

**March 2013**

## Editorial

In this issue of STEM Foresight, we take an in-depth look at the skills requirements of the **UK rail industry**. We review it from all sides, from the manufacture of equipment to the operation of passenger and freight services, and consider the roles of the different companies and organisations that control its operation and future development. This provides the context for a detailed look at employment statistics and specific skills requirements of the industry that will enable colleges to respond to needs in their region.

The recent crisis in the food industry has brought food quality and sustainability very much into the public eye. What we eat is important to us and there are likely to be demands for higher levels of scrutiny in all parts of the food chain to ensure the standard of our food and the accuracy of the information we receive about it. We look at how new **food technologies** and applied research are taking this industry forward, and relate these to the training and education that is now being offered by colleges in the UK.

Finally, we progressively build our understanding of UK skills requirements as a whole through the second of our regional economic reviews, covering **London, the South East, and East of England**. This report looks at four key indicators in the regional economy that help us to understand the labour demand: the value of the regional economy; industrial structure and levels of employment; the occupational structure of the regional workforce; the qualifications and skills held by the workforce. These statistics help us predict likely areas of growth. They also help us to identify gaps in skills and qualifications that colleges are well placed to address through the development of new qualifications, courses and curricula.

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## News-in-Brief

### 2013 Industry Report: Information Security Skills Shortage

A recently released industry report<sup>1</sup> has highlighted a severe shortage in information security skills that is likely to have an impact on global business activity unless it is addressed as a priority. The study surveyed 12,000 information security professionals, world-wide (21% of which were based in Europe), including professionals from a wide range of industry sectors (IT, Banking, Insurance & Finance, Professional Services, Telecom & Media, Manufacturing and Healthcare) and public sector organisations.

#### Managing Security to Protect Business Operations

Rapid developments in information technology and changes in the way business operations take place mean an increasing need for organisations to protect networked operations and information assets from attack. Reputational risks and breach of regulations, as well as the cost of downtime, means that organisations are being forced to take cyber security seriously.

The greatest security concerns in the study relate to application vulnerabilities, malware and mobile devices. However concerns relating to cloud-based services, the use of social media and allowing the use of personally owned devices (laptops, tablets, and smart phones) to access privileged information and applications are increasing.

#### Training and education requirements

The report noted an increase in spending on training and education of employees in 2012. Investment is expected to increase further in the next 12 months. Security training and education should balance the need for knowledge of security technologies (e.g. secure software development, network monitoring & intelligence, intrusion detection & prevention technologies, web security applications, policy management & audit tools, automated identity management software) with human aspects of security (e.g. security management and leadership, policy adherence, etc). Secure software development is

viewed as more important by the banking, insurance & finance, IT, retail & wholesale, telecom & media sectors. Healthcare respondents emphasised the need for policy management and auditing tools.

#### Attributes of information security professionals

The report highlighted an acute shortage of suitably qualified professionals to fill vacancies in information security jobs. Knowledge and technical skills are essential, but it is also considered important that these are verified through certification and affiliation with appropriate professional bodies. Certification is a good indicator of competence and is considered important in many sectors of industry. Furthermore, the report states that security professionals need to have good communication skills to be successful.

Training and education of new professionals and up-skilling of the existing workforce is needed to maintain the security of businesses across the UK, large and small. Colleges should consider the potential for offering short courses to meet these needs (possibly in collaboration with industry partners) and should review curricula (and the advantages of providing certification and affiliation as part of these) to maximise the employment potential of new entrants to the industry.

1. 2013 (ISC)2 Global Information Security Workforce Study, Frost & Sullivan, in partnership with Booz, Allen & Hamilton, <https://www.isc2cares.org>

## Policy, Funding and Awards

### 24+ Advanced Learning Loans

As we go to press, it appears that capital funding promised by the government to support the study of STEM subjects with high equipment costs, will not now be made available in 2013. 24+ Advanced Learning Loans are being made available to learners from 1 August 2013 to help pay tuition fees for courses at level 3 and above. The funding government was expected to provide incentives for learners to take up studies in STEM subjects.

According to research carried out by the 157 Group in 2012, STEM learners could face fees 30%-40% higher



than other areas. FE colleges may therefore find it difficult to recruit viable numbers.

As we continue to report skills shortages in STEM subject areas at these levels, help is required to ensure that FE colleges are able to offer courses in areas that underpin and drive industrial growth.

### Round 4 of the Regional Growth Fund

The Regional Growth Fund is a £2.6 billion fund across England from 2011 to 2016 to support projects and programmes that lever private sector investment to create economic growth and sustainable employment. Round 4 is now open for applications. FE colleges are eligible, as demonstrated by Gateshead College's successful Round 2 bid of £6.2M.

### An award for young social entrepreneurs

Colleges running enterprise schemes may like to know of Ben & Jerry's 'Join Our Core' Competition 2013. The ice-cream company is looking for 18-24 year olds who are creating new sustainable business models which will help make a difference to communities.

Criteria include environmental awareness and innovation. The awards range from a year's supply of Ben & Jerry's ice cream to a cash prize of £10,000 with six months' mentoring from Ashoka, the company largely credited with coining the phrase 'social entrepreneur'. The deadlines are 10 April 2013 for early birds and final submissions by 3 May 2013.

### SfA Innovation Code

A reminder: there is updated guidance available from BIS explaining how colleges can use the Innovation Code to make the most of freedoms and flexibilities to meet the needs of learners and employers.

The Innovation Code allows colleges to enrol learners on a course that at present does not lead to a Qualifications and Credit Framework (QCF) qualification, enable them to address emerging STEM requirements.

The SfA were Highly Commended for this policy in the 2012 NEF Innovation awards.

## Industry Focus

### Mind the Skills Gap<sup>1</sup>: The UK Rail Industry and its Skills Needs

The rail industry occupies an unenviable position in the British economy; too essential to our daily lives to be free from government interference, too long-term to be manageable by short term political decision making, too critical for a safe environmental future to be left to the rigors of the market. This article explores the challenges the industry faces in acquiring people with the right skills.

It is helpful to divide the industry into the manufacture of rail equipment (locomotives, rolling stock, control and communication systems, and physical plant) and the operation of rail services. Rail services are subdivided between the maintenance and operation of the infrastructure (stations, track, signalling etc) and the operation of passenger and freight train services.

The industry comprises a mix of different types of private companies<sup>2</sup> interacting with government bodies, ie the Department for Transport, Transport for London, and the Office of the Rail Regulator.

1. Network Rail Infrastructure Limited owns and operates the infrastructure core of the railway system. It also owns stations but most of these are leased to and operated by train operating companies (TOCs).

Network Rail employs 20% of the workforce engaged in rail services. Its principal activities are the operation, maintenance, renewal and, in co-operation with train operators and funders, the development and enhancement of the national rail network; in particular:

- provision to train operators of railway track access
- management of train timetabling, train planning and signalling
- maintenance, renewal and enhancement of the infrastructure and undertaking major capital programmes



Future spending proposals include:

- investment of £28.5 billion
- providing 1,700 extra carriages
- improving train service punctuality to over 92% by 2014
- halving the costs of running the railway during the ten years to 2014
- investing £7.6 billion in projects designed to relieve crowding by lengthening platforms and increasing track and train capacity
- spending £10.8 billion on renewal of the network.

2. Infrastructure construction and maintenance companies who deliver contracts led by Network Rail and other contracting bodies for new developments, eg CrossRail, in civil engineering, eg Balfour Beatty Rail, Amey, Taylor Woodrow, Morgan Sindall, and in signalling and communications, eg Babcock, Invensys Rail, Siemens, Bombardier.

3. Train operating companies who operate passenger trains, eg Virgin, First Great Western, South West Trains, Northern Rail, Cross Country, Chiltern; 25 companies including Eurostar and London Overground.

TOCs are owned by big players in the passenger transport industry, eg Nederlense Spoorweg (Dutch State Railways), Arriva Trains (Deutsche Bahn - German State Railways), First Group, Govia, Stagecoach.

4. Freight operating companies, the main ones being DB Schenker Rail (formerly EWS), Freightliner, DRS (Direct Rail Services) and GB Railfreight.

5. Rolling stock companies (ROSCOs) who own and lease trains to the TOCs, maintaining them and investing in new build (only limitedly from the UK's own rail manufacturing industry) eg Eversholt Rail Group, Angel Trains, Porterbrook.

These companies are largely created by consortia led by banking and rail engineering companies

6. Railway locomotive and rolling stock manufacturers, eg Siemens, Bombardier, Alstom, Hitachi Rail.

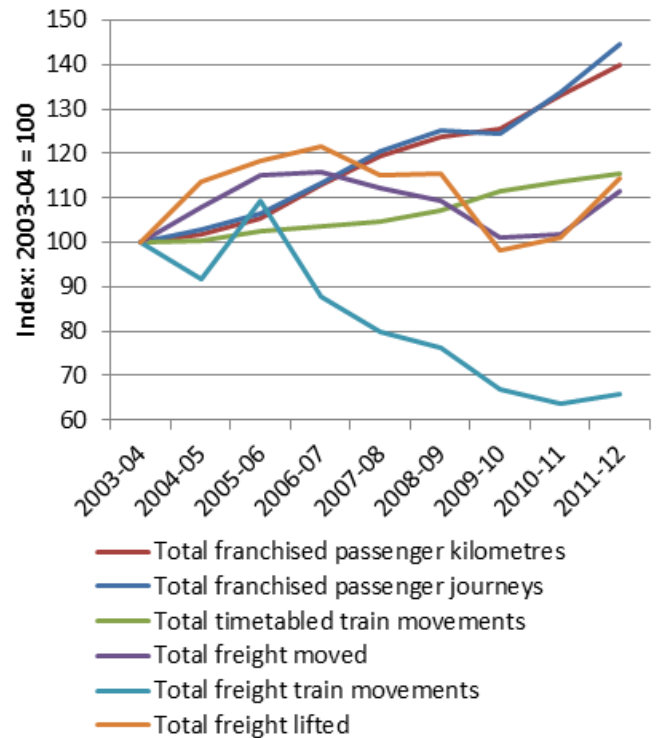


Figure 1: Rail Traffic Statistics<sup>3</sup>

## Employment in the industry

There are around 180,000<sup>4</sup> people working in the rail industry including:

- 47,000 work for train operating companies
- 112,000 work for Network Rail and in supplier and engineering companies including:
  - Track 55,500
  - Signalling & Telecommunications 12,000
  - Electrification & Plant 3,500
  - Building & Civil 15,500
  - Traction & Rolling Stock 13,500
- At least 4,000 work in railway manufacturing

The average employee is 41 years old and 43% is over 45; 2% are employed part-time; the female workforce comprises 4% of driving & maintenance, 11% of engineering and 31% of the customer service staff.

