing a core set of basic data, including the Occupational Employment Statistics (OES) survey results, detailed occupational projections produced by the BLS and the enormous occupational Information network known as O*NET. All this is freely available, at zero cost to users. Other organisations then build upon this foundation, carrying out their own detailed analyses and developing various products which are often sold on to users.

In Germany, the system is similar, with much work being conducted within the national institute for employment research (the Institut für Arbeitsmarkt-und Berufsforschung, IAB

which is funded by the state.¹ However, the German system is less centralised with many other stakeholders, including the regional authorities (the Länder), getting involved. Greater use is also made of sub-contractors to undertake specific tasks such as the long-term projections produced by Economix. While this has the advantage of introducing completion, this can be at the expense of a failure to build up long-term research capacity and possibly loss of corporate memory.

In the Netherlands, the role of ROA (an independent research organisation based in a university) has to some extent mirrored that of the BLS in the USA. In a relatively small country, this has allowed one research institute (ROA) some time to build up expertise and to develop a sound methodology and research programme around the theme and interrelated projects (forecast, tracer studies, sector studies etc.).

Initially at least, the Czech's mimicked the Dutch approach, but the Czech Republic still has some way to go to reach the level of sophistication and capacity that the Dutch have achieved. Their plans to develop a new system will move them closer to the Dutch model in the next few years.

Finding the right balance between allowing one (or a few) organisations to develop capacity (including method relevant tools and instruments) versus using competitive tendering processes to try to minimise costs is not easy. The latter approach risks a “race to the bottom” and may be short-sighted and can lead to the loss of embedded organizational and human capital. There are also dangers of commercialising and privatising what should be public information.

2.3 Who is involved

It is clear from the case studies that there are many different users and uses of good LMII. It is also clear that there is a multiplicity of stakeholders who, ideally, need to be involved.

Statistical data providers are key stakeholders. Their active involvement is likely to be a prerequisite for success. Without a good statistical foundation any attempt to understand the current situation let alone peer into the future is based on shifting sand.

End users of the outputs are the other key stakeholders. Labour market forecasts and related analyses of the current labour market situation are commissioned by a range of actors, including the government and its various departments and agencies (at local as well as national level); as well as social partners (employers organisations, trades unions); and others (such as education and training providers). Often these organisations represent other interest groups (such as individuals making career choices, individual employers and educational establishments) that may not be easily able to articulate their needs.

¹ The IAB is the research arm of the German PES (Bundesagentur für Arbeit). However, there are many other organisations working in this field, sometimes also more successful in specialized LMI niches. This is more like the situation in the UK where there are many organisations competing for funding and support.

2.4 How it is used

It is very clear from the case studies considered here that the LMII developed is not intended for use in mechanistic manpower planning, nor for micro management of education and training provision nor the perfect matching of skill demand and supply (in either short or the long term). In all four cases, the emphasis is on informing choices at the micro / individual level as much as about informing policy at a macro level.

Occupations lie at the heart of the systems developed in these 4 countries. In order to gain a good overview of the demand for and supply of skills, it is important to collect together the various instruments into databases defined by occupations or qualifications (as in the German BERUFENET, the Czech NOS and Occupation Profiles (OPs), the Dutch AiS and the US O*NET system). These are very important tools in the work of skills and labour market analysis as well as the provision of useful LMII and CAG. LMI for All is a step in this direction for the UK, but much remains to be done compared with best practice elsewhere.

The European experience also emphasises the importance of building networks of stakeholders that allow discussion of the outcomes and analysis of its policy implications. This has two effects: the researchers learn about the stakeholders view (causes and consequences of their numbers) which also serves as a reality check, and on the other side the stakeholders learn to use the information better. Again the UK can learn lessons from these countries about how to set up and use such networks.

2.5 Evaluation

It is clear that a simple minded evaluation of these complex systems is not possible. It is impossible to establish the counterfactual of what their labour market would look like in each of the countries considered in the absence of these systems.

Each has invested heavily in such systems. They have been evaluated as they have been developed; including regular efforts to survey users about their use of the information, peer review of many elements, as well as regular project management assessments. In all cases, it has been a process of constant evolution and improvement, (in the case of the USA for over 65 years).

Some elements, such as the quantitative occupational projections have been evaluated more formally in countries such as the Netherlands and the USA. However, it is clear from these exercises that such evaluation is far from straightforward. Many of the more critical assessments of such work have failed to appreciate the difficulties of evaluating why such projections may turn out differently from actual outcomes.

3. Lessons from the Czech Republic

3.1 Introduction

Skill needs forecasting methodologies have been developed on a systematic basis in the Czech Republic since 1999, using financial resources from various sources, including EU co-funded projects. The current forecasting activities are very different in nature to what was carried out during communist period. In that time the economy was centrally planned and the approach was different, but the modelling as such was very well developed and there was even a special institute dedicated to forecasting.

More recently, various initiatives have been realized, focussing on basic research – creating solid methods and individual tools for early identification of skill needs – as well as applied research aimed at creating knowledge with the help of developed methods and tools. The activities have taken the form of many individual projects and were only partly inter-related. The projects have been contracted mostly by the Ministry of Labour and Social Affairs (MLSA), the Ministry of Education, Youth and Sports (MEYS), social partners, and in some cases also by international institutions, regional bodies or private companies. Nevertheless, there was no systematic long-term central leadership.

In recent years, a new dynamic was brought to the area by employers, who have increasingly faced a lack of qualified workers and therefore urged government authorities to become more active in bridging the gap between the economy's skill needs and the supply of qualifications. As a result, an initiative with the aim of establishing a permanent system of skill needs anticipation is being launched by the MLSA. This new EU co-funded project will start from the beginning of 2017 (project *Kompas* – see below).

Research in the last two decades has been led by four independent research units:

- National Training Fund – National Observatory of Employment and Training (NTF-NOET);
- Centre for Economic Research and Graduate Education - Economics Institute at the Charles University (CERGE-EI);
- The Research Institute of Labour and Social Affairs (RILSA) and;
- The Education Policy Centre of the Faculty of Education at Charles University (EPC).

All four are institutions experienced in the fields of labour market analysis and educational policy. Their long-term co-operation in carrying out forecasts and developing methodologies constitute a good foundation for the necessary forecasting system. A website *Czech Future Skills* was created as an outcome of a project funded by the MLSA (and co-funded by EU). The website publicly presented the results of NOET's skill needs forecast (see www.czechfutureskills.eu). Unfortunately there was no possibility to maintain funding after the project ended and the website has not been updated. In addition to standard skills forecasts, other methods and tools have been developed (see *Job Vacancy Monitoring* below).

Since 2006, Sector Skills Councils (SSCs) have gradually been established in the Czech Republic. These have been formed as part of larger programme of projects funded by the Government (and co-funded by the EU). They gather employers and experts (educators and ministries and contribute to the process of defining occupations and qualifications. NOET

drafted the *Occupational Profiles* (see below) as background material for the SSCs decision making.

The EPC also created labour market forecasts within individual projects for MEYS and the National Institute of Education (NIE) (2005-2008, 2011-2012). It also provided MEYS with analyses and projections related to graduates (especially higher education graduates) in 2013.

In addition to this, there are initiatives that are not directly concerned with forecasting skill needs but which use some LMI elements to provide orientation and guidance for some target groups. For example, the NIE has developed an Information System on the Situation of Graduates in the Labour Market (ISA+) available at the *Infoabsolvent* web portal (www.infoabsolvent.cz, see below). The Education Policy Centre (EPC) also carried out an analysis of the development of qualification requirements in the Czech labour market to be used as a part of the system.

Another important tool that gathers information on occupations at the national level is the *National System of Occupations* (NSO). Its existence is laid down in legislation and it represents a common database of performance requirements (knowledge, skills and competences) and other characteristics identified by the world of labour for individual occupations. The *Infoabsolvent* system uses the information about occupations from the NSO in its section dedicated to career guidance and counselling.

Project *Kompas* (to be launched in 2017) draws on many of the abovementioned experiences and brings more comprehensive approach by including and interlinking central as well as regional levels. It should result in a detailed information system permanently providing LMI to all relevant users – public administration, employers, educators, including career guides and counsellors (at the labour offices and at schools).

