SUPPORTING VISUALISATION OF NATIONAL AND LOCAL LABOUR MARKET OPPORTUNITIES

A SUMMARY OF WORKSHOP DISCUSSIONS

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GATSBY

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We are grateful to the participants who contributed their time and insight to the series of discussions:

Jenifer Burden, Gatsby Charitable Foundation
Kevin Burke, independent facilitator
Kamal Choudhary, Liverpool City Region Combined Authority
Rob Cremona, Gatsby Charitable Foundation
Jenni French, Gatsby Charitable Foundation
Nic Hutchins, Greater Manchester Combined Authority
Janet Jackson, Lancashire Local Enterprise Partnership
Matt Joyce, North East Local Enterprise Partnership
Dominic Martinez, Gatsby Charitable Foundation
Tony O'Callaghan, West Midlands Combined Authority
Daniel Sandford Smith, Gatsby Charitable Foundation

And the following individuals and organisations who contributed to particular sessions:

Adam Cotgrave, Institute for Apprenticeships and Technical Education
Sarah Dhanda, Enginuity
Professor Sir John Holman, Senior Education Advisor to Gatsby
Stephen Overell, Greater Manchester Combined Authority
Jacob Sadler, North East Local Enterprise Partnership
Andrew Scott, Institute for Apprenticeships and Technical Education
Helenna Vaughan Smith, Enginuity
Emma Yates, Institute for Apprenticeships and Technical Education

INTRODUCTION

Credible information about the labour market is essential – for individuals making career choices, for their advisers, for employers seeking to recruit and develop their workforce, and for policymakers with responsibility for education and skills, business support and economic growth. For it to be useful, presentations of labour market information (LMI) allow users intuitively to access information relevant to their queries. A range of organisations seek to collect and/or provide both 'hard' and 'soft' LMI and disseminate it through presentations and visualisation of the information for different audiences.[1] These organisations include agencies with a remit for collecting and distributing national datasets (for example, the Office for National Statistics) and providing audience interfaces (for example, the National Careers Service), service providers that may aggregate and/or visualise datasets, and local government that has a strong interest in providing access to information that describes labour market opportunities in their geography for both individuals and employers. The importance of this local contextualisation for LMI is echoed in a recent international review of the nature and provision of good LMI (Alexander, McCabe & DeBacker, 2019).[2]

Since 2018 Gatsby has worked with a network of local partners to support the implementation of reforms for technical education. This work included exploring skills provision and demand through the lens of occupational maps for technical education routes. These occupational maps, which are maintained by the Institute for Apprenticeships and Technical Education (the Institute),[3] are themselves a source of LMI – grouping occupations with related knowledge, skills and behaviours (as defined by employers), thus making it easier to to identify, for example, possible opportunities for career progression within a technical education route, and how knowledge and skills learnt may be relevant to other occupations (for example, to inform choices about upskilling and reskilling).

Given occupations may operate across multiple sectors, taking an occupation view is critical for the collection and provision of labour market information, and subsequently when considering the development of education and training pathways. This perspective is also helpful for individuals considering the breadth of career pathways open to them (for example, digital, finance and catering occupations found in engineering, health and media production industries). The UK's Standard Occupational Classification (SOC) coding framework is maintained by the Office for National Statistics (ONS), and is used to classify occupations in a consistent way thus enabling comparisons across different datasets. Recent work to enhance the granularity of the SOC framework has identified almost 1,500 occupation classifications. The Institute for Apprenticeships and Technical Education has mapped occupational standards developed by employers to the SOC framework to support the transferability of relevant information.

1 Recent research by the University of Warwick has identified and described actors and their roles in the supply, provision and dissemination of LMI: Barnes, SA. & Bimrose, J. (2021) *Labour market information and its use to inform career guidance of young people: An overview of the labour market information system for careers guidance in England*. Warwick: University of Warwick. https://www.gatsby.org.uk/uploads/education/reports/pdf/ier-gatsby-lmis-landscape-2021-final.pdf

2 Alexander, R., McCabe, G. & De Backer, M. (2019). *Careers and labour market information: An international review of the evidence*. Reading: Education Development Trust.

