

Horizon Scanning and Scenario Building: Scenarios for Skills 2020

A report for the National Strategic
Skills Audit for England 2010

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Martin Duckworth, Nick Jackson, John Reynolds
SAMI Consulting www.samiconsulting.co.uk

Paul Drake
Senior Policy Analyst
UK Commission for Employment and Skills



Foreword

Launched on 1st April 2008, the UK Commission for Employment and Skills is a key recommendation in Lord Leitch's 2006 review of skills *Prosperity for All in the Global Economy: World Class Skills*. The UK Commission aims to raise UK prosperity and opportunity by improving employment and skills. Its ambition is to benefit individuals, employers, government and society by providing independent advice to the highest levels of the UK Government and Devolved Administrations on how improved employment and skills systems can help the UK become a world class leader in productivity, in employment and in having a fair and inclusive society.

Research and policy analysis plays a fundamental role in the work of the UK Commission and is central to its advisory function. In fulfilling this role, the Research and Policy Directorate of the UK Commission is charged with delivering a number of the core activities of the UK Commission and has a crucial role to play in:

- Assessing progress towards making the UK a world-class leader in employment and skills by 2020
- Advising Ministers on the strategies and policies needed to increase employment, skills and productivity
- Examining how employment and skills services can be improved to increase employment retention and progression, skills and productivity
- Promoting employer investment in people and the better use of skills.

We produce research of the highest quality to provide an authoritative evidence base; we review best practice and offer policy innovations to the system; we undertake international benchmarking and analysis and we draw on panels of experts, in the UK and internationally, to inform our analysis.

Sharing the findings of our research and policy analysis and engaging with our audience is very important to the UK Commission. Our Evidence Reports are our chief means of reporting our detailed analytical work. Our other products include Summaries of these reports; Briefing Papers; Thinkpieces, seminars and an annual Research and Policy Convention. All our outputs are accessible in the Research and Policy pages at www.ukces.org.uk

This report was commissioned by the UK Commission to contribute to the evidence base for Skills for Jobs: Today and Tomorrow, the National Strategic Skills Audit for England 2010. The report draws upon horizon scanning techniques, scenarios and interviews to identify the key drivers of change in the UK and globally which may impact on the employment and skills landscape in England by 2020. A further three reports were commissioned to contribute to the overall Audit these identify the strategic skills needs in the Financial Services, Bio-medical and Low Carbon sectors. We hope you find the report useful and informative in building the evidence we need to achieve a more prosperous and inclusive society.



PROFESSOR MIKE CAMPBELL
DIRECTOR OF RESEARCH
AND POLICY



LESLEY GILES
DEPUTY DIRECTOR AND
HEAD OF RESEARCH

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Table of Contents

Executive Summary	vi
Methodology	vi
Drivers of the UK Employment and Skills Landscape in 2020	vi
Scenarios for Skills	ix
Features of an Optimistic Outcome	x
Conclusions	xii
 1 Introduction and Methodology	 1
Chapter Summary	1
1.1 Introduction	1
1.1.1 Aims of the Project	1
1.1.2 Structure of Report	2
1.2 Methodology	3
1.2.1 Interviews	3
1.2.2 Horizon Scanning	4
1.2.3 Scenarios	5
1.2.4 Scenario Wind Tunnelling	7
1.3 Key Features of the Scenarios	7

2 Drivers of the Future Skills Landscape	10
Chapter Summary	10
2.1 Economics and Globalisation Drivers	11
2.1.1 Economic Growth in the UK.....	11
2.1.2 Knowledge Economy	15
2.1.3 Meeting Growing Consumer Expectations.....	17
2.1.4 Infrastructure and Networks.....	21
2.1.5 Rise of China	24
2.1.6 Cost and Availability of Capital.....	28
2.1.7 New Industries and New Jobs	30
2.1.8 Existing Industry.....	34
2.2 Technology Drivers	37
2.2.1 New Technologies.....	37
2.2.2 Design and Media	42
2.3 Demographic Change Drivers.....	43
2.3.1 Migration	43
2.3.2 Ageing Workforce in the UK.....	45
2.3.3 Generation Y.....	48
2.4 Environmental Change Drivers.....	50
2.4.1 Reducing Carbon Emissions.....	50
2.4.2 Resource Shortages	51
2.5 Values and Identity Drivers	53
2.5.1 Security Concerns.....	53
2.6 Regulation and Multi-Level Governance Drivers.....	54
2.6.1 Regulation.....	54
2.6.2 The Future of Education	56
2.6.3 Devolution, the EU and Trade Liberalisation.....	58
2.6.4 Government Interventions to 2020.....	60
2.7 Impacts on Work and Employment - Secondary Drivers	62
2.7.1 Death of Distance in Working Practices.....	62
2.7.2 Delivery of Training Online.....	64
2.7.3 New Ways of Working.....	67

3	Scenario Impacts and Implications	70
	Chapter Summary	70
3.1	Evolution of Skills Drivers by Scenario	70
3.1.1	Drivers that Evolve Differently in Each Scenario	71
3.1.2	Drivers that Evolve Similarly in Each Scenario	73
3.2	Scenario Impacts on the Employment Landscape	74
3.3	'Preferred' Scenario	77
4	Insights and Opportunities.....	79
	Chapter Summary	79
4.1	Observations and Insights from Interviews	79
4.1.1	Observations on Current Skills System	80
4.1.2	Ambitions for the Future Skills System	81
4.1.3	Optimistic Outcomes.....	81
4.1.4	Pessimistic Outcome	83
4.1.5	Achieving the Optimistic Outcome	85
4.1.6	Looking Back	86
4.2	Developing a Vision	87
4.2.1	Ambition 2020	87
4.2.2	Towards Ambition 2020.....	88
4.2.3	Interview Epitaphs.....	88
	Towards a Vision	90
5	Conclusions	92
	Chapter Summary	92
5.1	The Skills Picture in 2020 – changing features of the Employment and Skills Landscape	92
5.1.1	Globalised markets	92
5.1.2	New Training paradigms	93
5.1.3	Generation Y	93
5.1.4	Infrastructure	94
5.1.5	Up-Skilling and Multi-Skilling.....	94

5.2	Challenges and Opportunities for Government Skills Policy	94
5.2.1	Dealing with uncertainty	94
5.2.2	Improving the employment and skills system	95
5.2.3	Increasing employer ambition	96
5.2.4	Raising ambition in individuals	96
5.2.5	Assumptions about the future	98
5.2.6	Understanding technology life cycles.....	98
5.3	Implications for the National Strategic Skills Audit research programme	99
5.3.1	Use of scenarios to assess skills policy and strategies	99
5.3.2	Twenty year view	99
5.3.3	Scenario Framework.....	99
5.3.4	Further Research	100
	References and Bibliography.....	101
	APPENDIX 1 - Project Brief.....	110
	APPENDIX 2 - Interview Brief	111
	APPENDIX 3 - Interview Organisations	113
	APPENDIX 4 - Interview Details.....	114
	APPENDIX 5: Cross-Scenario Analysis Table.....	124
	APPENDIX 6: The Scenarios for Skills 2020	132

Table of Graphs and Charts

Figure 1.1	Process Diagram	3
Table 1.1	Prioritisation of Drivers	5
Figure 1.2	Scenarios to 2020	8
Figure 2.1	GDP Projections for the UK	14
Figure 2.2	Job Openings (2006-2020) by Broad Category of Occupations	15
Figure 2.3	Projections of Growth in National GDP (excluding short term variations) ..	24
Figure 2.4	Projections of Growth in National GDP at Purchasing Power Parity	25
Table 2.1	New or Resurgent Industries Identified in the Horizon Scanning.....	31
Figure 2.5	UK and Emerging Market Revealed Comparative Advantage	35
Table 2.2	Cross Sector Impacts.....	40
Figure 2.6	Projected Components of UK Population Change	44
Figure 2.7	UK Population Age Distribution.....	46

Executive Summary

This report was commissioned by the UK Commission for Employment and Skills to contribute to the evidence base for Skills for Jobs: Today and Tomorrow, the National Strategic Skills Audit for England 2010. It sets out the overall findings of the project undertaken by SAMI Consulting Limited. The project addressed the question: **“What will be the drivers and impact of change on the employment and skills landscape in England by 2020; what are the challenges and opportunities for government and employers?”**

The report represents the opinions and professional judgement of the authors and not necessarily those of the UK Commission.

Methodology

The approach used was as follows:

1. use horizon scanning techniques and interviews to identify key issues and changes in the UK and globally which may impact on the UK employment landscape and skill requirements over the long-term;
2. produce a set of employment and skills drivers;
3. overlay existing respected economic and social scenarios for 2020 with the skills drivers to produce a working set of scenarios for the 2020 UK employment and skills landscape;
4. use these scenarios to analyse, through a workshop and desk research, the challenges and opportunities for government skills policy; and
5. produce a report which contributes to the National Strategic Skills Audit 2010.

Drivers of the UK Employment and Skills Landscape in 2020

Drivers were derived from a variety of sources and were analysed to identify those with the most significant impact on the future skills landscape. This impact could be either direct, or through PEST effects (Political, Economic, Social and Technological, plus Environmental and Regulatory effects) and would change the world in 2020. The 23 most significant drivers were as follows:

Economic and Globalisation Drivers:

- **Economic growth in the UK** is a key uncertainty over the next 10 years. This will have substantial effects on the employment and skills landscape
- Technology and a **knowledge economy** may lead to a polarisation of jobs between the highly skilled and low skilled
- The challenge for government-sponsored training services will be how to meet **growing consumer (quality) expectations**; and how to grow demand for training
- Replacement and enhancement of **infrastructure** will be a big driver of employment and therefore skills, and its rate of introduction is highly dependent on future economic conditions
- At predicted rates of growth, the **economy of China** will overtake that of the USA by around 2025. When adjusted for purchasing power parity, China may overtake the USA as soon as 2017. China (and other countries with large/rapidly developing economies) will have an increasing impact on the UK economy
- **New industries and new jobs** will be stimulated by Government policy, consumer demand and by the development of new technologies, methods and materials requiring training on their adoption
- **Existing industries** will play a majority part in the employment landscape in 2020. They will have to adapt and improve to survive. Training will play a major part.

Technology Drivers:

- The bio- nano- and cognitive sciences will lead to **new technologies** and products. Low carbon products, information and communications technology (ICT), and other new technologies will change industry and services and hence demand for training
- Britain is strong in **design and media** and it is likely to be important to maintain this lead in the future, so training in this sector should not be undervalued.

Demographic Change Drivers:

- **Migration** is a key driver of the skills landscape. It has been in the past a solution to labour shortages in the UK especially for less skilled jobs, but outward migration is also likely to increase in importance
- The main demographic issue is an **ageing workforce**. People may work longer, and they will need lifelong training to help them do so
- Those born in the years leading up to the millennium, **Generation Y**, have been shaped by growing up with instant communication technologies, new media and social networking.

Environmental Change Drivers:

- **Reducing carbon dioxide emissions** will require skills in design, installation and maintenance of equipment and materials to generate low carbon energy and reduce energy consumption. In addition, low-carbon working practices will need to be generally adopted
- As world consumption continues to grow, there is a growing risk of **resource shortages** (or price hikes in anticipation) in a wide range of commodities. New jobs in recycling and resource conservation will emerge.

Values and Identity Drivers:

- International and internal **security concerns** have increased in recent years and are likely to be a significant concern for years to come providing new jobs and influencing the location of investments.

Regulation and Multi-level Governance Drivers:

- **Regulation** across society is generally expected to increase although with substantial differences in intensity and by target in different scenarios; with significant impact on training for certification and to meet regulatory norms
- **School education** is crucial in all scenarios but is it delivering the right product for the future?
- The growth of EU markets and the **liberalisation of international trade** are important drivers of growth and will impact on the UK's industrial landscape
- **Government** directly funds much training and also has an impact on the demand and supply of training through the effect of other policies.

Impact on Work and Employment - secondary drivers

Some of the drivers were seen to be caused by other factors (mostly ICT) that have already been identified as drivers themselves and have been classified as secondary drivers. These secondary drivers were:

- Improved communication will increase the number of work settings where virtual contact can be as productive as physical proximity, leading to the **death of distance** in an increasing range of working practices
- Many types of information are becoming available on the internet, and an increasing amount of economic activity is undertaken online. Increasingly, skills can be acquired and **training delivered online**
- ICT and globalisation will change the type of work people do, leading to new business structures and **new ways of working** and a changing balance in the respective roles of people and technology
- Existing skills in existing jobs will also need enhancing over the next decade, in a process known as **up-skilling** and/or **multi-skilling**.

Scenarios for Skills

The impact that a driver will have will not only be decided by its relationship with other drivers but also the socio/political/economic environment. This report uses three base scenarios to explore the variability in the future employment and skills landscape in 2020, and the possible effects of the drivers.

- The **World Markets** scenario reflects a world driven by aspirations of personal independence, wealth and mobility, to the exclusion of wider social goals; a belief in the continued efficacy of integrated global markets; and internationally co-ordinated policy, light regulation and a philosophy of “minimal government”
- Under **National Enterprise**, people aspire to personal independence and material wealth, embracing liberalised national markets to secure national self reliance and security; and political and cultural institutions are strengthened to buttress national autonomy in a more fragmented world
- In a world of **Global Sustainability**, people aspire to high levels of welfare within communities characterised by shared values, more equal distribution of opportunities and a sound environment; they believe these objectives are best achieved through active public policy and international co-operation; and markets are regulated to encourage competition.

The various drivers described above evolve differently and have different impacts in each scenario. The insights gained from analysing each driver against the three original base scenarios enabled three Scenarios for Skills 2020 to be defined.

Features of an Optimistic Outcome

The contributions from interviews were analysed to identify the key features of an optimistic scenario for the employment and skills landscape in 2020:

Economy

- Economic growth and increased productivity based on an increasingly skilled workforce
- University research leading to new substantial profitable businesses
- Smart infrastructure and low-carbon working practices
- Entrepreneurs looking for locations to set up new technology businesses find all the skills they need in the UK at each stage of the technology development process.

Skills System

- Higher levels of ambition of employers, especially small and medium sized enterprises (SMEs) and of individuals
- A much simplified skills system in England, with better information available
- Improvements in basic education, including the ability and motivation to learn and a wider understanding of how the world works
- Stronger links and two-way communication between government and individuals who are the ultimate practitioners of skills and actual consumers of training
- More training delivered online, perhaps in a modular way, with new forms of intermediation and guidance appropriate for a virtual learning environment.

Vision

Interview responses and workshop outcomes were considered alongside the drivers of change to develop a potential vision for a successful employment and skills landscape in England. A successful employment and skills landscape will require the following:

1. Suitable metrics and robust national data on skills and a framework for international comparisons.
2. A robust understanding of the relationship between skills and economic growth and prosperity.
3. Data to inform the demand side on the added value of different skills and the quality of different providers.
4. A strong demand side 'voice and choice' to ensure a match between the demand and supply of skills.
5. An increase in the ambition of companies, particularly SMEs.
6. An increase in motivation and ambition of individuals and an ability to develop skills during their career.
7. Education valued and focusing on core skills, including softer skills such as an ability to relate (the 4+Rs, rather than the 3Rs: Reading, Writing, Arithmetic and Relationships).
8. A simplified supply side.

These are reflected in the proposed provisional Vision:

An increasing commitment from employers and individuals to optimising talent and skills is essential for the UK to be a successful sustainable economy; and is at the heart of a civilised society that provides opportunity for all.

Conclusions

Changing Features of the Employment and Skills Landscape in 2020

The main changes to the skills landscape in 2020 are likely to be globalised markets, a new paradigm for training, Generation Y, the renewal of UK infrastructure, and the need for up-skilling and multi-skilling:

- **Globalisation** of markets is likely to increase. The scale of investment by countries such as China and India, including in higher education, is likely to have moved them up the value-added chain by 2020. They will pose greater competition to knowledge-based and other higher-tech industries in the UK. It is not safe to assume that the UK will continue to have a technological lead over them after 2020
- **A new paradigm for training.** Many types of information are becoming increasingly available online, including material to support education and the development of skills. User-generated content and free-to-use training material will disrupt traditional courseware development models. These changes will generate new challenges in the relationship between training providers, government and individuals
- **Generation Y.** Represented by the population currently centred around the age of 24, Generation Y grew up surrounded by technology and by 2020 this group will represent a significant proportion of middle managers. Generation Ys' ambition and challenge to the established way of doing things could make them an important element to responding to future opportunities
- **Infrastructure.** The renewal of UK infrastructure will be an important driver of employment and skills because of the sheer scale of the task ahead. An improved infrastructure will also help enable wider change and development across the economy
- **Up-skilling and multi-skilling.** A number of drivers, including an ageing population, new technologies and new ways of working, will make it more important for existing employees to enhance their skills throughout their careers.

Challenges and Opportunities

The most pressing challenges (and opportunities) for government skills policy include: dealing with uncertainty; improving the employment and skills system; raising the ambition of employers and individuals; dealing with unspoken assumptions about the future; and understanding technology life-cycles within industrial and skills policy:

- We live in an **increasingly uncertain time**, and there are a number of factors that have the potential to cause disruptive change to the future UK economy. Beyond 2020 there could also be a number of truly transformational changes. It is vital that the UK skills system is able to quickly respond to changing future demands. This includes meeting the training needs of the existing workforce, up-skilling and multi-skilling, and ensuring that older workers can access new skills

- If the challenges and opportunities for 2020 are to be properly addressed **the employment and skills system needs to improve** in part by learning from other sectors and disciplines, such as commercial marketing
- Drivers such as globalisation and technology highlight the importance of employers moving up the value chain and **increasing their demand for skills**
- **Raising individuals' ambition** requires an understanding of their attitudes and behaviours in relation to skills, as well as marketing to communicate messages. These will vary widely between social groups and different generations, so robust market segmentation will be required. We recommend that the next cycle of the National Strategic Skills Audit explicitly addresses individuals, as well as government and employers
- The **assumptions about the future** that are expressed in the three scenarios used in this report are already reflected in Government policy. 'Towards Ambition2020: skills, jobs, growth' is closest to the World Markets scenario; whereas 'New Industry, New Jobs' is closest to Global Sustainability' 'British jobs for British people' would be typical of the 'National Enterprise.' scenario. This does mean that careful thought needs to be given to the relationship between these policies, their implementation, and the respective challenges and opportunities that they present
- **A new technology can impact on the employment landscape at any point in its life cycle.** When promoting new technologies within an industrial and skills policy, it is important to distinguish where in the life-cycle a technology is, and what sort of impact the policy initiative is trying to accomplish.