With regard to the existing more or less independent activities, the following five initiatives have been selected for more detailed overview here:

- *Job Vacancy Monitoring*;
- *OPs*;
- *Infoabsolvent*;
- *National System of Occupations*; and
- *Kompas*.

3.2 How it is done

Job Vacancy Monitoring

NOET developed a “lean” method of gaining LMI that is based on job portal advertisement analysis, automatized to a large extent, thus very cheap, efficient and easily repeatable. The initial phase that built up and piloted the methodology was the most demanding. It included selection of the source job portals. Three data sources were selected: the two largest job servers in the Czech Republic “Jobs.cz” and “Prace.cz” (owned by one company); and the

Labour Office² (LO) public job portal. The two private portals are used dominantly for jobs with middle and higher level of qualification (in a questionnaire survey 90% of employers stated that they use these two portals for their job advertisements), while the LO job portal focuses more on lower qualified jobs. The provision of data was negotiated successfully.

In the next step, the databases were merged and cleaned up. Overlaps were identified by finding (testing) the right combination of factors that indicated a duplicity and subsequent eliminating of double posts. In this way, a single database of vacancies reflecting the reality of the labour market demand was obtained. Word and phrase analysis of the job offers was performed to match the job offers with the right ISCO codes.

Once the software and the algorithms were prepared, the analyses could be repeated easily. This includes obtaining new data, its adjustments, cleaning and merging into a single database and running the software. The final and key step, which requires expert knowledge, is the interpretation of the results (which must take into account of various issues such as the high frequency of short-time jobs or high fluctuations in certain occupations). In principle, the method enables time series to be built up easily.

The vacancy monitoring system is not currently carried out as regular and permanent exercise, but is provided as a service by the NOET based on the demand from external partners and clients. A recent example is the 'Assessment of higher education in Ústecký region and its relevancy to the regional labour market' from 2015. The project included job vacancy analysis in the Ústecký region, with special attention paid to high qualification vacancies suitable for HE graduates. The results were compared to the existing HE structure and graduates in the region.

Occupational Profiles

Occupational Profiles are an LMI tool providing concise information about the current labour market situation and prospects for major occupational groups at a national and regional level. The information is presented as a two-page set of statistical indicators, their trends and interpretation. The tool has been developed by the NOET. The "national version" of the occupational profiles was the main output of the *Koncept* (Concept of Continuing Education and Training³) project carried out by the National Institute for Education in 2010-2011, to be used by the sector skills councils. A "regional version" of the product was developed focussing on skills demand in the Moravian-Silesian region in 2012.

Altogether 180 profiles were developed. The "national" occupational profiles exist in printed form, while the regional ones are available at the website, which enables structural searching. Updates are foreseen with roughly a 3-year period.⁴ The content is based on expert input from NOET and available statistical sources. Each profile is very short (covers

² Technically, the LO is a single (huge and hierarchic) institution (operating under the purview of MLSA). It operates through its many local units/contact points (informally also called labour offices, but that is not their official title).

³ See English summary of the project at: <http://www.nuov.cz/koncept?lchan=1&lred=1>

⁴ One update has been done (with NOET's assistance) after three-years, but at the time of writing this has not yet been published.

only two pages) and clearly structured - conciseness was one of major request from users. It consists of 9 parts:

1. Group description (ISCO code, name and synonyms used in vacancies advertising);
2. Employment development analysis (total employment, trends in employment since 2000 and employment forecast for 3 years);
3. Labour market opportunities analysis (number of vacancies and job seekers, unemployment rate, share of hard-to-fill vacancies and share of job seekers per 1 vacancy);
4. Sectoral employment analysis (key employment sectors for the particular group and analysis and forecast of employment for these sectors);
5. Qualification analysis (suitable field of education, share of persons with other-than-recommended qualification, level of education);
6. Earnings analysis (used also as a proxy for occupation attractiveness on the labour market both for graduates and for non-graduates, providing information on median wages, wage growth and comparison with similar occupations);
7. Skills supply: graduates (number of graduates of the most suitable field(s) of study, forecast of graduates for next 3 years, unemployment rate of graduates and its development);
8. Age structure (% of young and old workers);
9. Summary of key findings (a short text highlighting issues most relevant for the users).

Infoabsolvent

*Infoabsolvent*⁵ is an information portal developed in 2010 within the framework of a broader project on career guidance and counselling in the context of curricular reform. It was carried out by the National Institute for Education (NIE). The portal provides information and tools aimed at increasing the chances of successful completion of secondary education and subsequent employment. It consists of four thematic modules:

- Which School to Choose – educational options, schools, programmes, related professions presentation including video trailers;
- Graduates and the Labour Market – information about the transition of graduates to the labour market, their employability and information appropriate for career decision-making;
- “Barrier-free” access to the labour market (for students with disabilities);
- Advice and Recommendations (for applicants with different levels of education) - focus on career counselling: how to choose school and study field, how to deal with problems during studying, etc.

The primary target group are pupils in the last grades of the basic schools (aged around 14-15) and students of secondary schools deciding on further education or employment possibilities; their parents and career counsellors. The secondary target groups are state administration officers, employers, departments and officers of the Labour Offices, etc.

The system gathers the labour market intelligence from various sources. Among the most important are the surveys of graduates conducted regularly by the NIE. The NIE also

⁵ Infoabsolvent: www.infoabsolvent.cz

undertakes surveys of employers and examines selected aspects of graduates' transition to the labour market. Short overviews of future prospects for occupational groups and industries are also provided (based on EPC input). Other data sources are also used (e.g. the statistical data of MEYS, Czech Statistical Office and Eurostat).

National System of Occupations

The National System of Occupations (NSO) has been developed within the framework of subsequent projects commissioned by the MLSA. In the NSO development, the SSCs play a key role by providing the core information on the occupations in their sectors. The work is organized by a private company TREXIMA, in cooperation with the Confederation of Industry of the Czech Republic and the Chamber of Commerce. As a result, the NSO is an open, universally accessible database of occupations that reflects the situation in the labour market (it lists the majority of occupations, with their descriptions being filled in gradually following the SSC's approval). Besides the detailed occupation requirements, the NSO also includes information on other characteristics of the occupation, such as related work units, job positions, health requirements and risks, average wages, examples of tasks in business/public sector, working conditions, qualification requirements, etc.

The NSO's role is to develop detailed occupational standards, while the OP is the main vehicle used for the dissemination of LMII to a broader audience. The NSO is a national system, defined in the legislation. It is very comprehensive and its main purpose is to define and describe occupations and related requirements and standards. The OPs in contrast are cards listing selected statistical indicators and presenting a short commentary about the current situation and future prospects for the selected occupation (or groups of similar occupations). They were created to meet the demand of institutions who required this particular information for their work (such as SSCs) and/or to disseminate the information to be used by all interested parties (e.g. in the Moravia-Silesia region). The NSO development and updates are centrally supported and promoted, while the OP updates are based on the client's decision (not incorporated in the regular system updates).

Kompas

In 2017, a comprehensive project will be launched by the MLSA. It will establish a sustainable system of reliable labour market projections and monitoring. It will interconnect national and regional levels and will reflect technological developments and regional specifics. In its framework a quantitative model of skill needs anticipation (that has been managed and used in previous projects by the NOET) will be improved.

The model focuses on employment projections by sector (taking into account the structure of employment by age, education, and occupation) and projection of graduate supply. It provides labour market prospects for 40 educational groups and expansion and replacement demand for 40 educational and 37 occupational groups. Within the *Kompas* project, the data inputs will be extended (e.g. inputs from the Czech Social Security Administration and from the Average Earnings Information System will be added), data quality will be enhanced and the methodology will be made more precise. An important step forward is the inclusion of the regional dimension. A platform (partnership) will be established in each region that will include representatives of the respective regional Labour Office units, social partners, employers and other LM experts. Its main tasks will be providing qualitative inputs and feedback to the forecasting model and helping to validate its results. Namely, they will

identify factors influencing and conditioning trends on the labour market (e.g. the regional investment plans, plans for development of public educational institutions, etc.), assess the projections of regional employment development and verify the model results at the regional level.