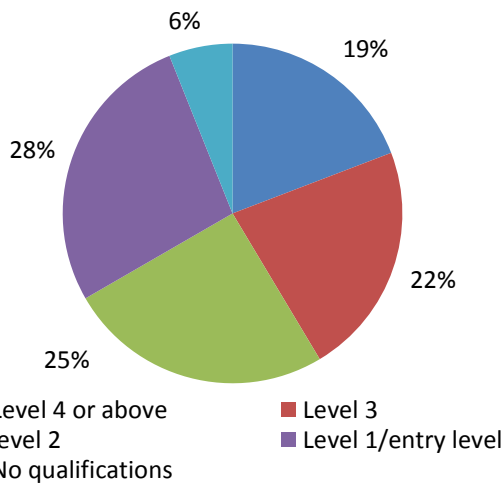
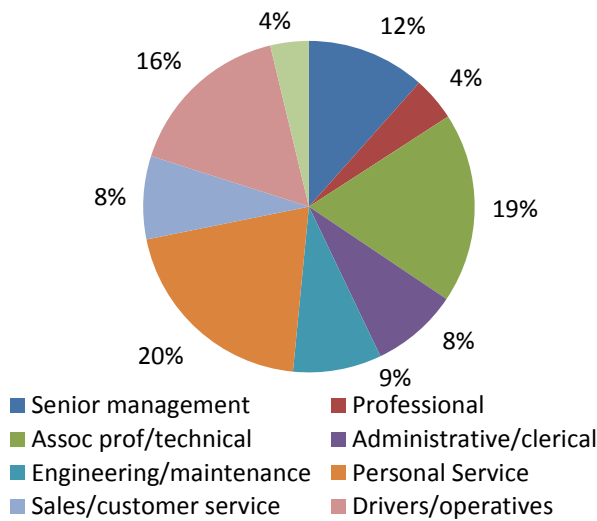
The workforce includes the following occupations, the profile of which is shown in Figure 2:

- Rail operations – customer facing (eg station staff, train crew & gateline assistant) and service



delivery( eg driver, control room operator, service planner and signaller).

- Technical and engineering – with responsibility for rolling stock, track and its surrounds, telecommunications and the electrification of the railway (eg engineer, track maintenance worker, signalling technician, traction and rolling stock technician).
- Management (eg customer service manager, technician manager).



**Figure 2: Rail Occupational Structure (SOC 2010) and Qualifications Profile 2010**

The link between occupations and qualifications is always difficult to track since there is a distinction between the qualifications necessary to undertake a job and those that the workforce actually hold. Some

simple rules of thumb are that the top 3 occupational groups should require qualifications at Level 4 or above and the top 5 should require Level 3 or above.

For the rail industry, the top 3 and top 5 occupations are 35% and 52% of the workforce, respectively, but the level 4+ and Level 3+ qualifications are held by only 19% and 41% of the workforce.

A more specific analysis of the rail industry reveals<sup>6</sup> how difficult this comparison can be: 42% of employees in the rail industry would benefit from further training, either to address skill gaps (under qualified for the job) or to provide access to the increasing numbers of higher level occupations.

	Level 4 and above	Level 3	Level 2	Level 1 & entry level	No quals
Travel assistants	15%	19%	28%	30%	8%
Train drivers	11%	17%	31%	38%	4%
Transport operatives	8%	21%	38%	24%	9%
Construction & maintenance operatives	6%	18%	28%	32%	16%


**Figure 3: Highest Level of Qualifications Attained across Rail Core Occupations**

### Impact of Rail Sector Growth on Skills Requirements<sup>7,8</sup>

Despite the current recessionary gloom that has affected the freight sector (see Figure 1) and manufacturing, the future for railways remains remarkably bright. Passenger demand remains high and is predicted to grow as a result of population growth, acceptance of longer journeys to work and choosing rail due to the cost of other options. The government is already committed to major projects<sup>9</sup>:

- Electrification of the Midland Main Line between Bedford and Sheffield, the Great Western Main Line to Bristol and Swansea, the North Transpennine, the North West triangle, and the electric spine from Southampton to South Yorkshire for freight.
- The High Level Output Specification programme, £9 billion of investment including a £500 million link between the Great Western Main Line and





Heathrow, £510m for the Northern Hub and £240m for the East Coast main line. This is expected to create an increase of around 51 million passenger journeys each year.

- For London, Crossrail (and possibly Crossrail 2), plus the expansion of Thameslink.
- Intercity Express Programme to replace HST and East Coast fleets for which Hitachi will build a factory in County Durham creating 730 skilled jobs and 200 jobs during construction.
- HS2 between London and Birmingham and the second stage to Manchester and Leeds.
  - ERTMS (European Rail Traffic Management System), replacing traditional railway signals with a computer display inside every cab, reducing maintenance costs, improving performance and enhancing safety.

These will lead to a significant increase in the demand for highly skilled labour to construct and maintain the infrastructure, deliver the environmental benefits of electrification and electronic/communications based systems, manufacture and maintain the new trains, and service the projected increase in passenger journeys arising from both these developments and projected growth on the existing network.

NSARE estimates<sup>10</sup> the engineering/technical requirements for the next 5 years will be 10,000 new people, within which the traction and rolling stock area will see 30% of its existing workforce replaced. In electrification and plant, this will present a considerable challenge since this area has a qualifications profile with 32% of staff at Level 4 or above and 76% at Level 3 or above.

## Skills Gaps and Requirements

People 1<sup>st</sup> has highlighted two main areas of skill shortage; customer service and technology. Operators will need to address both these and the demand for new labour highlighted above.

Customer service skills gaps have been recognised for some time. In passenger transport, increased customer satisfaction contributes to business growth and profitability. However, less than 50% of employers offer customer service training. TOCs are finding it difficult to recruit customer service staff. These

positions need few formal qualifications but do require an ability to deal with the travelling public.

Network Rail has a shortage of signallers. As with driving, regulating train movement demands attention to detail rather than specific qualifications.

A significant development has Network Rail's requirement that contractors employ staff directly, relying less on agencies to improve standards in the quality of new build. The in-house management of maintenance has also required new staff.

Infrastructure maintenance organisations normally employ a small core staff and there are vacancies to maintain track and signalling structures. Skill levels vary from technical staff with engineering experience and qualifications to track maintainers with physical strength who can work in all weathers. Specialist agencies work under contract to supply such people.

Network Rail has announced it is creating more than 300 engineering jobs to deliver infrastructure projects. Its award-winning Advanced Apprenticeship Scheme offers a three-year programme for candidates to become skilled maintenance engineering technicians.

Rail relies on getting the most out of limited physical resources so those with a logistics background are in demand. Academic qualifications and practical experience help to secure the better-paid management positions but there are shortages in customer service management, operations management, and leadership positions.

## Entry and Progression<sup>11</sup>

For most entry level jobs there are no specific qualifications required other than a sound basic education. For train crew and station staff jobs, experience working in a customer service environment, such as a call centre, restaurant or shop is an advantage. Employers look for communication skills and the ability to deal confidently with the public.

To become a train driver (more than 300 applications for each job), applicants either apply for a trainee position or, more commonly, gain employment in another rail industry role and wait for a trainee driver vacancy to be advertised internally.



Engineers can be recruited as trainees or experienced technicians. Applicants are usually expected to hold an entry level award in engineering or technology. For more experienced positions, work experience in a related area is required.

The transferable skills most valued include: foreign languages, job-related IT, customer service; communication; organisational & planning skills; team working; and health & safety. There is a general weakness in mathematics and the use of numbers.

People 1<sup>st</sup> is providing consultation on entry routes and qualifications in the industry in an attempt to remove the barriers to prospective employees. Although 42% of employers say they would consider hiring apprentices, only 3% actually do.

## National Skills Academy for Rail Engineering<sup>12</sup>

NSARE was established in 2011 and its activities include:

- **Skills forecasting**, developing and maintaining a cross industry view of future (10+ years) skills needs and gaps
- **Training provision accreditation**, providing a unified industry accreditation scheme for training organisations, trainers and assessors.
- **Development of a national competence database (SkillsID)** that will enable all workers in the railway engineering industry to hold a skills passport recognised by employers
- **Working with employers** to provide access to training support
- **Industry promotion**, developing and publicising career opportunities

NSARE has identified the following engineering skills challenges:

- Recruitment of school leavers as apprentices, with a career path to becoming professional railway engineers (Level 4+) for those sufficiently motivated and capable
- Recruitment, training and development of graduates to become future professional engineers
- Encouragement and training of experienced technicians without degrees to become professional engineers

- Development of consistent competence requirements for professional recognition
- Up-skilling of the engineering workforce to a minimum of Level 2, including transient workers, and a general up-skilling of all at Levels 1 to 3
- Training today's craftsmen to become the supervisors of tomorrow
- Conversion training of craftsmen and professionals from other sectors to railway engineers.

