

# Lessons from America: A Research and Policy Briefing

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# **Lessons from America: A Research and Policy Briefing**

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## Summary

The United States (US) Bureau of Labour Statistics (BLS) has been undertaking regular employment projections for many years. It invests substantial resources in such activity. This paper considers why, and what lessons can be learned from the US experience.

The first key lesson 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 (not in order to conduct 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.

The second key 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 in data, standard systems of classification, as well as models, methods and systems. It also 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, and the implications of this for skill requirements (which are differentiated by detailed occupation and sectoral categories). The focus is on providing a robust and detailed view of **current** occupational employment within sectors.

The third lesson is that, in order to achieve this detailed picture, a comprehensive survey of employers' occupational skill needs is an essential component of the whole approach. An 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, which are highly valued by various users. 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 (either in the UK in particular, nor in most of Europe in general).

Skills can, of course, be measured in various other ways, including qualification and “soft” or generic skills. Scientific progress requires taxonomy and measurement for each of these, as well as occupation. But the most fundamental gap (in the UK and more especially across Europe as a whole) is the latter, especially robust and detailed information on occupation by sector. This is a crucial part of the statistical infrastructure. It is not just needed for projections but is an essential element in understanding the current situation. Other things are also important, but 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 but to focus on what they actually do, (i.e. to measure the skills employers reveal they require by their actual staffing patterns (not necessarily what they perceive or say)? The focus on how they behave is the key - who do they employ and in what positions? Other surveys can then help to translate this into demand for qualifications and soft skills.

The fourth 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. 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 might be more closely integrated with the Working Futures type quantitative projections funded by the UK Commission for Employment and Skills (UK Commission).

The final lesson that emerges relates to the potential value of the 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 what skills to invest in.



# 1 Introduction

## 1.1 Background

The United States (US) Bureau of Labour Statistics (BLS) has been undertaking regular employment projections since the end of the Second World War. It has invested more resources in such activity than any other country. Both these facts suggest that the UK may have something to learn from how the US approaches these matters. This briefing paper provides a summary of the US methodology, including its rationale. It then draws out a number of lessons that might be learned from this experience that can help identify priorities for future research and development for the UK Commission for Employment and Skills (UK commission).

It is of course not always possible to transplant systems and approaches from one country to another. Differences in culture, institutions, and statistical infrastructure have a strong influence on what is possible. These constraints need to be recognised in any attempt to transfer practice across national boundaries. It is also important to recognise that many other countries have also made significant advances in their approach to anticipation of labour market change over the past 50 years (not least in Canada and the Netherlands), and there may be other valuable lessons to be learned from this experience. However, the focus here is on the US approach.

## 1.2 Rationale and history

The rationale for undertaking forecasting and projection activity has varied considerably across countries and over time. In broad terms this falls into two camps:

- those concerned with detailed planning of the education and training systems and /or the labour market; and
- those concerned with providing labour market and related information and intelligence that can help markets to function better.

The US approach has had elements of both, with the earliest efforts being focussed on trying to help manage the process of war veterans returning to the labour market. The first *Occupational Outlook Handbook* was published in 1949 in recognition of veterans' need for guidance when rejoining the civilian labour force.<sup>1</sup> This was characterised by detailed occupational employment projections, over a 10-year horizon, which have subsequently been updated roughly every two years, with the most recent results being published in 2009, covering the period 2008-2018.<sup>2</sup>

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<sup>1</sup> Celebrating its 60<sup>th</sup> anniversary in 2009.

<sup>2</sup> See BLS (2009).

As with efforts in many other individual countries, and international projects such as the “Mediterranean project” set up to aid post-war recovery in Europe, there was a strong belief in the 1950s and 1960s that central planning could help in the achievement of broad social and economic objectives. This recognised that although it may have caused many problems, Fascist and Communist states had demonstrated that much could be achieved by centralised planning (although often with many unforeseen and undesired consequences).

Many of these early efforts at so called “manpower planning” faltered in the face of inadequate data, and unrealistic and untenable assumptions about how the economy and labour markets work. The general collapse of Communism in the 1980s as the prime form of governance (in most countries at least) and the general acceptance of the power and significance of market forces, accelerated the demise of mechanistic and indicative manpower planning in most (if not all) countries.

Despite these setbacks it is apparent that there is still a huge demand for information about what the future might look like, from both policy makers but also a much wider audience. While it is generally recognised that nobody can predict the future with any precision or certainty, it is also true that everyone can plan and prepare for it (and that this requires some view of what the future might look like). The key question therefore is how this is done. One possible option is to allow everyone to make up their own minds. Letting markets resolve matters was a key slogan of the 1980s, but recent events have caused many to question whether markets can be relied upon to deliver optimal solutions.

The other main 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 second course. This is perhaps the first crucial lesson from US experience.

### **1.3 The Three pillars of US anticipation of labour market trends**

The current US approach to anticipating changing labour market trends is the result of many years of systematic investment in data and methods. It has evolved over the years into a complex and sophisticated system, involving many inter-related elements. This note aims to provide a broad overview of the key components in the current approach rather than a detailed technical description or a complete history of how this has been developed. The references provided in the bibliography allow the interested reader to follow these up if required.

The approach can be regarded as being based on three key pillars:

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

Each of these is discussed in turn.

## 2 BLS models and systems for projecting the labour market

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 multi-sectoral and macroeconomic models; and
- Projections of detailed occupational staffing patterns within sectors.

The general process and the links between the various elements are set out in Figure 1. 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 use a non integrated input-out model (in *Working Futures* the input output model is fully integrated into the multi-sectoral macroeconomic model);
- The BLS projections model assumes full employment;
- The treatment of the labour force is also not fully integrated;
- However, the BLS treatment of labour supply has greater detail than in *Working Futures*, including information on ethnicity;
- The BLS occupational analysis is also much more detailed, distinguishing some 800 occupations (based on the OES), as compared with typically 25 (or at most 75 in the Qualifications projections work) carried out in *Working Futures*);
- 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 areas where the UK might learn from US experience are primarily related to these last three points, which are to some extent interlinked, as will become apparent from the discussion below.

It is notable that the US does not do a national employer survey of vacancies and skill deficiencies, although some individual States do this (including Minnesota, Washington and Colorado). Each of the main elements of Figure 1 is now discussed and comparisons made to the *Working Futures* approach.