Currently, regional Labour Office (LO) units perform some LM monitoring activities (personal visits to employers; questionnaires), but they are aimed rather at the counselling and supporting activities for employers, such as recruitment and job fairs). Within the *Kompas* project, these activities will be enhanced to provide relevant LM data input to the forecasts. This input will be realized through regular standardized surveys, data processing and methodical guidance of LO units, with necessary increases to their personnel capacity. The capacity will be funded through the EU funds during the project duration and by the MLSA after the project ends (2020). This new approach should add significant value to the quality of the forecasts.

Moreover, the central expertise and capacity of the MLSA for forecasting, monitoring the results, and interpretation will be strengthened by expanding the team of qualified experts, who will ensure the efficient functioning of the system in the future, administer individual processes, and control the quality (not only at the national, but also at the regional level).

Project *Kompas* will be realized through the following core interrelated tasks:

1. Review and evaluation of the existing situation in the area of skill needs anticipation;
2. Mapping of LM trends and the needs/expectations of the future system users;
3. Enhancements of the existing skill needs anticipation model at the national level, including the methodology;
4. Creation of respective regional prediction models including methodologies (taking into account distinctive regional differences);
5. Ensuring the availability of data and its preparation in the form of long-term time series for the national level model;
6. Ensuring the availability of data and its preparation in the form of long-term time series for the regional model;
7. Regional labour market monitoring enhancements;
8. Creating the regional structures: engaging subjects active in the regional development;
9. Verification of the model outcomes at the national as well as regional levels, correction and improvements of the results;
10. Development of a Labour Market Compass: Creating an interactive and user friendly web-based platform to publish and share the results, helping users to orientate themselves in the labour market.

3.2 Who is involved

Job Vacancy Monitoring

- NOET (owner of the methodology, expert);
- The client/commissioning body (usually a public, regional body, but also private enterprises, universities etc.).

Occupational Profiles

- NOET (author of the methodology, expert);
- The Ministry of Education, Youth and Sports / the National Institute of Education⁶ (commissioning body, customer);
- Sector Councils and career counselling institutions (users);
- Regional LM Observatory in Moravia-Silesia Region (user/data provider/administrator/owner).

Infoabsolvent

- The Ministry of Education, Youth and Sports (owner of the project, commissioning body);
- The National Institute of Education (responsible for the implementation);
- Users – individual schools (the schools have also an important role to provide an information about new study programmes), teachers, Labour Office local units, counsellors, general public (pupils, parents).

National System of Occupations

- SSCs, Confederation of Industry of the Czech Republic, the Chamber of Commerce (expert role, information source);
- TREXIMA company (work organisation, data administration);
- Ministry of Labour and Social Affairs (commissioning body, supervision and control).

Kompas

- Ministry of Labour and Social Affairs (commissioning body) – special unit;
- LM institutions (especially the Labour Office and its local units);
- Regional Platforms (one in each region): regional LM actors, including LO regional units, employers (industrial clusters etc.), regional chambers of commerce, experts, SSCs, schools etc.;
- Regional Offices (public administration authorities);
- NOET, the Research Institute of Labour and Social Affairs (responsible for implementation, expert role);
- Research institutions, NGOs.

3.3 How it is used

Job Vacancy Monitoring

Job vacancy monitoring is often part of more complex analysis and its final usage depends on the policy of the client (owner of the results). For example, the Ústecký Region commissioned a study to gain evidence based LMI for the preparation of its regional strategy for education.

⁶ An organisation directly managed by the MEYS.

Occupational Profiles

The Occupational Profiles were used by SSCs to identify key skills mismatches and set priorities for targeted actions on the labour market. It enabled the sector councils to assess the future availability of occupations and identify key factors for the development of occupations (including skills supply prospects expressed as projected numbers of graduates in relevant fields of study). The tool is used most extensively at the regional level by the Regional LM Observatory of the Moravia-Silesia Region. It is one of the important information sources for the counsellors providing their service within the education system (mainly schools) as well as within the regional LM institutions (mainly the LO units). It also provides information to the employers about the forthcoming trends in availability of specific occupations, average wages for specific professions of comparable education level, etc.

At the regional level (Moravia-Silesia region) the LMI was used for implementation of a regional *Joint Action Plan* aimed at matching skills provision with labour market needs in medium term, as well as for career guidance and counselling (public employment services, schools).

Infoabsolvent

The *Infoabsolvent* portal is used either by the career counsellors to provide their clients (students) with useful information about educational choices, or directly by the students and parents themselves (thanks to the website interface that is tailored to the end users and with very well illustrated and intuitive arrangement). With the help of the *Infoabsolvent* portal the schools can expand and improve their career guidance and career education, better reflect the labour market's skill needs and also better shape their study programmes. The Regional Authorities (school founders) can draw information from the system to support their policy decisions related to the local schools system (e.g. what fields of study should be promoted in the future).

National System of Occupations

The NSO represents a publicly available common database of occupations relevant to the Czech labour market. Its main task is to provide employers (especially HR experts), educators, job applicants, career counsellors and Labour Office local experts with detailed information about individual occupation requirements and characteristics. It enables more precise and concrete communication about labour supply and demand and provides information for jobs and skills matching at the Labour Office local units. It provides background material for creation of company registers of job positions and for personnel management. It enables educators (schools and higher education institutions) to better define the learning outcomes and the target profile of their graduates to match the requirements of the real labour market. The *Infoabsolvent* system uses the information about occupations provided by the NSO in its sub-section dedicated to career guidance and counselling.

Besides that, the content of the database affects the design of qualifications and constitutes a common foundation for the National Registry of Qualifications that includes assessment standards for qualification recognition and validation.

Kompas

This new system will provide unified projections to be jointly used by the national as well as regional authorities. It will be aimed at:

- public administration (as a background material for long term and short term strategies);
- the PES for formulating effective active labour market policies (especially in the field of retraining courses), it will enable the Labour Office experts to employ new ways of collaboration with their clients, to better address their service according to the specific regional LM situation and to allocate optimally their capacity (e.g. to any endangered groups of clients);
- education and training institutions for better shaping their educational programmes and learning outcomes;
- the education administration for better formulation of their education policies to enhance the employability of graduates;
- employers and professional associations to better plan future development of their members and employees;
- counsellors, with information on development needed for future perspective career of their clients;
- the general public (especially individuals making their career decisions).

3.4 Evaluation

Job Vacancy Monitoring

This methodology as a whole has not been systematically evaluated. The results of each individual job vacancies analysis is evaluated and commented upon by the client/commissioning body. It is a relatively frequent choice by clients aiming to grasp the current status of the labour market as a whole or a part that they are especially interested in (e.g. regional focus or a specific group of professions). It has repeatedly proved to be a very successful and effective tool in providing unique information about the current situation in Czech labour market.

Occupational Profiles

Occupational profiles have yet to be evaluated in a systematic or methodical manner, but they have been assessed by the commissioning body (Ministry of Education) and by the end users (SSCs). They were very well received, not only because their content and structure matched user group needs, but also because they were designed in close cooperation with key stakeholders.

Infoabsolvent

Considering the numbers of users and their reactions, the portal has been seen to have had a significantly positive effect. The portal was positively evaluated by its main beneficiary, as well as the other target groups and users. One significant signal is the frequency of web page use, which has been bigger than expected and also the positive feedback from the career counsellors. They have appreciated the tool as an instrument enabling them to make their work easier, up to date and precise, in addition to appreciating the value of several e-learning courses that were prepared for them under the project.

The success stems from the fact that the portal fulfils the expectations and needs of the target groups, in this case primarily those of pupils and their parents, career counsellors and teachers.. The website has been also praised by the OECD, especially for the benefit it brings to the target groups.

National System of Occupations

The NSO was evaluated in the framework of the implementation projects by the MLSA. In its current shape is a bit fragmented in certain levels (especially, for example, in occupations requiring tertiary education). Its structure does not always reflect the structure of the real labour market well (e.g. some common occupations are not represented in the greater detail), which is mainly a consequence of diverse approach and level of engagement of individual SSCs and their members. In the next NSO development it will be necessary to balance the representation of occupations to reflect their real significance in the labour market.

Kompas

The project commissioning body (the MLSA) will evaluate the results regularly as part of normal project management and control. The results of the forecasting activities will be evaluated and confronted with the reality as the project proceeds.