1 Introduction and Methodology

Chapter Summary

This chapter introduces the report and describes the process used to deliver the project.

This material is presented in the following sections:

- Introduction - projects aims and report structure
- Methodology - interviews, scanning, scenarios, wind tunnelling
- Summary of the three scenarios - World Markets, National Enterprise, Global Sustainability

1.1 Introduction

1.1.1 Aims of the Project

This report sets out the overall findings of the 2020 Horizon Scanning and Scenario project, commissioned by the UK Commission for Employment and Skills from SAMI Consulting Limited. The aims of the project are to:

- use horizon scanning techniques and interviews to identify key issues and changes in the UK and globally which may impact on the UK employment landscape and skill requirements over the long-term;
- produce a set of employment and skills drivers of change;
- using existing respected economic and social scenarios as a base, overlay these with the skills drivers to produce a working set of scenarios for the 2020 UK employment and skills landscape;
- use these scenarios to analyse the challenges and opportunities for government and employers; and
- produce a report which contributes to the National Strategic Skills Audit 2010.

As part of the project initiation the following ‘focal question’ was agreed:

“What will be the drivers and impact of change on the employment and skills landscape in England by 2020; what are the challenges and opportunities for government and employers?”

The aims of the project, outlined above, demonstrate the breadth of the work undertaken. This broad scope meant that it was not possible to examine the implications of each driver in detail against each scenario; neither was it possible to draw out the inter-dependencies between drivers. The report does however provide valuable insight into the possible future of the employment and skills landscape which will feed into Skills for Jobs: Today and Tomorrow, the National Strategic Skills Audit for England 2010. It is also intended that the report and its conclusions will stimulate wider debate and appropriate action among all those having an interest in ensuring a successful future for the UK's labour market – including employers, individuals, Sector Skills Councils, training providers, the unions, professional associations, regulatory authorities and other public and private sector bodies.

The year 2020 was chosen as an appropriate initial time line for analysis. 2020 is sufficiently far ahead in time to explore the impact of current trends, including some potentially significant changes to the macro environment and overall UK skills landscape.

Finally this report represents the opinions and professional judgement of the authors and not necessarily those of the UK Commission.

1.1.2 Structure of Report

Following the Executive Summary, this introductory **Chapter 1** sets out the approach and methodology adopted for the project.

Chapter 2 identifies and explains the key drivers which may have a significant impact on the future employment and skills landscape in England and the associated opportunities and challenges, drawing on extracts from the interviews and the results of the horizon scan.

Chapter 3 draws on this analysis, and places it within a broader economic, political and social framework. It sets out and develops three alternative scenarios of the UK's employment and skills landscape for 2020. The full texts of the scenarios are included in Appendix 6 of this report.

Chapter 4 presents the key insights and observations drawn from the horizon scan, the project interviews and the scenario workshop.

The implications of the three alternative scenarios are compared and contrasted to identify common, scenario-generic, themes as well as areas of potential divergence, scenario-specific themes.

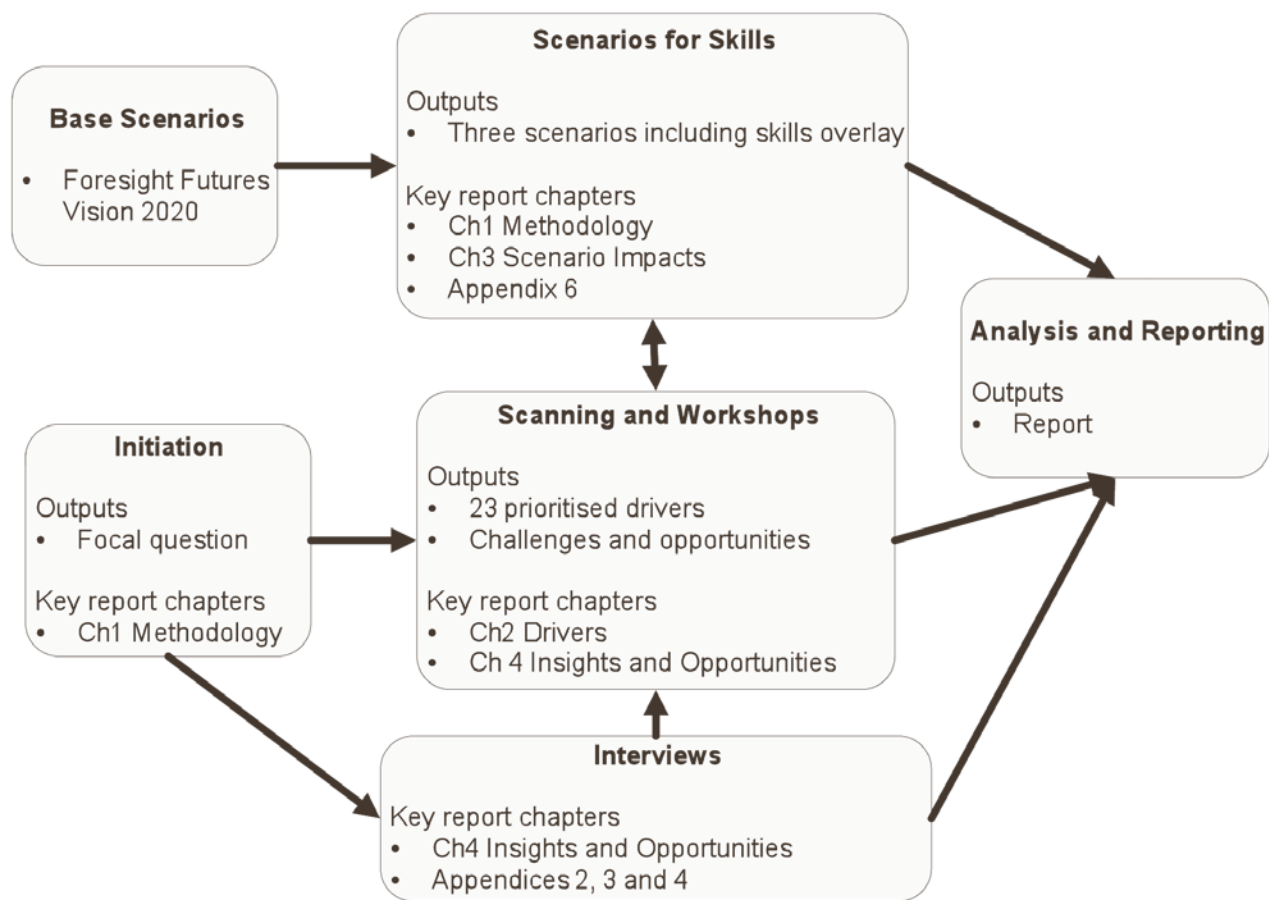
An optimistic and a pessimistic outcome are described which lead to the issues facing employers and government, and a vision and a preferred scenario.

Finally, the conclusions are outlined in **Chapter 5**.

1.2 Methodology

The basic process is shown in this diagram:

Figure 1.1 Process Diagram



1.2.1 Interviews

Twenty one interviews were undertaken to gain insight and to inform areas for further scanning and analysis. The interviewees included two senior UK Commission members of staff, a range of stakeholders engaged with UK Commission and other experts covering economics, technology and society. The interviews were conducted using the 'SAMI 7 Questions', using the interview brief shown in Appendix 2.

Interviews were conducted around the project's focal question: "What will be the drivers and impact of change on the employment and skills landscape in England by 2020; what are the challenges and opportunities for government and employers?"

They were all undertaken on a strict non-attributable basis, and therefore the names of those interviewed are not being published. The affiliation of the twenty one interviewees is given in Appendix 3.

The results of the interviews were added to the scanning data and have been used in preparing the skills overlay for each of the three scenarios. They were also used to prepare optimistic and pessimistic scenarios for skills in 2020; and a proposed draft vision for skills in England.

1.2.2 Horizon Scanning

General Scanning

The first key project task was to carry out a “horizon scan” in order to identify the trends and drivers that may potentially affect the UK’s long-term employment and skills landscape and the country’s future skills requirements. This involved a comprehensive scan of both global and national PEST factors (Political, Economic, Social, Technological factors but also including legal, regulatory and environmental factors) using a wide variety of published information sources.

The scan included search and identification of issues that will stretch thinking about the future. To encourage such stretch, the project team scanned for issues that may have an impact over the next quarter of a century, significantly beyond the chosen 2020 time-line adopted for the development of the project’s scenarios. This will also provide valuable material for any future development of the scenario time-line beyond 2020.

The raw information captured during this horizon scan, together with the associated sources, is contained in a companion “clippings file” which has been made available to the client. This is not included for re-distribution with the main report, as much of the material is covered by copyright.



Prioritisation

The resulting 101 trends and drivers were then reviewed in a project team workshop. They were sorted according to the likelihood that they would be important to the world in general (i.e. PEST) and their impact on the UK skills landscape. They were grouped into related clusters of trends and drivers on a two-dimensional matrix, the results of which are in the prioritisation of drivers table in Table 1.1.

Trends in the bottom left quadrant, those with relatively lowest importance to the world and employment and skills, were not considered further in the analysis.

The 23 trends and drivers in the other three quadrants were analysed further to develop their implications for future UK employment and skill requirements.

Table 1.1 Prioritisation of Drivers

Increasing impact on the UK skills landscape 	
Increasing importance on the world 	Infrastructure and networks Rise of China Resource shortages Devolution, EU and trade liberalisation Security concerns
	Economic growth in the UK Knowledge economy Cost and availability of capital New technologies Death of distance in working practices Migration Generation Y Reducing carbon emissions Regulation The future of education New jobs and new industries Existing industry
	Advances in social science Improving the workspace Declining civic values Outer space Promises
	Meeting growing consumer Expectations New ways of working Delivery of training online Design and media Ageing workforce in the UK Government Interventions to 2020

1.2.3 Scenarios

What are Scenarios?

Scenarios are not forecasts. Rather, they are possible alternative views or plausible stories of how the world may look in the future. They describe possible ‘paths’ to the future, based on an analysis of trends and drivers of change. They must have internal logic and consistency, incorporating both areas of critical uncertainty and predetermined elements or trends.

Scenarios can illuminate significant drivers of change, including those that may be relatively uncertain. By presenting a range of possible worlds and an understanding of their potential drivers, organisations are given a clearer context in which to think about the future, decisions will be better informed, and a strategy or actions based on this knowledge and insight will be more likely to succeed.

The three scenarios adopted in the current analysis do not necessarily represent all possible outcomes and are not equally likely or exclusive. The eventual outcome may in practice comprise of a combination of events from the various scenarios, or be completely different. The benefit of the scenario approach is that the uncertainty inherent in the future is made more explicit when considering that future.

Selecting Base Scenarios

We agreed with the UK Commission to adopt the Foresight Futures Vision 2020 scenarios as an initial basis on which pictures of the country's possible future employment landscape and skill requirements could be developed (Foresight 2002).

The Foresight Futures Vision 2020 scenarios were developed for the then Department of Trade & Industry by a team of researchers at SPRU-Science and Technology Policy Research, University of Sussex, in consultation with stakeholders from business, government and academia. They built on an extensive review of national and global futures scenarios, and have the advantage of being widely used.

The scenario storylines draw on an analysis of socio-economic trends, but also introduce elements of novelty and change. They are framed within the context of two key drivers, the direction of which is uncertain yet likely to have a major impact on shaping the future course of events; social values and systems of governance.

- Social values (horizontal axis in Figure 1.2 below) range from individualistic values to more community orientated values.
- Systems of governance (vertical axis in Figure 1.2 below) deal with the structure of government and the decision making process, ranging from autonomy where power remains at a national level or becomes more regional, to interdependence where power increasingly moves to other institutions e.g. up to the EU, or to other international bodies, or to multi-national corporations.

For the purposes of this project three of the Government's "Foresight Futures 2020" scenarios, considered to have the greatest impact on employment and skills, were selected. These were then developed to reflect the key global developments since the original scenario storylines were drafted. They have also been linked to potential economic recovery paths following the 2008-09 recession.

Skills Overlay to the Base Scenarios

The next step was to overlay these base scenarios with the drivers from the scanning process that had been prioritised as having key implications for future employment and skill requirements.

Each driver was assessed against the scenarios and judged on the relevance, likelihood and impact of the driver on or within each scenario.

Key skills drivers which appear as predictable trends over the next 10 years were overlaid onto all three scenarios. Those factors which are uncertain over this timescale (such as potential new industries, patterns of migration, or UK economic performance) were assigned in different degrees to the individual scenarios to reflect that uncertainty. This process converts the set of general base

scenarios into one tuned to explore the future employment and skills landscape of the UK. The scenarios were then assessed for consistency, plausibility and accuracy.

Scenario Workshop

The resulting scenarios, coupled with an analysis of the implications of each of the key drivers for employment and skills under each alternative scenario, were then tabled and reviewed at a workshop involving the core SAMI team members and relevant experts, along with representatives from the UK Commission.

The objectives of the workshop were to review and expand the impact of scenarios on the UK employment and skills landscape; and synthesise the scenarios into an initial view of challenges and opportunities facing government and employers. Specifically, three syndicate groups, one for each scenario, prioritised clusters of key drivers, developed initial skill impact assessments, considered the implications for the UK Skills landscape, and identified the most important issues.

1.2.4 Scenario Wind Tunnelling

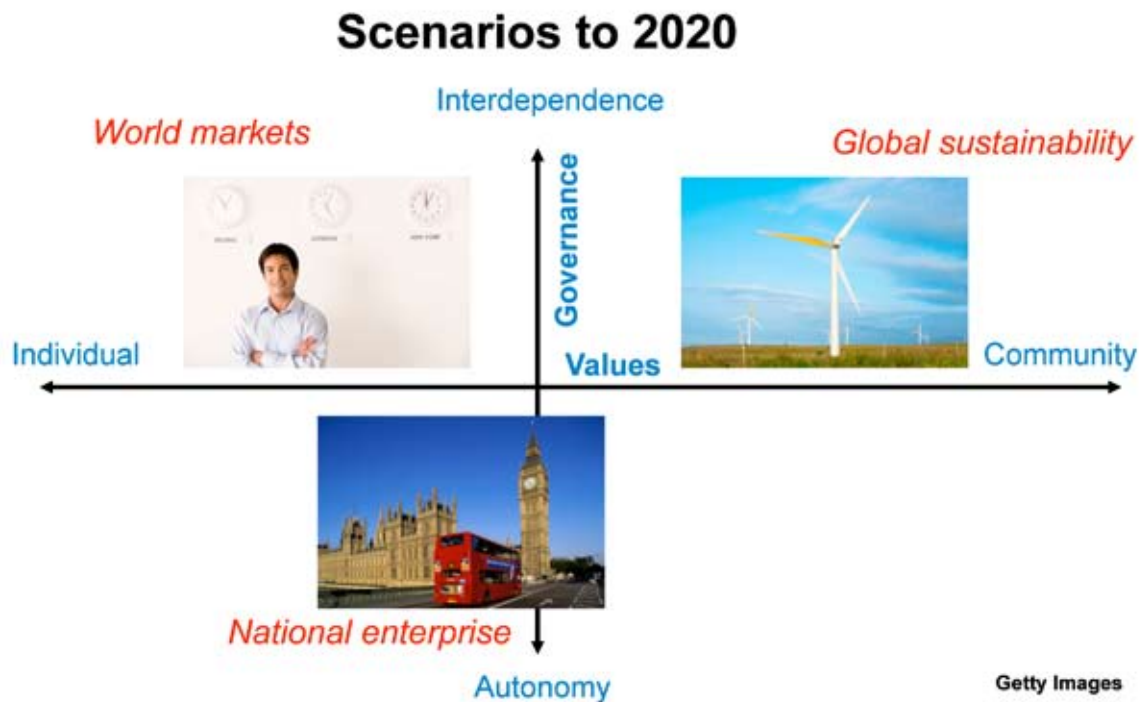
The final stage of the project has been to convert the findings from each of the alternative three scenarios into a single assessment of current policy and future policy options using a “Wind Tunnelling” process.

Under this process, we have taken each scenario in turn and considered the implications for government strategy for workplace skills. This has raised a series of implications (“challenges”) and options (“opportunities”).

1.3 Key Features of the Scenarios

A brief description of the three scenarios, in terms of their underlying social values and systems of governance, and the relationship between them is summarised in the text and diagram below (for a more complete description see Appendix 6). Reflecting the original Foresight Futures Vision 2020 analysis (Foresight 2002), the three scenarios have been named World Markets, National Enterprise and Global Sustainability:

Figure 1.2 **Scenarios to 2020**



The **World Markets** scenario reflects a world in which individual aspirations can thrive in a global economy sustained by international cooperation.

Key features of this scenario are:

- People aspire to personal independence, material wealth and mobility to the exclusion of wider social goals
- Integrated global markets are presumed to be the best way to deliver this
- Internationally co-ordinated policy sets framework for the efficient functioning of markets
- The provision of goods and services is privatised wherever possible under a principle of 'minimal government'
- Rights of individuals are enshrined in law
- High growth.

Under **National Enterprise** both individuals and governments seek autonomy and independence.

Key features of this scenario are:

- People aspire to personal independence and material wealth within a nationally-rooted cultural identity
- Liberalised national markets with a commitment to build capabilities and resources to secure a high degree of national self-reliance and security are believed to best deliver these goals
- International cooperation is minimal. Political and cultural institutions are strengthened to buttress national autonomy in a more fragmented world
- Medium-low growth.