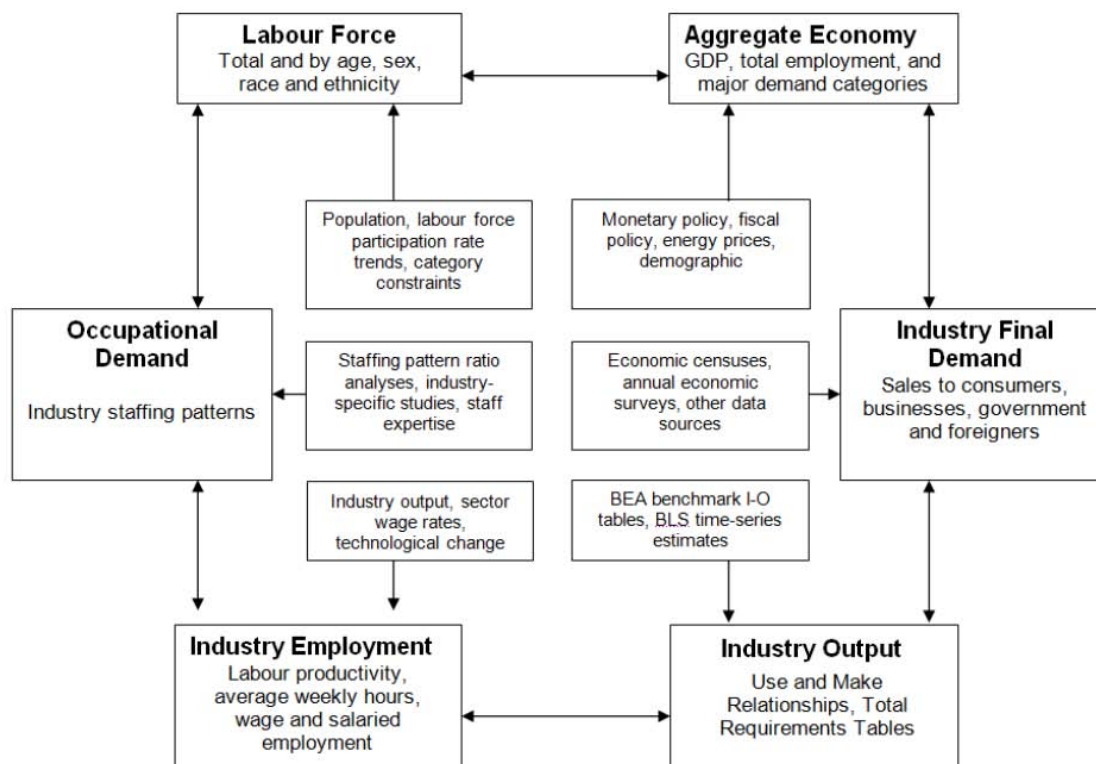
## **2.1 Labour Force**

The Labour Force is comprised of all those aged 16 and over who are:

- working at full- or part-time jobs;
- unemployed but actively seeking work;
- not on active military duty;
- not institutionalised.

It is projected based on independently produced demographic projections of the population by age, gender and ethnicity. Projections (based on largely extrapolative techniques) of labour market participation rates for the same categories are then applied to the population numbers to get the labour force. This is similar to the *Working Futures* approach, although the latter makes greater use of behaviourally based econometric analysis.

**Figure 1: Overview of the BLS Projection Methodology**



The overview of macroeconomic prospects is based on the Macroeconomic Advisers (MA) Quarterly Model. This is a comprehensive macroeconomic model but not one that includes detailed industrial analysis. The key exogenous assumptions include:

- demography;
- energy prices;
- monetary and fiscal policy.

It generates results on:

- GDP (and all the usual components of aggregate demand);
- aggregate employment, by household and establishment;
- labour productivity;
- unemployment rate;
- inflation (GDP price index);
- federal budget deficit/surplus;
- foreign trade deficit/surplus.

This is then translated into implications for detailed industry demand by an “industry-by-commodity” total requirement table, which shows the output required of each industry per dollar of commodity final demand. This is then used to drive the projections of industry employment. The relationship used takes into account changes in average weekly hours, and also allows for substitution effects by including the real wage as a determining factor. The results are evaluated to consider:

- the rates of growth of employment output, labour productivity;
- how ageing capital stock might slow productivity growth; and
- how infusions of new capital might generally increase productivity growth.

The general approach is similar to that used in *Working Futures*, except that for the latter an integrated multi-sectoral dynamic macroeconomic (MDM) model, with embedded input output tables, is used. The level of industrial disaggregation in MDM is however much less than the BLS uses. MDM distinguishes 41 (2/3 digit) industries whereas the BLS approach identifies some industries down to the 5 digit level. The general approach to anticipation of changing skill needs in the UK has recently shifted the emphasis towards the Sector Skills councils of which there are currently 23, with “footprints” cutting across Standard Industrial Classification boundaries.<sup>3</sup>

## **2.2 The occupational projections**

The BLS method for translating the industry employment projections into occupational “demand” focuses on projecting so called “staffing patterns”. In combination these produce overall occupational employment (demand). An industry’s “staffing pattern” is measured by the shares of occupational employment in a specific industry.

Changes in occupational employment are attributed to

1. Changes in the total level of employment in the industry in which the occupation is found;
2. Changes in staffing patterns.

National industry-occupation matrices of employment levels for historical and future years are derived by applying the staffing patterns to the industry employment estimates and projections.

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<sup>3</sup> For details see the *Working Futures Technical Report* (Wilson et al. (2009)).

The key data sources for base-year staffing patterns are:

- Current employment statistics (CES) survey (base year employment in almost all industries);
- Occupational employment statistics (OES) survey (staffing patterns in almost all wage and salary industries);
- Current population survey (CPS) (self-employed and unpaid family workers and agricultural production and private household industries).

Estimates of wage and salaried employment (based on the OES) are combined with self-employed and unpaid family worker employment (from the CPS) to produce total employment for each occupation.

The methods for projecting future staffing patterns are eclectic. They involve a review of historical data and trends, and much research and analytical judgement. The projections of occupational employment shares are produced by a combination of fairly simple extrapolations of historical trends in occupational patterns within sectors,<sup>4</sup> combined with analytical studies of specific industries and occupations, technological change, a variety of other economic data, and judgements about how things will change in the future. This is as much a qualitative as quantitative process, involving dedicated and specialist BLS sectoral analysts, who are expected to collate views from their sectors and occupations, as well as conducting their own quantitative and other analysis (including case studies, involving talking with those responsible for training, and to professional organisations, etc). There are around 16 full time analysts employed in this capacity, which takes up around 50% of their time. The investment in this activity by BLS is therefore substantial and central.

This is, in part, an iterative process, in which staffing ratios for particular individual occupations are projected to increase, decrease, or remain unchanged, reflecting the evidence available. The outcomes are then adjusted until a consistent overall picture emerges, with numbers adding to the overall industry total. The process is subject to peer review within BLS before they are published.

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<sup>4</sup> In most countries, including the UK, the analysis of occupational shares within industries is quite simplistic, involving simple trend extrapolation rather than sophisticated behavioural analysis. In contrast, the multi-sectoral models used to generate the sectoral projections are usually very complex, drawing upon leading edge econometric and economic theory and practice. The difference between the two elements is largely due to differences in the quality of data available to the analyst.



The degree of change for detailed occupations within a specific industry are categorised as follows (similar categories are also used when presenting the aggregate results across all sectors, although the precise numbers are also reported):

- No change: (the occupation will more or less maintain its current share of industry employment);
- Small change: (the occupation's share of industry employment will increase/decrease by 10 percent);
- Moderate change: (the occupation's share of industry employment will increase/decrease by 20 percent)
- Large change: (the occupation's share of industry employment will increase/decrease by 35 percent over the projection period).
- Very large change: (the occupation's share of industry employment will increase/decrease by at least 50 percent).

The rationale for future changes might include factors such as:

- *Changes in business priorities* (e.g. the employment shares for pharmacists may be projected to increase in grocery stores as more offer in-house pharmacies);
- *Technological change* (the employment shares for assemblers in the industrial machinery manufacturing industry may decrease because of increasing automation);
- Substitution ( the employment shares of dentists may decrease as more dental services are provided by support staff rather than dentists, as dentists delegate more tasks to assistants in order to reduce costs and raise productivity);
- *Other factors* (e.g. the employment share of legislators in State government is likely to decrease as there is fixed number that can be elected and this number will not grow as quickly as the remainder of occupations in this industry).