3.5 Key lessons

Job Vacancy Monitoring

There are a variety of methodologies available to monitor vacancies. These often involve large employer surveys and costly data collection. The job vacancy monitoring developed by NOET is a lean, very efficient and easily repeatable method. The basic precondition is cooperation with major (representative) job advertising portals and relevant (public) employment agencies in the country, which provide their databases. An important issue is maintaining the cooperation with the data providers (e.g. if the management changes, with the new management not willing to provide the data, this can undermine the process, etc.) The crucial part is the initial building up and piloting of the methodology (which is time consuming and relatively costly). This includes the word & phrase analysis of the job offers – it will differ in various countries depending on the sources available, their content, language specifics, etc.

Occupational Profiles

Work in this area proved that the use of LMI depends not only on its quality, but also on the process by which it is developed. Users explicitly involved in the process are more likely to take it on board if it is something they helped to create. They are then much more open to make use of the information to shape their actions.

Infoabsolvent

The biggest problem in this project appeared during the implementation. It concerned the creating of the information system (ISA+) behind the website. Its development, and fulfilling the whole scale of technical requirements on the system as such, was very demanding. This was one of the reasons why the implementation of the project was prolonged from September 2012 until June 2015. The related complex and time consuming tenders with

continuously changing regulations constituted the biggest obstacle. Within additional time, all tasks related to the project were fulfilled and no other significant problems occurred.

The actual successful implementation was reached thanks to the co-operation between the team composed of experts in suitably overlapping areas who were motivated to achieve the best result possible.

National System of Occupations

The most important factor for success and for the relevance of gathered information is the cooperation and involvement of the partners in the SSCs. The lack of balance of the information collected reflects to some extent the composition and the level of engagement of the individual SSCs. Methodical coordination and guidance is needed to maintain the proper balance of the System, to take into account the real labour market structure and the relevance and importance of the occupations covered.

4. Lessons from Germany

4.1 Introduction

Germany has a wide range of actors and initiatives that contribute to, or generate, skills anticipation or labour market intelligence. Labour market forecasting, identifying anticipated changes in demand for and supply of skills at National level, is carried out by various institutions and actors. However, there are only a few initiatives that provide regular and comprehensive skills forecasting. These include the BiBB/IAB forecast, initiated some ten years ago, and the Economix/IER/CE forecast of the German labour market (2012, 2014, and 2016) carried out on behalf of the Ministry of Labour and Social Affairs (MLSA). Those long-term regular and comprehensive forecasts are carried out on behalf of public authorities by independent research organisations (although some of these are directly funded by the Federal government). They are used primarily to inform the commissioning organisations' strategic planning.

Sub-national forecasting – commissioned by regional bodies at the 'Länder' or regional level – is another feature of the German system. This focus on a regional approach reflects the federal structure of Germany. Skills forecasting is also seen as useful to broaden the knowledge base for other actors. Long-term forecasts are often commissioned, or (if already existing) adapted, to gather information on labour market threats and trends.

For example some current issues that are influencing skills forecast, and for which skills forecast (or scenarios) are being used to evaluate alternative possible future outcomes, are: the refugee crisis; the increasing average age of the population (and associated issues of rising demands for health care, concerns about financing pension payments and labour shortages caused by a labour force declining in size); and the digitization of the labour market. The potential shortage of skilled workers caused by ageing of society and its heterogeneous impact on the qualification levels, and the impact of the migration crisis are important topics on the supply side of a skill forecast that need to be understood properly in order to highlight possible outcomes in the medium term. Skills forecasts are not only used to help assess the impact and current and future scope of these events on individual sectors or on different skills levels. Policy makers also expect to identify suitable policy actions to counteract potential negative effects on labour supply. For example, forecasting might show that a shortage of skilled workers could be mitigated by reducing inequalities in education opportunities. Unequal opportunities might prevent young adults from weaker social backgrounds to use their abilities to its fullest potential. Often alternative calculations are included to show what could happen if these or other measures are not implemented.

Another key issue driving the discussion on future labour demand in Germany is the impact of the digitization of the labour market. German policy makers and economic actors use skills forecasting, to identify the impact of such trends and assess assumptions regarding the degree of significance of the dual training system in view of rising tertiary education participation. In addition, assumptions about upward mobility within the educational system are also included in the forecasts.

In Germany, there is a strong belief that suitable econometric models are the best way to identify plausible future outcomes at various sectoral, occupational or geographical levels, while taking into account direct and indirect effects.

One main actor on the labour market and in labour market policy, the Federal Employment Agency, also relies for many elements of policy on short-term assessment instruments. A combination of current and backward looking LMI feed into the important (public) information source *berufenet.de*. However, to prevent future imbalance mid- to long-term evaluations and formal skills forecast are also done by its associated research institution, the Institute for Employment Research (IAB).

German stakeholder organisations use skills forecasting as an instrument to help influence and formulate policy. Using such evidence-backed methods, outcomes of the projections are used to evaluate current policy critically. The German Chamber of Commerce and Industry (IHK), employers' organisations, non-profit-organisations like the Bertelsmann foundation, and other business associations are also turning to this instrument to highlight their standpoints and underline their arguments. This is done, for instance, by quantitatively assessing the effect of policy measures in a formal model. With this approach they are able also to address issues that are not on the policy agenda (yet), creating pressure on policy makers and economic actors. Due to the sectoral orientations of many of these stakeholder organisations, these forecasts are often sector- or skills-group- specific.

4.2 How it is done

In Germany, the ways in which comprehensive skills forecasts are set up and funded are highly dependent on the institution that is commissioning the work. The German skills governance system is rather fragmented: the responsibility for producing useful labour market information and intelligence (LMII) does not lie with just one particular ministry or one political actor. Furthermore, private institutions also carry out their own forecasting.

Usually, ministries or organisations tender such projects and they are carried out by independent research organisations. Skills forecasts are thus not institutionalised within government departments, although some research organisations are funded directly by the state to conduct such work. There is a fairly narrow circle of research organisations that have expertise in comprehensive skills forecasting. Forecasts are tendered to be carried out for specific time periods. If deemed useful, they are either prolonged, or the commissioner issues a new invitation to tender. Currently, the two most important long-term multi-level labour market forecasting instruments that simulate future skills demand and skills supply are the project QuBe - Qualifikation und Beruf in der Zukunft (Qualifications and Occupations in the future) and the project Arbeitsmarkt 2030 (The German labour market in the year 2030). Arbeitsmarkt 2030 was commissioned by the Federal Ministry for Labour and Social Affairs (BMAS) and was carried out by private research institution Economix regularly from 2011 to 2016. QuBe - Qualifikation und Beruf in der Zukunft is carried out by two public research organisations, namely the Institute for Employment Research (IAB) and the Federal Institute of Vocational Education (BiBB), based on initial funding from the Federal Ministry for Education and Research (BMBF). In Germany, it is not uncommon that several competing public funded forecasts exist simultaneously.

Those two studies were financed by public funds. However, forecasts at the sub-national level, commissioned by regional or local policy makers, are often (co-)financed by a variety of sources, including European Regional Development funds. For example, *EQUIB Bremen* (qualification demands in Bremen) was carried out by the Institute for Work and Economy (IAW) of the University of Bremen. *Gemeinsame Fachkräftestudie Berlin-Brandenburg* (skilled workers study Berlin-Brandenburg) was carried out by Prognos AG (see below).

There are also sector-specific and skills-level specific forecasts carried out on behalf of national and sub-national authorities. *Hessischer Pflegemonitor* (Hessian care monitor) was co-financed by European Regional Development funds and carried out on behalf of the Hessian Ministry for Social Affairs. PROSIMA is a short-term econometric forecasting and simulation model of the national apprenticeship market which was carried out by the Federal Institute of Vocational Education (BiBB) and the Ruhr University Bochum on behalf of the Federal Ministry for Education and Research (BMBF).

Private actors, private stakeholder associations (and more rarely large companies) also commission and carry out forecasts. Some commercial private research organisations offer regular and comprehensive labour market forecasts for sale, most notably Prognos AG (owned by Holtzbrinck Publishing Group) with its *Deutschland Report* (Report Germany). In addition, foundations play a role in publishing LMI. A recent example is Bertelsmann Stiftung with its forecast *Auf dem Weg zu Arbeitsmarkt 4.0* (outside of Germany this is coined the 4th industrial revolution).