3 https://www.instituteforapprenticeships.org/occupational-maps/

In 2021 the government's White Paper, *Skills for jobs: lifelong learning for opportunity and growth*, noted the importance of supporting access to the information in the occupational maps: 'We will introduce interactive careers maps, which will show the occupations and career options that technical or higher technical education can open the door to.'[4] Gatsby hosted a series of workshops with participants from local area partners in England to explore potential interests regarding the future development and visualisation of labour market opportunities. This report summarises the discussion themes and recommendations for further work.

Visualisation – what do we mean in this context?
One theme of discussion was visualisation of LMI. The group was conscious that this term could be interpreted in multiple ways, depending on the context, user, and application. After considering several definitions used by education, training and careers organisations the following agreed definition was developed as applicable to work within this project:
'The representation of complex information regarding occupations that enables users intuitively to get to relevant data that they need.'

4 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/957856/Skills_for_jobs_lifelong_learning_for_opportunity_and_growth__web_version_.pdf (p45)

BACKGROUND

The Government's White Paper, *'Skills for jobs: lifelong learning for opportunity and growth'*, proposed several initiatives relevant to this group, summarised as:

- *Data is vital in careers information and guidance. Government will improve the data available for people when considering different career routes and education and training options.*
- *The National Careers Service website will become a single source of government-assured careers information for young people and adults, bringing together all the learning and careers routes available along with updated labour market information. It will offer personalisation, with content recommendations for individual users, and access to local and regional careers information and advice.*
- *Government will introduce interactive careers maps, which will show the occupations and career options that technical or higher technical education can open the door to.*

This ambition requires the development of a single, warranted, and comprehensive common information platform for career pathways. The occupational maps underpin this work where occupations may be reached through technical education pathways, whilst recognising that in some cases these may not be the only paths that individuals follow to prepare for entry to particular occupations. However, as a starting point it should be feasible to capture 'the paths most commonly taken' through education and training to occupations. The challenge is to illustrate these occupations, paths and other associated robust LMI in easily navigated, appropriate formats for different audiences.

Several agencies are engaged in work in this area, including the Institute for Apprenticeships and Technical Education (the Institute), the National Careers Service, and the Careers and Enterprise Company. The Institute is currently taking forward work to develop interactive views for the occupational maps for rollout by end 2022. In future the occupational maps and associated data will:

- *become the basis for the planning, development, and communication of technical education in England*
- *represent all occupations that can be accessed through technical and higher technical education*
- *demonstrate how occupations link and show progression routes and opportunities, using more commonality in language*
- *support different user groups such as employers, learners, and providers*
- *be future proofed to show both emerging skills and occupations.* [5]

5 Presentation from IfATE officials to a group discussion session (27 May 2021)

The National Careers Service website will be updated to become a single source of government-assured careers information for young people and adults:

- *bringing together all the learning and careers routes available to people, along with improved content on work experience, applying for roles, and updated labour market information*
- *offering personalisation, with content recommendations for individual users, access to local and regional careers information and advice for specific groups like parents, students and the unemployed.* [6]

The Careers & Enterprise Company (CEC) will encourage use of the National Careers Service site as part of careers education in schools and colleges.

6 https://www.gov.uk/government/publications/skills-for-jobs-lifelong-learning-for-opportunity-and-growth (p45)

WHAT WOULD GOOD LOOK LIKE?

During a series of workshops the group considered the forthcoming national activity as described in the Skills for Jobs White Paper; examples of current local and national practice and available LMI resources; and exemplars of wider data visualisation tools.

HIGH-LEVEL REQUIREMENTS

In its initial session the group considered the high-level requirements for a single visualisation of career pathway, and summarised these as:

- drawing upon the occupational maps and overlaying credible aggregated data sources
- presenting data in multiple ways to fulfil the needs of different audiences
- valued by all user groups, allowing individuals and employers to make better informed decision-making regarding education, training and career options; higher level management of skills; reskilling and workforce development and deployment.