## Conclusions

The long lead times to commence projects and even longer lead times to implementation should facilitate effective manpower planning. Figure 2 showed clearly that there is evidence of a skills gap with the current workforce that can only grow with increasing investment in technology and rising occupational expectations. Combine this with the projects identified above, and the warning of skills shortages in customer service and technology, issued by People 1<sup>st</sup>, appears to have been an understatement.

NSARE has provided a model for effective skills forecasting, planning and action on qualifications and training. It is imperative that this approach is extended to the whole industry and that NSARE's aspiration "**A network of FE colleges that will work collaboratively with employers and other training providers within the Railway Engineering sector**" is adopted by all stakeholders.

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## Technology Focus

### Meeting the Sustainable Food Challenge

Food is a key element of the sustainability challenge. Indeed, food production and consumption have an impact upon economy, society and the environment. A major challenge is responding to the production of enough food to meet the demand of an increasing world population (expected to peak at 9.5 billion by 2075). The challenge is further compounded by the constraint of finite resources and the amount of food that is wasted and not consumed.

A recently published report from the Institution of Mechanical Engineers<sup>1</sup>, highlights the extent of **food waste**. An estimated 30-50% (1.2 – 2 billion metric tonnes) of the total food produced per annum (4 billion metric tonnes) never reaches a human stomach.

In the UK, the government launched its **food strategy, Food 2030**<sup>2</sup>, in January 2011. This national food strategy, the first for 50 years, developed across government, provides coherence and direction within government, private and voluntary sectors.

A major concern of the strategy is the long term sustainability of the UK food system. This is addressed through priorities which include:

- **Increasing food production sustainably**  
The fundamental goal of feeding a growing world population must be achieved in ways that protect and enhance the environment. DEFRA is using initiatives such as the Environmental Stewardship schemes and the Rural Development Programme for England to support farmers and help them meet their environmental responsibilities. International development programmes are also required to this goal by helping farmers in developing countries reduce post-harvest losses and make efficient use of natural resources.
- **Reducing emissions in the food system**  
The UK Government's Climate Change Act 2008<sup>3</sup> introduced a legally binding obligation to reduce national greenhouse gas emissions by at least 80% on 1990 levels by 2050. An estimated 22% of emissions from economic activity in the UK come

from the food chain, so major reductions will have to be made here if we are to meet targets.

- **Enabling and encouraging people to eat a healthy, sustainable diet**  
There is a need to encourage market demand for fresh locally produced food (low food miles) that aligns the drive to improve the nation's health with sustainability.
- **Ensuring a resilient, profitable and competitive food system**  
Essential for sustainable development in the UK as without the relevant skills and investment the UK's food system will be unable to adapt to more sustainable practices.

Associated with this is the debate on energy from waste<sup>4</sup>, where food features. But the key message is to reduce food waste, as the technologies to convert biological waste to energy are in their infancy.

In parallel a recent UK survey<sup>5</sup> highlights concerns in the food and drink industry where 46% of respondents cannot find people with high-level skills, such as shift managers and product development specialists and this lack of skills poses the greatest risk to the sector.

There are **opportunities for colleges** in contributing to meeting the challenge. Curriculum for courses in food technology, new food engineering, packaging design, agricultural studies, waste management, amongst others, should address these issues. There is room for specialist modules on technologies related to food production. General and extra-curricular activities with learners need to support debate on the best route to healthy and sustainable food as one important element of the green agenda.

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## Regional Labour Market Foresight: London, the South East, and East of England

In each edition of STEM Foresight, this section reviews the latest available information about the current status and likely future of the labour market in two or more of the UK countries or regions. In this issue we examine the boom regions of the south and East of England that, even in these times of recession, display significantly better performance than elsewhere. The North-south divide is even more prominent now than it has been at any time in recent history. It is demonstrated most clearly in the differences in the proportions of high order occupations and high level qualifications held by the labour force, both issues over which colleges and universities have considerable influence.

The objective of our analysis is to help colleges, universities and businesses to match the profile and levels of labour supply and demand. To do this, we would ideally explore both sides of the market; understanding the characteristics of residents of working age and the needs of local industry, then assessing where shortages and gaps occur both now and in the future so that we can identify actions to better match the two. This is problematic since at any one time we can only record the current equilibrium but we must recognise that this will mask the presence of skill shortages and unemployment, skill gaps and under-employment.

### Key Indicators

There are four key indicators within a regional economy through which we understand the labour market. These align with the recommended metrics of the UKCES in their Ambition 2020 report<sup>12</sup>.

### Value of the Regional Economy

The **first key indicator** is the value of the regional economy, both as a contributor to the national economy through productivity and to the people of the region through the wealth generated. Productivity is measured on a workplace or residence basis by the Gross Value Added (GVA) (or, better, by the GVA per worker or per hour worked)<sup>3</sup> and broken down by industrial sector.

Productivity	Date	London	South East	East of England	UK
Gross Value Added (million)	2005	£223,045	£159,328	£98,154	£1,116,882
Workplace at current prices	2010	£274,085	£186,860	£110,783	£1,301,118
Nominal GVA per hour worked, indexed	2005	129.6	105.3	101.1	100
	2010	133.3	108.2	97.5	100
Nominal GVA per filled job, indexed	2005	136.4	103.4	101.5	100
NB jobs may be full or part-time	2010	141.2	105.7	94.1	100
GVA per head	2005	£29,799	£19,495	£17,682	£18,542
NB This relates workforce output to the residential population	2010	£35,026	£21,924	£18,996	£20,849
GVA per head, indexed	2005	163.6	107.1	97.1	100
	2010	171.1	107.1	92.8	100



The most effective measure of productivity is the GVA per hour worked. All three regions perform close to or above the UK average, although the East shows a decline over the five year period. This is typical of all the UK countries and regions other than London and the South East (refer to GVA chart on page 11).

The lower performance by the East represents an “Output Gap” that would be worth £2,800million if the region was as productive as the UK average. These gaps can be explained by a combination of factors; a lower working age population, lower employment rate, lower hours worked, the industrial and occupational structures, or lower regional prices. All except the last factor provide a focus for action to change the operation of the labour market in order to improve its productivity.

Wealth is measured by the **Gross Disposable Household Income (GDHI)** of the resident population<sup>4</sup>. Earnings by workplace and by residence provide an alternative measure of wealth and an indication of the relationship between the wealth of those living and working in the region.

Wealth	Date	London	South East	East of England	UK
GDHI per head	2005	£16,787	£15,311	£14,416	£13,535
	2010	£20,238	£17,610	£16,392	£15,727
GDHI per head, indexed	2005	124.2	113.3	106.6	100
	2010	128.8	112.1	104.3	100
Median Full-Time Gross Weekly Earnings	2006	£569.2	£469.0	£440.6	£443.6
by workplace	2011	£650.9	£528.1	£494.5	£500.7
Annual % change	2010/11	1.3%	0.8%	1.2%	0.4%
Median Full-Time Gross Weekly Earnings	2006	£537.6	£486.5	£466	£443.6
by residence	2011	£610.2	£554.4	£528.5	£500.7
Annual % change	2010/11	0.6%	1.2%	1.0%	0.4%

Only in London has household income increased relative to the UK average over the five year period, but for all three regions it remains higher than average for the UK. Data for full-time earnings records the effect of inward commuting to London from the South East and East and the concentration of higher full-time earnings in London and the South East.

HM Treasury and the Department for Business, Innovation and Skills (BIS) have identified **five key drivers of productivity** that can help explain differences in productivity across regions. These are investment, innovation, enterprise, competition and skills. Alongside these five key drivers, other factors such as connectivity, industrial structure and region-specific assets can have a strong influence on regional productivity performance. Data on the regional allocation of total investment is unreliable.

Expenditure on Research and Development (R&D) by businesses<sup>3</sup> can be used as a measure of innovation, the numbers of business births and deaths<sup>3</sup> and survival rates<sup>13</sup> are indicators of enterprise, UK regional trade in goods<sup>3</sup> serves as a measure of competition, and the qualifications of the current working-age population and those of young people, who represent the future workforce, provide an indicator for the skills driver<sup>11</sup>.



A full exploration of qualifications is presented later as a key element in understanding the regional skills profile but a summary of four of the drivers is presented in the table below.