However, these privately funded forecasts are mostly sector- or skills-group-specific. For example, the tertiary education report 2020 (Hochschulbildungsreport) is a forecast concerning the skills of tertiary education graduates and the future demand for tertiary education graduates. It was carried out by the management consultancy McKinsey on behalf of the stakeholder Association for the Promotion of German Science and Humanities (Stifterverband für die Deutsche Wissenschaft). The research Institute IW Köln regularly carries out occupation-specific skilled workers shortage monitoring and forecasting for employers' organisations (MINT Trendreport). Skilled workers forecasting on a regional level is provided regularly with the skilled workers monitor that is carried out on behalf of the German Industry and Trade Chambers. Themenreport Pflege 2030 (care report 2030) was carried out on behalf of the Bertelsmann Stiftung by the Center for Social Policy (ZeS) at the University of Bremen and the Evangelische Hochschule Freiburg.

In addition to the wide range of medium- and long-term forecasting instruments, short-term assessment tools are also very common in the German skills governance. The Federal Employment Agency relies on short-term assessment instruments to prevent future imbalances. Usually, these are carried out by its own research institution, the Institute for Employment Research (IAB). Examples are the short-term skill analysis based mainly on time needed to fill a vacancy (*Engpassanalyse*) or the skilled-worker radar (*Fachkräfte radar*). Also, surveys among employees are used to assess skills needs or skills demands on a short-term base, e.g. by the Federal Institute of Vocational Education (BiBB) in co-operation with the Federal Institute for Occupational Safety and Health (BAuA). There are also short-term assessment instruments that are carried out on behalf of stakeholder associations, e.g. the associations of engineers and the employers' oriented IW-research institute engineering monitor (*Ingenieurmonitor*).

Therefore, market mechanisms (including public and private tendering and business planning by private actors) play an important role in the production and use of information.

4.3 Who is involved

Labour market forecasts are commissioned by a range of actors: federal and regional ministries and governments, social partners, foundations, stakeholder associations, the Federal Employment Agency, and also single companies. Labour market forecasts are

carried out by public research organisations which are often tied to universities, private research organisations, and also by management consultancies. Sectoral stakeholder associations, employees' and employers' associations, other research institutes, as well as economic and political decision makers are the main users of information produced in the forecasts.

Forecasting is usually based on data provided by the Federal and Regional Statistical Offices or the Federal Employment Agency. They rely usually on information of the Mikrozensus, which also provides the LFS information for Germany. Other data sources include the German Socio-Economic Panel (SOEP).

The federal employment agency has developed a database, BERUFENET, accessible through a web portal collecting various relevant LMI. It includes, among other LMI, a database on the skill requirements and task within occupations. While the database includes many elements of present and past data, it does not structurally include skills forecasts. The updates to the database are done in regular intervals and the Bundesagentur für Arbeit uses experts (through a tendering process) to summarize and describe the various elements presented for each occupation. BERUFENET is freely accessible, financed through the Bundesagentur für Arbeit.

4.4 How it is used

The use of LMI generally is quite mixed. Many different sources feed into specialized portals and information sources. These sources are specifically developed to produce concise yet complete statistical and descriptive information on occupations and qualifications. The main purpose is to provide information aimed towards career guidance. Users range from students, journalists and policy makers to specialized career advisors and labour markets researchers.

The outcomes of skills forecasts, both at national and regional levels, are usually discussed and used in more specialised groups of policy makers and labour market actors. It is up to those users and their organisations to identify and use the various studies on the future of work. It is much less coordinated than in many other countries, especially with respect to the sharing of results and complementarity of the work performed.⁷ It is quite common to have different approaches towards similar instruments of labour market monitoring and forecasting, which are to some degree also only known to the more specialized community. The approaches on the regional level usually involve a more elaborate interaction between important stakeholders, who also played a role in the development or financing of the project.

LMI produced by (public and privately funded) skills forecasting is usually available for free, on the Internet in most cases. There is a range of publications that collect and assess data concerning (future) skills needs and demands. Key publications are the *Berufsbildungsbericht* (Report on Vocational Education and Training), that is published regularly by the Federal Ministry of Education and Training, and the *Bildungsbericht*

⁷ Many institutions do very good work, but this work is not necessarily shared and used across all institutions (nor are results are brought together in one place). In fact the BA does not even use their own long-term forecast (IAB/BIBB) within their career guidance.

(Education Report) published by the Standing Conference of the Ministers of Education and Cultural Affairs and the Federal Ministry of Education and Training. These publications also take up information produced with forecasting instruments.

It is difficult to assess precisely how LMII produced in forecasts is used by policy makers and economic actors. There are, however, some examples of its use. Recently published labour market forecasts highlight the need for further training due to the continuous digitalisation of the labour market. The Federal Minister for Labour and Social Affairs (Andrea Nahles) justified her claim for the implementation of a legal right to further training based on these results.

When updating occupational profiles in the dual vocational training system, but also in wage bargaining, the outcomes of skills forecast are also taken into account by social partners. Formal mechanisms within the political system, in particular questions formulated by the parliament towards the government both at the national and the Länder level, regularly deal with information on future skills demand and skills supply. In these situations, the results of labour market forecasts are used frequently, for example regarding concerns about the digitalisation of the labour market or the shortage of skilled workers.

In Germany, the identification of the tasks performed within an occupation is usually based on survey data (BIBB-IAB or BIBB-BAuA employee surveys). However, similar to the USA's O*NET, an expert database in Germany describing, among other things, the tasks usually performed in different occupations is regularly used in the context of career guidance and in matching unemployed to suitable jobs. This is the BERUFENET produced by the German Federal Employment Agency,

Career advice and guidance (CAG)

The main provider of career and vocational guidance is the Federal Employment Agency. Persons interested in guidance can make an appointment with a career advisor at the local Federal Employment Agency. Careers advisors also visit schools to provide career and vocational guidance. The Federal Employment Agency operates several local *Berufsinformationszentren* (BiZ, career / occupation guidance centres) that provide personal career and vocational guidance concerning dual and tertiary training, career choices, retraining, and further training. However, career and vocational guidance provided by the Federal Employment Agency is based primarily on short-term indicators rather than on long-term regular and comprehensive skills forecasts. This is due to the – probably exaggerated – fear that vocational guidance based on long-term trends may lead to a “hog-cycle” that risks producing over-supply in the long run (predictions of good employment prospects leading to too many people making that career choice).

Guidance for pupils and persons who finished school is given by the Federal Employment Agency. It is furthermore given directly in schools and therefore a responsibility of the Länder Ministries responsible for education, and of municipal bodies. Initial vocational guidance for persons interested in non-tertiary (dual) or tertiary training is the responsibility of the local industry and trade chambers (Industrie- und Handelskammern), the craft chambers (Handwerkskammern), institutes of tertiary education, and of the Länder Ministries responsible for education and municipal bodies (via career guidance in school). Adult education guidance is given by the Volkshochschulen (adult education centres providing

evening classes), the above mentioned chambers, the Federal Employment Agency, and further training providers. Vocational guidance for persons returning to working life, for persons who want to follow a new career path, and for unemployed persons is provided by the Jobcentres of the Federal Employment Agency, by municipal bodies, and by the Volkshochschulen.

4.5 Evaluation

It is not always clear to what extent policy decisions were based on the results of regular and comprehensive skills forecasting approaches. Due to the fragmented skills governance system in Germany, no single (public) institution is responsible for the evaluation of this issue.

However, the German skills governance system seems to be able to produce the kinds of information demanded by stakeholders. For example, according to an interviewee of the Association of German Chambers of Commerce and Industry (DIHK), one main problem in adapting to future skills needs is the lack of fundamental research regarding issues such as the impacts of digitalisation of the labour market. The German skills governance system seemed to have detected this lack of information. The 2016 runs of the two most important long-term multi-level labour market forecasting instruments QuBe - Qualifikation und Beruf in der Zukunft (Qualifications and Occupations in the future) and Arbeitsmarkt 2030 (The German labour market in the year 2030) both focused on this topic precisely, and a number of other studies in the areas have been recently commissioned and published by several ministries and stakeholder associations.

Overall, many institutions provide valuable and methodologically sound LMI, however the usage of the information across institutions and coordination and collaboration to benefit from cross-fertilization is not necessarily well established. For example, the long-term (or mid-term) forecasts are traditionally not used in the BERUFENET database that is used as for general career guidance.