From this brief review it is clear that the OES (which is described in detail in the next section) is an essential element in the BLS's approach to occupational employment projections. It provides:

- **An employer perspective**, based on actual behaviour (what jobs they actually employ people in) rather than opinions;
- **Detail**, distinguishing both sector and occupation (as well as geographical area).

The detail helps in both understanding the key drivers of changing skill demand (sectoral employment) but also the implications of this for skill requirements (which are differentiated by detailed occupation, as highlighted by the O\*NET system). The key element in the US approach to employment projections is therefore the detailed review of the historical data based on the OES, combined with detailed sectoral employment projections based on a multi-sectoral macroeconomic model (incorporating a detailed analysis of the links between industries, using an input-output table showing how each industry buys goods and services from others).

### **2.3 Uses and users**

The BLS Projections are used by a wide variety of individuals and organisations including:

- Career guidance counsellors and students;
- Government agencies;
- Private consulting and research firms;
- Academic economists in the U.S. and abroad;
- Policy makers and the Media.

The results are published in a wide variety of formats for these 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).

### **2.4 Costs**

For the national projections produced by BLS, the annual budget is about \$6 million. This includes the cost of producing the *Occupational Outlook Handbook* and the *Occupational Outlook Quarterly*, which together account for roughly half the total. The Employment and Training Administration also funds the individual States for production of separate State and area level projections. The latter is part of a grant to States for production of a variety of labour market information, including projections, that in total amounts to a further \$32 million per annum, although this covers things like O\*NET as well as projections.

## **3 The Occupational Employment Statistics survey**

### **3.1 Background**

As noted above, the *Occupational Employment Statistics* (OES) survey is the cornerstone of the US system. Without it neither the detailed employment projections nor the O\*NET system could exist in their current forms.

Initiated in 1968, the OES has established a sound statistical base which supports a range of activities, including detailed projections from the BLS of occupational employment. It is also used to provide LMI to the agency responsible for monitoring migration flows. The OES is used to provide crucial information on changing patterns of labour demand, as well as wages, which are used to help identify occupations for which there is a case to allow inward migration. Data on pay (as well as employment) enables the analysis of substitution effects, as well as growth accounting.

The OES survey is carried out as part of a joint Federal-State Programme, with contributions from various parts of the Bureau of Labor Statistics and many State workforce agencies. The division of labour between these bodies is as follows:

- BLS national office: concepts and procedures; survey forms; sample selection; mail out; estimation; data quality assurance; publication and data analysis;
- BLS regional offices: training and technical assistance; liaison between national office and states; central office collection; data quality assurance;
- State workforce agencies: data collection, processing and editing; publication of State and area estimates; data analysis.

### **3.2 Method**

The OES survey is a survey of Business Establishments. Data are collected from 1.2 million establishments over a 3-year cycle. Around 400,000 establishments are sampled each year in two semi-annual panels (which allows the capture of some seasonal effects). The reference dates are 12<sup>th</sup> May and 12<sup>th</sup> November.

The sampling methodology is designed to ensure robust and precise estimates of the 800 plus occupations distinguished. This includes both variations across sectors and industries, as well as geographical areas. A technical document describes this in detail (Piccone, 2009).

Estimates are produced from the 3 years of data. Each set of estimates is based on six semi-annual panels of data, collected over the relevant three-year period. The large sample allows a great deal of occupational, geographical, and industry detail that would otherwise not be possible. The three-year collection period helps reduce respondent burden – no establishment is asked to respond more than once every 3 years, and the BLS operates sophisticated checks to ensure that other surveys are also not directed to these business causing “survey fatigue”. Each year the two oldest panels drop out of the sample and two new ones are added. Employment *levels* are benchmarked to the latest Quarterly Census of Employment and Wages (QCEW).

The sampling frame is derived from the unemployment insurance (UI) system. It consists of all non-firm establishments in the UI system. Data are collected from establishments in metropolitan and non-metropolitan areas. All establishments employing more than a certain number of workers are included in the OES sample with virtual certainty. A probability sample is taken of establishments with employment below the certainty cut-off. Education and health sectors are treated like standard private sector organisations. Federal government data and state government data come from a separate annual census.

The sample is stratified by industry and geographical area, the former using the North American Industry Classification System (NAICS). Within each stratum, there is probability sampling proportional to establishment size.

The data are collected by mail survey, although increasing use is being made of the web and other digital methods. There are two types of survey forms: structured and unstructured. Respondents can also provide data in other formats, such as spreadsheets, hard copy printouts, or by phone.

The BLS has developed sophisticated procedures to deal with different types of non-responses (sample unit fails to respond or unit provides only partial information). These include imputation procedures, based on identifying similar units (or “nearest neighbours”).

### **3.3 Focus**

The key focus of the survey is on occupational employment patterns (total employment, and occupational structure), together with corresponding information on wages (distinguished by pay intervals).

The employment data are classified using the North America Industry Classification System (NAICS) at 2-, 3-, 4- and selected 5-digit industry levels, as well as the 2000 Standard Occupational Classification (SOC) system. The latter comprises 23 major groups and over 800 detailed occupations.<sup>5</sup> These detailed occupational data form the core of the system for both the projections and the O\*NET system. Coding of occupations is based on what people do rather than the job title *per se*.

In order to help respondents to recognise the detailed occupational categories, structured forms are supplied which are specific to particular industries or groups of industries. There are currently some 97 different forms. These forms each list occupations that are commonly found in that particular sector. The forms also include industry and occupational definitions and include a supplemental page for occupations not listed separately (including any new and emerging occupations). The forms are sent to mostly larger establishments, based on State-specified cut-offs. Considerable effort is made to avoid surveying the same company more often than necessary, including keeping track of all other official surveys. Unstructured survey forms are sent to smaller establishments, again based on State-specified cut-offs. These adopt an open-ended format, with the responses being coded to occupations by OES State or regional office staff.

The OES covers full and/or part-time paid workers, including those on paid leave at the time of the survey, as well as those workers assigned temporarily to other units. It excludes proprietors, owners and partners of un-incorporated firms, self employed, unpaid family workers, workers on unpaid leave and contract workers and temporary workers not on the establishment payroll.

It is important to distinguish a few sectors and occupations in even greater detail in order to be sure of identifying them (e.g. some highly technical and specialised occupations such as veterinarians and veterinary surgeries).

### **3.4 Wages as well as employment**

The OES includes data on wages as well as employment levels. This is in the form of information on intervals rather than precise wage levels. For this purpose wages are defined as gross pay, exclusive of overtime and shift premia. A modelling approach is used to calculate the variance of the mean wage estimates and information on wage percentiles developed including the median. Mean wages for each pay interval are estimated using data from the separate BLS National Compensation Survey. Wage information collected in the earlier panels are “aged” (or adjusted for inflation) using movements in the official Employment Cost Index (ECI).

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<sup>5</sup> More information about the US SOC is available at <http://www.bls.gov/soc/home.htm>

Detailed geographical industry and occupational employment and wage estimates are produced, covering over 580 metropolitan statistical areas, metropolitan divisions and other non-metropolitan areas. These detailed results are made available annually.<sup>6</sup>

### 3.5 Confidentiality

Considerable emphasis is placed on the confidentiality of responses. Some results are censored to ensure confidentiality. For publishing purposes a cell must meet all three of the following conditions:

- Estimated employment size of at least 10 people;
- At least 3 establishments;
- At least 2 reporting establishments.