Productivity Drivers	R&D Investment % of GVA (Innovation)	Export % of GVA (Competition)	Import % of GVA (Competition)	Business Birth Rate (Enterprise)	Business Death Rate (Enterprise)	3-year % Business Survival Rate (Enterprise)	% of working population with no qualifications	% KS4 pupils* gaining A-C inc Maths & English
Date	2010	2010	2010	2010	2010	2007	2011	2009/10
London	1.08	10.4	22.3	13.1	15	59.5	9.3	57.3
South East	2.98	22.5	41.2	10.0	12.2	66.1	7.9	57.1
East of England	4.5	20.5	41.1	9.7	12.0	63.8	9.6	55.6
North East	1.31	29.1	22.6	9.6	13.1	62.3	12.2	52.6
North West	2.26	20.5	20.3	9.9	13.5	62.7	12.0	54.9
Yorkshire and Humber	1.17	15.7	17.5	10.2	13.6	60.2	11.9	51.7
East Midlands	1.96	18.8	20.1	9.3	12.7	64.4	11.5	53.1
West Midlands	1.34	18.8	24.4	9.6	13.0	62.3	14.0	53.9
South West	2.15	11.3	15.8	8.8	11.6	65.9	8.0	55.2
Wales	1.16	25.9	14.2	8.5	12.5	61.9	12.3	-
Scotland	1.79	13.9	10.6	10.3	12.6	65.5	11.6	-
Northern Ireland	1.78	18.8	18.3	7.8	9.1	62.7	21.3	-
UK	2.08	20.2	27.8	10.2	12.9	63	10.9	53.10*

\* Data relates to England

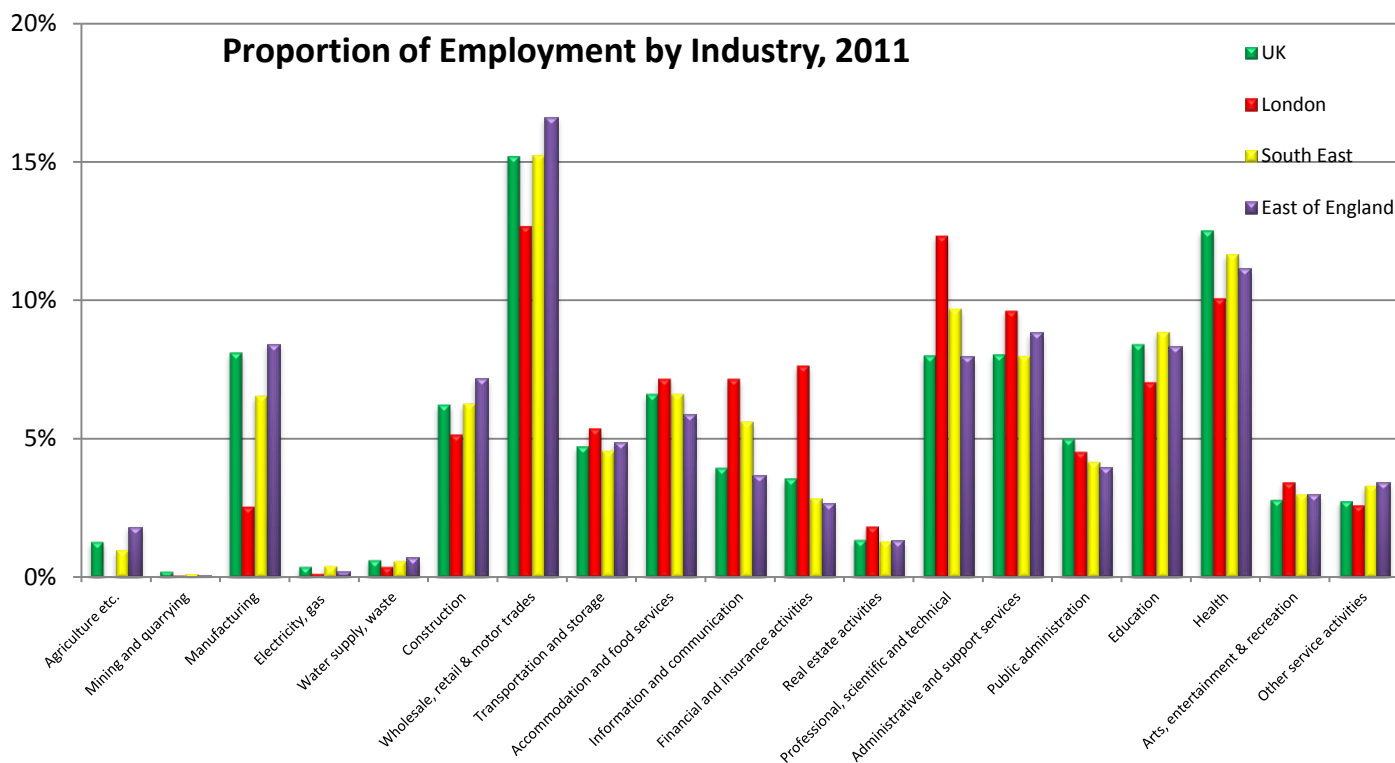
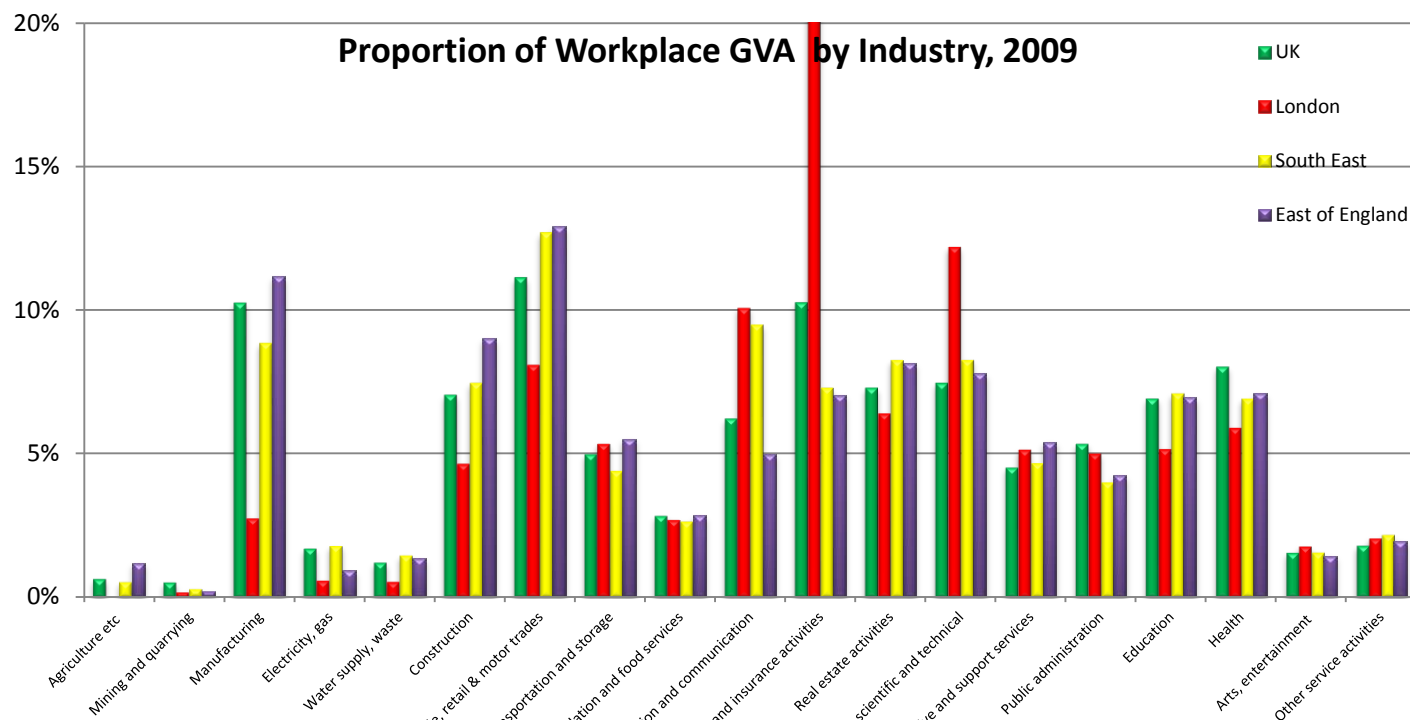
**Key:** In the table above, red indicates the worst and green the best of the UK regions and countries; amber denotes the second best. The best values for six of the eight indicators are found in the three regions under scrutiny.

Overall, the South East appears most capable of driving future productivity and London least able. Some of the reasons for this may become clearer with the investigation of the operation of the labour market in the data that follows.

Both London and the South East have lower proportions of their workforce qualified at Level 4 than the UK as a whole but the same proportion qualified at Level 2 or above. However, their occupational structures, and particularly that of London, have greater proportions of the workforce engaged in the highest level jobs (Groups 1-3) and less engaged in the lowest level jobs (Groups 6-9) than in the UK as a whole. There are two possible explanations for this.

Qualifications relate to the resident population whereas occupations relate to the resident population in work and so the qualification structure may look weaker due to the level of unemployment (noted above). Alternatively, there may be several instances of significant skills gaps, ie insufficient qualifications to perform fully the job required. Both explanations indicate a need for up-skilling the London labour force. The workforce in the East of England has both qualification and occupational structures that more closely reflects that of the UK as a whole, although there is a higher proportion with Level 1 or no qualifications.





## Industrial Structure and Levels of Employment

The **second key indicator** is the industrial structure and levels of employment in each industry<sup>6</sup>. The structure of the regional economy can be seen both from the industrial composition of GVA and in the proportion of employment in each industrial sector. A comparison of the two reveals the different levels of productivity between the manufacturing sector (high productivity) and the education, health and public administration sectors (lower productivity) taken in isolation. This masks the interconnections between the sectors of any economy and, for example, the need for a vibrant education sector to enable most other sectors to perform effectively.

The main differences between the structures in the three regions and the UK as a whole are:

- London is an economy of extremes with very high proportion of its economic activity concentrated in IT, financial services, and professional and scientific activity, and a very low proportion in manufacturing and distribution activity. There is also relatively less activity in construction, education and health.
- The South East has high proportions of IT and professional and scientific activity but low proportions of manufacturing, financial services and public administration activity.
- The East of England is much more closely aligned to the average UK profile but with higher proportions of activity in construction and distribution, and lower proportions in financial services and public administration.