The world of **Global Sustainability** is a caring world where individuals value the community and look to government to implement policies for welfare and sustainability.

Key features of this scenario are:

- People aspire to high levels of welfare within communities with shared values, more equally distributed opportunities and a sound environment
- Belief that objectives are best achieved through active public policy and international co-operation within the EU and at a global level
- Social objectives are met through public provision, increasingly at an international level
- Competition is fostered within a regulated framework
- There is reconciliation of growth and sustainability, seen from a global perspective and undertaken with global cooperation
- Medium–high growth.

The full content of the scenarios are included in Appendix 6 at the end of this report.

2 Drivers of the Future Skills Landscape

Chapter Summary

This chapter describes the principal drivers of change of the UK employment and skills landscape in 2020. They were derived from the horizon scanning and interview comments, and were developed by subsequent analysis using the scenarios. The drivers summarise the impact that external forces and trends may have on the skills and employment landscape, review the uncertainty surrounding the possible impacts, and outline some of the challenges and opportunities presented to employers and government over the next decade. Where important to do so the implication of the driver is considered against the three scenarios.

The 23 drivers are presented in seven categories, generally corresponding to the categories used in the National Strategic Skills Audit:

- Economic and Globalisation Drivers
- Technology Drivers
- Demographic Change Drivers
- Environmental Change Drivers
- Values and Identity Drivers
- Regulation and Multi-Level Governance Drivers
- Secondary Drivers - Impacts on Work and Employment

This section examines each driver in turn and where important to do so highlights when the driver will have a different impact due to the socio/political/economic context by referring to the base scenarios (further examined in Chapter 3 and Appendix 5). It is important to note that whilst each driver is examined separately in reality all drivers are interdependent to a greater or lesser extent.

2.1 Economic and Globalisation Drivers

2.1.1 Economic Growth in the UK

Summary

Economic growth could be stable or volatile over the next ten years. The overall level of growth between now and 2020 is a key uncertainty, with substantial effects on the employment and skills landscape. Any plans today for the development of the UK skills system should take explicit account of this uncertainty.

Trends

In the short term, asset prices have stabilised after recent sharp falls: stock markets are rising and UK house prices are recovering slowly. The end of the recession may be in sight, with many commentators predicting a return to economic growth in 2010.

Recent forecasts in the IMF (IMF 2009/1) are that UK activity in 2009 is projected to be even weaker than was expected in July, with the economy shrinking by 4.4 per cent rather than 4.2 per cent, but the IMF believes growth in 2010 will now be 0.9 per cent as opposed to the 0.2 per cent it was previously forecasting.

The long-term rate of growth in the UK will be dependent on the rate of global growth, but domestic factors will be important too.

The latest IMF forecasts (IMF 2009/1) are that the UK will return to 2.5 per cent real growth by 2011, rising steadily to 2.9 per cent in 2015. The latest Bank of England forecasts (BoE 2009/1) show mid-range growth estimates between three per cent and four per cent in 2011 and 2012, see figure 2.1 below.

Uncertainties

There is still a risk of further financial crises. A year ago, the “world stared into the abyss of total financial collapse” (BBC 2009/3). Despite government action to deal with the effects of the 2008 crisis, similar crises could all too easily happen again (Spitzer 2009).

Governments have acquired unsustainable levels of debt and there is an urgent need to implement policy changes to address the remaining domestic and international distortions that are a key cause of imbalances. Failure to do so could threaten the sustainability of the recovery (Blanchard & Milesi-Ferretti 2009).

There are imbalances in the world economy that may still resolve themselves through a dollar collapse and a debt crisis. A dollar collapse has the potential to transform the world economic outlook, with a sudden shift of political and economic power to countries like China with its huge foreign exchange surpluses.

“The immediate financial sector policy responses to the financial crisis—including emergency liquidity support, expansion of financial safety nets, and interventions in financial institutions—have succeeded in stemming widespread panic. But the effort has generally been insufficient and ad hoc. Issues that remain unsolved—the “known unknowns”—include the resolution of problem assets, the restructuring of troubled, systemically important financial institutions, and the development of credible exit strategies.” (World Bank 2009)

Similarly, if recent concerns over the level of UK government debt (Guardian 29 Dec 2009) turn into a sterling crisis, then there is the potential for the UK recovery to be stalled by the increasing cost of credit and the need to pay down government borrowing.

Impacts on the Employment and Skills Landscape

Growth in demand is the leading driver for UK output and hence the need for trained employees. Higher levels of growth, if mirrored in consumer spending, will stimulate demand for higher value products and services.

Recovery will exacerbate any future skills shortages, though these are a limited problem at present. In particular, the rate of recovery will impact upon the size of the financial services sector, which was hard-hit in the 2008 banking crisis, and will affect the time taken for differing industries to recover. Of these, construction is the industry that is likely to be the slowest to recover, as it has a traditional lag factor, but this does depend on policy options from Government.

The 2008-2010 cohort of NEETs (people Not in Employment, Education or Training) will also have different experiences of the next few years, depending on the shape and pace of any recovery.

In the scenarios for skills in 2020, there are two higher growth scenarios. World Markets comes with rapid structural change driving high demand for new skills and retraining of existing workforce. In Global Sustainability, growth is diverted into new infrastructure, with consequent impact on skill needs, at the expense of rising consumption.

In the relatively low-growth scenario, National Enterprise, financial pressures on state and business are likely to constrain investment in much needed modern infrastructure and other services – and in particular state provision of education and training. In this scenario, there is a risk of an exodus of skilled workers due to a lack of attractive work/career opportunities in the UK.

Challenges for Government

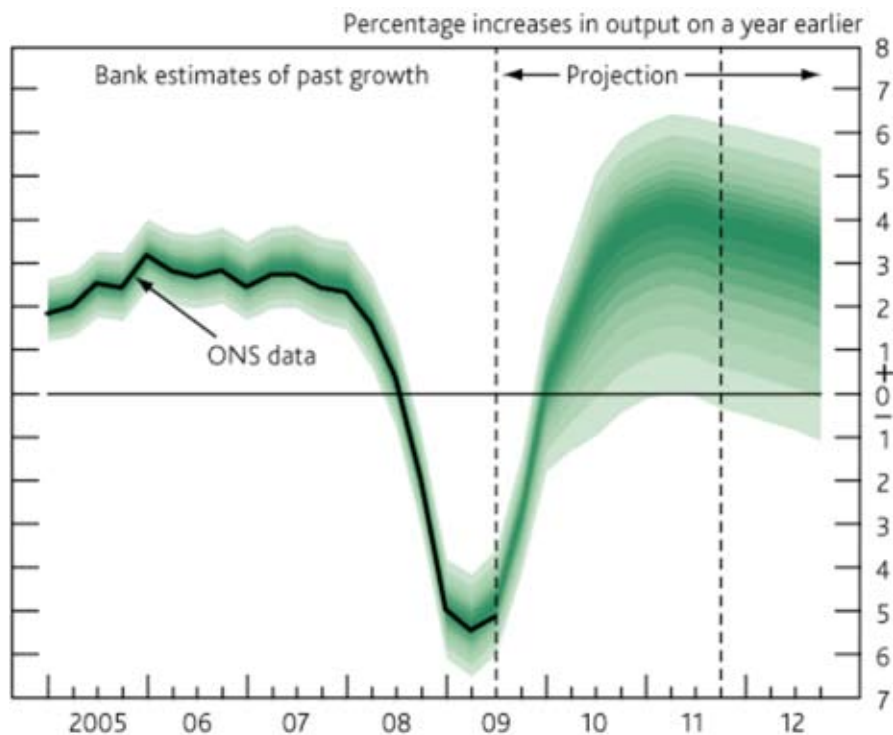
In the skills arena, the main challenge is to take a realistic account of the uncertainty that is inherent in economic forecasting. The Bank of England November Inflation report (BoE 2009/1) shows the scale of this uncertainty. Here even the most sophisticated growth forecasters can only predict that by 2012, UK economic growth will be somewhere in between minus one per cent and plus six per cent. Note that these numbers only show a 90 per cent confidence interval; they do not reflect the full uncertainty inherent in these projections. For 10 out of 100 occasions, growth is predicted to lie outside this range.

And there are additional uncertainties which are not included here: these predictions are based on assumptions about purchases of government debt which may not in fact occur, and are predicated on market expectations of interest rates, which may be inaccurate.

Given this uncertainty, there is an opportunity to make projections on workforce and skills needs more accurate (though not more precise). Traditionally single-point forecasts such as those given in UKCES Working Futures 2007-2017 (UKCES 2007/1) are supplemented with a qualitative discussion on uncertainties. These discussions could be made much stronger with detailed quantified forecasts around possible scenarios which would give a richer picture of the possible futures. Indeed the UK Commission acknowledges that forecasts such as Working Futures should not be used in isolation but as a starting position for further work; Sector Skills Councils for example are advised to use a variety of techniques to assess the potential future as part of their LMI assessments.

The difference between a reasonable high growth and a low growth scenario is quite large. Over 10 years, average growth in the UK could easily be one per cent or it could be three per cent. A precision of less than around two per cent p.a. between high and low growth figures would not be consistent with the uncertainty forecast by the Bank of England Monetary Policy Committee in the chart below.

Figure 2.1 GDP Projections for the UK



Source: Bank of England Inflation Report November 2009. Projections based on market interest rate expectations and £200 billion asset purchases. The fan chart is constructed so that in any particular quarter of the forecast period, GDP is expected to lie somewhere within the fan on 90 out of 100 occasions.

Challenges for Employers

The main challenge for employers is to recognise this uncertainty in future economic growth and build it into their workforce and skills planning. Flexibility of response to external factors is a key competitive advantage for employers.

Employers will need training plans with sufficient capacity to enable them to take advantage of any upturn but with the flexibility to keep costs down in the event of a low-growth scenario developing. The key is to keep training for those skills (particularly efficiency and productivity improvements) which will have an economic benefit whatever the future holds and to maintain a training programme in lean times that can be quickly increased in anticipation of conditions becoming more favourable to growth. In many industries, demand will typically recover faster than training lead times, so training will need to be ramped up at times of recession.

2.1.2 Knowledge Economy

Summary

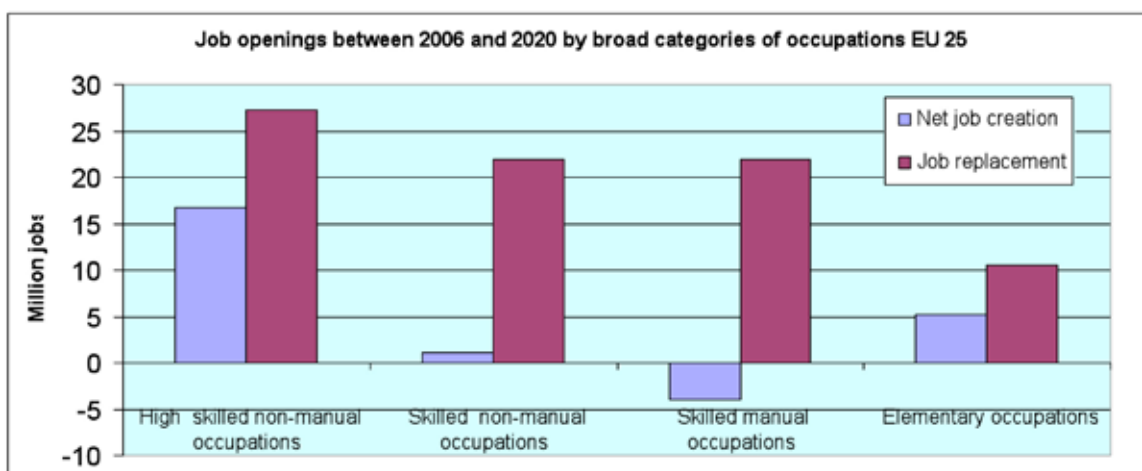
Technology and a globalised knowledge economy lead to a tendency towards a polarisation of jobs between the highly skilled and low skilled (often articulated as the hourglass (ESRC, 2005/1)). The number of intermediate skill jobs may decrease and workers will need more conceptual and interpersonal skills. How will the UK compete as a knowledge economy?

Trends

The knowledge economy essentially describes a process whereby the economic competitiveness and performance of organisations and firms is increasingly determined by their investment in knowledge based or intangible assets such as R&D, design, software, human and organisational capital, and brand equity and less by investment in physical assets such as machines, buildings, and vehicles (WF2009/2).

New technologies and developments in work organisation result in job expansion at the ends of the job spectrum (especially at the higher level). New technologies cannot substitute either the “non-routine” tasks typical of high-skilled occupations (e.g. cognitive and communication tasks), or low skilled jobs, especially in the service sector (e.g. personal care). However, medium skilled routine tasks and repetitive work can be replaced by automation and computerisation, or outsourced (EC 2009/4).

Figure 2.2 Job Openings (2006-2020) by Broad Category of Occupations



Source: CEDEFOP (2009) Base: EU25

The proportional growth of highly skilled jobs and, to a lesser extent, lower skilled jobs at the expense of intermediate jobs is referred to as the hourglass, reflecting the shape of the rate of job creation: wide at the top and bottom and relatively narrow in the middle. Figure 2.2 shows one forecast (CEDEFOP 2009) of the impact of the hourglass in Europe to 2020, showing a small reduction in newly created intermediate jobs (net job creation), although demand for skilled workers to replace retirees or other workers lost to the industry (job replacement) will maintain a high level of demand for training.

In spite of the squeeze this does not necessarily mean an overall reduction in jobs (EC 2009/4), but getting a job will not be enough to escape poverty. Finding 'good' work will be vital (ESRC 2005/1) and this will require training and improvement of attitude.

Uncertainties

The evidence for this trend in different countries in the EU and Britain is mixed. Moynagh & Worsley (ESRC 2005/1) contend that it is already apparent in Britain and is likely to continue, whereas data from HM Treasury (HMT 2000) shows an increase in high and medium skill level jobs at the expense of low level jobs over the period 1978-1998.

Others also suggest, qualitatively, that the hourglass tendency has not significantly occurred in Britain over the last decade (BIS 2009/3; one interviewee).

Impacts on the Employment and Skills Landscape

The scenarios suggest strongly different trends. World Markets suggests an "hourglass" Britain with an increasing number of highly skilled knowledge workers, the export and loss of intermediate skill-level jobs, but continued provision of local services with low-skilled jobs. In Global Sustainability, social values and high levels of government intervention, particularly on infrastructure are likely to retain a larger number of intermediate jobs with efforts to improve the position of the lower skilled and raise skills at all levels. National Enterprise presents the probability of an increasing, or at least not decreasing, proportion of manufacturing jobs, fewer high skilled knowledge jobs and the risk of an increase in low skilled jobs, not suggestive of an hourglass economy.

In spite of there being little evidence of a rapid move towards an hourglass economy in the UK, there is evidence that the UK could become a more knowledge based economy in the future (ESRC 2005/1). For this to occur there appears to be a need to train more in the higher level soft skills:

- Assimilation and communication of information
- Interpersonal communication skills
- 4Rs , being the 3R's (Reading, Writing, and Arithmetic) plus Relationships (also known as Emotional Intelligence; this needs to start at school)
- Logic
- Application of acquired knowledge to real-world problems
- Knowledge management skills.

New forms of certification could be developed to demonstrate possession of these soft skills.

With automation of manual or knowledge-based transactions, there will be fewer transactional skills needed. Present-day examples are the deployment of self-checkout lanes in supermarkets, and automatic train operation on the Docklands Light Railway.

Challenges for Government

An increasing knowledge economy will make it very much more difficult for the low skilled to pull themselves out of poverty and repetitive unrewarding jobs through training, with the implication of reduced social mobility and consequent risk of social tension.

2.1.3 Meeting Growing Consumer Expectations

Summary

Consumers are very important in the development of the skills and employment landscape. Consumer spending accounts for more than half of GDP (ONS 2009/8), and will define the types of industries and jobs that flourish and therefore the type and level of skills needed in the UK. Also, as consumers of training, consumers' attitudes and expectations will impact on how training should be provided.

Trends

Consumers and consumer behaviour are central drivers of the skills and employment landscape (three interviews, EC 2009/3.04, EC 2009/3.12). Consumers are becoming used to being treated and courted in many aspects of their lives. Retailers in particular offer the consumer increased choice; low prices; immediate fulfilment; a pleasant and captivating experience; and money-back guarantees.

Older consumers will generate demand for health and social care (EC 2009/3.11 and 3.06) and leisure services (EC 2009/3.14). Lifestyle changes such as healthier living will generate new service jobs; new fashions and trends will create new or replacement jobs in manufacturing, distribution and retailing.

Another trend in consumerism is the use of the internet to find consumer information, make comparisons and buy or make reservations, particularly for leisure activities (EC 2009/3.12). This makes consumers better informed and more discerning. Consumers are likely to continue to shop in physical stores but will be looking for a full shopping experience, for example, shopping in combination with other entertainment experiences such as going to the cinema, sports, games and casinos (EC 2009/3.06).

Consumer expectations are rising as commercial organisations provide more ancillary services to attract them. This expectation is likely to transfer across to the use of public services in general (SAMI 2007/1) and to training in particular. Simple messages, simple access to services and rapid response will be necessary to achieve desired outcomes from the provision of both public and private training services.

Uncertainties

The detailed outcomes of these trends will be very different in each of the three scenarios:

World Markets is a world where the consumer rules, demanding high levels of service from both the private sector and what remains of the public sector. As a result, public services will be more market driven, marketing themselves and using commercial techniques to provide better service. Technical change will be consumer focused. Customer relationship management will be central to all activities, assisted by high levels of technology. More personal health trainers and higher expectations generally of personalised/tailored service and products, including expecting more out of Jobcentres. Individuals will be seeking training to improve themselves.