### 3.6 Uses and users

The information from the survey is made available to a wide range of users via the internet. Detailed tables are available in html format. Other current data are available via online access. 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;<sup>7</sup>
- Basic information for the America’s Labor Market Information System (ALMIS) online labour market database;<sup>8</sup>
- Labour market information (LMI) for the America’s Career InfoNet online career information centre;<sup>9</sup>
- 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.

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<sup>6</sup> For details see the OES Website: [www.bls.gov/oes/](http://www.bls.gov/oes/). Data are available in 3 forms: Downloadable zipped Excel files; Drill-down tables; and Form-based query tool (current data only).

<sup>7</sup> at: [www.flcdatcenter.com](http://www.flcdatcenter.com)

<sup>8</sup> at: [www.doleta.gov/almis/](http://www.doleta.gov/almis/)

<sup>9</sup> at: [www.acinet.org](http://www.acinet.org)

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

### 3.7 OES response rates

High response rates from employers are attributed to:

- Making it easy to take part;
- Avoiding survey fatigue by careful sampling;
- Flexible approach to data collection;
- Demonstrating value to employers (including involvement of employer organisations);
- Civic responsibility;
- Follow up, at local level; and
- Establishment of trust.

### 3.8 Lessons from the OES

In the US approach detailed taxonomy and measurement of occupational employment are regarded as central to any assessment of changing skill needs. Some might argue that it is possible to side step occupations, especially in qualitative work, but to **quantify** and anticipate changes in skills needs over time, a detailed understanding of occupational structures and trends are regarded as an essential component in the US approach, both in their own right, and as a stepping stone to drawing out implications for key/core /generic skills. This is a key lesson for both the UK and Europe.<sup>10</sup>

The US OES survey provides an excellent example of good practice. This survey delivers robust and very detailed data on both occupational employment and pay, which are highly valued by various users. 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.

The costs of conducting the OES survey, (as well as the related projection activities of the BLS and the complementary O\*NET system, which focuses in more detail on changing generic skill needs within occupations) are substantial. For the OES, the cost is about \$35 million annually. In the case of the US, this investment is supported by a government interested not in trying to plan the future in precise detail but in informing its citizens so that they can make the decisions about what skills to invest in.

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<sup>10</sup> Alongside the need at a pan-European level for better for longitudinal and demographic stock/flow data (in order to improve the supply side estimates)), see suggestion by Tessaring (2009) at the Cedefop June 2009 Agora conference in Thessaloniki.

The cost for the OES may sound high, but is important to keep in mind that this covers the whole of the US, and that it produces local area data across the entire country (i.e. for all 50 States plus 4 other jurisdictions (District of Columbia, Puerto Rico, Virgin Islands, Guam), and 585 metropolitan and nonmetropolitan areas). It takes a large sample to do that in a robust manner.

While a number of individual countries within Europe have some comparable data to that available from the OES, there is at present no pan-European equivalent. In the UK the nearest equivalent is the Annual Survey of Hours and Earnings (ASHE). However while this has the merit of making consistent information available for both employment and pay from a survey of employers, it no longer provides an independent estimate of occupational structure, the patterns being constrained by the Office for National Statistics (ONS) to match those from the LFS household survey. There are also similar surveys in some other European countries. Eurostat collates the so called Structure of Earnings Survey, which draws these together to form a pan-European perspective. However, as noted during the 2009 Cedefop Agora workshop,<sup>11</sup> this is not a real survey of employers, since it is based on official national statisticians supplying data from various sources to meet Eurostat's specification. In the UK case it is based on ASHE. As noted above, this is not necessarily an independent source of occupational data. Nevertheless, this possibility does offer potential to get a reasonably consistent view, putting the onus on member states to make the best efforts they can to harmonise **outputs**, even if sources and methods are different. This might be a useful stop gap until something better is in place.

The US OES clearly confirms that obtaining detailed occupational data from employer surveys are feasible, but this has taken over 40 years to establish and cannot be replicated overnight. Such surveys can be burdensome to the respondents, and for this reason one should be cautious when proposing them. The burden can be particularly heavy for small enterprises. However, the US experience suggests that with the right approach response rates can be very high indeed.<sup>12</sup> This requires measures to avoid the questionnaires being burdensome and appealing to employers' self-interest.

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<sup>11</sup> See Tessaring (2009).

<sup>12</sup> Around 75% according to Phipps and Jones (2007).



The US OES survey produces a detailed occupational picture, but it is a legitimate question to ask whether an employer survey is the best (or only) way of doing this. The LFS household survey also produces detailed occupational information. A key issue is that the current LFS sample size is nowhere near large enough to provide the detailed picture provided by the OES. Indeed, to achieve the equivalent precision would require an increase in size which is likely to be prohibitive in terms of cost, although these are questions that should be explored in more detail with both ONS and Eurostat.

Both employer and household surveys have their strengths and weaknesses, and there is a strong case to be argued that both are needed. Currently, the UK (and Europe more generally) rely almost exclusively on the LFS for occupational analysis. This reliance on household participants (often based on proxy responses) has its limitations, only part of which can be addressed by further increasing sample sizes. Some of these limitations are set out in Annex B. The strength of the LFS is in measuring the supply side rather than demand.

A household/individual-based survey of occupational structure is in some respects better than an employer survey, because it covers those people who are not traditionally employees (the self-employed, freelancers, etc), who employers tend not to include as being in their workforce when they complete surveys. The US has to supplement its OES data with the equivalent to LFS based estimates for such people. However, self employment only accounts for about 1 in 10 of those in employment.

The LFS does not provide such a reliable and detailed fix on the changing demand for different types of job that an employer based survey can provide. The big advantage of the US OES survey is that its large sample (1.2 million establishments over a 3 year cycle) allows a much more detailed analysis of occupational employment by industry than is ever likely to be achieved using the LFS. The OES sample size, and detailed methodological approach, together generate precise and detailed estimates that are unlikely ever to be matched by LFS based estimates.

The 1.2 million establishments in the OES compares with the England's 79,000 establishments covered by the National Employer Skills Survey (NESS). The UK *pro rata* equivalent to OES would need to have a sample size of around a quarter of a million establishments. Currently NESS only asks for very broad information on occupational structure (1 digit SOC), focussing much more on vacancies and other aspects of skill deficiencies. The UK SOC has around 353 occupations classified, down to the 4 digit level, but it is doubtful whether the existing NESS interview based approach could collect such detailed information.

## 4 The O\*NET system

### 4.1 Overview

The O\*NET system is the primary source of occupational competency information in the US. It is available to all users online. 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. Details are given in Annex A.

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.

### 4.2 Content

The content of the O\*NET model is summarised in Figure 2. It looks at things from both an individual worker and an employer (job) perspective. It covers six main domains: Worker characteristics; Worker requirements; Experience requirements; Occupational requirements; Workforce characteristics; and Occupation specific information. Each of these is outlined below.

**Worker Characteristics** cover enduring characteristics that may influence both work performance and the capacity to acquire knowledge and skills, including: abilities; occupational interests (encompassing personality traits); work values; and work styles.

**Worker Requirements** are descriptors referring to work-related attributes acquired and/or developed through experience and education. These include: basic skills; generic skills; knowledge; and prior education.