The proportion of businesses employing less than 5 people in 2011 was 72% (London), 71% (South East), and 70% (East), compared with a UK average of 68%<sup>5</sup>. These are the SME's to which we must look for future growth.

Demand for labour in the three regions may be compared with the UK<sup>7</sup> as a whole using the ratio of jobs in the region to the resident population of working age. The difficulty in separating supply and demand (noted above) is illustrated by comparing job density with the activity rate in the following table and trying to determine which causes which.

Labour Demand	Date	London	South East	East of England	UK
Number of jobs	2010	4,772,000	4,372,000	2,770,000	31,093,000
Job density (number of jobs per resident aged 16-64)	2010	0.88	0.80	0.75	0.77

Both London and the South East provide a higher number of jobs to their regional population than the UK average but this may mask net inward commuting. The reverse may be true of the East of England. The characteristics of labour supply are summarised by the following data relating to the residential population:

Labour Supply	Date	London	South East	East of England	UK
Economically active population 16 and over	2012 Q3	4,244,000	4,478,000	3,115,000	32,111,000
Population in employment 16 and over		3,863,000	4,189,000	2,899,000	29,601,000
Percentage economically active (16-64)		76.1%	79.8%	80.5%	77.4%
Percentage in employment (16-64)		69.1%	74.5%	74.7%	71.2%
Unemployment rate		9.0%	6.5%	6.9%	7.8%

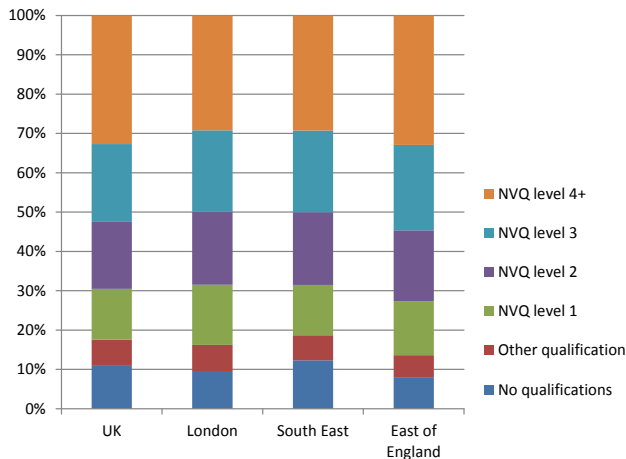
The East has the highest activity rate of the three regions combined with a fairly low unemployment rate. This is the reverse of London that displays a low level of economic activity as well as a high level of unemployment. This confirms that the high job density indicates very significant inward commuting and a lower degree of match between the jobs available and the characteristics of the resident population than is normally found within a region.



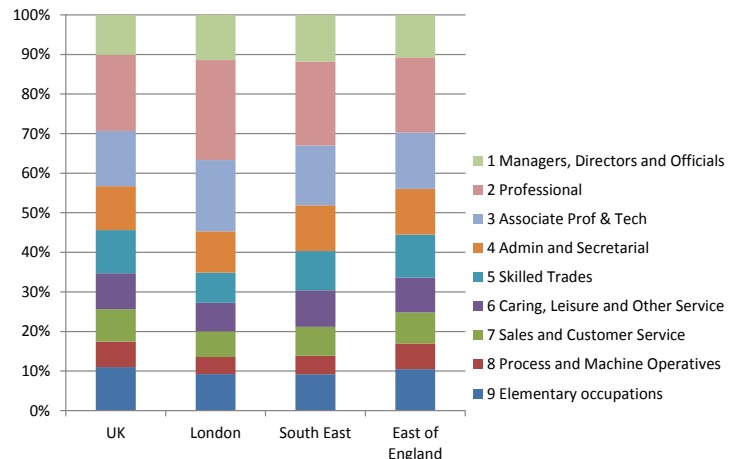
## Occupational Structure, Qualifications and Skills

The **third key indicator** is the occupational structure of the workforce<sup>1</sup>. Variations in productivity between industries in different regions and countries may be explained by different occupational profiles; improving the occupational structure may improve the productivity of a region without changing its industrial structure. The **fourth key indicator**, the qualifications and skills held by the labour force, may similarly explain strengths or weaknesses in the occupational structure<sup>1</sup>. However, there is some concern that the supply of labour may become increasingly over-qualified for the structure of demand (see below).

**Qualifications Structure 2011**



**Occupational Structure 2011/12**



Both London and the South East have lower proportions of their workforce qualified at Level 4 than the UK as a whole but the same proportion qualified at Level 2 or above. However, their occupational structures, and particularly that of London, have greater proportions of the workforce engaged in the highest level jobs (Groups 1-3) and less engaged in the lowest level jobs (Groups 6-9) than in the UK as a whole. There are two possible explanations for this.

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## Addressing the Local Labour Market

The local labour market is continually attempting to balance the four key variables, above. Changing patterns of demand for goods and services result in a shifting demand for labour. The changing aspirations of the economically active resident population, and their access to qualifications, creates a dynamic pattern of labour supply. Any imbalances between either the total supply and demand or their profiles results in increasing commuting flows between the region and other labour markets or a reduction in the level of economic activity in the regional population, ie unemployment or withdrawal from the labour force. In either case, the costs to the labour force is increased and the wealth accruing to the region is diminished.

The current (2011) structure of skills and employment for the three regions may be analysed using a variation to the framework developed for the National Strategic Skills Audit<sup>14,15</sup>. This examines the degree of match/mismatch in the labour market and signals potential problem areas that warrant further action:



- perceived shortages in labour supply that may reflect skills shortages, ie vacancies that cannot be filled, and skills gaps, ie employees in jobs where they have less skill than is required to undertake the job effectively;
- excess of labour supply over demand that may result in significant unemployment and underemployment (defined here as where the skills that the workforce possess are not fully utilised);
- economic net commuting which can be seen as a response to mismatches between job opportunities and skills within the region.

Education providers can address four of the five issues raised by National Strategic Skills Audit framework:

- Skill shortage vacancies can be tackled by re-skilling the existing workforce or by introducing the right skills through training new entrants to the workforce;
- Unemployment might be reduced by providing training in skills aligned with the skill shortage vacancies;
- Skills gaps require up-skilling of the existing workforce;
- Net commuting can be reduced by better matching training opportunities for the residential workforce to the profile of local labour demand.

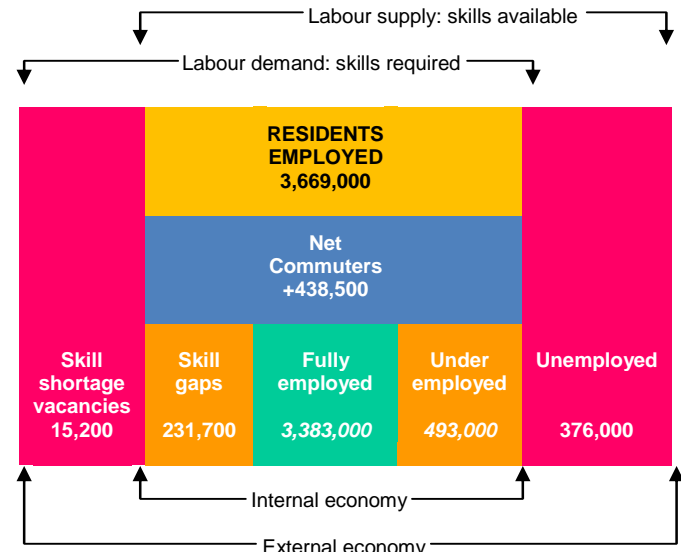
An analysis of underemployment in the UK, ie the mismatch between qualification demand and supply, between 1986 and 2006<sup>12</sup> shows clearly the origins of the current trend whereby the supply of skills exceeds demand at all levels except at the ‘no qualifications’ level.

It is unclear whether, over time, jobs become “allocated” to the best qualified of those potential employees available, ie there is a trickle-down effect with successive levels of qualified employees taking lower level jobs, but if this is the case, then it is reasonable to assume that either all or a proportion of those qualified at each level undertake jobs below their capability, ie they are underemployed.

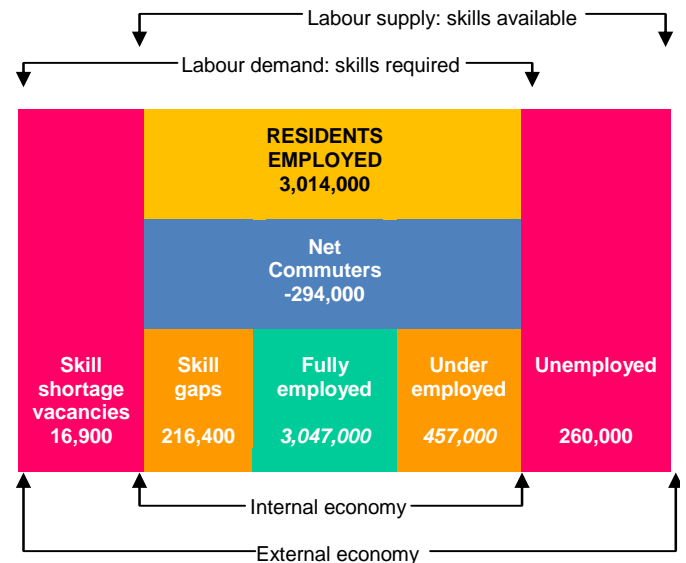
Mitigating against this is the fact that over time the requirements of most jobs will rise, for example, with the adoption of new technology, but the definition of the qualification level remains static. Therefore, underemployment may be progressively reduced as jobs “catch-up” with the skills available in the labour supply.