4.6 Key lessons

The wide range of skill forecasting and skill assessment instruments developed in Germany has the advantage that many viewpoints and angles are analysed in the public debate. However, they can also lead to a lack of focus in the debate while interest groups shop around for the study or instrument that backs their specific political opinions. The amount and assessment of information can overwhelm both political and economic actors, as well as other labour market participants, with too much and too diverse information.

In Germany, no single mechanism is established that systematically regulates the transmission of skills intelligence information. The individual end user is mostly on his own in interpreting the information produced. This requires a sound knowledge about the German labour market and research methodology, even more so when interpreting information provided by interest groups, e.g. stakeholder associations, and for studies where the research methodology is not explained in detail. The different forecasting approaches and models could, therefore, be better connected and a platform for a discussion of different forecast results set up to allow easier interpretation.

Particular types of forecasts are often carried out on behalf of a political institution for several years before they are discontinued or significantly revised. The direct comparability of the

results may therefore be limited to these years. However, it can be assumed that the informal way the German skills forecasting system is set up allows for higher flexibility in adapting skills forecasts to newly emerging labour market trends and threats.

The influence of LMII on labour market policy and CAG is difficult to assess, although there is much anecdotal evidence to suggest that it does not go unnoticed by labour market participants.

5. Lessons from the Netherlands

5.1 Introduction

The Netherlands has a long tradition of economic forecasting in general, but also skills forecasting. The Dutch Bureau for Policy Analysis ('Centraal Planbureau'), established in 1945, has, for many years, analysed the effects of current and future government policies. Its founding director was Jan Tinbergen. The focus of its research was on the macroeconomic effects of policy, forecasting, and policy evaluation. While funded by the Ministry of Economic Affairs (MEA), it is still deemed independent. It also publishes on labour market issues, yet without formally and regularly modelling detailed skills forecast.

The predominant player in labour market and skills anticipation is the Research Centre for Education and the Labour Market (ROA) based at Maastricht University. This institution was established in the late 1980s to focus specifically on skills. There are now three main elements to ROA's research into qualification and the labour market. ROA monitors school leavers through tracer studies at various education levels. They perform sector studies, and they have developed a general regularly updated skills forecast. The latter is based on a quantitative macroeconomic model, estimated using econometric methods.

Since the 1990s ROA has conducted research among recent school-leavers in most sectors of education in the Netherlands. The surveys among different groups of school-leavers have been standardized, and the resulting data have been integrated into a single School-leavers Information System (SIS). The system is designed to function as a monitoring instrument for the transition from school to work, covering the full breadth of the Dutch education system. ROA bears the responsibility for the design, implementation and management of SIS.

The forecasting project (POA) focuses on the match between education and occupation. It is described in more detail below.

The sector studies are more *ad-hoc* and cover various sectors. Only the large 'Metalektro' encompassing metallurgy, ship-building, car manufacturing as well as machine-building, electro technical industry, are updated regularly. This includes employer surveys as well as other means of labour market monitoring and evaluation.

Another important skill forecast is performed by the Dutch Public employment services 'UWV Werkbedrijf' (PES). While it is less elaborate and detailed than the one carried out by ROA, it plays an important role in allowing the PES to understand labour market trends. The Dutch PES uses data from Statistics Netherlands, along with their own data on the professions and qualifications of people who receive Unemployment Benefits. PES has data for economic sectors and regions.

5.2 How it is done

The main skills forecasting model is the POA ('project onderwijs en arbeidsmarkt', i.e. the project on education and the labour market). This has been developed from scratch by ROA. It focuses on the match between education and occupation. It models the labour market in detail, differentiating demand for and the supply of skills. It generates (biannually) mid-term forecasts / labour market perspectives (5 years ahead) for about 100 educational

programmes and for more than 100 occupations in 21 sectors of economic activity. These forecasts, with a lower level of detail, are also translated into 35 labour market regions.

The model has been continuously developed and enhanced over the past 30 years. Using a macroeconomic forecast of economic sectors (based on the CPB official forecast) as given, it develops forecasts of supply and demand, with a subsequent analysis of imbalances. Supply is derived from administrative flow information on school attendance and (historic experience of) graduation rates. On the demand side, next to the calculation of occupation specific trends, it has an elaborate modelling of replacement demand by occupation, age and gender. Supply and demand are combined, while also modelling substitution processes on the Dutch labour market. In this way, ROA computes early warning indicators for imbalances by occupation and qualification. As part of the project, a LMI database is generated that summarizes the information generated through the forecast, but also including other current labour market information generated from the LFS of Statistics Netherlands combined with administrative sources of (among others) the school registers and the social security databases.

The forecast is funded largely by the Dutch ministries. These include the Ministry of Education, Culture and Science (OCW), the UWV Werkbedrijf, the Ministry of Economic Affairs (EZ), the Ministry of the Interior and Kingdom Relations (BZK), the Ministry of Social Affairs and Employment (SZW), and in addition the Dutch PES (UWV Werkbedrijf), the foundation for the Co-operation Vocational Education, Training and the Labour Market (SBB) and Randstad Nederland. All financing organisations get early access to the results and are part of the stakeholder groups discussing the results and determining in-depth studies or scenarios. They do not, however, have a direct influence on the outcomes of the forecast.

5.3 Who is involved

The government, mainly through the three ministries – the Ministry of Social Affairs and Employment, the Ministry of Education, Culture and Science, and the Ministry of Economic Affairs, are an important stakeholder in the Netherlands. They steer education and training provision and organize the tripartite discussions on labour economic (and social) issues between unions, employers and the government. They fund the Dutch PES (UWV), education organisations, but also the social economic council (SER), research institutions and education institutes.

Along with the other stakeholders, these organisations – ministries or financed independent bodies, address imbalances on the Dutch labour market at a national and regional level. The Dutch sectoral training funds also play an important role here. Financed by a share of the total wage bill of each company, they provide labour market intelligence, training, and a forum for discussion that brings together unions and employers who are also supervising their work.

The results of the forecasts, together with the tracer studies, are discussed with the various councils of higher education (at the university, technical college, and vocational school level respectively) as well as with individual schools, colleges and universities.

5.4 How it is used

The Dutch forecasts and labour market information are widely used in research and policy. The early warning indicators are useful to: young people when considering their educational and occupational choices; the unemployed and unemployment placement officers when considering retraining or career changes; employers in their hiring policy; and to policy makers who are concerned about the optimality of the match between educational demand and supply in the labour market. The information is processed into simplified presentations (“traffic lights”) that summarize the labour market situation for qualifications (or occupations) in a simple fashion. In addition key statistics on wages, employment opportunities and experiences of recent graduates by type of qualification are presented.

For the professional public, the biannual report contains detailed interpretations of the results by supply, demand, and imbalances and in addition two chapters on a specialized subject (e.g., in 2015 the topics covered were “inclusion in the labour market”, and “changes in occupational structure of the past 20 years”; in 2013 the topics were “the specialisation or generalisation of qualifications” and “regional labour markets for vocational training”).

All studies containing forecasts are readily available on the Internet. There are also sector level organisations, such as employers' associations that use data to report trends to their members so as to inform them where labour market shortages or surpluses might occur. As such they are a source of information for employers that want to develop future policies for personnel. The more active employers' associations also host workshops where views, information and best practices are shared. Some even develop regional level 'transition pools' where employers may exchange personnel so as to develop employment security within the region and economic sector, and thus help to retain skills for the sector.

5.5 Evaluation- how successful it has been and how (if at all) it has been evaluated

Skills forecasts in the Netherlands are generally considered valuable and successful. The outcomes are widely discussed and receive media attention. In addition, they play an important role in the information provided to graduates in the process of career guidance using simplified yet relevant information.

At the professional level the forecasts play a very important role. Imbalances identified are generally discussed among all stakeholders. Policy actions and stakeholder actions are taken and sometimes coordinated based on these outcomes. The forecasts, along with other information on the relevance of qualifications have also played a pivotal role in deriving contents for existing qualifications, but especially in the decision to finance new qualification programmes.

ROA has a self-evaluation of components of the model that are published regularly.

5.6 Key lessons for the future

The Dutch economic model is based on corporatism in which all stakeholders attempt to cooperate in various forms. In this context, an empirical independent forecast of the labour market by qualifications and occupations is able to play an important role in the discussion among professional stakeholders.