The following observations were noted:

- This presents a strong opportunity to develop a common core dataset to support a robust national and local career guidance offer.
- The language and terminology of LMI, occupations and jobs can be confusing – this is an opportunity to create a common lexicon to be used moving forward.
- A key exemplar is the task of describing skills that may be applicable to work activities required for multiple occupations, and any emerging alternative routes into occupations. O*NET was cited as a good example of representing much of this type of data in the USA.
- There are substantial sets of data already available that can be integrated into new sources and tools. The integration of credible LMI with any career pathways visualisation will be a key factor in enhancing its functionality, tailored for each audience.
- As one visualisation the occupational maps support technical education routes. It is clear where responsibility for their creation and maintenance lies (the Institute). This format of visualisation of possible 'next steps' progression has the potential to be applied more comprehensively to cover all occupations accessed via education and training pathways. However, it was not clear where ownership lies for occupations sitting outside of the technical education routes.
- Any visualisation of the occupational maps would include overlay of LMI to enrich the information regarding each occupation. Thus a 'common information platform' would include both pathways to occupations and the associated LMI for each of these. *(When considering what is meant by data to be accessed via the common information platform, this would include fields describing occupation title, knowledge required for the occupation, typical salary, associated qualifications, and others).*
- Five audience groups were identified as primary users: career guidance professionals; education & training providers; employers; individuals (adults, young people & their parents/carers); skills policy makers (at local and national levels).

- All audiences need confidence that the visualisation they are using to inform their decisions is drawing from credible, robust data.

A set of high-level requirements were described for such an 'ideal' solution. Whilst several of these are within the current scope of work for the Institute, others are beyond the framework for our technical education system but were included because of the importance placed by the group on a comprehensive solution. The requirements generated a high degree of agreement; to aid consideration of possible implementation later in the workshop series the statements were reviewed, adjusted, and structured into a prioritised sequence. An additional suggestion was introduced at this stage – establishing a number of projects to explore what is possible using existing data sources. The revised and ranked requirements are shown in Annex C. It is recognised that this approach will be based on current and established custom and practice, and over time would need to evolve with changing behaviours regrading occupational progression and/or changing pathways.

INFORMATION SOURCES

There is an extensive range of LMI sources and tools available to support career guidance, and a review of these was not within the remit of this work – a recent research study from the Institute for Employment Research explores LMI in England to understand sources and identify gaps (Barnes & Bimrose, 2021)[7]. The group shared both LMI sources and visualisation tools that they currently use, access or have developed locally for various audiences. Each of these had elements that could be adapted to enhance future visualisations of labour market opportunities.

All participants were sufficiently familiar with the technical education occupational maps to consider their potential use for further visualisation. Participants also regularly used directly (or worked with teams/intermediaries who used) a wide range of other LMI and presentation tools – including from both government and commercial sources. These included: Individual Learner Record and other DfE datasets, and datasets from HESA, JISC, ONS, and LMI for All. The LMI sources and tools commonly discussed are shown at Annex B. These need to be blended and filtered appropriately for presentation to each audience in order to meet their requirements, which would include filtering by place, for example, to offer context to description of local growth opportunities.

The group considered current use of the occupational maps and other resources that are commonly used in conjunction with them by a range of audiences. It examined materials and resources from adjacent relevant markets to review how others had visualised complex data from multiple sources, and considered visualisations from other organisations, which offered alternative representations of relevant data. It was recognised that a universal challenge was in illustrating predictions for future labour market requirements, but noted current active developments to support forecasting for emerging skills.

7 Barnes, SA. & Bimrose, J. (2021) *Labour market information and its use to inform career guidance of young people: An overview of the labour market information system for careers guidance in England.* Warwick: University of Warwick. https://www.gatsby.org.uk/uploads/education/reports/pdf/ier-gatsby-lmis-landscape-2021-final.pdf

LOCAL PERSPECTIVES

The majority of the UK based visualisations appear to access a core of datasets, which for localised use are tailored or, to a limited degree, enhanced with additional information. Many organisations across local areas use labour market information to inform their work – for example, to guide their investment in education and training investment, or to demonstrate for employers the supply of skills available in a locality to drive inward investment. Career professionals tailor the provision of labour market information and local intelligence to an individual's aspirations and requirements. Alongside supporting career choices for young people, local areas seek to develop better data driven approaches to support reskilling and upskilling – for example, to enable individuals to identify their existing knowledge and skillsets, and match these to job growth in the area, or to inform employers' choices about upskilling support for their employees.

The majority of labour market data used derives from national datasets cut to the local level. The extent to which this may capture local nuance varies depending on dataset reliability at increasingly granular levels. A common data structure and open visualisation tools for local areas to access would reduce duplication of development effort and cost. Local areas would also be better enabled to exchange reliable data about their jobs market over time with neighbouring areas and national organisations.