NB Figures in *italic* in these diagrams are estimates using UK proportions of underemployed)

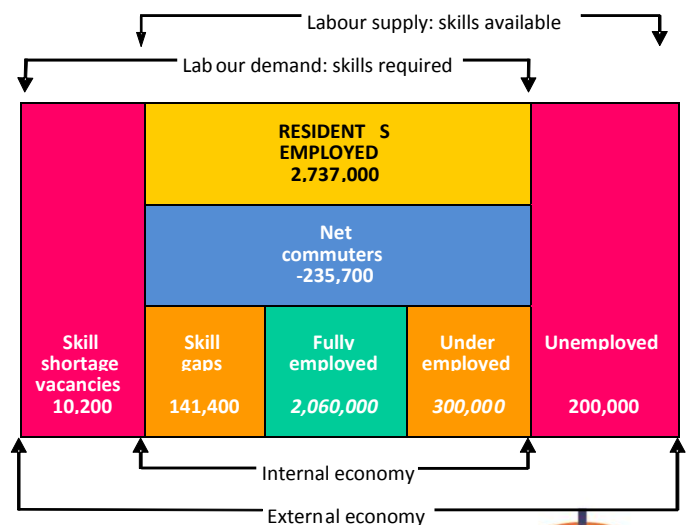
## LONDON



## SOUTH EAST



## EAST OF ENGLAND



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The balance between demand and supply fluctuates due to a number of short-term factors but the current position is that the excess supply of labour with Level 3 qualifications is reducing but the excess supply of those with Level 4 qualifications and above is still increasing.

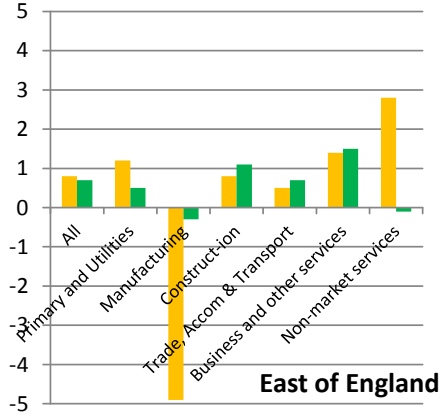
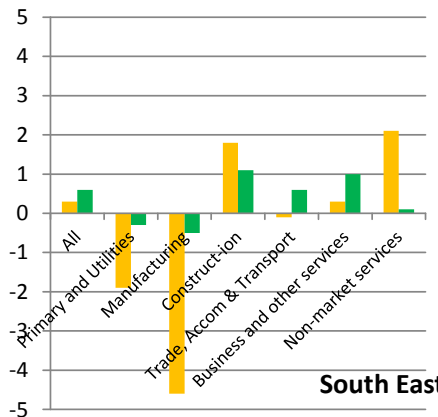
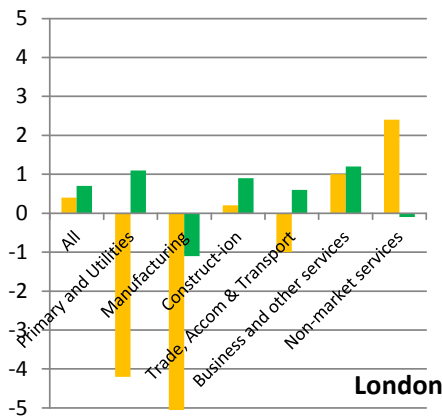
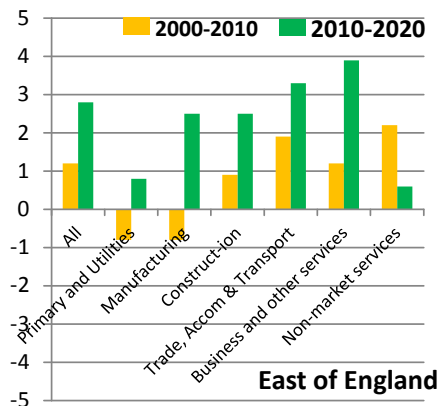
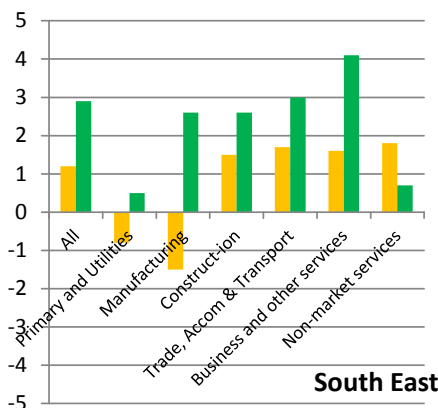
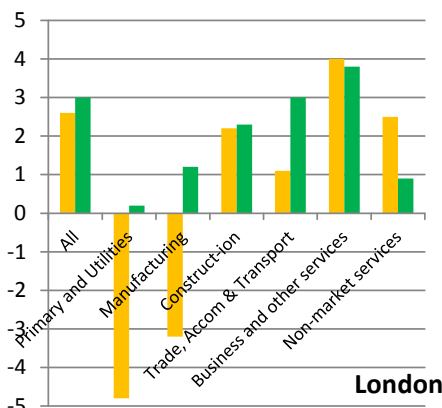
The difference, nationally, between the supply and demand for degree-holders is now well over one million, ie the supply of graduates is outpacing the growth of jobs that require them.


### Labour Market Forecasts<sup>8,9,10</sup>

A cautionary note: these forecasts were constructed in 2010 on the assumption that the recession had ended with the 2009-10 period. They relate to the changes that can be expected to take place over a ten-year period from the date at which there is sound evidence that the recovery has begun, ie the forecast period should be interpreted currently as starting in 2013 or later.

### Gross Added Value

Between 2000 and 2010, the GVA of **London** grew at nearly double that of the UK and faster than any other region or country in the UK. For the period to 2020, the annual average rate of GVA growth for all three regions is forecast to be greater than for any other region or country in the UK with the **South East** and **East of England** growing nearly as fast as London. In terms of employment, the annual average rate of growth from 2000 to 2010 in **London** and the **South East** was the same as for the UK but growth in the **East of England** was double that for the UK. Employment growth in all three regions is projected to increase during 2010-2020 and to exceed the overall rate for the UK.





In **London**, GVA growth was fastest in *business & other services, non-market services and construction*, but declined quite rapidly in the *primary & utilities* and *manufacturing*. The latter two sectors also displayed rapid employment decline, but employment grew strongly in *business* with the fastest growth in *business & other services* and *trade, accommodation and transport*. Projected growth is poor relative to other regions in the *primary & utilities* and *manufacturing* sectors but is near the top of the range of regional performances in other sectors.

London is projected to gain employment in all sectors except *manufacturing* and *nonmarket services* between 2010 and 2020. Employment in the *primary & utilities* sector is projected to recover from the rapid decline of 2000-2010 but employment in the *construction* sector will grow more slowly than the UK average. London is projected to experience one of the fastest annual average rates of employment growth in the *trade, accommodation and transport* sector.

In the **South East** GVA grew in all sectors except *primary & utilities* and *manufacturing*, and at a faster rate than the UK average in other sectors except *business & other services* (in which growth was just over half the UK average and slower than rest of the UK except East of England). Growth in *non-market services* was faster than the UK average but the decline in *manufacturing* was also faster. Employment declined between 2000 and 2010 in *primary & utilities, manufacturing* and *trade, accommodation & transport* sectors. In each case performance was poorer than UK average. Employment increase was above average in *construction* and *non-market services*.

GVA in the South East is projected to grow in all sectors between 2010 and 2020 and particularly quickly in *manufacturing, construction* and *business and other services*. Employment in *primary & utilities* and *manufacturing* is projected to decline between 2010 and 2020 but grow in other sectors. The projected average rate of employment growth is above average in *trade, accommodation & transport* and the region is one of only two regions expected to see growth in *non-market services*. The rate of employment increase is projected to be higher during 2010-2020 than for 2000-2010 in all sectors except *construction* and *non-market services*.

In the **East of England** GVA declined in the *primary & utilities and manufacturing* sectors between 2000 and 2010, but in both cases at a slower rate than the UK average. In the same period the GVA growth rate for the *trade, accommodation and transport* sector was above the UK average and that for *non-market services* was higher than that for any other region or country except London. GVA is projected to grow in all sectors between 2010 and 2020, at a rate higher than the UK average in all sectors except *non-market services*, and with the highest projected growth rate of any region or nation in *trade, accommodation and transport*. Between 2000 and 2010, employment in the *primary & utilities, trade, accommodation and transport, business and other services* and *non-market services* sectors grew faster than the UK average, but the loss of employment in the *manufacturing* sector was greater than average.

The East of England region is projected to gain employment between 2010 and 2020 in all sectors except *manufacturing* and *non-market services*. The region's relative employment performance is projected to be particularly strong in the *primary & utilities* sector, and above average in the *trade, accommodation and transport* and *business and other services* sectors.

## Labour Supply and Demand

Summary statistics on labour supply and demand are shown in the table overleaf.

All indicators are residence-based except for workplace employment (jobs). The decline in the **economic activity rate** (defined as the labour force expressed as a percentage of the population aged 16 years and over) from 2010 to 2020 reflects the increasing share of the population in retirement.

**Workplace employment** (or labour demand) measures the total number of jobs located within a region. This is projected to increase slightly slower than the number of employed residents thereby increasing the level of outward commuting.



The **labour force** (measured as the **employed residents** plus unemployed) indicates the total potential supply of labour. The difference between this and the available workplace employment reflects the marginal stress in the market resulting from a failure to match the amount and profile of supply and demand.