The process of combining analysis of several topics on skills, qualification and occupations within a single independent institute has proven successful in nurturing the build-up of organisational knowledge within that institute, but also in recognition of the independence and reliability of the results in the rest of the country. While the institute (ROA) is not a single actor able to provide all relevant research and output on this topic, it has allowed the build-up of a critical mass of research and people involved which would otherwise be hard to finance in an economically medium sized country.

More recently, there has, however, been a tendency towards more tender based studies, which spread the financial resources more widely (and thinly) at the cost of less focussed and integrated research agendas.

6. Lessons from the USA

6.1 Introduction

Systematic and regular skills forecasting has been carried out in the USA for well over half a century. The rationale for such work has changed over time. The earliest efforts were focussed on trying to help manage war veterans returning to the labour market. The first *Occupational Outlook Handbook* was published in 1949 in recognition of veterans' need for guidance when re-joining the civilian labour force. There was a strong belief at that time that systematic scientific methods could be used to predict the course of the economy and labour market and help to plan education and training systems accordingly. This rather "mechanistic" approach to "manpower planning" soon ran into problems because of its failure to take into account social and economic aspects of the way labour markets work.

More recently, it has been recognised that, while it impossible to predict the future of the labour market in detail and with precision, it is possible to identify robust trends and patterns that can be used to inform labour market participants about the world they are likely to face. So, while most skills forecasters will readily admit nobody can predict the future with any precision or certainty, they would argue that everyone can plan and prepare for it (and that this requires some insight into what the future might look like). The key question therefore is not whether or not such projections should be undertaken, but how they should be done.

One option is to allow everyone to make up their own minds and make their own projections. Letting markets resolve matters was a key slogan of the 1980s, but recent events have caused many to question whether markets can always be relied upon to deliver optimal solutions. Another option is to recognise that there is a public good argument for providing such information, explicitly, transparently, systematically and centrally. The US has followed the latter course. The key rationale for the US government investing in this kind of work is to better inform labour market participants and to make labour markets work better.

The Bureau of Labor Statistics (BLS) has been producing detailed occupational employment projections, over a 10-year horizon, roughly every two years, since 1949 with the most recent results being published covering the period 2014-2024 (see example⁸). More recently, the main emphasis has been on developing systems focussing on the skills required within different occupations.

6.2 How it is done

The current US approach to anticipating changing labour market trends is the result of over 60 years of systematic investment in data and methods. It has evolved into a complex and sophisticated system involving many inter-related elements. The approach can be regarded as being based on three key pillars:

1. the Occupational Employment Statistics (OES) Survey;
2. BLS models and systems for projecting the labour market;
3. the O*NET system for identifying skill requirements within occupations.

The focus of the OES survey is on providing a robust and detailed view of current occupational employment within sectors, BLS models help to assess how this might change

⁸ Bureau of Labor Statistics, Employment Projections: <http://www.bls.gov/emp/>

in the future and O*NET enables users to then assess the implications of this for changing skill requirements and how this affects their own choices and decisions. In order to achieve a robust and detailed picture of current skill demand, a comprehensive survey of employers' occupational skill needs is essential. The employer perspective, based on actual behaviour (the kinds of jobs they actually pay to have done), provides crucial insight into how demands are changing, and delivers sufficient detail to make this useful to a wide range of users. The Occupational Employment Statistics (OES) survey fills this role in the US, delivering robust and very detailed data, on both occupational employment and pay *within sectors*. From an economic perspective it is difficult to over-emphasise the importance of pay. Any attempt to understand the possibilities of substitution of one skill category for another is dependent on having a measure of relative pay, as well as relative employment levels. At present, there is no equivalent data source that gives such a detailed and robust picture of how skill demands are changing in the UK (nor in most of the rest of Europe).

While there is not much survey based evidence on this, several European countries have been using administrative (usually social security based) data to try to achieve the same end (e.g. in Norway), there is in some respects a surfeit of information. However, the challenge in many countries lies in the following points:

- Data protection does not allow the usage or linking of the administrative sources;
- Administrative sources are not reliable in the identification of information which is not at the core of their purpose (i.e. occupations in German social security pay data).

The BLS conducts regular and systematic occupational employment projections based on the firm foundation provided OES and a detailed assessment on the employment prospects for sectors based on multi-sectoral macro-economic models. The Office of Occupational Statistics and Employment Projections (OOSEP) within the BLS currently carries out projections in the following areas:

- Labour force;
- Macro-economy;
- Industrial production & employment;
- Occupational demand (employment).

The occupational employment projections comprise two main elements:

- Detailed sectoral projections generated by the multi-sectoral and macroeconomic models; and
- Projections of detailed occupational staffing patterns within sectors.

With a few notable exceptions, the general approach is similar to that in many other countries, including the UK. The main differences compared with the UK's *Working Futures* methodology are as follows:

- The BLS uses a non-integrated input-output model (in *Working Futures* the input output model is fully integrated into the multi-sectoral macroeconomic model);
- The BLS projections model assumes full employment, but the treatment of the labour force is not fully integrated, although the BLS treatment of labour supply has greater detail than in *Working Futures*, including (for example) information on ethnicity;

- Most significantly the BLS occupational analysis is much more detailed, distinguishing over 800 detailed occupations (based on the OES), as compared with typically 25 categories in most of the *Working Futures* projections);
- The occupational modelling and projections are based on a more eclectic and qualitative methodology (*Working Futures* uses a statistical approach, albeit tempered by considerable judgement);
- The OES is not used by the BLS to develop a time series. Rather it aims to provide a very robust and detailed picture of **current** occupational employment within sectors. The BLS has not done much work to try to harmonise across classifications over time, placing much more emphasis on analysts' judgement about future trends.

The key areas where the UK might learn from US experience are primarily related to these last three points, which are to some extent interlinked. It is notable that the US does not do a national employer survey of vacancies and skill deficiencies, although some individual States do this (for example Minnesota, Washington and Colorado).

O*NET is the primary source of occupational competency information in the US. It is available to all users online, for free. At its core is the O*NET database which contains detailed data on a large range of occupation-specific indicators, including tasks undertaken, pay and technical requirements. The database is updated on a continuous basis, drawing upon customised surveys and other material. The data collection and validation process for O*NET is complex.⁹ O*NET has been described as a “common language and dynamic system for describing the world of work for both the public and private sectors”. It is a comprehensive system for collecting, organising and disseminating information on occupational and worker requirements, based around the notion of competency, with emphasis on skills transferability. The US has invested many millions of dollars in refining the O*NET system over the past 3 decades.

The UK has a much more modest Skills and Employment Survey,¹⁰ which provides similar kinds of information on patterns and trends in what people do at work, what skills they use and how they work. However this is carried out on a much less detailed level than O*NET. The UK also has recently developed the LMI for All data portal. The latter makes some use of the US O*NET data base, but there is scope for much greater use and more investment in this area.¹¹ Generally, the current scale of UK investment in this area is very modest compared with the US.

⁹ See Wilson (2010) Lessons from America: a Research and Policy Briefing. UKCES Briefing Paper Series UK Commission for Employment and CE Wath on Dearne

¹⁰ See Felstead, Green *et al.* (2012) Skills and Employment Survey 2012. Please note: this is not to be confused with the UK Employers Skills Survey commissioned by UKCES which is a much larger survey of employers focusing in recruitment difficulties

¹¹ See Hillage and Cross (2015). Exploring the value of an O*NET resource for the UK. Report from a workshop held in London, June 2015 Institute for Employment Studies: Brighton.

6.3 Who is involved

This work is essentially carried out under the auspices of the Federal Government, although many individual states complement and extend this with their own analyses. Here is also a small industry that has developed in the private sector which uses the BLS data and adds value to it in various ways before selling on to final users.

Unlike many countries in Europe, there is no extensive involvement of social partners. Of course the US is large and corresponds to something more like the EU than to individual countries in terms of size and capacity.

In terms of the intended audience, this work is now aimed a very broad range of users, effectively all labour market participants including:

- The media;
- Policy makers;
- Education and training providers;
- Employers;
- Individuals making career choices and decisions.