Data science can help individuals understand those occupations that use the knowledge and skills that they have, thus identifying roles they may wish to move into, and relevant training to support any upskilling or reskilling they may need to support this career development. For example, Enginuity is working with the engineering and manufacturing sector to encode and analyse the language used across occupational standards and job descriptions, vacancy notices and employer progression pathways. This analysis supports identification of common skills both within and across industries; matching current knowledge and skills to future projections to inform upskilling and reskilling; signposting to existing training opportunities to meet the upskilling or reskilling gap. However, data analysis skills may be limited in some localities – enabling local areas to access shared analysis resource could support smaller areas to more easily benefit from the analysis expertise capacity available to larger areas.

RECOMMENDATIONS

1. At the national level there should be clear remits for the roles of distinct agencies:

(a) All national agencies should implement a **common data structure** for describing occupations in the labour market. This will underpin the development of interchangeable and sustainable datasets both nationally and for two-way sharing of data from national and local inputs.

(b) A single agency to hold the remit to establish a **credible, aggregated national LMI dataset**. This would reduce duplication of effort, support levelling up, and ensure that audiences for subsequent LMI visualisations can be reassured of data provenance. It must operate for occupations rather than multiple job roles to enable clarity for any gaps in data so these can be honestly reflected in LMI for users.

(c) Where other organisations use this dataset to power visualisation front-ends produced by them, this reassurance could be signalled to the user audience through a simple kitemark provided by the agency responsible for the aggregated data.

(d) A single agency to hold the remit **to develop and maintain descriptions for occupations that sit outside of the technical education routes**, contributing to a comprehensive view of occupation opportunities. **Where occupations have a standard developed by employers for the technical education routes this should have primacy**, and other occupation descriptions should work with these.

(e) A single agency to be responsible for developing and maintaining a visualisation of a comprehensive map of occupation opportunities with associated LMI. The group suggested a prioritisation for iterative inclusion of key LMI datasets.

(f) All national agencies should implement a **glossary of agreed terms** when presenting LMI, for example, 'good jobs'.

2. Short projects could be established to:

(a) Review existing datasets to determine how complete they are in scope and size, the level of granularity required to support use at regional and local levels, and make realistic recommendations for improving this provision.

(b) Develop **tools to demonstrate use of datasets**, for example, showing the integration of technical education routes with sectoral skills needs to support individuals identify where occupations have broad opportunities across multiple sectors.

(c) Explore using the occupational maps to support knowledge & skills matching between occupations to inform design of education and training options for upskilling and reskilling (eg short courses, 'skills bootcamps[8]' approaches).[9]

8 https://www.gov.uk/government/publications/find-a-skills-bootcamp/list-of-skills-bootcamps

9 NESTA has mapped skills from job titles to neighbouring SOC to enable linking of associated groups of roles.

3. **User research** should be undertaken with young people and adults to better understand what they want to gain from LMI.
4. To support the use of LMI at the local level, **examples could be produced illustrating how occupational maps can show career opportunities at a local level**.
5. Further work could be undertaken to determine **what additional, genuinely local LMI is wanted and realistic**, as distinct from national datasets that can be broken down to provide a localised view. Where local data is required **mechanisms for sustainable collection should be cultivated** and implemented through collective effort across local teams.
6. **Work could be undertaken to identify how data scientists might be funded to work collectively across local areas** to support matching of demand and supply information to inform policy and prioritise interventions.

ANNEX A: TERMS OF REFERENCE

The group agreed to offer frank and honest opinions and insight into how career progression pathways could be visualised in the future; including the current use and potential future use of the occupational maps; and to share their own relevant local initiatives. This included:

- What should be the future scope of career progression pathways visualisations?
- Who are the audience(s) for these visualisations?
- What could an idealised future career progression pathway look like?

In participating in this work the group agreed to:

- Share current initiatives that they are using, developing or have tried, which aim to visualise career progression pathways (including examples from 'adjacent markets')
- Share the sources of data that they currently use and explore what additional data would enhance future visualisations.
- Review current national initiatives (as a result of the White Paper etc), and how these could be use in a local context.

The group aimed to inform a report to include:

- Suggested elements for a future idealised career progression pathway.
- A route map describing the steps required to achieve this.
- List examples of current local initiatives to visualise such pathways.
- A description of data currently being used by partners, and suggested sources of additional data that would enhance any future visualisation.
- A brief review of current national initiatives and how these could feed into local initiatives.