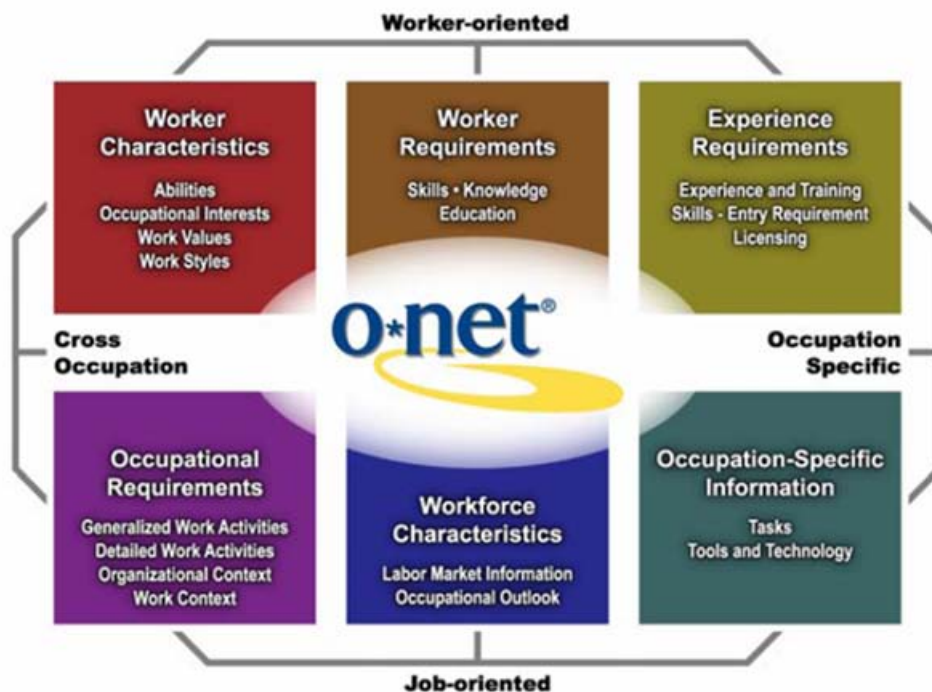
**Experience Requirements** relate to work related experiences that may be needed, including: specific prior experience and training; basic and cross-functional skills and entry requirements; licensing and other certificates, registrations or credentials needed.

**Occupation-Specific Information** includes other content model elements needed in specific occupations, such as: particular tasks; and use of special tools, technology or machines that workers may need to function in the workplace.

**Workforce Characteristics** cover variables that define and describe the general characteristics of the occupations concerned, including: *Labor Market Information* (current labour force characteristics of those employed in the occupations); and *Occupational Outlook* (prospects for these occupations).

**Occupational Requirements** is a detailed set of elements that describe what various occupations require, covering: generalised and specific work activities (types of behaviours occurring in many different jobs); and organisational and general work context (the latter covering physical and social factors that influence the nature of work in the job).

**Figure 2: The O\*NET Content Model**



Occupation is defined using an extended version of the US Standard Occupational Classification. The O\*NET SOC has been developed by a multi-agency initiative. It is structured for comparability, with 4 hierarchical levels. The O\*NET-SOC currently distinguishes over 800 occupational categories. It is constantly growing to include important new and emerging (N & E) occupations.

The level of detail enables much more subtle and sophisticated analysis of changing skill demands than is possible when only aggregate data are available. For example studies such as those by EMSI (2009) show how this kind of information allows a very detailed analysis of the possible impacts of climate change on employment patterns (both positive and negative), the opportunities for generating green jobs and what this means in terms of skill requirements and training priorities.

### 4.3 Updating

Information in the O\*NET system is updated and published on a regular basis, with a new database released at least annually (for 2001-2006 there were two releases per year). Information on at least 100 occupations is refreshed on each release. A maximum of 5 years is allowed before information on **key** occupation is refreshed. The average currency for all occupations is 2.59 years, so the information is generally pretty up to date. Key occupations are defined as:

- Identified as “in-Demand” by Department of Labor (DOL);
- “Top 50 occupations” as identified by DOL;
- High growth rates and/or large employment numbers;
- Linked to technology, maths and science, computers, engineering and innovation;
- Linked to “Job Zones”; or
- “Green” occupations.

### 4.4 Dissemination

The database is freely available via the O\*NET Online web-based application.<sup>13</sup> The latter enables users to explore a huge range of occupational information, such as:

- Employment and pay levels, including job prospects;
- Skill requirements.

Users can see individual occupational summaries, but also related occupations, with similar requirements in terms of skills, knowledge, and tasks, (which BLS refer to as “crosswalks”). The system includes a number of separate databases covering:

- Occupational classification & “crosswalks”;<sup>14</sup>
- Occupational coding assistant;
- Training and e-Learning;<sup>15</sup>
- Technical assistance (including testing & assessment guides);
- Questionnaires;
- Research & technical reports;
- Links to related sites, including national/state information;<sup>16</sup>

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<sup>13</sup> See - O\*NET Resource Center ([www.onetcenter.org](http://www.onetcenter.org))

<sup>14</sup> For details see: <http://online.onetcenter.org/>

<sup>15</sup> See <http://www.onetacademy.com/>

<sup>16</sup> See O\*NET Code Connector ([www.onetcodeconnector.org](http://www.onetcodeconnector.org))

## 4.5 Tools

Within the main website there are a variety of tools design to help users to make maximum use of the information. This includes the O\*NET **Toolkit for Business**, which provides technical information detailing O\*NET's many uses for employers and HR specialists. This includes detailed job descriptions, as well as information to help with succession planning, training needs analysis, career development, and general workforce development.<sup>17</sup> There is also a range of other tools aimed at workers and students searching for work or looking to change career direction (so called **Career Exploration Tools** (covering interests and abilities)).<sup>18</sup>

O\*NET draws upon the national industrial and occupational employment projections described in Section 3.2. The 10-year horizon projections produced by BLS are widely used in career guidance, as well as in education and training programme planning, and by all those interested in long-range employment trends. They continue a 60-year tradition of providing labour market information to individuals making choices about education and training, as well as to those entering the job market or changing careers.<sup>19</sup>

In addition to the national level projections the DoL and BLS also support State and local level employment projections. The Department's Employment and Training Administration (ETA) provides funding for states to develop medium to long-term (10-year horizon) as well as short-term (2-year horizon) projections. Much of this information is made available via State Web sites.<sup>20</sup>

The Projections Managing Partners Consortium, which includes representatives from BLS and ETA, as well as the individual States, helps to organise and coordinate these activities. They help to provide structure and guidance, as well as some software. This helps to ensure that the results are comparable.

Other websites also offer common resources and tools to facilitate strategic planning and benchmarking at regional level and to assist economic development and recovery programmes. These include:

- the "Workforce Information and Economic Analysis" website, which recognises the role of good quality LMI and related and economic analysis for making sound local and regional economic development decisions, including strategic planning, benchmarking economic competitiveness, and measuring outcomes;<sup>21</sup>

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<sup>17</sup> For details see: <http://www.onetcenter.org/toolkit.html>

<sup>18</sup> The Career Exploration Tool set includes: Ability Profiler; Interest Profiler; Computerised Interest Profiler; Work Importance Locator; and O\*NET Work Importance Profiler. See [http://www.onetcenter.org/dev\\_tools.html](http://www.onetcenter.org/dev_tools.html) for further details.