National Enterprise is a world of haves and have-nots, the haves demanding service. Lower classes have lower expectations and get lower standards of service. The public sector will be cash constrained limiting consumer power in public services. More niche markets will develop requiring a more integrated, flexible and adaptable approach to product/service design to meet individual consumer demands. Certain groups will be seeking training to improve their position.

In Global Sustainability, consumerism will have turned green with constraints on consumption (particularly the ostentatious sort) but consumer expectations of service and quality will be high. Demands on public service quality will be high. Branding will be important and litigation will be frequent. Training will increasingly be freely provided by government and encouraged for all.

Impacts on the Employment and Skills Landscape

Good personal skills and maintaining high quality of workmanship can be seen to be important in all scenarios. The types of products/industries in the UK could vary considerably in each scenario but their impact is covered elsewhere in this report.

The trends above will be reflected in the types of jobs people have but will also reflect on individuals' attitudes to the provision of training.

As a large component of GDP, higher levels of consumer spending imply increased demand for more high-end goods and services and therefore high end jobs and skills.

Challenges for Government

Continually seek to improve public services to match the demand for higher service levels and efficiency.

Provide training in service skills.

Make government sponsored training services more customer-focused and improve access to training.

Challenges for Employers

Follow trends, understand them and seek the necessary skills to provide matching goods and services.

Ensure that service capability is uppermost in all aspects of business and find employees with the right soft skills.

Box 1: Parallels with Retailing and Branded Goods Manufacturers

Consumers have come to expect increased choice, low prices, immediate fulfilment, a pleasant and captivating experience, and money-back guarantees. These expectations are delivered by many sectors of the UK retailing system:

- **Increased choice.** Retailers nowadays stock many more lines than they did 20 years ago. Easy availability and wide range drives demand as well as supply
- **Low prices / good value.** Successful retailers have relentlessly cut their costs to become highly efficient logistics operations. They focus not just on costs in their stores but throughout the length of their supply chains, so that they can provide the cheapest shopping experience possible
- **Immediate fulfilment.** Check-out initiatives such as Tesco's "One-In-Front" guarantee, and the rise of self-service check-outs cater for this customer need.

Also, consumers are now turning to the internet for immediate fulfilment of their requirements. Many retail services that do not require physical delivery (such as banking services, travel arrangements, insurance quotes) are being undertaken online. Even retail shopping, where transactions are not fulfilled until physical delivery of the goods is moving online. Though the total size of the online retail channel is still small at £14bn last year, the latest figures from IMRG, a membership community for the e-retail industry, show online sales are growing at a rate of 12 per cent year-on-year (IMRG 2009).

- **The Shopping Experience.** Offline retailers are fighting back against the threat of online sales by driving demand through the shopping experience. Two routes are preferred: cost cutting and slick operations (providing a cheap, quick and easy shopping trip); or retail centres that are more theme park than store (and thus provide an entertainment experience).
- **Guarantees.** Thirty years ago, Marks and Spencer differentiated itself with its no-quibbles returns policy, and this was to some extent to cover for the fact that it didn't have changing rooms in its stores. Nowadays nearly all retailers offer money-back guarantees (and M&S does provide changing rooms). Retailers use returns as an immediate and informative route to collect customer feedback about product quality.

Branded goods manufacturers drive demand through **effective advertising** campaigns designed to tap into the fundamental motivations of consumers and thereby convert latent demand into a propensity to buy.

Those retailers who have flourished in the past decades have taken great trouble to really **understand their customers**. They use extensive market research and the best Customer-Relationship Management (CRM) tools (such as loyalty cards linked to huge databases) to understand their customers' needs and shopping habits; and to grow demand through targeted direct marketing.

Retailers also focus on the efficiency and effectiveness of their **supply chains**. Supermarket IT systems are designed so that purchases initiate same-day replenishment orders to suppliers. Variation in demand is signalled quickly to allow commensurate variation in supply. Returned goods are sent back, and incur a financial penalty in the supplier contract. This mechanism provides real incentives to suppliers to address quality issues quickly.

Opportunities for Government

In many ways the government and government-funded skills bodies are in a situation analogous to brand goods manufacturers who supply retailers (see Box 1). Their immediate "customers" are the employers, who will mostly fund skills training but the ultimate "consumers" of the product are the people being trained.

The immediate opportunity is to use the techniques of consumer brand management, including market research, to really understand the behaviour and motivations of the various consumer segments; and then to use targeted advertising to increase demand where it can be shown to be effective to do so.

The second opportunity is for government to focus on the training supply chain; to make the delivery of effective training as quick, slick and low-cost as possible; and to ensure that it meets all the requirements of those being trained

The third opportunity is to introduce better feedback mechanisms into the skills system so that demand signals are transmitted to the training providers.

2.1.4 Infrastructure and Networks

Summary

An ageing infrastructure and ageing networks will continue to need replacement over the coming decades. New forms of communication and energy generation will need new or enhanced infrastructure to support them and new skills to build and maintain them. They are likely to be 'smarter' than the current infrastructure.

There will also be a longer term need for adaptation of infrastructure to anticipate the effects of climate change.

Trends

Much of Britain's existing infrastructure is old. Some of it is already being replaced and this is likely to continue in all three scenarios. Much of the built environment will need retro-fitting to meet modern insulation requirements and standards.

Additional improvements and replacements will be necessary to accommodate communication systems, including high speed national broadband. Intelligent transport systems will need networks to manage them. Our reliance on networks (such as broadband, power, traffic control) and the complex nature of our environment, often with poorly understood properties, will increase. For example, better bandwidth, processing, sensors and understanding of virtual network behaviour will converge to allow new types of information network. However, this growth can occur in a decentralised manner and there will be a need to understand network topology (DCDC 2009/2) and skills at all levels to meet and match this understanding.

The electricity network will need reinforcing and extending to connect to new power sources, such as offshore and remote wind farms and expanded nuclear power stations. Micro generation at the householder or local community level will require installation of equipment and connection to the existing network (LSE 2009/1) with implications of higher skills levels for installing engineers. Gas storage and open EU gas markets will need a strong supply network.

Smart networks and smart meters will require investment and equipment installation on existing networks. To aid energy efficiency there may be growth in local networks, such as local power generation and combined heat and power. Additional local sources of power can add to the resilience of national networks but will also increase complexity.

Efforts to tackle climate change, its effects and environmental degradation are currently largely focussed on creating a low carbon, energy-efficient and "green" economy (IES 2009/1). Depending on the success of such mitigation efforts, there will be a requirement for adaptation to new climate and weather conditions. More investment and more employment will be directed towards projects such as flood defences; improving drainage systems; protecting transport systems; predicting and managing extreme meteorological conditions (IES 2009/1).

Uncertainties

The rate of installation of new networks will depend on economic growth but expansion of existing networks will also be a driver of growth. Nevertheless, in all three scenarios repairs to existing infrastructure seem certain, and in World Markets and Global Sustainability there will be substantial growth in infrastructure.

The main impact of climate change is probably post-2020 but initial impacts may arrive earlier. Some preventative/adaptive measures could be undertaken earlier.

Impacts on the Employment and Skills Landscape

Traditional skills for repairing and replacing existing physical infrastructure (water, gas etc.) will continue to be needed.

Increasingly complex new digital infrastructure, networks, and systems will require higher levels of skills in design, programming and installation of networks and ancillary and consumer units. While many ancillary units will be “plug and play” the blend of old and new will require the understanding of interactions and the ability to read and understand continually changing procedures on more complex installations.

High demand, in most scenarios, for network access from a wide range of users will lead to high levels of demand for installation and maintenance operatives. The higher the rate of economic growth, the higher will be demand for access. Network users may also need training in the use of new systems.

Challenges for Government

To assist and accelerate the installation of communication systems across Britain including nationwide next generation broadband by 2017 (HMG 2009/2).

To provide the right commercial framework and market return for utilities suppliers to invest to improve and enhance networks.

To provide or mobilise the necessary funding.

Opportunities for Government

To promote social equality by ensuring all have access to modern communication systems (see New Technologies driver).

Challenges for Employers

To ensure that they have enough adequately trained staff to work independently across Britain on complicated and sensitive networks/infrastructure. To replace retiring employees who have knowledge of the installed infrastructure.

Opportunities for Employers

To increase multi-skilling of site operatives and reduce costs. To retrain older workers to repair and upgrade existing networks – maybe bringing back old skills. To retrain older workers for new jobs in areas of new infrastructure such as alternative energy and energy efficiency.

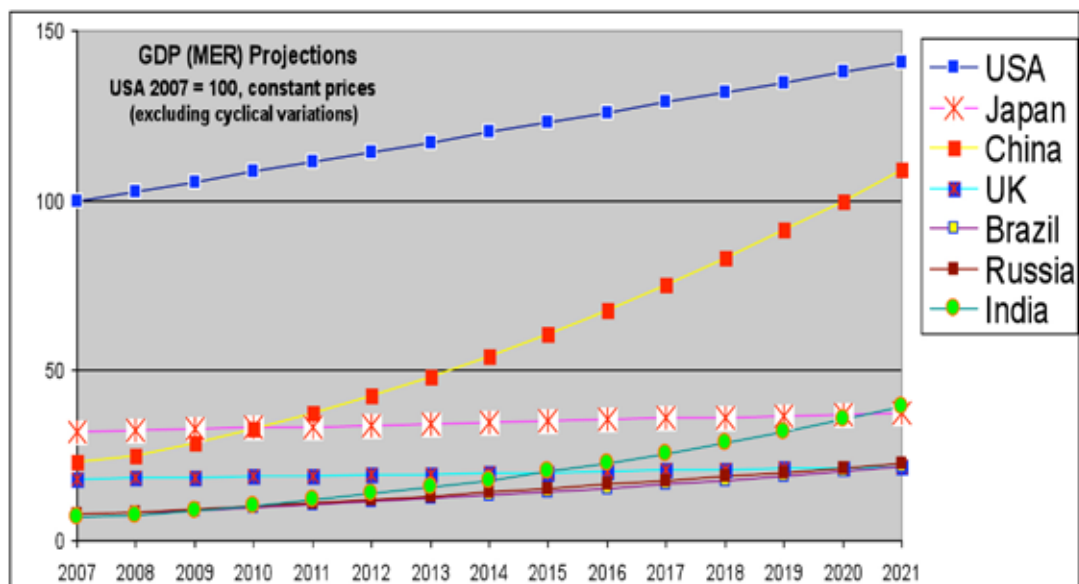
2.1.5 Rise of China

Due to the timeframe of this report it was not possible to look at each significant emerging economy in turn; the report has selected to focus on China, however a number of the broad sentiments could also apply to a number of other nations, including India, Brazil and Russia.

Trends

China is now the second largest economy in purchasing-power parity (PPP) terms; in 2009, it overtook Japan to become the second largest economy at market exchange rates (MER) (IMF 2009/2).

Figure 2.3 Projections of Growth in National GDP (excluding short term variations)



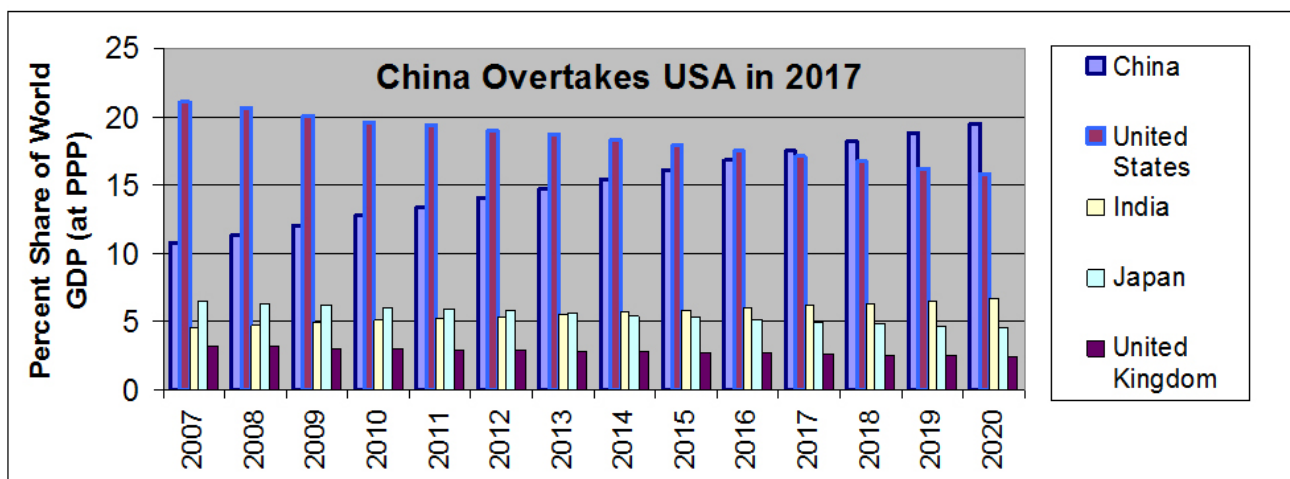
Source: Duckworth et al (2009), using growth rate data from Hawksorth and Cookson (2008)

China is growing at around 10 per cent a year; the annual increase in China's economic output is already the biggest single contributor to world economic growth (see Figure 2.3).

Hawksworth and Cookson (2008, p10) estimate that by 2025 the Chinese economy will overtake that of the USA, even when measured at market exchange rates.

The picture at purchasing power parity is even starker. China is growing faster than the average and therefore accounts for an ever-increasing PPP share of world GDP. America counts for an ever-decreasing share, as shown below. IMF (2009/2) analysis and estimates show that the two economies will be nearly equal in size by 2014. Simple straight line projections of these trend lines suggest that the cross-over point will occur in 2017.

Figure 2.4 Projections of Growth in National GDP at Purchasing Power Parity



Source: IMF (2009/2) Staff analysis and estimates for data to 2014; Straight line projections from 2015 to 2020

After about 2030, India, with a faster growing population, is likely to start to catch up with China (Hawksworth and Cookson, 2008). By then, the India/China dynamic is likely to be one of the main drivers of the geo-political landscape.

Uncertainties

China's stability and economic out-performance is not guaranteed as it will still be a relatively poor country. It will be vulnerable to the economic swings and crises that affect any developing economy. On the other hand, if exchange rates move closer to purchasing power parity (i.e. the US suffers a dollar devaluation relative to the yuan) the cross-over may happen earlier than 2025.

One key uncertainty is how the US/China relationship will develop as China reaches global economic dominance.

Another uncertainty is how world politics will change when the dominant economic power is a relatively poor country, with GDP per capita very much less than that of the United States.

Impact on Employment and Skills Landscape

The main impact of China will be a transformation of the world geo-political landscape. This PEST driver will change the world economy and have an important if indirect impact on employment and skills.

However, an early direct impact will be the need for Chinese language skills. This is especially important if the world financial imbalances are rectified by dollar and sterling devaluations relative to the Yuan and an increase in consumption in China. As an importer of Chinese manufactures, the UK can get by using the English language. If the UK balance of trade depends on companies successfully selling to China, then Mandarin language skills will become important. A lack of these language skills will put the UK and Europe at a competitive disadvantage.

In all of our scenarios China becomes a greater source of competition to the UK:

- In World Markets, this will be for high-end manufacturing jobs, not just simple low-cost manufacturing
- In National Enterprise, there is a competitive threat with respect to procurement of natural resources and in business and consumer product and service markets. Also, overt/covert protectionism and possible development of regional trading blocs constrain UK trading opportunities
- In Global Sustainability, steadier growth makes China a stronger competitor in the long run, forcing the UK to focus on industries where it has competitive advantage. The China/US relationship gets stronger and leads to a weakening of the UK/US special relationship.

Challenges for Government

The scale of investment by countries such as China and India, including in higher education, is likely to support a move up the value-added chain by these countries; posing greater competition to knowledge-based and other higher-tech industries in the UK. This may be exacerbated if constraints on investment in UK universities and other educational establishments diminish the quality and volume of basic research and the output of appropriately-skilled graduates and other highly skilled individuals.

Trains are just one example (see Box 2: High-Speed Trains in China). This effect is likely to be replicated across advanced manufacturing and other high-tech industries.

Box 2: High-Speed Trains in China

The implications of China's scale are neatly shown in the future of High-Speed railway engineering. In 2009, the Chinese government announced orders for 280 high speed trainsets. These are the fastest (350km/h) trains in the world and they will be built in China to German and Japanese designs.

"China Northern signed a 40.8bn Yuan contract on September 28 to supply 140 eight-car 350 km/h CRH3 trainsets. The manufacturer said this brings the total order for the Siemens Velaro-derived trains to 400 sets. They are to be built at CNR's Changchun and Tangshan plants."

"China South has received a 45bn yuan order for a further 140 high speed trains based on the Japanese E2-1000 design. These 350 km/h sets will be built by Nanche Sifang in Qingdao under licence from Kawasaki Heavy Industries and will incorporate components from Japanese firms." ("Huge train orders in China", Railway Gazette 12 Nov 2009)

These are just one set of orders in a series that dwarf purchases by European railway systems. By contrast, the UK has no domestic high-speed train services and no decision on any high-speed route for them. (Even on the Channel Tunnel Rail Link, domestic services are limited to 140mph (225km/h) and do not meet the EU definition of "High-Speed Rail".)

Railways are not aerospace, but these are very high tech trains. The size of the Chinese market will have implications for the future of train design.

- Firstly, production engineering and some design work will now be undertaken in China. Transfer of technology is a condition of these orders.
- Secondly, there will now be good commercial reasons for Kawasaki and Siemens to set up engineering design laboratories in China, to help design the next generation of railway transportation systems. They will increasingly recruit Chinese engineering graduates to staff them.

As the Chinese subsidiaries of these multinational corporations gain skills and expertise, they will inevitably win more and more development work from their parents, and there will be inescapable political pressures for the parents to give them the work.

Despite the "Death of Distance" trend, if China remains the largest market for high speed trains in the coming decades, it is difficult to envisage a future where the high-tech design expertise for this technology does not migrate over time to the location of the industry's largest customer.

Opportunities for Government and for Employers

By focusing on areas of competitive strength and by employers increasing their ambition into high skill areas the UK may be better able to take advantage of global opportunities.