LABOUR MARKET SUMMARY	Total pop.	16+ pop.	Working age pop.	Labour force	Economic activity rate	Employed residents	Workplace emp.
London 2010 (000s)	7,792	6,305	5,224	4,119	65.3	3,740	4,683
London 2020 (000s)	8,463	6,876	5,747	4,453	64.8	4,172	5,037
South East 2010 (000s)	8,474	6,880	5,156	4,418	64.2	4,145	4,263
South East 2020 (000s)	9,065	7,358	5,566	4,638	63.0	4,355	4,507
East of England 2010 (000s)	5,803	4,716	3,514	2,985	63.3	2,780	2,827
East of England 2020 (000s)	6,290	5,109	3,830	3,184	62.3	3,016	3,026

## Occupation and Skill Levels

The charts overleaf show the overall requirement for labour in each occupation group and at each qualification level as the sum of expansion demand, ie new jobs, and replacement demand, ie the effect of retirements, mobility between occupations and other factors.

The charts show the predicted level of employment for each category in 2020 and its composition. Where there is expected to be a decline, the “new jobs” are shown as a negative value on the left hand side. This value should be subtracted from the total on the right to provide the 2020 level. The relative importance of these two aspects of change varies according to the age structure of the workforce in different industrial sectors and occupation groups.

In terms of qualifications, both new and replacement demand at each level may be met by people moving upwards to higher qualifications or downwards into underemployment. It is therefore extremely difficult to identify where the real gaps will occur in relation to the qualifications needed by those entering the labour market.

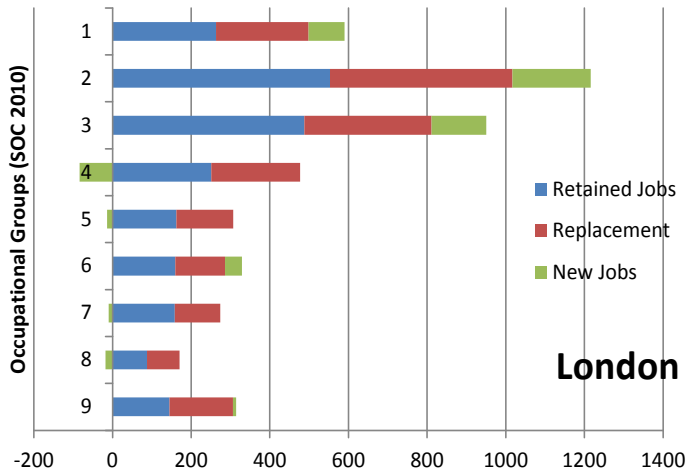
The main issue is that additional jobs (or a reduction in jobs) are an extremely small proportion of the overall change. It is the nature of replacement jobs, ie whether they imply new or enhanced skills or simply replacement of the existing skill, that should form the main target for action by education and training organisations.

Part of the mismatch between labour supply and demand derives from the jobs or occupations required by employers compared with those accessible to the labour force. Expected changes in the occupational structure of employment are shown in the charts below. In all regions, the proportion of the workforce engaged as **managers, directors and senior officials, professionals and associate professionals** are expected to increase between 2010 and 2020 and the proportion of **administrative, clerical and secretarial, and skilled trades occupations** are expected to decline.

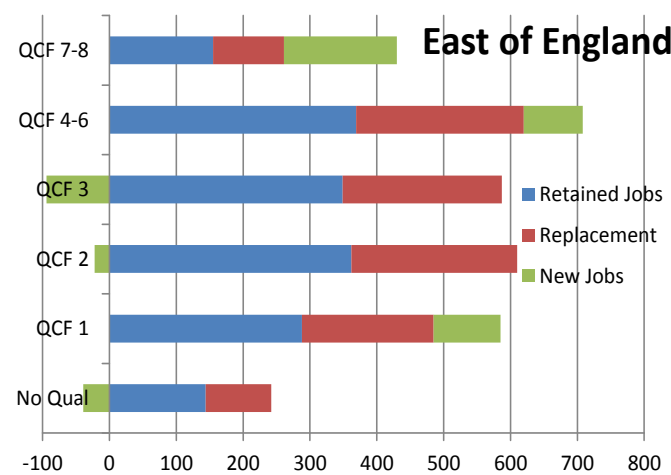
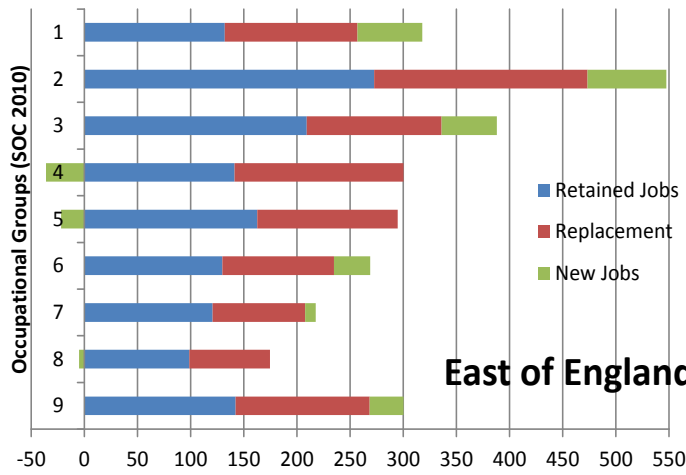
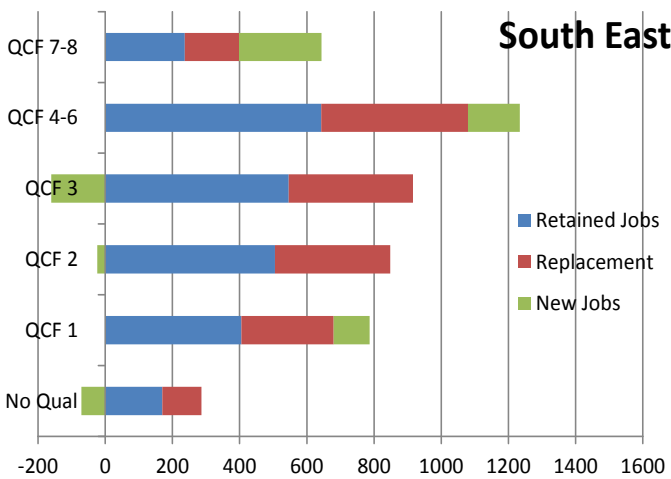
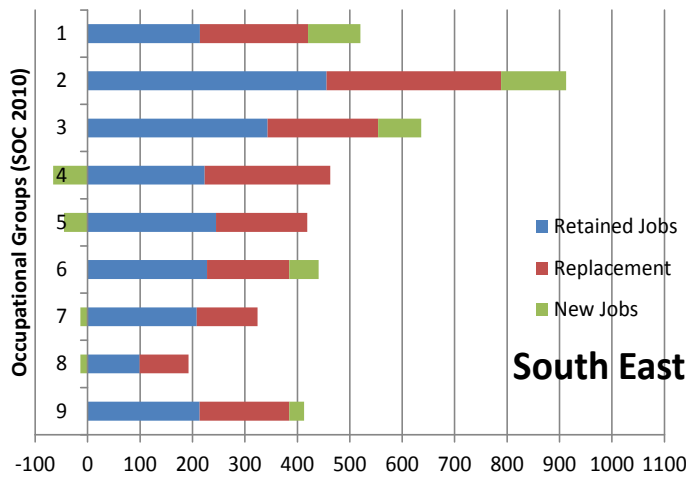
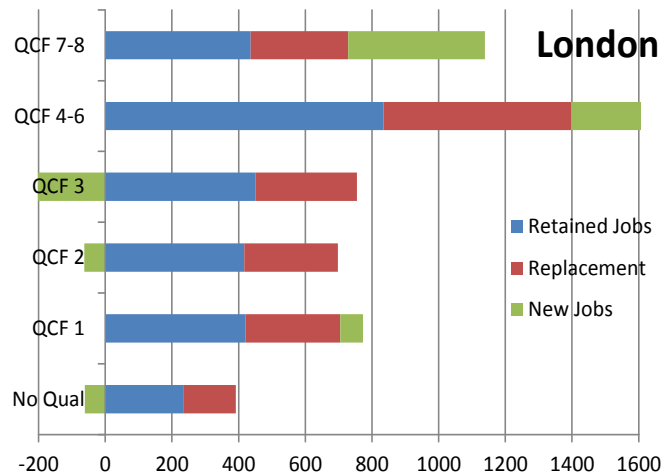
The occupational structure of the London residential population will continue to very different to that of the UK as a whole and the East of England will maintain its close similarity with the average for the UK.