ANNEX B: EXEMPLAR LMI SOURCES AND VISUALISATIONS

Commonly accessed LMI sources:

Name	Web address	Notes
Adzuna	https://www.adzuna.co.uk/	
Horsefly Analytics	https://horseflyanalytics.com/	
Nomis	https://www.nomisweb.co.uk/	
ONS	https://www.ons.gov.uk/employmentandlabourmarket	
Burning Glass	https://www.burning-glass.com/about/	
Stat Xplore (DWP)	https://stat-xplore.dwp.gov.uk/webapi/jsf/login.xhtml	
EMSI	https://www.economicmodeling.com/	
LMI for all	https://www.lmiforall.org.uk/	
Education & training datasets		
ILR	https://www.gov.uk/government/collections/individualised-learner-record-ilr	
HESA	https://www.hesa.ac.uk/data-and-analysis	

Commonly used localised visualisations:

Lancashire	
Start www.startprofile.com	• Aimed at young people, parents/carers,teachers and careers professionals in schools. • SOC based, holistic careers site. • Extensive use of video and infographics. • Does not include much pathway information. • This is a development of the Blackpool Opportunity Area funded site, now expanded to cover Lancashire. • Relatively inexpensive to implement locally.
https://www.lancashireskillshub.co.uk/our-people/evidence-base/	• Local skills evidence base for policy makers
Greater Manchester	
https://teched.oldham.ac.uk/	• Developed by Oldham College (using Opportunity Area funding). • Website includes information drawn from the occupational maps, overlaid with local information (diagram on a page). • Aimed at young people, used with help from careers staff.
https://gmacs.co.uk/	• GM Careers Service local initiative. • A holistic future planning tool based on life readiness as well as career preparation. • Extensive occupation descriptions (does not include routes to these). • Areas for young people, teachers and employers.
www.greatermanchester-ca.gov.uk/what-we-do/research/research-work-and-skills/labour-market-and-skills-review/	• Local skills evidence base for policy makers
North East	
https://www.northeastdatahub.co.uk/our-data/	• Local skills evidence base for policy makers
Liverpool	
https://be-more.info/	• Apprentice opportunity search website for Liverpool City Region. • Potential basis for further development into wider local careers site.
http://bitly.com/samplelcrdashboard	• Local careers hub and LMI dashboard
West Midlands	
https://blackcountry-blackcountry.hub.arcgis.com/	• Local skills evidence base for policy makers
https://www.the-blackcountry.com/economic-intelligence-unit/black-country-intelligence-reports	• Local economic intelligence hub
Scotland	
https://www.skillsdevelopmentscotland.co.uk/what-we-do/scotlands-careers-services/16plus-data-hub/	• Post 16 data hub

Other visualisations:

USA	
https://flowingdata.com/2017/11/28/career-paths/	• Visual representation showing possible routes from one career to another.
https://va.tech.purdue.edu/lilly/career_mapping_3.0.php	• Example of advanced visualisations.
https://www.onetonline.org/	• Presents a dataset that may be filtered and searched in multiple ways.
Denmark	
https://www.ug.dk/vaerktoej/jobkompasset/index.html	
UK	
https://www.nesta.org.uk/project/mapping-career-causeways/	Interactive map shows indicating roles workers could transition into if their current job is susceptible to economic shocks such as automation.
https://www.skillsfuture.gov.sg/skills-framework	Frameworks detailing the competencies required in almost 1,500 job roles in Singapore.
https://data-viz.nesta.org.uk/skills-taxonomy/index.html	A skills taxonomy framework to measure skills demand, current and potential supply based on courses offered by education providers.
https://www.nesta.org.uk/project/open-jobs-observatory/	A project to deliver open, up-to-date and actionable insights on UK skill demands.
https://www.nesta.org.uk/data-visualisation-and-interactive/making-sense-skills/	A skills taxonomy representation.
www.SortYourFuture.com	A platform for young people entering the labour market to help them explore possible career paths
www.yuno.uk	A platform exploring individuals' interests and related career options.
https://wouldyouratherbe.com/	A webapp aiming to support individuals' career choices.
https://staynimble.co.uk/	A platform offering career guidance options.
https://www.nesta.org.uk/project/futurefit/	A comprehensive platform for businesses.
https://uk.hellobob.com/	An AI career coach platform.
https://www.careerear.co.uk/	A careers information platform focused on younger adults.