Opportunities for Employers

Recruit marketing workforces with Chinese language skills (Mandarin especially), and cultural understanding to sell into Chinese markets.

Challenges for Employers

Prepare for increased competition from Chinese firms, and not just in the low-cost manufacturing sectors.

2.1.6 Cost and Availability of Capital

Summary

Capital investment and associated jobs follow skills. Skills availability is an important issue in attracting foreign direct investment (FDI) and in retaining domestic investment.

Trends

Capital investment is a key driver of jobs. Successful development of the UK economy will require capital at an economic price but the current trends on the availability and cost of capital are not encouraging.

On the other hand, Britain is currently second only to the USA in attracting foreign investment (Mandelson 2009/1) and further investment may be attracted from abroad if the UK is seen as the right place for investment. Foreign direct investment is particularly associated with new skills and ways of working being imported from the investing company (e.g. Nissan and Toyota changing methods in the British motor manufacturing industry).

In a world of global mobility, for example in World Markets and Global Sustainability, if Britain cannot provide the right skills, indigenous employers may seek the skills they need overseas.

Uncertainties

The cost and availability of capital could be a constraint on investment in certain scenarios. It could lead to less capital intensive, more labour intensive activities and processes in the UK.

Impacts on the Employment and Skills Landscape

The three scenarios present different threats and opportunities.

World Markets assumes high levels of capital flows, with capital being transferred easily and quickly between businesses and countries. If Britain can compete in these open markets capital will be available, from within or as FDI. If Britain cannot compete it will find capital difficult to get and costly. The loss of FDI would impinge significantly on the UK employment landscape with loss of many good jobs.

In *National Enterprise*, investment is low, constrained by availability and cost of capital, restricting the growth of successful industries.

Global Sustainability assumes an upsurge in investment requiring overseas capital. International companies will invest in UK to use research and design skills if they are available.

Challenges for Government

To ensure the availability of affordable capital, this in turn will help to stimulate job creation.

To ensure that the UK has the right skills to encourage FDI and domestic investment.

To ensure that SMEs can find capital at affordable rates and reasonable terms.

To ensure Britain remains a world leading financial centre.

Opportunities for Government and for Employers

UK financial markets are still a great source of expertise and a source of capital.

Challenges for Employers

Financial services skills will be needed to find and manage capital.

Employees will need the right skills to attract capital in a competitive market.

2.1.7 New Industries and New Jobs

Summary

A wide range of new industries is suggested in the horizon scanning sources. Not all will need new skills; some will nullify existing skills (EC 2009/4). Not all will develop, other unforeseen ones will arise. They will all need a wide range of skills to be successful.

Trends

New industries and new jobs will be stimulated by government policy, consumer demand and by the development of new technologies, methods and materials. Different scenarios will lead to significantly different rates of development of new industry and type of industry.

The UK Strategic Investment Fund (BIS 2009/1) is focussing on the following sectors:

- Advanced manufacturing
- Low carbon technologies
- Ultra low carbon vehicles
- Life sciences
- Digital Britain

There are other possibilities identified from the literature and these are shown below.

Table 2.1 New or Resurgent Industries Identified in the Horizon Scanning

Advanced infrastructure – smart grid and smart metering.	High Value Manufacturing
Advanced manufacturing	High Value Services
Advanced Materials	Industrial biotechnology
AI	Intelligent Transport Systems
Assisted Living	Life sciences – regenerative medicine- stratified medicine – drug development
Biomass/Bio-fuels	Low carbon technologies (aircraft)
Biosciences	Low carbon vehicles
Building retrofit low carbon	Low Impact Buildings
Carbon sequestration	Medicine and healthcare
Creative Industries	Nano-scale technologies
Cybernetics	Network Security
Desk top manufacturing	Printable electronics
Developments in health care.	Quantum computing
High speed broadband	Recycling
Digitised portable communications/ entertainment	Remote sensing
Electronics, Photonics and Electrical Systems	Resource efficiency
Emerging Technologies	Household/care robots
Energy from waste	Secure systems
Energy Generation and Supply	Socio-technical sensor based applications
Energy recovery systems – e.g. CHP	Solar PV
Environmental remediation (Using new techniques)	Solar thermal
Enzymes	Synthetic biology
Flexible, as opposed to advanced, manufacturing.	Ultra low carbon vehicles
Food safety/tracing/authenticity using DNA etc	Wave and tidal energy, and wind
Genetics	Wind power
Geo-engineering driven by climate change issues.	

New industries do not just need technological skills but need a range of other supporting skills. The mix and levels of skills changes as the technology moves from research to market and production, then in-service use and maintenance. For example, many low-carbon jobs will be created outside the manufacturing sectors. Installing electricity generating capacity requires not only manufactured goods but also financial and legal services and project management. The comparative advantage of some countries – the UK being one example – will lie in these parts of the value chain, rather than in engineering (IPPR 2009/1).

In some cases marketing, in-service use and maintenance will provide more jobs than manufacturing, medical technology being one important case.

New industries and jobs are not necessarily directly based on new technology but can be derived from it. For example, the internet and pervasive ICT have opened up new routes to market and a new form of retail industry. Online commerce requires different skills to traditional commerce but needs few technological skills. Mobile device “apps” offer a route to market for entertainment, datasets, expertise and games.

The UK has certain weaknesses in developing new businesses including early stage, pre-investment and proof of concept work. The skills required are in short supply (TSB 2009/6).

In scenarios where competition becomes more intense and globalisation faster, the clustering effect of new technologies will be more marked. This raises the stakes for any initiative that invests in a new technology or growth area. The rewards for success will be greater, but the chance of success will be less.

Uncertainties

Will the British economy be attractive to entrepreneurs, British or otherwise?

Which new businesses are the winners?

Should the UK focus available resources on existing successful centres of excellence and exploit related regional clusters of growth, which already have a relatively good asset base and offer an attractive living environment or quality of life?

Impacts on the Employment and Skills Landscape

Starting a new business requires a range of different skills; these include those required to recognise the value of new technology, those required to develop a business, and finally those required to run the business. The first two are in particularly short supply (TSB 2009/6).

New industries, such as offshore wind farms, will often span several existing recognised sectors. Sometimes the right blend of skills may be available in unconnected sectors; others will need sectors to work together to provide the right skill sets.

To run a new business based on new technology or new commercial ideas requires business need to be identified and training developed.

Challenges for Government

To promote those industries where the UK has or can achieve a competitive advantage (RAE 2009/1). In the UK, these may be in “financial and legal services and project management” rather than in engineering (IPPR 2009/1).

To maintain an economy that enhances business opportunity and new ideas.

To identify and resolve UK skills weaknesses in business start-up.

To promote effective clusters.

Opportunities for Government

The development of activities and related skill needs in sectors that support greater national self-sufficiency (Workshop).

To promote local markets for new technologies such as low carbon energy.

Challenges for Employers

To liaise with the research base to keep abreast of technology and understand what skills are needed to capitalise on the use of new technologies.

To liaise with training providers to ensure that the right training is available, particularly where skill sets cut across traditional sectors.

Opportunities for Employers

New business opportunities.

To use business clusters to work closely with researchers, suppliers, skills providers to generate centres of excellence and generate new business and improve skills.

Box 3: Capturing New Technology Clusters for the UK Economy

General Purpose Technologies (GPTs) available to be captured may include plastic electronics and regenerative medicine (Will Hutton presentation at BIS 2009/5).

It is difficult for governments to create the right conditions to anchor new technology developments in a given country. The issue is well recognised, but is usually couched in terms of how to predict and provide. In addition, the window of opportunity for effective action may only be open for months, not years and therefore areas promoted by government for support need any interventions to be timely.

Skills to Anchor New Technology Clusters

Technology needs skills to anchor clusters in the UK. Potential or established technology clusters will need fast development of a skill base to support their growth and keep them in the UK. It is important to ensure that the UK does not lose GPTs because of lack of key skills in the UK at the crucial stage in the development of a new technology.

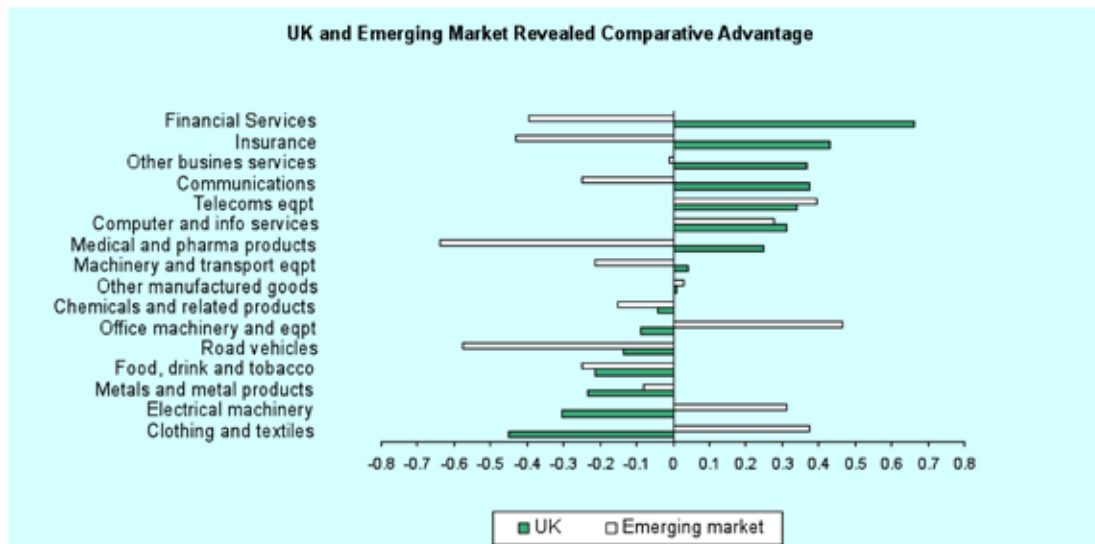
2.1.8 Existing Industry

Summary

In spite of potentially rapid change, existing industries will play a majority part in the employment landscape in 2020. To survive they will have to adapt and improve. Training will play a major part in their survival.

Trends

In 2020, almost three quarters of jobs in the EU will be in services. Job creation in services is likely to be substantial up to 2020, especially in business services. The primary sector could lose 2.9 million jobs while construction should tend to stabilise. Manufacturing could experience a net loss of 800,000 jobs despite an increase in engineering; however, given the impact of a strong replacement demand, there would still be important job openings in manufacturing, which will therefore remain an important sector for the EU economies (EC 2009/4).

Figure 2.5 UK and Emerging Market Revealed Comparative Advantage

Source: BIS calculations based on UNCOMTRADE and IMF Balance of payments data, 2006

An objective assessment (BIS 2009/1) of the UK's core strengths suggests that the UK has a comparative advantage in many service sectors; in particular high value added professional services such as financial services, computer and information services and other business services as well as strengths in some manufacturing sectors such as medical and pharmaceutical products. Figure 2.5 shows UK's advantage against a group of emerging economies.

Manufacturing is a real success story that is not always recognised. Though falling as a share of national output, it still accounts for 13 per cent of UK GDP and has increased its productivity by 50 per cent since 1997, outstripping the rest of the economy. This has narrowed the overall economy's historic productivity gap with major competitors: between 1997 and 2004, average labour productivity in the UK grew by four per cent more than the USA, five per cent more than France, and 15 per cent more than in Germany. (DIUS 2008/2)

Uncertainties

The general level of economic activity and Britain's competitive position will impact on the rate of change within existing industries. Of the three scenarios, the one with the slowest rate of change would be National Enterprise. World Markets is likely to have the fastest rate of change, with a continued shift towards high value services. In Global Sustainability there will be a relatively stronger shift towards green jobs. In all scenarios, all existing industries will need to improve continually to survive.

Impacts on the Employment and Skills Landscape

Most current industries will still exist but will need to up-skill and potentially move up the value chain to ensure that they stay ahead of the market. To survive, some sectors will need to adapt; for example high street retailers may need to provide more services to compete against the ease-of-use and pricing of on-line retailing.

In the construction sector, the skills required in building and installation components need to be significantly higher than in the past to achieve future energy conservation levels in new build. Higher precision in manufacture, installation, use and maintenance is required to achieve high levels of performance. In turn, this requires higher levels of care at all stages of the process (ConstructionSkills 2008). In other words, operatives and others will need to read, understand and obey what is written on the label or on their pocket electronic installation manual. This effect is likely to apply to most sectors to some degree in the search for improved efficiency and productivity. Note that this concept suggests an increase in mid-level skills, undermining the hour-glass concept of some commentators.

In other sectors, such as office or administration functions, employees will be required to have additional competences as more routine functions are automated. For example in the financial sector (EC 2009/3.09) middle office functions will require people highly skilled in financial processes but also with more legal expertise, an international background, language skills and a good knowledge of IT. In telecommunications, predefined technical knowledge will become somewhat less important while skills to adapt and learn new competences and lifelong learning will be at a premium (EC 2009/3.15).

In many knowledge-intensive sectors both managerial skills and scientific knowledge will be needed. In social care and education further skill upgrading will be needed to improve the quality of services. This reflects the growing demand from employers for transversal key competencies, such as problem-solving and analytical skills, self-management and communication skills, linguistic skills, and more general “non-routine skills” (EC 2009/4).

Some existing industries will shrink; ex-employees will require access to retraining to re-enter the jobs market.

Challenges for Government

To ensure that training is available to meet the needs for up-skilling.

To ensure that adequate skills training and support is available to re-skill workers in shrinking industries.

Challenges for Employers

To ensure that adequate training is given to their employees to maintain competitiveness in an increasingly rapid changing market.

2.2 Technology Drivers

2.2.1 New Technologies

Summary

The development of new technology is a key driver for successful growth of UK industry. The bio-, nano-, and cognitive sciences will lead to new technologies and products. The demands for low carbon products and systems will stretch existing and new technologies. New technologies and information and communications technology will continue to change industry and services and hence the demands for skills and training across industry sectors.

Trends

ICT is already widespread but its impacts will continue to change job structure and work practices. A high proportion of workers are likely to need ICT skills, with benefits to the employer of higher productivity. Trends that are likely to affect work include open source software; user-generated content; video-conferencing and distance working; cloud computing; accessing online training; new mechanisms for interacting with computers; new ways of displaying information.

Technologies that are new today will become pervasive by 2020 with major advances in healthcare, biotechnology, and new smart infrastructure:

- ICT is accelerating. By 2020 we are likely to see increased use of a variety of ICT across a widening range of workplaces, including: swarm computing, radio-frequency identification (RFID) tags on most items, surfeits of data, free information, grid computing, video-conferencing, effectively free telecommunications. 3D printing is likely to become commonplace, disrupting supply chains as components and spare parts are manufactured where they are needed (Interview)
- New forms of healthcare will include genetic medicine; personalised medicine; human augmentation (initially targeted at disabled people, but also used by the non-disabled, e.g. memory drugs that allow more efficient acquisition of skills)
- Biotechnology is developing rapidly. Biotechnology can be classed as Red (healthcare), Green (agricultural) or White (chemical)
- Infrastructure will include intelligent infrastructure, new energy technologies will become more prevalent.

Rapid developments are expected in some sciences, especially in areas of informatics, bio-science, health and life sciences, nanotechnology and systems and cogno-sciences.

Unpredicted (and unpredictable) scientific breakthroughs are possible, particularly in the interdisciplinary areas where these sciences overlap. There is the potential for revolutionary paradigm-changing scientific breakthroughs at the intersection of the converging nano-, bio- and cognosciences, which could generate completely new technologies.

Box 4: Technology and Employment within the Technology Life Cycle

A new technology can impact on the employment landscape at any point in its life cycle. When promoting new technologies for industrial and skills policy, it is important to distinguish where a technology is in its life-cycle and what sort of employment effects the policy initiative is intended to accomplish.

A typical technology life-cycle may include six stages, illustrated with three examples from different industries.

Technology stage	Vehicle Engines	Pharmaceuticals	Wind Turbine
1. Basic Research	Science of combustion	Cell science	Aerodynamics; material science
2. Technology Development	Cutting edge engine design (Formula-1)	Bio-technology; clinical trials	Turbine design
3. Implementation	Engine factory	Manufacture and packaging	Turbine manufacture and assembly
4. Maintenance and Support	Servicing garage	Information and training	Wind farms
5. Use	Delivery of traded goods	Prescription by doctors	Use of low-carbon electricity
6. Disposal and Decommissioning	Scrap yards; oil recycling centres	Monitoring of oestrogen in the water supply	Disposal and decommissioning

Each stage needs a different skill base and will be subject to different economies of scale:

- The Basic Research and Technology Development stages are subject to clustering effects. The output of research labs can be shipped anywhere in the world and these knowledge-based activities can benefit from great economies of scale. The Implementation stage is also subject to clustering, depending on the economies of scale of the technology concerned; some technologies cannot be shipped to the point of use.
- Technology Development and Implementation usually provide the highest economic value and the best paid high-end jobs.
- The stages of Maintenance Support and Use will typically provide the greatest number of jobs.

When promoting industries and the skills needed for them, it is vital to be clear about what stage or stages of the technology are being considered and to remember that no technology is of intrinsic value unless it can be put to productive use in delivering other economically profitable activities.

Skills for New Technology Clusters

For the early stages in the technology life-cycle, employment and growth prospects in the UK will depend on the UK's competitive advantage in these areas and whether it can provide the necessary conditions to promote new technology clusters. These conditions include the availability of the correct scientific, engineering and technician skills at the right stage of the technology development cycle. The precise skills needed are dependent not only on the sector but on the specific requirements of the technology and its application.

More general factors which appear to be important for early-stage technology clusters are the availability of venture capital; access to global scale; entrepreneurial spirit; suitable premises; global transport links; freedom from government interference; and pleasant environments for globally mobile workers to live (Porter 1998).