6.4 How the information is used

The results of the BLS occupational projections are published in a wide variety of formats for the various audiences:

- *Monthly Labor Review* (MLR) articles;
- *Occupational Outlook Handbook* (OOH);
- *Occupational Outlook Quarterly* (OOQ);
- *Chartbook* (charting the projections);
- *Job Outlook in Brief*;
- *Career Guide to Industries* (CGI);
- *Occupational Projections and Training Data* (OPTD).

The BLS Projections and the O*NET database are used for a variety of purposes, including:

- Career choice and education and training investment decisions;
- Design of education and training courses;
- Economic development and labour market policy;
- Private consultancy and research;
- Academic research in the U.S. and abroad;
- Informing the public about trends and developments.

The role in CAG and making labour markets work better has become progressively more important over time

The information from the OES survey is made available to a wide range of users via the internet. Feedback from users, again much of it online, confirms substantial use of the OES data. There are many users and uses. These include:

- A central input into the BLS employment projections;
- An input into “prevailing wages” for the Foreign Labor Certification program, online wage library;
- Basic information for the America’s Labor Market Information System (ALMIS) online labour market database;
- Labour market information (LMI) for the America’s Career InfoNet online career information centre;
- General LMI for human resources professionals, students, job seekers, guidance and career counsellors, academic researchers, media, etc.

Employer uses of OES data include:

- Comparing internal salaries for specific jobs to the averages for similar jobs in their local area;
- Comparing their salaries to what other industries are paying;
- Setting new payroll scales to stay competitive in the job market; and
- Deciding whether to expand their company, either in their current area or some other part the country.

Emphasising these uses to participants of the survey is an important aspect of encouraging participation.

O*NET is used by a wide range of different individuals and organisations, including:

- Students;
- Young people and other labour market entrants;
- Job seekers;
- Employers in general;
- Business analysts;
- Workforce and economic development specialists;
- Organisational consultants;
- HR professionals;
- Training specialists;
- Careers counsellors;
- Government officials and policy makers;
- The military;
- Education and training providers;
- Teachers and lecturers;
- Researchers.

Amongst employers, O*NET is used for:

- Job matching, recruitment and training activities (including writing job descriptions, identifying competencies skills gaps and training needs);
- Developing training programmes and curriculum;
- Other human resources planning and related activities;
- Business forecasting and analysis.

It is widely used in large organisations and corporations, in both private and public sectors, including many famous names such as Boeing, Manpower and Microsoft, but its availability via the net also makes it accessible to small and medium size enterprises and individuals. Individuals use O*NET for career exploration and development, job search and employment transitions. O*NET enables people to learn what jobs might fit their personal interests, skills and experience as well as highlighting the different skills required for different jobs and which occupations and industries are in demand based on the latest workforce information. The system identifies success factors associated with different occupations, including the types of qualifications and competences need to enter and advance in that particular job.

6.5 Evaluation

The BLS regularly monitors use of O*NET and its other systems. It reports extensive downloading of data and reports and widespread and intense use of its websites.

Response rates to the O*NET surveys are generally very good, all of which points to a service which is regarded as of great value by its users. Many of the users of O*NET are very positive. For example the Brookings Foundation said:

*“We find that O*NET is indispensable to the development of the nation’s workforce. By providing a common taxonomy and highly detailed information on the characteristics of 800 occupations, O*NET:*

- *serves as the foundation for critical workforce delivery systems,*
- *enables interaction and cooperation across the workforce development community, and,*
- *most importantly, allows jobseekers, employers, educators, and workforce professionals to make more informed choices.”¹²*

An official, but independent, evaluation of O*NET (at Federal level) was initiated in 2008 and reported in 2009.¹³ This concluded that the Department of Labor has demonstrated the usefulness and value of the publicly funded O*NET system and that it should focus its attention on continuing to maintain and publish the core, high quality database leaving the development of new applications and tools based on this foundation to the private sector state and local governments and other educational institutions.

6.6 Key lessons

The United States has been undertaking regular employment projections for decades. It invests substantial resources in such activity (many millions of dollars over the past 5 or 6 decades). A number of important lessons can be learned from this experience.

¹² See: <http://www7.nationalacademies.org/cfe/Andrew%20Reamer%20Comments%20on%20ONET.pdf> for some other, typically positive, endorsements.

¹³ See for example The National Research Council’s review of O*NET (2009), which describes the cost of data collection and the benefits of the database in its use for state workforce development, career development, human resource development and research, available at: http://books.nap.edu/catalog.php?record_id=12814

The first relates to the rationale for doing such projections. They are undertaken in the US to help inform individual labour market participants and make labour markets function efficiently (as opposed to conducting centralised, top down planning). At their root is the idea that there is a very strong public good argument for providing detailed labour market information, explicitly, transparently, systematically and centrally. Thus, despite the primacy given to market forces, projections are seen as a valuable, indeed essential, element in making markets work better.

A second lesson is that a very detailed analysis of changing occupational employment structure is both valuable and necessary in order to provide labour market participants with the information they need to operate efficiently and effectively in a market economy. The US example shows the general benefits of investing substantially and systematically over an extended period of time in data, standard systems of occupational classification, as well as models, methods and systems. It highlights the centrality of a detailed occupational analysis in a quantitative assessment of the changing demand for skills. Such detail provides insight into the key drivers of changing skill demand, including technological and other changes. It highlights the implications of these and other key drivers for changing skill requirements (differentiated by detailed occupation and sectoral categories).

A crucial factor here is the importance of obtaining a detailed and robust picture of the current demand for skills. This is achieved in the US by their Occupational Employment Statistics (OES) survey, which asks employers factual questions about their actual employment of skills (both numbers and the rates of pay). Skills can be measured in a variety of ways, and occupation is just one approach. Others include formal qualifications and various indicators of so called “soft” or generic skills. But the US approach emphasises the centrality of occupation. Scientific progress requires taxonomy and measurement for each of these. A fundamental gap in the UK is the lack of really robust and detailed information on occupational employment structure based on employer perceptions. The Labour Force Survey based on a survey of households is a poor substitute, both because of its limited sample size and the fact that it is based on self-reporting of individuals. Detailed data on occupational employment by sector, based on the numbers employers actually employ rather than perceptions, is a crucial part of the US statistical infrastructure that underlies its approach to these matters. This information is not just needed for projections but is an essential element in understanding the current situation.

Without these core data, it is impossible to quantify skill demand in a meaningful fashion. In order to achieve this, a survey of employers is essential, not to take their views and opinions (as UK Skills employers have tended to do) but to focus on what they actually do, (i.e. to measure the skills employers reveal they require by their actual staffing patterns. The focus on how they behave is the key - who do they employ and in what positions, and how much do they pay? Other surveys can then help to translate this into demand for qualifications and soft skills.

A further lesson that emerges from the US approach is the emphasis placed on a combination of both quantitative and qualitative methods when making projections of likely future occupational employment trends. Existing data sources in the UK are not able to provide robust estimates at a detailed occupational level. Qualitative judgements are therefore important to fill the gap. The focus in the US is on how detailed occupational patterns change within sectors. In order to do this, specialist analysts are deployed

concentrating on each sector to examine all the evidence on how the demand for skills is changing. This is then combined with a multi-sectoral macroeconomic approach to take account of changing economic forces in a systematic and transparent manner. In the UK, this points to lessons for how sector based work (building upon the expertise within SSCs might be more closely integrated with the *Working Futures* type quantitative projections funded (up until recently) by the UK Commission for Employment and Skills (UK Commission).

The final lesson from the US experience relates to the value of the US O*NET system which focuses in more detail on changing generic skill needs within occupations. While it has been designed for the US, there is considerable potential for it to be exploited in other countries. Many of the characteristics of jobs are common across countries, and the O*NET system has already been applied (with only minimal modification) to a number of countries outside the US. With modest additional investment substantial benefits could be achieved by exploring how the insights from O*NET about changing skill needs within occupations could be applied at both a UK and pan-European level.

The costs of conducting the OES survey, the related projection activities of the BLS, and the complementary O*NET system are substantial. However, the consensus in the US is that these costs are small compared to the potential benefits. Although the latter are regarded as difficult to quantify, the BLS (and many others) argue that they are very large. This is an investment which is seen as paying for itself. In the case of the US, the investment is supported by a government interested, not in trying to plan the future in precise detail, but one interested in informing its citizens so that they can make the right decisions about which skills to invest in.