<sup>19</sup> For details see: <http://www.bls.gov/emp/hom.htm> and <http://www.bls.gov/news.release/ecopro.nr0.htm>

<sup>20</sup> See, for example, the State of Florida's website: <http://www.labormarketinfo.com/library/ep.htm>

<sup>21</sup> The website (<http://www.workforce3one.org/page/wiea>) offers resources and tools aimed at assisting employers, economic developers, and educational institutions, as well as jobseekers to understand and make best use of such LMI.

- the WIN-WIN Network Community of Practice, which was established to advance the application and integration of data, analysis, and research to decision making
- in national and regional workforce, economic development and economic recovery efforts;<sup>22</sup>
- The DoL CareerOneStop offers career exploration resources and related LMI to job seekers, students, businesses and workforce professionals, including matching skills and supporting career transitions;<sup>23,24</sup>
- The ETA's Industry Competency Model Initiative is aimed at promoting an understanding of the skill sets and competencies that are essential to educate and train a globally competitive workforce, and includes a number of elements related to competency models, their many uses, and how to exploit them from both a employer and an individual perspective.<sup>25</sup>

#### 4.6 Uses and users

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;

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<sup>22</sup> The WIN-WIN network is intended to identify best practices and to share this information about methods and techniques with both data producers and consumers. It is also intended to promote capacity building and the development of new tools and technology that support analysis and research. For details see: <http://winwin.workforce3one.org/>

<sup>23</sup> The main site is at [www.CareerOneStop.org](http://www.CareerOneStop.org). Highlights include:

- *America's Career InfoNet* which is designed to help individuals explore career opportunities and make informed employment and education choices. (see [www.CareerInfoNet.org](http://www.CareerInfoNet.org));
- *Certification Finder* which is an online directory of occupational certification standards, provide by authoritative bodies (see [http://www.careerinfo.net/certifications\\_new/default.aspx](http://www.careerinfo.net/certifications_new/default.aspx));
- *Skills Profiler* which allows users to identify skills and activities used in a job, including a feature that identifies similarities and differences between the selected occupation and any other occupations (see <http://www.careerinfo.net/skills/default.aspx?nodeid=20>); and
- the *Worker ReEmployment Portal* which is designed to assist and support workers made redundant (see [www.careeronestop.org/ReEmployment](http://www.careeronestop.org/ReEmployment)).

<sup>24</sup> OneStop partners include: career counsellors; interviewers; rehabilitation counsellors; Veterans' representatives; training providers; and business consultants.

<sup>25</sup> The initiative has produced various resources and tools including key documents which explain the concept and illustrate practical uses as well as providing tools (see [http://wdr.doleta.gov/directives/corr\\_doc.cfm?docn-2743](http://wdr.doleta.gov/directives/corr_doc.cfm?docn-2743)). The *Competency Model Clearinghouse* (CMC) website also offers developers and users of competency models a variety of resources, tools, and links including easy to follow examples and illustrations, (for details see: <http://www.careeronestop.org/competencymodel/>). The CMC site also offers interactive tools, including the *Build a Competency Model* (which enables users to customise national industry competency models to reflect specific workforce needs in a particular region or sub-industry) and *Career Ladder Tools* (designed to display the sequence of jobs or occupations with specific careers in a particular industry, including documentation of the requirements for each job and the critical development experiences needed to move up the career ladder).

- 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.

#### **4.7 New & emerging and “green” jobs**

O\*NET and the OES are being revamped to focus on so called “Green Occupations”.<sup>26</sup>

The BLS has concentrated on three main aspects:

- the extent to which “green” issues are shaping patterns of economic activity and technology, increasing the demand for some existing industries and occupations
- the way that they are altering the nature of the tasks and competences needed for existing jobs; and
- the ways in which they may generate new work and worker requirements.

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<sup>26</sup> The BLS defines the “Green Economy” as covering “Economic activity related to reducing the use of fossil fuels, decreasing pollution and greenhouse gas emissions, increasing the efficiency of energy usage, recycling materials and developing and adopting renewable sources of energy.”



The former are referred to as “Green Increased Demand Occupations”. Generally these face few (if any) significant changes in tasks or job requirements. The second group are termed “Green Enhanced Skills Occupations”. For these, although the essential nature of the job remains the same, tasks, skills, knowledge, and external elements, such as credentials, may have changed so that there are some significant changes in worker requirements. The final group, called “Green New & Emerging Occupations”, reflect jobs where the impact of green economy activities and technologies are creating new types of activity and work, possibly resulting in the generation of new occupational titles.

The O\*NET “New & Emerging” project identifies “new” occupations, defined as:

- significantly different from existing occupations and not adequately reflected in the current SOC;
- have significant employment; and
- are expected to see positive projected growth.

The work to identify such occupations is undertaken in conjunction with education and certification programmes, and involving related professional associations.

#### **4.8 Monitoring of use and 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 improving over time (2001-2008), 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 says:

“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.”<sup>27</sup>

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<sup>27</sup> See: <http://www7.nationalacademies.org/cfe/Andrew%20Reamer%20Comments%20on%20ONET.pdf> and for some other, typically positive, endorsements: <http://www7.nationalacademies.org/cfe/Mercer%20Associates%20Comments%20on%20ONET.pdf>



An official, but independent, evaluation of O\*NET (at Federal level) was initiated in 2008 and reported in 2009.<sup>28</sup> This concluded that the Department of Labor has demonstrated the usefulness and value of the publically 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.<sup>29</sup>

#### **4.9 Costs**

The estimated annual cost to the government for the O\*NET Data Collection Program for 2009 to 2011 is estimated at approximately \$4.6 million. This includes all direct and indirect costs of conducting the sampling, data collection, and analysis activities of the O\*NET Data Collection Program.<sup>30</sup>

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<sup>28</sup> See 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](http://books.nap.edu/catalog.php?record_id=12814)

<sup>29</sup> See: [http://www7.nationalacademies.org/cfe/ONET\\_Review.html](http://www7.nationalacademies.org/cfe/ONET_Review.html) for further details

<sup>30</sup> See Section A.14, O\*NET® DataCollection Program, Office of Management and Budget Clearance Package Supporting Statement: [http://www.onetcenter.org/dl\\_files/omb2008/Supporting\\_Statement2.pdf](http://www.onetcenter.org/dl_files/omb2008/Supporting_Statement2.pdf)

## 5 Lessons for the UK and Europe

The first key lesson arising from the US experience relates to the rationale for doing any kind of projections. In the US it is not just about centralised top down planning for policy makers, (indeed this is probably not a motive at all for current US policy in this area). It is accepted that there is a very strong public argument for providing such 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. The US is probably the prime example of such an approach.

The US example shows the general benefits of investing substantially in data, standard systems of classification, as well as models, methods and systems. It also 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, and the implications of this for skill requirements (which are differentiated by detailed occupation and sectoral categories). The focus is on providing a very robust and detailed picture of **current** occupational employment within sectors. The second key lesson is therefore 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 *Working Futures* forecasts prepared for the UK commission currently go down to the level of 2 digit SOC (25 categories). It is possible using UK data to produce forecasts to the next level down (3 digit, around 75 categories) but this has only been done at an aggregate level, not distinguishing the sector as well.<sup>31</sup> The LFS data are adequate for aggregate analysis by 3 and 4 digits, but to explore detailed variations by sector, (which is one of the key drivers of change), much larger sample sizes are needed to avoid rapidly running into problems of sparsely populated (or indeed empty) cells. For the 4 digit level, the LFS data allows only aggregate, all sector, all country, analysis (as conducted by the Migration Advisory Committee (2008)).