Skills to Adopt and Exploit Technologies

The employment and growth implications for later stages of the technology cycle are more predictable. A technology only contributes to economic growth if it can be used to do economically productive work more efficiently. The ability of the UK to exploit and benefit from the adoption of new technologies will depend on the wider workforce having the skills and training to make use of them.

Impacts on the Employment and Skills Landscape

We foresee strong demand for skills in all these growth areas of technology (ICT, healthcare, biotechnology, smart infrastructure etc.), both to develop and deliver the technologies and to make use of them in other productive endeavours.

The rate of technological change is increasing and life cycles are becoming shorter, with consequent impact on training needs, as they react to the rate of innovation and adoption by industry and services.

Healthcare appears to be a sector where ICT and other developing technologies may make a particular impact. There is likely to be a shift towards more technicians in the sector, or retrained existing practitioners, to use and implement new technologies.

Cross-Sector impacts of ICT

ICT will continue to have impacts across the economy. There will be a need to teach greater numbers to use basic office tools more productively and to keep up to date with new software for work productivity as new paradigms (such as Web 2.0) and ways of working emerge.

Some of the foreseeable impacts of current developments in ICT will be so profound that they can be considered as separate drivers in their own right. These drivers include:

- Death of distance in working practices
- Delivery of training online
- New ways of working

These are considered at the end of this chapter.

Cross-Sector impacts of new technology

Exploiting a new technology will often apply to many industrial sectors. Some examples are described in table 2.2 below.

Table 2.2 Cross Sector Impacts

Area	Impact Across Industrial Sectors
Healthcare technology	New healthcare developments seem likely to have employment and skills implications mostly in the healthcare sector itself.
Bio-technology	Red bio-technology is likely to be limited to the healthcare sector but green biotechnology could in time require training for the whole agricultural and petrochemical industries. White biotechnology, if the more extreme speculations come true, could revolutionise construction and land management.
Smart Infrastructure	Would require large proportions of the whole nation to learn how to control and use such infrastructure.

Impacts by Scenario

The impact of new technologies varies in each of our scenarios:

- In *World Markets*, rapid rollout implies greater demand for new skills to develop, produce, maintain and use all manner of new technologies. Intense competition suggests reduced time to learn new skills before the comparative advantage derived from them is reduced as other countries learn these skills. This applies to both development and production skills.
- In *National Enterprise*, the relative failure to attract inward investment by multi-nationals and foreign companies, low growth, low investment economic environment, is likely to inhibit spread of best practice, innovation and rate of take-up and application of new technologies. Government needs to focus on what policies can be enacted and/or what actions can be taken in constrained circumstances to create as favourable an environment as possible for business and private investment to compensate for reduced public sector expenditure. Concerns over energy costs and security of supplies are likely to drive innovation in energy efficient technologies including retrofitting of the existing built environment. This will require some new skill-sets, including possibly more multi-skilling in construction, and more generally an understanding of the need for greater quality and precision to achieve energy efficiency goals and reduce wastage.
- In *Global Sustainability*, there will be widespread and effective development of technology, primarily low carbon technology. It will be supported by government incentives and procurement policies. Development of other technologies may be weaker in comparison. Green business will generate jobs in manufacturing where UK design and development succeeds, but more jobs are likely in installation, operation and maintenance. The development of jobs by other technologies will depend on the type of technology and its impact. It is possible that some, such as nano-medicine, will not generate new jobs except some limited growth in manufacturing.

Opportunities for Government

Opportunities for government from the above technology stage model:

- To promote new basic research in the UK
- To create the right conditions to capture new technology clusters for the UK
- To promote implementation in the UK of promising new technologies
- To promote the profitable use and exploitation of new technologies.

Opportunities for Employers

Capitalise on opportunity from new technologies.

Find ways to exploit new technologies to deliver new productive outputs.

2.2.2 Design and Media

Summary

Britain is strong in design, media, and marketing and it is likely to be important to maintain this lead in the future. Interviews suggested antipathy to media studies as a subject of education, so efforts need to be made to understand and improve such provision.

Trends

Britain's creative industries are becoming increasingly important to the UK economy. Two million people are employed in creative jobs and the sector contributes £60 billion a year, 7.3 per cent, to the British economy. Over the past decade, the creative sector has grown at twice the rate of the economy as a whole and is well placed for continued growth as demand for creative content, particularly in English, grows (DCMS 2008/1).

Other analysis (NESTA 2009/1) suggests that "between 2009 and 2013 the UK creative industries - which is responsible for films, music, fashion, TV and video games production - will grow on average at four per cent - more than double the rate of the rest of the economy. By 2013, the sector is expected to employ 1.3 million people, likely to be more than the financial sector." This will of course be dependent on many influences.

Uncertainties

Whilst some consider that relaxed intellectual property regimes can improve products and increase revenue other commentators suggest that the risk from the piracy of ideas could undermine the value of some parts of the media industry (DCDC 2009/2).

There is antipathy to, or at least neglect of, "media studies" by certain influential leaders in industry and government and this was evidenced in a number of interviews. However none of the three scenarios appear negative to the sector.

Impacts on the Employment and Skills Landscape

Specialisation of UK workforce to these service sectors. There may be a need to broaden the individual employee's knowledge base, crossing traditional skill boundaries and professional disciplines, in order to provide a greater understanding of how components and areas of knowledge inter-relate and inter-react to provide a more effective and reliable end product and service.

Challenges for Government

Maintain high quality design and media training capabilities. Keep close connections with businesses that can use design.

Challenges for Employers

To ensure that training and higher education (HE) delivers the right outcomes to keep the UK ahead of the field.

Opportunities for Employers

Britain has a strong reputation and needs to continue to grow in this sector as its competitiveness in general manufacturing slips. The UK's recognised strength in design and media may attract skilled practitioners to the UK and the development of such clusters will continue to support specialisation of the UK economy along these lines.

2.3 Demographic Change Drivers

2.3.1 Migration

Summary

Migration is a key driver of the employment landscape, often driven itself by relative skills supply. It can be, and has been in the past, a solution to labour shortages in the UK especially for less skilled jobs. Current forecasts are for net immigration, but migration can work in both directions.

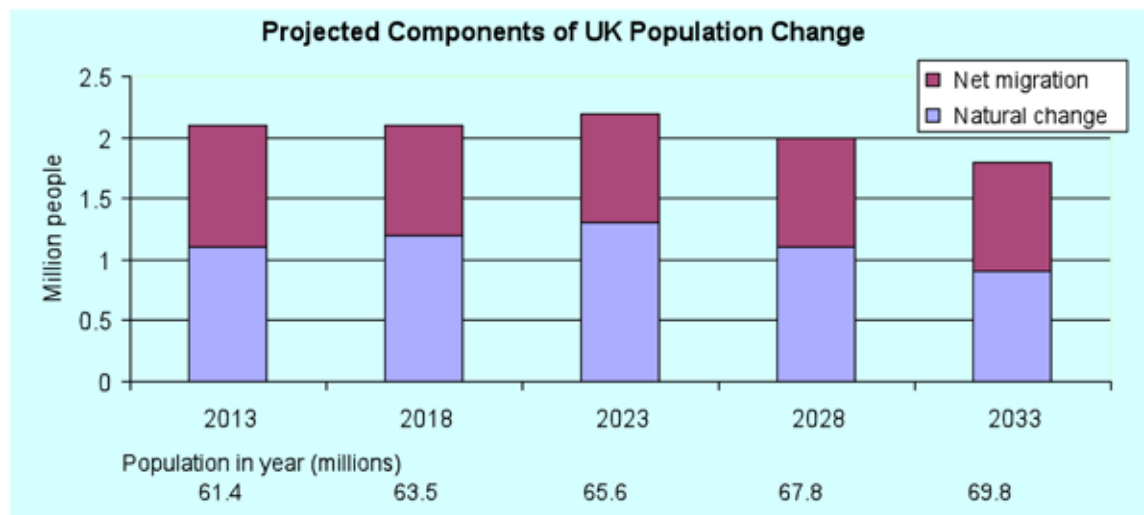
Trends

Labour is increasingly mobile, and people will travel the world to find work. Labour mobility cuts both ways: the "brain drain" of scientific and technical expertise can also be a way to attract highly skilled workers to the UK. Immigration can improve supply and keep down pay rates, particularly for low-end jobs; it can also act as a relief valve in a downturn, as more recent immigrants return home.

Until around 1997, immigration into the UK was roughly balanced by emigration (ONS 2005/3). Since that time, net immigration has become the norm. Recent high levels of net migration into the UK are projected by the ONS to continue.

“Of the 4.3 million projected increase in the UK population over the next 10 years, some 2.4 million (56 per cent) is a result of projected natural increase (more births than deaths) while the remaining 1.9 million (44 per cent) is the assumed net number of migrants.” (ONS 2009/4, p. 2)

Figure 2.6 Projected Components of UK Population Change



Source: ONS 2009

In our scenarios, the migration picture is a key differentiator between the envisaged futures. In the open economy scenarios (World Markets and Global Sustainability), migration is high, and skills shortages are effectively met by recruiting abroad. In the nationalistic scenario (National Enterprise), migration is strongly curtailed.

Uncertainties

Migration is linked to other drivers. The economic performance of the UK will tend to drive migration (in and out). The evolution of “death of distance” will reduce the need to migrate because economic migrants will no longer have to move to work for companies based overseas; the jobs might migrate to the skills rather than vice versa.

Impacts on the Employment and Skills Landscape

Without migration the UK faces a shortage of skills and a shortage of entrants to the jobs market.

New skill sets will be required to prosper in a high-mobility world; including those required to retain marketability and those required to work within different global cultural contexts.

The “death of distance” trend will not apply where physical presence is a component of the work, e.g. fast food, cleaning, construction, manual labour, personal care, services, etc. Migration will still be important in filling these jobs.

Challenges for Government

English language training needed for immigrant workers and their children.

Increased demand for housing; child services; infrastructure etc.

Opportunities for Employers

Opportunity to recruit skills from abroad to meet demand in the UK.

Greater ability to outsource abroad.

Challenges for Employers

In some scenarios, there will be difficulties in retaining skilled workers in a more mobile world.

2.3.2 Ageing Workforce in the UK

Summary

The most significant demographic issue to skills is an ageing workforce. There are a number of reasons why people may work longer, even if they don't want to. They will need the training to help them do so. There will be some sudden and significant shifts in the number of school leavers and retirees.

Trends

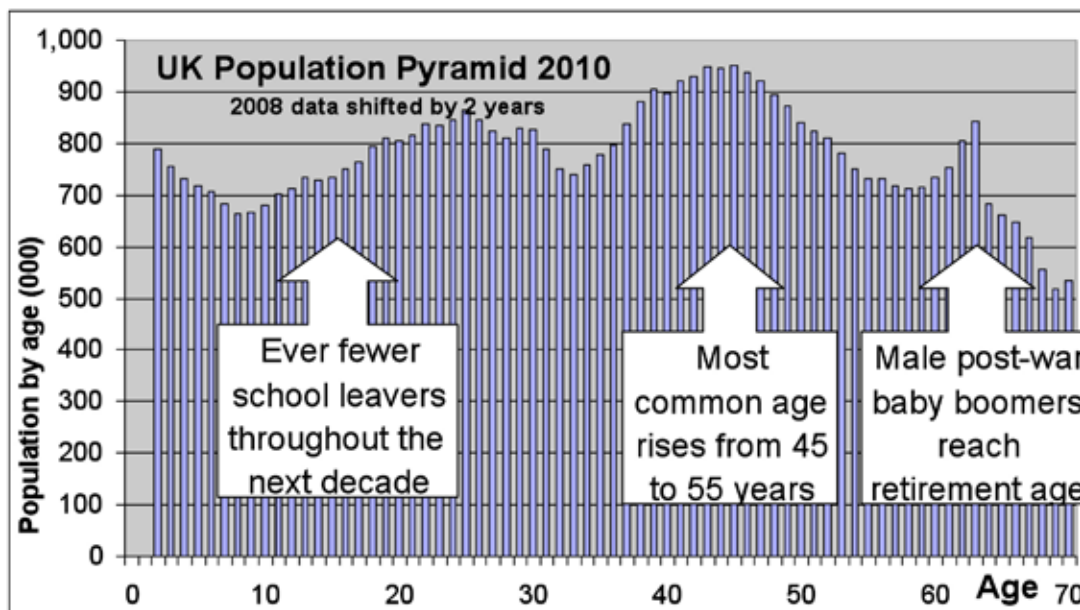
Demographics predict an ageing workforce in all scenarios.

The average age of the British workforce will increase over the next decade. The largest age band is currently workers aged 44-46; by 2020 the largest band will be 54-56.

The number of British pensioners now exceeds the number of under-16s for the first time ever; the biggest change in population profiles is due to the reducing mortality of the old and very old, rather than any change to the working age demographic (ONS 2008/5).

Over the next 10 years, employers will find it increasingly difficult to maintain their workforce as baby-boomers retire and fewer school leavers and graduates become available. Figure 2.7 shows the UK population distribution.

Figure 2.7 UK Population Age Distribution



Source: ONS (2008/7). Base: 2008 data shifted by 2 years.

Male post-war baby boomers will reach 65 - their current retirement age - in the next few years. At the same time, the number of school leavers will decline. There will be a drop in workforce numbers unless compensated by migration, or people working longer.

Will retirees in the next 10 years be richer or poorer than today's? They are likely to be fitter. If they are as rich, or richer, the market from older people for leisure and healthcare will increase.

State pension ages are being increased slowly. Public finances may force an acceleration of current schedules to raise pension ages; the need to pay for social care insurance may force people to work longer.

Uncertainties

There is little difference in this driver between all scenarios, except for the impact of immigration (see 2.3.1). Even changes in retirement and education/training leaving ages, which are likely but not confirmed, will be announced in advance of them happening giving adequate time for the training sector to adjust its policies and practices.

A proportion of older people may be forced to work beyond retirement age due to financial circumstances. This circumstance has become more likely since the global financial crisis.

Impacts on the Employment and Skills Landscape

The ageing workforce may be less willing (or be seen to be less able) to adapt to change, adopt new skills, or retrain.

As the population ages and new talent becomes less available, employers and employees will need to re-skill or up-skill existing talent (RAE 2009/1).

There will be a loss of key skills in some technologies that boomed when the retiring generation entered the workforce. An example is nuclear engineering. The civil nuclear sector will expand at a time when senior managers and experts reach the end of their working lives (Aldersgate 2009/1).

There is likely to be more demand for healthcare and leisure industries. This effect may also be linked to new healthcare technologies aimed at keeping older people in their home.

There will be fewer school leavers each year in the next decade and a higher proportion of these may go on to university. Around 80 per cent of the workforce in 2020 are already of working age and therefore much more training will need to focus on the existing workforce.

Challenges for Government

The increased dependency ratio will put great strains on social services and the country's ability to finance the welfare state.

Government will need to encourage and support older workers to up-skill or retrain all through their working life, preferably without losing status or income (interview). This challenge emphasises the importance of the life-long learning agenda and the importance of individual ambition.

Challenges for Employers

Encouraging and supporting older workers to up-skill or retrain throughout their working life. Traditional models of career progression may have to be revised to reflect this need for continual retraining.

Businesses and public sector organisations will no longer be able to depend on recruitment and graduate training to meet their skills needs. A main conclusion of the Leitch review (Leitch 2006) was that training and retraining of the adult workforce will be essential for the future prosperity of the UK.

Opportunities for Employers

Using existing but retrained workers.

2.3.3 Generation Y

Summary

Generation Y is the next cohort of middle managers and will have very different attitudes to new technology.

Trends

Generation Y is the generation born in the period leading up to the millennium, generally described as being aged 10 to 30 today. Generation Y, like other generations, has been shaped by the events, leaders, developments and trends of their time. The rise of instant communication technologies made possible through use of ICT, such as email, texting, and IM and new media may explain the Generation's reputation for being peer-oriented due to easier facilitation of communication through technology. This trend of communication is continuing into Generation Z.

Expression and acceptance has been highly important to this generation. In China, with a total population of a billion people, the urge to stand out and be individualistic has become a staple of the Chinese youth culture (Gallup, 2005). The widespread use of ICTs and the internet, especially social media and networking and blogging, has given consumers opportunities to voice concerns and influence product development (IES 2009/1). This freedom has helped Generation Y to be questioning, ambitious and to have high expectations.

Other views of Generation Y highlight a possible cultural divide as our current leaders are 'digital immigrants,' who are talking to 'digital natives' (Interview). The Lord Chief Justice warned that the jury system is threatened by the internet generation who no longer get their information by listening to people but use technology to find and assimilate information. He warns that by 2025 the oral tradition of the courts may need to be rethought and juries given evidence via computer (Times 21 Oct 2009/6).

It is argued that Generation Y may also possess differing perceptions of our political system; they see government as target driven, top down and micro-managed, and view government communication as spin and manipulation (Ipsos Mori, 2008).

Impacts on the Employment and Skills Landscape

Generation Y will demand and use new methods of communication and learning both inside and outside the workplace and this will encompass the delivery of training.

Challenges for Government

To build the means that will allow for effective communication with this generation.

To ensure that a generation of potentially ambitious and achieving employees have the means to fulfil those ambitions through training.

Challenges for Employers

To recognise the differences and take advantage of upcoming generations.

Opportunities for Employers

A new generation of potentially ambitious and achieving employees.

2.4 Environmental Change Drivers

2.4.1 Reducing Carbon Emissions

Summary

Mitigation of global warming by addressing carbon dioxide emissions will require design, installation and maintenance of equipment and materials to generate low carbon energy and reduce energy consumption. Low carbon working practices will need to be adopted by all.

Trends

This trend covers the whole area of mitigation of climate change. Particularly in the Global Sustainability scenario, reactions to the risks of climate change will mandate a high price for carbon through taxation, or the equivalent of a high price through regulation. In the other two scenarios, the price of energy is still likely to rise through supply/demand mechanisms, but more slowly.

Energy industries will need to develop new technologies to increase efficiency or, along with other industries, change their methods of production, for example using new technologies to replace feedstock which have become less available.