**Composition of Employment 2020  
Relative to 2010 by Occupation (000s)**



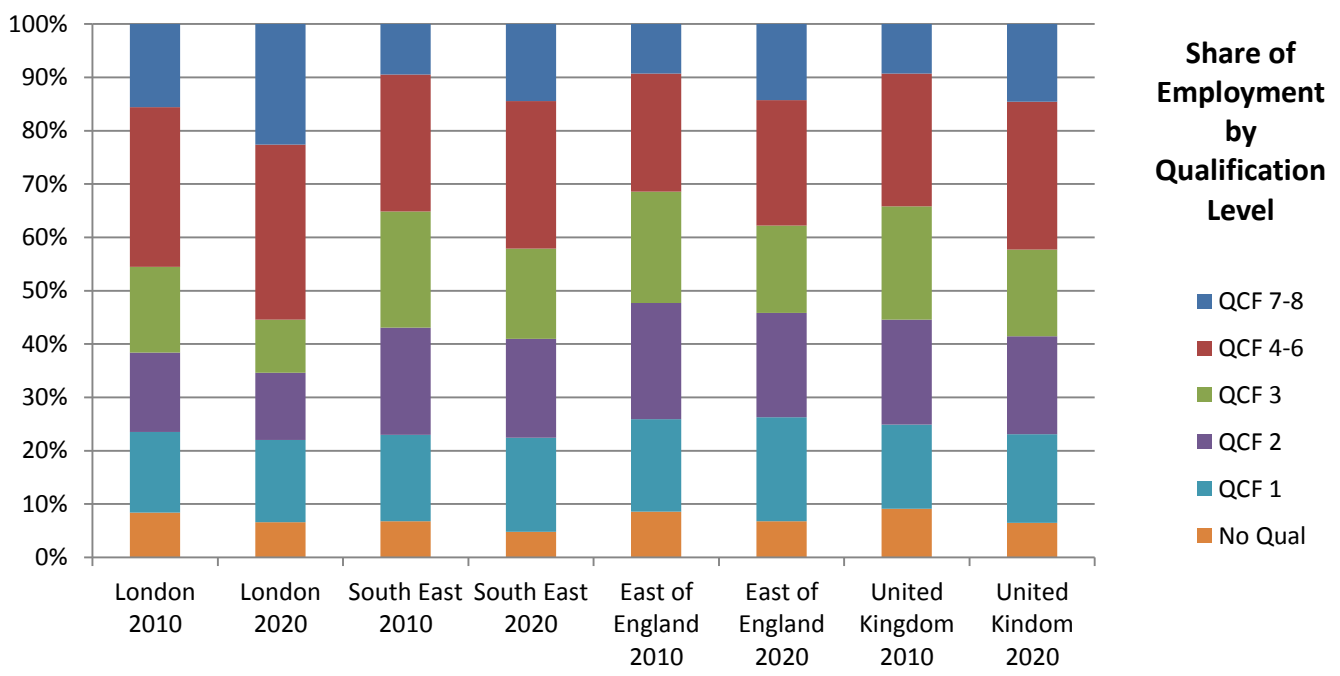
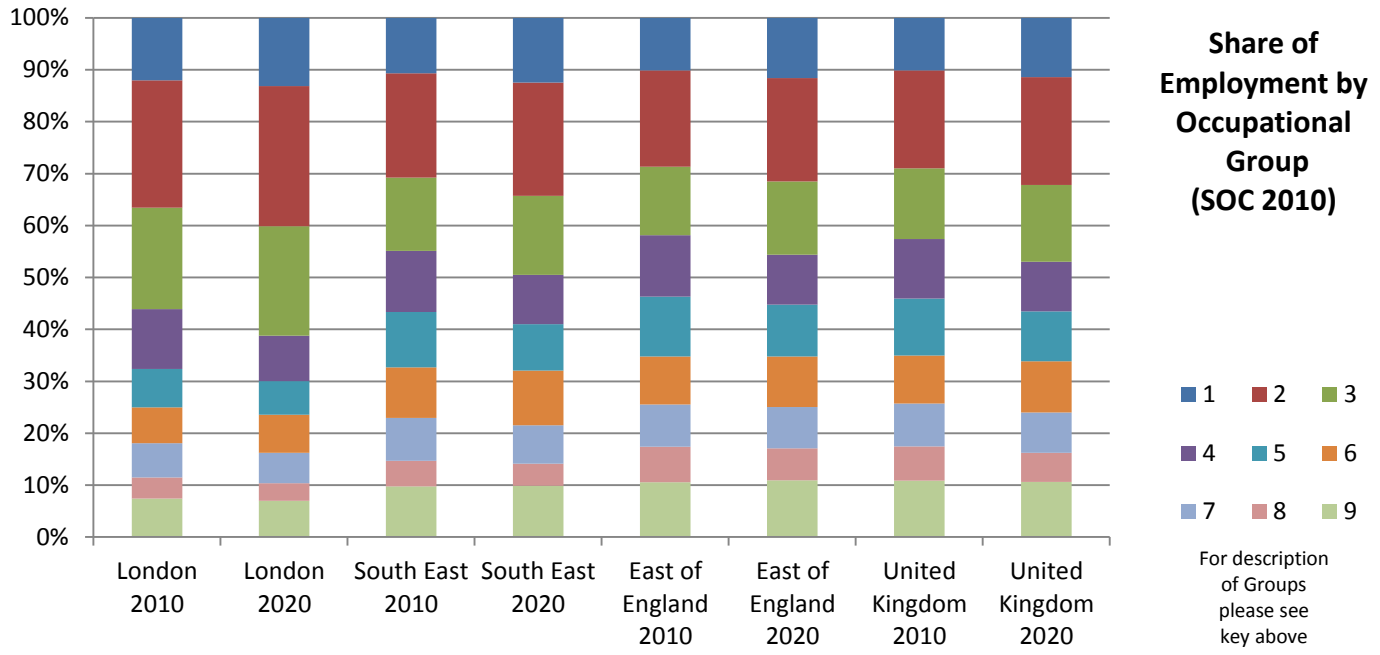
**Composition of Employment 2020  
Relative to 2010 by Qualification (000s)**



- 1 Managers, directors and officials
- 2 Professional occupations
- 3 Associate professional and technical
- 4 Administrative and secretarial
- 5 Skilled trades occupations
- 6 Caring, leisure and other service
- 7 Sales and customer service
- 8 Process, plant and machine operatives
- 9 Elementary occupations

Source: Working Futures 2010-2020, Warwick Institute for Employment Research/Cambridge Econometrics, UKCES, Revised August 2012






The expected changes in the qualifications profile of the workforce in the three regions reveals an even greater difference between London and the other two regions, both of which are similar to the UK average.

The East of England is expected to continue to have a greater proportion of those qualified at Level 2 or below than the UK average and the South East to be very close to the average. The most significant aspect is the much greater increase in the proportion of those with qualifications at Level 4 and above compared with the increase of the proportion of those employed in occupation groups 1, 2 and 3 when there is expected to be some relationship between the





proportion of employment in these two sets of categories. This may again be a reflection of the increasing over-supply of available labour with higher qualifications relative to the demand for labour in related occupations.

Patterns of employment by qualification vary considerably across the different parts of the UK. These patterns have been changing rapidly and are projected to continue to do so over the next decade. Much of the data presented above are based on the assumption that for a given geographical area, the qualification patterns are similar for those resident and those working. At the regional or country level the difference between the two is probably not very great but it is much more significant for local labour markets.

### The Role of FE

Education and training provided by the FE sector is key to preparing new entrants to the workforce with the qualifications necessary to access the current and future occupational structure. Colleges are also central to the progressive up-skilling of existing jobs and to the re-skilling of workers displaced from their current occupations.

Colleges can provide a more qualified and capable potential workforce that will aid Local Enterprise Partnerships to attract inward investment to their area and influence changes in the local industrial structure that generate a more productive local economy. But product market strategies drive skill use. It therefore follows that to increase the level of skills used in the workplace, there is a need to drive companies up the product market value chain<sup>2</sup>. Businesses need to improve the market position of the existing regional industrial structure in order to exploit the opportunities offered by the increasingly higher skills profile of available labour.

Colleges have a key role to inform local businesses of the opportunities for change and provide the services that will enable them to do so.

### Key Questions for Education and Training Providers

- In all three regions, the problem of skills gaps far outweighs that of skills shortages. Do you actively seek to identify the extent of this need and is your curriculum offer suitably aligned with addressing this problem?
- The number of replacement jobs in the next ten years will far outweigh new jobs. This may not mean a direct replacement of existing skills. How does the College engage with curriculum authorities and local employers to identify and respond to changing skill requirements within the existing structure of employment?
- The predicted growth in demand for managers, professional and associate professional occupations is considerable over the current decade, with overall decline predicted for administrative and skilled occupations. How will your current strategies address this imbalance of growth and decline?
- The supply of qualifications is thought to exceed demand, particularly at higher levels. However, growth in new jobs requiring Level 7 and above qualifications is likely to continue along with growth at Level 1. Jobs requiring no qualifications and those at level 3 are likely to decline overall. Given this likely mixed pattern of change, how is the College balancing its policies between encouraging progression up the qualifications ladder and ensuring that qualifications lead directly to employment?
- One solution to the over-supply of qualified job-seekers is to raise the level of demand by improving the product market positioning of businesses in the region. How will you engage with the local business community to support such growth?



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## Innovation Workshops

- |        |  |
|--------|--|
| 21 Mar | NEF Enable<br>Royal Society of Chemistry, London   |
| 02 May | NEF Enable<br>Royal Society of Chemistry, London   |
| 23 May | NEF Improved<br>Royal Society of Chemistry, London |

## Forthcoming Events

### NEF Masterclasses

- |        |   |
|--------|---|
| 21 Mar | Recycling: 5 Years Time<br>Closed Loop Recycling, London        |
| 19 Apr | Welding and Fabrication<br>The Welding Institute and AWFTE      |
| 5 Jun  | Global Data Management<br>Oracle, Scotland                      |
| 26 Jun | Innovative Teaching of Product Design<br>Bournemouth University |
| 10 Jul | Innovation in Bio-Based Industries<br>NIAB Innovation Farm      |

### Innovation Seminars

- |        |  |
|--------|--|
| 07 Mar | Where is the next smart opportunity for your business?<br>Royal Society of Chemistry, London |
| 11 Apr | Have you the innovative capability to create the next game-changer?                          |