The projections currently produced in the UK (and also at a pan-European level) aim at providing information on broad trends at the 2 digit level. While this is useful for both policy makers and individuals it does not provide anywhere near as much information as the BLS work. Such detail is valuable, not as an input into some detailed “Manpower Plan”, but to provide much richer information about what is going on in the labour market that can help individuals make the right choices (i.e. helping markets to work better).

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<sup>31</sup> See the *Qualifications Report* produced for *Working Futures 2004-2014*. The additional occupational detail was essential for identifying differences in qualifications requirements within occupations, the 2 digit level not providing sufficient granularity.

“Manpower planning” in meticulous detail is generally regarded as impossible. But detailed analysis and projections are seen as interesting and valuable in their own right. Systems in the US (as well as those in other countries, such as the Netherlands) are designed not just for policy makers and planners, but also to help the labour market to work efficiently, by providing robust and detailed LMI to individuals.

The US experience emphasises the need for great detail for this kind of information to be really useful. This granularity can help to provide understanding of the key drivers of changing skill demand and the implications of this for skill requirements (which are differentiated by detailed occupation and sectoral categories). This enables it to distinguish some 800 occupations, as compared with typically 25 (or so) at a UK or pan-European level. The Occupational Employment Statistics survey (OES) is an essential element in the BLS’s approach to occupational employment projections. It provides:

- An employer perspective, based on actual behaviour (what jobs they actually employ people in) rather than opinions;
- Detail, distinguishing both sector and occupation (as well as geographical area).

The third lesson is therefore that, in order to achieve this kind of detailed picture, a comprehensive survey of employers’ occupational skill needs is an essential component of the whole approach. An 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 provides sufficient detail to make this useful to a wide range of users. The OES survey fills this role in the US, delivering robust and very detailed data, on both occupational employment and pay, which are highly valued by various users. 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 (neither in the UK in particular, nor in most of Europe in general).

It is interesting that the OES survey is not used by the BLS to develop a long and consistent time series. Rather it aims to provide a very robust and detailed picture of **current** occupational employment within sectors. The BLS places much more emphasis on analysts’ judgement about detailed changing patterns within sectors rather than trying to harmonise time series data. The emphasis is on combining qualitative as well as quantitative evidence to establish likely trends and developments in occupational structure within sectors, rather than time series models. This is still undertaken within the overall framework provided by a quantitative, multi-sectoral macroeconomic approach. This serves to emphasise:

- The strengths, but also limitations, of econometrics;
- The importance of qualitative elements and judgements;
- The need to draw on sectoral expertise.

The fourth lesson that emerges from the US approach is therefore to do with the emphasis placed on a combination of both quantitative and qualitative methods when making projections of likely future occupational employment trends. 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 on how sector based work might be more closely integrated with the Working Futures type quantitative projections funded by UK commission. Such benefits could be achieved in a UK context by integrating more closely the activities involved in carrying out the national *Working Futures* projections and what sector bodies are doing to monitor changing skill demand within their sectors. This would however require a much greater degree of coordination than has happened to date, and a more extensive and iterative process, with sector bodies taking the role of the expert analysts in the US approach.

The final lesson that emerges relates to the potential value of the O\*NET system itself. While it has been designed specifically 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 at both a UK and pan-European level.

The US O\* NET system provides an enormous amount of information on skills used in occupations. National Occupational Standards (NOS) in the UK, and similar systems at a pan-European level, provide some of the same information.<sup>32</sup> However, generally, they do not form part of an integrated system in the same way that OES and O\*NET do. O\*NET goes well beyond NOS. Moreover O\*NET provides a wealth of information not elsewhere available in the UK that could be exploited on this side of the Atlantic, given some effort to develop a detailed mapping from US to UK occupational categories.<sup>33</sup>

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<sup>32</sup> The German system is particularly notable, covering much of the same ground as the US O\*NET system.

<sup>33</sup> O\*NET descriptors have recently been shown to have application outside the US.

However to make maximum use of it requires more detailed and robust occupational employment information to make it both operational and useful.

The costs of conducting the OES survey, the related projection activities of the BLS, and the complementary O\*NET system (which focuses in more detail on changing generic skill needs within occupations) 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 they are argued (by the BLS and many others) to be very large. When assessing the overall costs of activities like O\*NET, the OES survey and the BLS projections, it is important to also take into account such benefits. These include the tax revenues and other benefits that arise from the many consultants (such as EMSI (2009) and others), who use these results to develop their own commercial products, adding value to them, and selling them on to generate additional value added), as well as the benefits of more efficient and well informed labour market operations.<sup>34</sup>

In discussion with senior BLS staff it was emphasised that, to get a proper perspective on costs and benefits, the Federal investment on the BLS projections (\$6 million per annum), the OES (\$35 million) and in O\*NET (\$4.6 million) needs to be seen alongside the overall public expenditures on training, job search assistance, and similar activities in which OES, projections, and O\*NET are used. The cost of producing the data is very small in comparison. If all ETA grants to individual States are included the overall annual budget for data collection and processing is probably around \$75 million. At the same time, the U.S. Department of Labor distributed about \$4 billion in grants to States for youth, adult, and dislocated worker training and labour exchange services. In addition, the U.S. Department of Education distributed another \$1.2 billion in grants to States for career-technical education. Billions more in State and local funds are also spent. This makes the \$75 million for information to make good decisions in use of this money look pretty small. It would not take very many examples of beneficial use of data in allocation of resources to show benefits exceeding the costs.

This is an investment which is therefore seen as paying for itself. In the case of the USA, the investment is supported by a government interested, not in trying to plan the future in precise detail but, one focussed on keeping citizens well informed so that they can make the right decisions.

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<sup>34</sup> As noted in Section 4.8, the US has conducted an extensive evaluation of O\*NET which reported in the autumn of 2009.

## **Bibliography**

This paper draws heavily on presentations delivered at a special session organised by the BLS for Cedefop, as a precursor to the US/EC Roundtable event held in Washington DC on the 28-29<sup>th</sup> May 2009, "Skills for Growth and Jobs in the Economic Recovery and Beyond." The BLS contributions were coordinated by Brian Graf and included presentations by: Audrey Watson and David Piccone (on the Occupational Employment Statistics survey), Richard Graham and Alan Lacey (on the BLS projections) and David Rivkin and Phil Lewis (on O\*NET).

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## **Where to find BLS employment projections and publications**

Employment projections: <http://www.bls.gov/emp>

Occupational Projections and Training Data: <http://www.bls.gov/emp/optd>

Occupational Outlook Handbook: <http://www.bls.gov/ooh>

OES Website: [www.bls.gov/oes/](http://www.bls.gov/oes/)

OES Technical Note: [http://www.bls.gov/oes/current/methods\\_statement.pdf](http://www.bls.gov/oes/current/methods_statement.pdf)

Handbook of Methods: [http://www.bls.gov/oes/current/methods\\_statement.pdf](http://www.bls.gov/oes/current/methods_statement.pdf)

O\*NET Resource Center ([www.onetcenter.org](http://www.onetcenter.org))

Review of O\*NET: [http://www7.nationalacademies.org/cfe/ONET\\_Review.html](http://www7.nationalacademies.org/cfe/ONET_Review.html)

Career Guide to Industries: <http://www.bls.gov/cgi>

Monthly Labor Review: <http://www.bls.gov/mir>

US SOC: <http://www.bls.gov/soc/home.htm>



## **Annex A: Overview of O\*NET Data Collection Processes**

### **Background**

The US has over the past 40 years developed a well proven, successful and cost effective methodology to collect and yield high quality occupational data, including detailed information on skills and competences. This has involved close cooperation between Federal and State agencies as well as between the Department of Labor (in particular) and the private and public community. The approach has involved multiple methods to provide flexibility, within a broad framework of standardised procedures. It has involved inputs from huge numbers of businesses, organisations and associations, as well as individual experts.