Impacts on the Employment and Skills Landscape

New building techniques and industrial processes will require new skills. New energy infrastructure will require investment and provide jobs.

Working in a more energy efficient manner will require new ways of working, more training and probably higher levels of training (i.e. less travel; less commuting; less waste).

Certain new or nascent industries serving the low carbon market will demand fairly specific mixes of skills, and attitudes, which are likely to be in short supply at present. Training will be needed specifically for some of these new industries. Low carbon skills will be needed across a number of sectors, suggesting a range of specific skills will be needed.

Various changes in work practices and skills are envisaged:

- Skills for brown field sites and retrofitting built environment
- More precision in building – needs higher skill levels (ConstructionSkills 2008)
- Changes in manufacturing design and process – multi-skilling

- Evolution of skills during work life
- More focus on lifecycle cost of goods and investment, not just its capital cost

A low carbon world will mandate a more careful approach to many aspects of work.

In some areas, the UK is well placed to capitalise on the low carbon economy. It has a large off-shore wind potential, though the global opportunities for off-shore technology may seem limited as on-shore turbines are considerably cheaper to build. The UK also has expertise in some solid-state physics that may be important for new lighting technologies (Humphreys 2009). The UK economy is also strong in knowledge industries, which are relatively low consumers of energy per unit of value added.

2.4.2 Resource Shortages

Summary

Food security is already an issue and will probably get worse. Fuel crises may occur and there is continuing depletion of other resources. There will be a growing need to conserve and reuse resources.

Trends

As world consumption continues to grow, there is a growing risk of resource shortage (or price hikes in anticipation of shortage) in a wide range of commodities including, oil, food, water, phosphate, rare-earth metals etc.

There is a risk of food shortages in the next decade. In Britain this will be experienced as an increase in food prices; but in poorer countries many more people will experience hunger as they cannot afford to feed themselves and their families (TSB 2009/1). This could lead to an increase in pressure of migration from, for example, North Africa to Europe.

Uncertainties

Shortages of specific resources are rarely predictable and are often initiated by unforeseen natural, political or commercial events.

Global Sustainability is likely to be less susceptible to sudden resource shock. Growth rates will determine the rate of consumption of scarce materials more than the other scenarios. International cooperation could help avoid markets overheating.

Nevertheless, the trends above will apply to some degree in all scenarios and they will have some level of impact on the skills landscape in all scenarios (DCDC 2009/2, EC 2009/3.07, EC 2009/3.13).

Impacts on the Employment and Skills Landscape

There will be new market opportunities as economic activity and industrial processes change in response to resource supply and demand and price signals. There will be demand for related workforce skills at all stages of the development, design, delivery and after-sale/maintenance process.

Concern over energy supplies and global competition for natural resources in the National Enterprise scenario and a stronger focus on resource conservation in Global Sustainability, will lead to new activities and industries (EC 2009/5, TSB 2009/3) including a greater focus on:

- recycling and reduction of waste
- effective and efficient use of resources
- whole life use/cost of resources embodied in products, processes and services
- self-sufficiency.

Solutions for some impending shortages, such as food production in the longer term, will require new technologies (TSB 2009/1).

Challenges for Government

Continued promotion of recycling will require trained specialists in recycling.

Opportunities for Government and Employers

Government and business can capitalise on the related market opportunities that may arise from new resource efficient processes.

Challenges for Employers

All employees will need to be trained to be aware of resource conservation and recycling to meet regulations and produce cost savings.

Specialists will be needed to guide recycling and conservation.

Training courses need to be up to date as new methods and materials are used and as regulation or conservation tightens, or as prices increase.

Opportunities for Employers

Employees properly trained in resource conservation and recycling can contribute to significant cost savings, and may be a future source of competitive advantage.

2.5 Values and Identity Drivers

2.5.1 Security Concerns

Summary

International and internal security issues have increased in recent years and are likely to be a significant concern for years to come.

Trends

On the global arena there is a continuing threat from terrorism and the closely interconnected problems from potential failed states. The concerns of companies and individuals have increased in response to terrorism, cyber crime and other criminal activities.

In response to these threats there have been legislative changes and a growth in surveillance. There are signs of growing public disquiet to these trends, in part due to the powers being used in a way some consider inappropriate.

Impacts on the Employment and Skills Landscape

The UK Government has a leading position in comparison with Europe and the USA on managing these national threats.

The UK has a dynamic security sector that advises clients in the UK and globally on the protection and resilience of their staff and assets. Many of the skills required for this are provided by people who have experience of working in the security services and the Armed Forces. These are complemented by analysts and researchers from a wide range of technological, economic and political research backgrounds.

The UK also uses its high end skills and creativity and innovation to support its secure and resilient control and communications systems. These include the control systems for major energy and transport infrastructures and public and private communications networks. Developments over the next 10 years in the areas of 'smart infrastructure,' cloud computing and the next generation internet will provide opportunities for hardware, software and service provision, differentiated by a capability to deliver high levels of resilience and security.

Opportunities and Challenges for Government

The UK's reputation for effective threat management helps to attract and retain high skill high value added businesses. There is also the opportunity for technology transfer and the movement of highly skilled people out of public sector security organisations into wealth creating opportunities.

One challenge for Government is that terrorist incidents can have a negative impact on perceptions of the UK although in most cases the psychological impact far exceeds any financial or physical impacts.

Opportunities and Challenges for Employers

This is an area that presents opportunities for high skill high value added business. The UK also has a significant pool of experts from the defence and security sectors.

While security and resilience rely heavily on physical and electronic measures the behaviour of employees is also a vital factor. There is an increasing need for staff at all levels to have the necessary skills to maintain the appropriate level of security. As the level of interconnection increases the need for these skills will increase rapidly.

The skill level for lower skilled security jobs is likely to continue to increase due to the wider application of increasingly high technology, such as scanning and surveillance systems.

2.6 Regulation and Multi-Level Governance Drivers

2.6.1 Regulation

Summary

Increased regulation at work can increase training needs by expanding the need for certification. Regulation outside work can increase jobs by increasing surveillance, inspection and monitoring. Overly restrictive regulation can hamper growth, increase cost and reduce labour flexibility.

Trends

Regulation across society is generally expected to increase with substantial differences in intensity in each scenario. Global Sustainability is the most regulated.

Regulation is an important driver in relation to skills needs and training in many industries (ConstructionSkills 2008, EC 2009/4, EC 2009/3.06, EC 2009/3.07, EC 2009/3.13, EC 2009/3.14, EC 2009/3.15). It impacts primarily on health, safety and security but all businesses must consider environmental and in labour regulations. Employees need training in health and safety, environmental and other regulated activities (including finance and other white collar activities) and may need certification or accreditation to undertake many jobs. Companies need to provide adequate training to ensure employees do not transgress regulations applying to the company.

Certification is currently a reason for training and will remain so (Interview).

Regulation is not always governmental, for example constraints imposed by insurance companies can be just as important as legal restrictions.

Uncertainties

The level of regulation is substantially different in each scenario.

Anticipated labour market regulation varies widely. Looser regulation in National Enterprise will lead to a more flexible market, but one with more unlicensed operators. The onus will fall more on individuals to acquire skills but there is likely to be reducing respect for certification. In World Markets, through industry self interest and the need to maintain standards in a highly competitive market, self regulation by industry could replace state regulation. In Global Sustainability substantial regulation will emanate from the state, EU or global organisations.

Impacts on the Employment and Skills Landscape

Excessive labour regulation can impede labour markets and reduce jobs (Workshop) but it is suggested that in Germany a relatively inflexible employment market has promoted skills training by employers, as it is easier for employers to retrain employees than to make them redundant (Interview).

A number of EU industries claim that the quality of institutions based on measures including reliability, quality and enforcement of rules and regulations is an important driver for success (EC 2009/3.04, EC2009/3.11).

High levels of certification of individuals will increase training requirements. However, individual qualifications should be carefully structured and integrated with the full range of industry certification to facilitate workers transferring between companies and preferably industries and countries (Interview).

Increasingly tight regulation could prevent on-the-job training, which would have significant impact on training programmes. Excessive certification, including industry self-regulation, can cause labour shortages in trades or professions. Too lax a regime could lead to more activity in the hidden/illegal economy, as could a regulatory regime that was too restrictive, by making the process of training and certification too expensive (Workshop).

Challenges for Government

To avoid regulation beyond that necessary.

To promote acceptability of certification across Europe and industries.

To ensure that EU regulation does not threaten British jobs.

Opportunities for Government

To attract jobs to Britain by shaping an appropriately flexible regulatory environment.

Challenges for Employers

Meeting and challenging regulation applicable to new jobs and industries. Developing adequate training programmes for all employees to understand and meet industry regulation.

Opportunities for Employers

Good certification provides evidence of employees capabilities.

New jobs may also arise in inspection and regulation in the workplace and at home, such as Home Information Packs and electrical and gas certification of properties, as well as a raft of environmental, financial and commercial regulations.

2.6.2 The Future of Education

Summary

School education is crucial in all scenarios but is it delivering the right product for the future: that is, understanding, interpretation, adaptability and social skills? Is Government providing sufficient funding? What impact will raising the compulsory learning leaving-age have? How should HE liaise with business?

Trends

Increasingly there is a view that education in the future should provide resilience, social skills, intelligence, interest, responsibility, understanding and awareness. Teachers will need to make available a wider range of social services, including mentoring (FS 2008/1). The SAMI project workshop raised the concept of the 3Rs rising to 7Rs adding reasoning, relationships, responsibility and rights.

The growing use of technology may influence the continuing demand for generic skills, e.g. autonomy, initiative taking, problem solving, self-management, team working, flexibility/adaptability, communication (including inter-cultural communication), and media literacy (CEDEFOP 2009). Similarly, working in chains, networks and clusters creates requirements for team-working skills.

Whether working in teams, making presentations, influencing people to think differently, or helping to solve the many complex problems of modern workplaces, modern workers increasingly need to be able to communicate with others in more sophisticated ways (DCSF 2009/2).

Another set of skills deemed particularly important by both policy makers and employers relates to innovation and creativity, which also puts a premium on systems thinking. These skills needs are likely to be subject to continuing debate about how 'new' they are and how 'teachable' they are (IES 2009/1).

Whilst there is evidence that some STEM (science, technology, engineering and maths) subjects may be enjoying a renaissance in schools, IT and computing are not (RAE 2009/1). There remains a need to train in the use of technology, in spite of a belief that technology is improving and becoming easier to use.

Education is widely regarded as a good investment. Private schools are seen as worth paying for by those that can afford them. It is seen as the ticket to a top university and a top job, which amply repays the investment made (Workshop).

It appears likely that the leaving age for education or training will increase over the decade to 2020 (in England increasing from 16 to 17 in 2013 and rising to 18 in 2015). In the short-term, this may result in a drop in supply of young workers. In the long-term, the sections of the workforce who stayed in learning until the age of 18 will have higher levels of qualifications than the older cohorts who are retiring from the labour market (IES 2009/1).

Impacts on the Employment and Skills Landscape

There will be growing demand from employers for people leaving education with soft and hard skills. An inability to supply them would be a major loss of competitive advantage to Britain

A need for teachers of all kinds to liaise with employers.

Challenges for Government

To provide more innovative education and training with more flexibility between learning and work, so school and work are more integrated, with learning continuing throughout life (Interview).

To create a culture in education that inspires creativity and innovation.

Poor education makes acquisition of new skills doubly hard. An education that spoon-feeds with facts makes subsequent retraining more difficult (Workshop).

Maintaining expenditure levels for education and training and ensuring that higher education intake and output is not compromised by the cost to individuals (Interviews).

To ensure that education providers clarify with employers what skills are needed in the workplace.

Challenges and Opportunities for Employers

To deliver good vocational training having been given well-educated raw material.

2.6.3 Devolution, the EU and Trade Liberalisation

Summary

It is unclear what the scope of Political Unit in 2020 will be. Will it be viewed at a European, national or regional scale and how will this impact on the skills landscape?

The growth of EU markets and the liberalisation of trade outside the EU are important drivers of growth.

Trends

Through growth in the EU and trade liberalisation, markets available to UK exporters will grow.

The current trend is towards open international markets but the Doha round of WTO negotiations is stalled on the issue of service liberalisation (Interview). Liberalisation will lead to economies of scale, opportunities to exploit new markets, and cheaper materials for successful businesses but will also permit earlier and more intense competition from abroad. Liberalisation of trade in services will encourage the clustering of knowledge-based skills (law, design, finance etc.), as global economies of scale are more easily exploited.

There is at present a growing trend to devolution in the UK, reinforced by regionally-focused EU policy. The EU believes that it has a strong role to play in the development of EU skills although it recognises that many aspects should be dealt with at the national or regional level.

Uncertainties

The extent of UK integration into Europe. Will regions rather than nations compete within a Europe where power is subsequently devolved from EU and national centres? Could this lead to greater regional economic and social disparities, imbalances and inequalities?

What impact will EU training activity have in the UK? If Europe has enough skills in a given area, will it matter if the UK does not? Or does it only count as a lost opportunity to train someone in the UK into a useful profession?

Impacts on the Employment and Skills Landscape

Possible adoption of more European directives on skills and training policies and more freedom for intra-Europe migration of skilled workers.

Trade liberalisation will have no great impact on training except through competition and more consistent levels of growth.

Challenges for Government

It will be essential for powers from central government to be effectively devolved to the right level of governance (local, sub-regional, regional) to best ensure democratic accountability and co-ordination between all the many stakeholders crucial to the development and delivery of public services, including training (SAMI 2007/1).

Avoid conflicts between EU policies and British needs.

Opportunities for Employers

The large EU labour pool.

Opportunities in emerging, liberalised economies.

Challenges for Employers

Ensuring workforces have appropriate enabling skills, for example financial and language skills for international markets.

2.6.4 Government Interventions to 2020

Summary

Apart from direct intervention in and funding of training, Government can have an impact on demand and supply of training. Examples of such interventions include:

- The state of the economy which has an overwhelming impact of skills demand (Interview). (See Driver: Economic growth in the UK)
- Public policy on buying services and goods either for consumption or provision to the public can include requirements for training from the suppliers
- Support for specific industries will change skill demands
- Promoting attitudes to training for companies and individuals.

Trends

Two of the scenarios (World Markets and National Enterprise) imply significant cuts in public spending in the long term. The 2008/9 recession and associated budget deficit suggest that public spending will be reduced in the short term in almost any scenario; and growth, at best, will be slow for a few years.

Government procurement is currently playing a part in ensuring labour employed on government contracts is trained according to current and future needs (DCMS 2009/2).

Uncertainties

This driver's outcomes vary greatly in each scenario: Global Sustainability is heavily focussed on government expenditure and control, whereas World Markets and National Enterprise have a much lighter hand of government. The growth rate in World Markets will partially compensate for reduced government expenditure.

Will the recession and cuts in government spending lead to permanent loss of particular workforce skills through early retirement, redundancy or emigration? Will those made redundant in the public sector have the right skill-set and mind-set to meet the requirements of the private sector? Will specific retraining be needed for public sector employees to meet private sector needs?

What is the role for trade unions, professional bodies and employer organisations?

Public procurement requirements for certification are a significant driver in demand for training, for instance for ISO 9000 quality standards. This applies particularly for the certification aspects of the training, if not for the skills themselves.

Impacts on the Employment and Skills Landscape

Cuts in government spending across the board are likely to impact on training spending, in the short term, in most scenarios.

Cuts in public expenditure will reduce the amount of money that can be used to influence training.

Fast-moving technology and intense competition will make it more difficult for government interventions to bring economic benefits by promoting new industries.

In the Global Sustainability scenario, government will play an important part in stimulating demand in the economy as funds are spent on green technologies.

Funding should also come from the private sector but government will need to ensure that the right market is in place to attract finance.

Challenges for Government

To ensure that any short term loss of skills or training due to recession is minimised.

To improve the rights and opportunities for individuals to improve themselves (BIS 2009/2).

To increase ambition in individuals and companies to improve their skills (Interviews).

To create the right environment conducive to new industry and technological change.

To minimise the loss of skills held by individuals.

Opportunities for Government

To maximise the impact of all Government expenditure on improving skills.

Opportunities for Employers

To recognise and take advantage of Government's attempts to influence improvements in the skills landscape.

2.7 Impacts on Work and Employment - Secondary Drivers

Some of the drivers were seen to be caused by other factors (mostly ICT) that had already been identified as drivers themselves.

These drivers were identified in the scanning and subsequent analysis in the same way as the primary drivers, but they have been classified here as "secondary" drivers. This reflects the way in which they derive from other drivers whilst also having impact in their own right.

2.7.1 Death of Distance in Working Practices

Summary

Distance has much less meaning than it used to have. ICT has already improved communication to an extent that virtual contact can be as productive in some work settings as physical proximity.

This is already having significant, political, educational and security impacts. Coupled with easy mass travel it increases off-shoring/outsourcing and mobility of labour.

Trends

By 2020, techniques such as video-conferencing and software to recognise facial expressions are likely to have developed to the point that effective inter-personal communications can be made over computer links and more importantly workers will have learnt to make effective use of such tools.

Some examples show how this trend may develop:

- The managing attorney at Rio Tinto corporation (BBC 2009/2) has recently described how some of the company's legal services have been moved to India.
- Diagnostic radiology is now regularly undertaken by radiologists in India for client hospitals in the USA and the UK. Levy and Yu describe radiology as an "extreme" professional service with its extensive training requirements and heavy government regulation, though in their examples, remote radiologists are often expatriates with client-country recognised qualifications (Levy and Yu 2006).

In some circumstances social networking tools will replace face-to-face social interaction. Younger workers who grew up with social networking tools are likely to be more ready to use technology in this way. Older workers will have to adapt to collaborative working at a distance.

Impacts on the Employment and Skills Landscape

We can expect global work groups to become as effective as local groups through telecommunications and remote working, though many office workers may have to learn how to do this. In any industry with global economies of scale, the ability to assemble a team quickly and apply that team's expertise anywhere in the world will be a factor in a firm achieving competitive advantage. Firms that do not have this capability or the culture may fail to prosper.