ANNEX C: HIGH LEVEL REQUIREMENTS

1	Agree and implement a common language that is shared across data sets, structures for organising data, and user interfaces.
2	Develop a common information platform holding credible underpinning data for all occupations.
3	Enable the common information platform to be accessed by intermediary organisations so that they may develop visualisations for different audiences (eg local use)
4	Develop visualisation for occupations within the technical education routes, described by occupational standards and shown by the Institute's occupational maps
5	Develop comprehensive visualisation that encompasses all agreed occupations – including both within and not captured by the Institute's occupational maps
6	Show typical technical education training paths leading to occupations (both within and outside of the Institute's occupational maps) where these apply
7	Show typical education and training paths (both academic and technical) leading to occupations (both within and outside of the Institute's occupational maps) where these apply
8	Show less typical education and training paths leading to occupations (both within and outside of the Institute's occupational maps) where these apply – indicating through weighting that this is a less common path
9	Indicate paths to occupations where formal education and training is typically not required
10	Identify and describe current occupations not shown on the Institute's occupational maps
11	Identify and describe all emerging occupations going forward and feed these into the visualisation
12	Use skills analysis to underpin signposting for related occupations that share a common skills-set but are not grouped together (eg they are not in the same technical education route) – aiming to demonstrate how knowledge & skills are transferable for reskilling
13	Tailor separate visualisations for different audiences: • Parents & students • Employers • Providers • CEIAG professionals • CAs/LEPs/LAs
14	Link LMI data to occupations: • Commonly used job titles • National & local salary data • National & local vacancy data • National & local forecast demand growth
15	Enable a view of all occupations by sector
16	Link to career guidance resources for occupations (eg video clips)
17	Link to providers of relevant education and training programmes

The revised analysis of the high-level requirements is shown below, on a scale of 1-5; 1 being ranked as an early action, 5 a much later action.

Requirement		Group Ranking (1-5)
1	'Hack Day' to explore what is possible towards 'brilliant' using currently available data	1
2	Develop visualisation for occupations within the technical education routes, described by occupational standards and shown by the Institute's occupational maps	1.4
3	Agree and implement a common language that is shared across data sets, structures for organising data, and front-ends	1.6
4	Show typical technical education training paths leading to occupations (both within and outside of the Institute's occupational maps) where these apply	1.6
5	Use skills analysis to underpin signposting for related occupations that share a common skills-set but are not grouped together (eg they are not in the same technical education route) – aiming to demonstrate how knowledge & skills are transferable for reskilling	1.8
6	Tailor view for students/parents	1.8
7	Link LMI data to occupations: commonly used job titles	1.8
8	Link LMI data to occupations: salary data national	1.8
9	Link LMI data to occupations: salary data local	1.8
10	Link LMI data to occupations: vacancy data national	1.8
11	Link LMI data to occupations: vacancy data local	1.8
12	Link LMI data to occupations: forecast demand growth national	1.8
13	Link LMI data to occupations: forecast demand growth local	1.8
14	Link to career guidance resources for occupations (eg video clips)	1.8
15	Identify and describe current occupations not shown on the Institute's occupational maps	2
16	Enable a view of all occupations by sector	2
17	Tailor view for employers	2
18	Develop common information platform holding credible underpinning data for all occupations	2.2
19	Show typical education and training paths (both academic and technical) leading to occupations (both within and outside of the Institute's occupational maps) where these apply	2.2
20	Tailor view for CEIAG professionals	2.2
21	Tailor view for providers	2.2
22	Enable common information platform to be accessed by intermediary organisations so that they may develop visualisations for different audiences (eg local use)	2.6
23	Develop comprehensive visualisation that encompasses all agreed occupations – including both within and not captured by the Institute's occupational maps	2.6
24	Show less typical education and training paths leading to occupations (both within and outside of the Institute's occupational maps) where these apply – indicating through weighting that this is a less common path	2.6
25	Indicate paths to occupations where formal education and training is typically not required	2.6
26	Identify and describe all emerging occupations going forward and feed these into the visualisation	2.6
27	Link to providers of relevant education and training programmes	2.8

The Gatsby Charitable Foundation
The Peak, 5 Wilton Road, London SW1V 1AP
T +44 (0)20 7410 0330 www.gatsby.org.uk
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