### **Sources of occupational data for O\*NET**

The data for O\*NET are sourced from a large variety of places. It includes information from job incumbents but also occupational experts and analysts. This covers:

- Job Titles;
- Knowledge;
- Work Activities;
- Work Context;
- Work Experience;
- Work Styles, Tasks;
- Education;
- Abilities;
- Skills.

Internet sites are also used to obtain and report information on detailed job tasks and work activities as well as delivering various tools that can be used by individuals and employers to explore these issues.

### **Collection of Establishment Data**

The BLS adopts a two stage sample approach, focussing first upon business establishments and then on job incumbents within those establishments.

Three survey questionnaires are completed by each job incumbent. These focus on general work activities, knowledge/work styles, or work context (including detailed task list and some background information).

BLS data on employment patterns are used to determine the industry sampling frame for each occupation. Sample business establishments are then selected from a database of business locations (over 15 million establishments from Dunn and Bradstreet). The latter is drawn from several sources and is continuously updated.

Occupation is the key. The aim is to gather data on the “core” of the occupation, focussing on where the majority of incumbents are employed. The average coverage level is estimated to be 85%.

Once the establishment is identified, each one is:

- Asked about 100 or fewer occupations;
- Never more than 20 employees selected;
- Only sampled once each year.

A list of eligible employees is identified by employer point-of-contact. There is an automated random selection of job incumbents from the available list, all of which is designed to minimise the burden on respondents.

### **Survey response and participation rates**

The aim is to collect high quality data from a nationally representative sample of job incumbents and also from occupational experts. There is a strong business participation, with 75% plus response rate from businesses, as well as strong individual employee participation (64% plus response rate). The strong involvement and support of occupational experts is indicated by a 82% response rate for surveys addressed to this group. There is also strong support from various national association and related organisations, with some 450+ endorsements.

Various incentives are put into place to encourage high response rates. These include:

- point-of-contact incentive for employers and employees;
- involvement of professional/trade associations to increase awareness and emphasise value and importance;
- continuous efforts to improve methods and procedures including systematic monitoring and research.

### **Revision and improvement of data collection instruments**

A variety of methods are used to evaluate the content and design of the O\*NET data and the survey instruments used to collect them. These include:

- expert evaluation;
- expanded interviews with individual respondents; and
- focus group interviews.

Various strategies are used to augment the establishment data collected from the survey, including use of:

- occupational experts such as supervisors or trainers, familiar with the work and requirements of an occupation, but not necessarily job incumbents;
- ratings by occupational analysts; and
- internet based methods to scan for the latest information.

Information from occupational experts (supervisors or trainers or others familiar with the work but who are not necessarily job incumbents) is especially important when occupations are hard to locate in establishments due to small sizes, remote locations or because they are “new & emerging”. These analyst ratings are validated and updated using various quality assurance procedures.

Results from these processes have led to significant enhancements to the instruments, while maintaining comparability to the theoretical underpinnings of the variables and taxonomies on which the system is based, including their psychometric qualities. Sampling and survey methods are designed to reduce data collection costs and burden respondents.

Such improvements include:

- simplification of instructions and layout;
- reduction in the number of items and scales per item;
- wording changes for specific variable definitions.

“New & emerging” occupations are evaluated in terms of various criteria:

- significantly different from existing categories, and not reflected in the current SOC structure;
- significant employment levels (5,000+);
- growth expected in the future.

## **Annex B: Problems and Limitations in using LFS data to measure occupational employment structure**<sup>35</sup>

For a number of years the LFS has been the prime source of information on occupational employment structure in the UK. At a pan-European level it is the only consistent source. However, as described in more detail in Livanos and Wilson (2007) and Wilson (2008) the LFS is far from perfect when trying to measure changes in occupational employment structure.

The LFS data information is based on a survey of households, and the sample size is often quite small for categories of interest. A key problem is that the kind of analysis described in Section 3.2 requires very detailed data by sector and occupation. Slicing the LFS sample across multiple dimensions simultaneously results in many cells which are empty or contain only a few observations.

These problems are even more serious when it comes to making estimates of replacement demand, which asks even more from the data. As a consequence there is often considerable volatility in the data. This reflects statistical noise (due to insufficient sample size). This means that the estimates of occupational structure within sectors are not always precise or robust.

There are a number of other issues that need to be highlighted regarding data quality, especially at a pan-European level.<sup>36</sup> A key problem is that the LFS relies on the respondent's own assessment of occupation (or if the individual concerned is absent at the time of the interview a proxy response is used from a member of the household actually present). Self assessment may be biased, while proxy responses raise concerns about accuracy of the assignment to particular occupational categories. Other problems arise due to double jobbing (many people have more than one job) and the fact that the LFS definition of employment includes anyone working for just a single hour during the reference period.

Another important issue relates consistency over time. For many countries there is only a quite short consistent data series. In many instances there are breaks and gaps in the data caused by changes in classifications or survey methodology. While Eurostat have tried to deal with some of these, many are ignored in what purports to be a harmonised and consistent data set.

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<sup>35</sup> This Annex is based the discussion in Wilson (2008).

<sup>36</sup> This applies to both the microdata set and the data and estimates published by Eurostat.

Finally, at a pan-European level, there are still some major concerns about how well harmonised the data are across countries. Casual inspection suggests some very significant differences in the importance of some occupational groups across countries, as well as some significant differences in the way qualifications are measured. This may reflect differences with the way jobs are classified across countries, as well as difficulties in fitting some national qualifications into the ISCO and ISCED classifications, despite attempts to harmonise the systems of classification. For example, there are some general problems with estimates of numbers of managers, with apparently many more managers in some countries (such as the UK and Ireland) than elsewhere). Elias and Birch (2008) attribute this to “the classification methods and procedures” used within the LFS.

The LFS focuses on individual and households. In general, it is much better suited to dealing with issues relating to supply than demand for labour. For the latter it is important to get an employer’s perspective.

Other limitations include the fact that the LFS only covers certain aspects of skill (notably occupation and qualifications). It does not deal with generic skills which are regarded as of increasing importance by many users and which feature so highly in the O\*NET system. Skills can, of course, be measured in various ways:

- Occupation;
- Qualification; and
- Soft, key, core or generic skills.

Scientific progress requires taxonomy and measurement for each of these. But the most fundamental gap (in the UK and more especially across Europe as a whole) is the first of these. Robust and detailed information on occupation by sector. This is a crucial part of the statistical infrastructure. It is not just needed for projections. It is an essential element in understanding the current situation. Other things are also important, but without these core data it is impossible to quantify skill demand in a meaningful fashion.

This is not just about taking employers’ views, but rather using their insights about what they actually do to monitor and measure actual skill demand. The focus is on real **needs**, what skills employers reveal they require by their staffing patterns (not necessarily what they perceive or say). How they behave is the key - who do they employ and in what positions? Other surveys can then help to translate this into demand for qualifications and soft skills.

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