Also, if work can be done anywhere, training becomes less of a national requirement and more of a concern for a given business: "Do we have the skills anywhere in our corporation that can be brought to bear on this problem?" This effect may lead to less migration if high end jobs can be completed by people without physically moving.

There is a risk that high-status professional tasks become more likely to be outsourced to cheaper countries. Many middle-class professionals could find their career structures threatened.

On the other hand, there is more scope for white-collar businesses located in the UK to win business from abroad, if they have the skills in place and an exploitable competitive advantage.

In our low-carbon scenario, Global Sustainability, the ability to conduct international business without travel becomes an essential technology for international business.

Opportunities and Challenges for Government

In global terms, London is a key legal site, with comparative advantages such as contracts being made under English law. The challenge for government is to ensure that the right legal and regulatory framework remains in place to keep these advantages.

It is important that other professions which depend on foreign clients and earn UK foreign exchange are recognised as such; and the conditions that promote the clustering of these professions in the UK are not disrupted unwittingly. This list may include the following: some specialisms of design engineering; computer games; pharmaceuticals; design; media; and investment banking.

Opportunities for Employers

There may be greater scope for the UK to win white-collar professional work from overseas. Winning this business will need the appropriate entrepreneurial activity to develop overseas markets for UK professional expertise.

2.7.2 Delivery of Training Online

Summary

Many types of information are becoming available online and an increasing amount of economic activity is undertaken on screen. This means that increasingly skills can be acquired online too.

Trends

Many types of information are becoming available online. Internet sources have become invaluable in many professions, and user-generated content such as Wikipedia has transformed the concept of sharing information.

Other manifestations of this “Web 2.0” phenomenon are YouTube and eBay. Successful commercial websites like Amazon use user-generated content to review products and customise marketing suggestions: “other people who bought this book also bought ...”

With growing bandwidth available, web content is becoming more a visual medium rather than text-based, see for instance the success of YouTube.

The growth of the knowledge economy means that an increasing amount of economic activity is undertaken via a screen, through some online service.

Impact on the Employment and Skills Landscape

Within the skills arena, it must be assumed that significantly more skills training could become available through the internet, possibly for free or nearly free. Massachusetts Institute of Technology now offers all its lectures free online as a service to further the cause of education to the world (MIT 2009/1).

Skills are more than just classroom based training but the use of video training and two-way web-cam links means that much skills assessment and development of competence in skills could be done online in the future too.

Training in future could make much more use of user-generated content, rather than having to use the intermediation of official training providers.

Opportunities for Government

As training content becomes more available, a critical parameter will become knowing which training to access, rather than the training material itself. There is a clear opportunity, or need, for government to help potential trainees to find the training material that is right for them.

There is also an opportunity for the UK government, or others, to sponsor a comprehensive training resource providing free-to-copy open-source training material.

Such a system might offer:

- better expert systems for on-line coaching
- public organisations offering advice on the training modules to access to achieve certification; also to establish the standards for certification in various skills
- 'local experience centres' to reinforce globally accessed curricula

Box 5: Need for Guidance

A number of issues suggest that more guidance should be given to potential trainees in their choice of training:

- Greater responsibility being placed on employees for their own training
- Greater use of internet for applications for training
- Possible reduced role for the state in skills provision
- The use of training to reduce social inequalities
- The increasingly rapid change in technology and demands on employees
- The need to increase individual ambition

Measures to improve guidance could include:

- **Greater use of the internet.** Over the past decade new forms of consumer inter-mediation have been developing, like Amazon, e-Bay and Linked-In. Often these are provided for free, as a service or at zero marginal cost to the user. In the future, this could be extended to provide guidance on the UK skills system to help potential trainees and employers steer their way through the maze of training opportunities. This would be qualitatively different from existing information and guidance, providing immediate diagnostic services and recommendations online.
- **Closer cooperation between skills and social services.** Just as the roles of schools and social services seem to be blending, there should be opportunities for social services to work closer with training providers.

Improved guidance could result in the needs of consumers (employers and individuals) of training actually driving the supply.

It is also suggested that there will be a general need for mentors/guidance across a range of services, public and private, not just training and skills. This will generate a need for more trained people to help and advise the public in an ever more complex world. Should the state adopt/readopt this role or could the voluntary sector provide the service? (SAMI 2007/1)

Opportunities for Employers

Greatly reduced cost and greatly increased flexibility in workforce training may be possible. Only by making the experience of training as quick and as easy as possible, will it be possible to maximise the conversion of latent demand into actual skills training.

Challenges for Employers

Employers would need to teach older workers how to acquire learning through non-traditional methods.

2.7.3 New Ways of Working

Summary

ICT will contribute to change in the type of work people do and the structure of business. More emphasis will be needed on logistics, time to market and tailor made production. New social skills will be required to cope with new complex organisational structures and the blending of manufacturing and service provision.

Trends

The internet is changing production and consumption patterns (e-business etc). Advances in ICT are impacting on organisational structures and new business models (EC 2009/3.04), such as improved logistics and supply chain management to benefit from out-sourcing and off-shoring.

ICT has also driven significant trading advantages through smarter customer data as well as the development of e-retailing, home shopping and lean retailing. Vertical integration has increased over the past decade and is likely to continue, with more producers dealing directly with consumers (EC 2009/3.06).

“Time to market” is becoming a key competitive factor (EC 2009/3.14). Supplychain management in world-wide operations and increased collaboration with suppliers is another booming job function (EC 2009/3.03). The traditional value chain has changed considerably over the past 20 years (EC 2009/3.06).

The reputations of companies – their innovative capacity, product quality, respect for delivery times, etc - are important determinants of business performance.

One of the strongest recent trends in UK manufacturing has been the blurring of the traditional division between manufacturing products and providing services, new distribution channels for recycled/reused goods and new forms of contractual arrangement such as leasing rather than sale of goods (TSB 2009/3 and DIUS 2008/2). Manufacturers are becoming more interested in their final customers and the care they need. More manufacturers are seeking direct contact with their customers for repairs and maintenance.

These trends are in turn placing new pressures on family life, as hard pressed parents try to reconcile the demands of new patterns of work with their responsibilities to care for both their children and elderly relatives. New forms of family life are emerging as relatives and friends help each other to cope with the stresses and strains of modern life (HMG 2009/1). “Part time work, temporary contracts, multiple jobs – will untypical work become the norm?” (Interview)

In time, managers at the top will no longer be the prime leaders of change: they will design sophisticated networks that link up individuals and enable others to take the lead. Being at the top will be about designing, managing and repairing these networks (ESRC 2005/1).

Uncertainties

There are probably slightly different outcomes to these trends in different scenarios but the trends are likely to continue in all scenarios in pursuit of productivity and efficiency. Individualistic entrepreneurial attitudes will be stronger in some scenarios, collaborative international working in others but almost certainly change will continue.

Impacts on the Employment and Skills Landscape

Employees need to learn that priorities will change. Different attitudes will be required and new and different ways of working with other people, either locally or at distance, need to be learned. Successful companies in all scenarios will be those that can adapt to changing business methods and this will require adaptable trained staff at all levels.

Even the most basic jobs will need to adapt, although significantly more in the World Markets or Global Sustainability scenarios than in National Enterprise. In successful companies everyone is a salesman, everyone is a representative of the company; and attitudes will need to change significantly, in some industries from top to bottom, as global competition increases. Manufacturers will need to learn more about retail customer care.

Labour and working sites may both become more modular and nomadic: taking your office and your factory with you.

Challenges for Government

To build on improvements in increased literacy and numeracy.

To produce new entrants to the workplace with the right attitudes and the ability to learn; and to maintain in schools the focus on ICT and soft skills, such as building relationships.

Challenges for Employers

With increasing importance of managers – upwards, downwards, sideways - where do employers, especially SMEs, find good managers?

To find employees with the right soft skills and the 7Rs (Reading, writing, arithmetic, reasoning, relationships, responsibility and rights) (Workshop).

Skills provision needs to be flexible to meet the changing demands on employees.

Opportunities for Employers

Improved operational efficiencies with employees with the right skills and better relationships with customers and suppliers.

3 Scenario Impacts and Implications

Chapter Summary

Chapter 2 demonstrated the interdependency of the drivers of change and the importance of not viewing each one in isolation. Similarly the socio/political/economic context will be important in determining how the drivers impact on the employment and skills system. This chapter explores the potential variability of impact by considering how the 23 drivers identified in Chapter 2 evolve in each of the three “Base” scenarios. The scenarios are then examined to explore possible future employment and skills landscapes.

Key themes:

- Some skills drivers evolve differently in each scenario
- Other drivers evolve independently of the scenarios
- Each scenario has an impact on the employment landscape

3.1 Evolution of Skills Drivers by Scenario

To demonstrate the importance of the socio/political/economic context for deciding how various drivers impact the following tables specify how each of the main drivers of the employment and skills landscape (see previous chapter) plays out in each scenario (for a fuller explanation of the scenarios see Appendix 6). This is the “Skills Overlay” needed to complete the scenario pictures and specify the impact of the scenarios on the skills landscape.

The state of many drivers is specified in the scenario stories themselves (see Appendix 6 The Scenarios for Skills 2020 and also Appendix 5). The others were developed after team analysis or were considered explicitly in the Expert Panel workshop. Some drivers play out the same in each scenario; some behave very differently.

3.1.1 Drivers that Evolve Differently in Each Scenario

Economic And Globalisation Drivers

Driver	World Markets	National Enterprise	Global Sustainability
Economic Growth in the UK	UK economy now strong after sluggish start to decade	Decade of low and fitful economic growth	Decade of steady economic growth at roughly historic levels
	Rapid structural change, driven by global competition	Relative structural stability	Fairly rapid structural change
	UK labour productivity improves strongly	Low productivity growth	Increasing resource productivity
Knowledge Economy	High-level and low-level jobs, but reduction in the middle. Tendency towards a "hour-glass" economy	Less pronounced divisions between high-level and low-level jobs	Growth in high-level jobs, but probably no reduction in the middle
			Strong link with social welfare
Meeting growing consumer expectations	Consumerism is to the fore; Customer Relationship Manager	Private provision of services for the rich	Growth diverted to sustainable investment
	Technical change is consumer-focussed	Constrained state provision of services for those with low incomes	
Infrastructure and Networks	High investment in profitable infrastructure and networks, including transport	Low levels of investment in infrastructure and networks	High levels of investment in low-carbon 'smart' infrastructure and nuclear industry
	Plentiful private finance		
Rise of China	Competition from China in higher value-added manufacturing	China stumbles in its economic growth	China seeks sustainability rather than maximising growth
		Protectionist barriers	
Cost and Availability of Capital	High levels of investment and free flows of capital	Investment is low, constrained by availability and cost of capital	Upsurge in investment international investment in UK
	High Foreign Direct Investment (FDI), seeking growth and profit	Reduced capital flows and FDI	High capital use to minimise resource use; less left over for consumption
New Industries and New Jobs	Rapid development of new technology clusters driven by intense competition	Government-sponsored national technology champions	Rapid development of new technology clusters driven by competition
	Extreme clustering driven by free trade and global economies of scale	New technology clusters form but expertise is developed within national centres or within trading blocs	Clustering driven by free trade and global economies of scale
Existing Industry	Steady attrition of industries in which the UK has no competitive advantage	Less disruptive global competition, perpetuation of traditional industries in the name of security of supply and local sourcing	High levels of investment stimulate manufacturing, construction and other existing industry
			All industry will need to adapt to new demands

Technology Drivers

Driver	World Markets	National Enterprise	Global Sustainability
New technologies	Rapid take-up and spread of new technologies, driven by intense global competition, spread of best practice, and by international standards Focus on growth and profits	Pace of adoption of technological change is more moderate with less radical innovation Focus on efficiency and cost-cutting, and national self-sufficiency	High level of technology development Focus on ecological and new energy technologies
Death of Distance in Working Practices	Off-shoring and on-shoring of white collar jobs Competition is between global corporations, rather than national champions	Less off-shoring of white collar jobs Work teams more nationally based	Off-shoring and on-shoring of white collar jobs Competition is between global corporations, rather than national champions Greater emphasis on global team-working with video and other tools to reduce travel.

Demographic Drivers

Driver	World Markets	National Enterprise	Global Sustainability
Migration	The labour force is highly mobile with immigrants filling low-paid service jobs Greater incentives for skilled workers to migrate to where rewards are greatest	Government limits the level of immigration, particularly that by unskilled workers Less international competition for skilled workers, due to barriers erected	High level of national and global mobility of labour with immigrants filling low-paid service jobs, with some controls Competition for the services of skilled workers

Environmental Drivers

Driver	World Markets	National Enterprise	Global Sustainability
Reducing Carbon Emissions	Use of fossil fuels Low carbon technologies adopted only where economic	Strong policy on energy efficiency is largely market driven, to maintain energy security	Products and services designed to minimise resource use with focus on eco-markets, recycling, waste etc. Cars and air travel expensive
Resource shortages	Energy prices high; oil, coal and gas available	Resource shortages and high prices UK food price increases and food and energy security are significant issues	Efficient resource utilisation High resource prices by intent, through regulation and taxation

Values and Identity Drivers

Driver	World Markets	National Enterprise	Global Sustainability
Security Concerns	Heightened security concerns	Real security issues at home; but less participation in overseas conflict	Reduced security concerns

Regulation And Multi-Level Governance Drivers

Driver	World Markets	National Enterprise	Global Sustainability
Regulation	Self-regulation and corporate social responsibility, but only where consumers demand it Planning controls relaxed and general weakening of labour market regulation	Less EU regulation and labour markets further deregulated Planning controls weakened at local level Strong “informal” service economy	Tight regulation on environmental impacts High levels of labour regulation on hours etc
The Future of Education	Private schools seen as the ticket to a top university and a top job State schools continue to produce young people with inadequate skills	State focus on primary and secondary education to improve 3Rs; communication, social and networking skills; and an ability to use new ICT media and channels State provision of tertiary education constrained by public finances	3Rs very important, plus relationships, reasoning, responsibility and rights = 7Rs
Devolution, the EU and Trade Liberalisation	Global economic institutions Greater role for EU, at broad international level Liberal open markets	Power and policy now primarily at national level although delivery is local and EU kept at arms length Limited international collaboration raises barriers and security concerns	International collaboration and global economic/environmental/ social institutions Regulated markets based on equitable international benefits from trade
Government Interventions to 2020	Public expenditure cuts	Swingeing public expenditure cuts	Public investment relatively high but diverted to fund sustainable infrastructure

3.1.2 Drivers that Evolve Similarly in Each Scenario

Group	Name	Evolution in all three scenarios
Economic and Globalisation Drivers	New ways of working	ICT will contribute to change in the type of work people do and the structure of business More emphasis on logistics/ time to market/ tailor made production
Technology Drivers	Delivery of training online	More skills training becomes available on the internet Much skills assessment and the development of competence can be done online
	Design and media	Design and media are strong sectors and UK design, engineering and science recognised around world
Demographic Drivers	Changing workforce in the UK	Ageing workforce, fewer school leavers and more retirees
	Generation Y	“Digital natives” have entered the workforce. Used to interacting online, they have different skills and attitudes to their elders

3.2 Scenario Impacts on the Employment Landscape

The three scenarios have different implications for the employment and skills landscape in 2020. This section explores how various aspects of that landscape may evolve over time, and how that evolution may differ in each scenario

Global Trading Environment

The centre of economic power has shifted towards the east.

World Markets and Global Sustainability point to the Far East as being both a competitive threat and market opportunity; less so under National Enterprise due to trade barriers and protectionism.

Concern over resource depletion and security of supplies under all three scenarios leads to greater focus on eco-efficiency particularly under Global Sustainability and greater self-sufficiency under National Enterprise.

Income Levels and Distribution

Due to different issues of emphasis, all three scenarios require significant focus on educating and training the population as a whole in ICT skills – to facilitate growth in the application of new technologies and activities and under World Markets and National Enterprise, to limit the risks of a digitally illiterate underclass.

State Provision of Public Services

Considerable opportunities for private provision of education, health and other public services develop under World Markets, rather less so under National Enterprise (income constraints) and Global Sustainability (due to level of state provision).

Skills training moves in line with international standards under Global Sustainability.

Regulation

Regulation is loose under World Markets and National Enterprise, high under Global Sustainability. Will all nations play by the rules; and will the UK be at a competitive disadvantage by imposing an over-zealous interpretation of global trading rules on UK-based business?

Consumerism

The consumer contribution to GDP is high on the agenda under World Markets and to a lesser extent under Global Sustainability. Consumers will have the greatest impact on markets for products and services under World Markets.

Consumer and Business Services

Healthcare, leisure travel, financial services, media, entertainment, education and information services are likely to see strong growth under World Markets and Global Sustainability with attendant market opportunities and skill requirements. Growth under National Enterprise is more modest.

Particularly under Global Sustainability, services are likely to become more integrated with other elements of the economy, as greater emphasis is placed on wider service supply packages.

There may be a blurring of traditional skill boundaries and processes, particularly as new ICT is progressively applied.

Manufacturing

There will be a shift to high-tech activities and new technologies such as ICT, biotechnology and ultimately nano-technology under World Markets and Global Sustainability but with competition to attract the companies involved. Under National Enterprise manufacturing will struggle under a lack of necessary investment in skills and infrastructure and an inability to retain strong skill and industry clusters.

Construction

A high rate of take up of ICT and modern construction methods is expected under World Markets and Global Sustainability. Construction is boosted under Global Sustainability by the requirement for much greater eco- and energy-efficiency. Again new skills will be required, particularly with respect to sustainability, with a generally higher level of literacy and numeracy. Traditional skill boundaries become blurred in World Markets and Global Sustainability.

Under National Enterprise, emphasis is likely to be heavily on retrofitting the existing stock to conserve energy, a move which is likely to be seen also under World Markets and Global Sustainability, particularly the latter due to a combination of regulation, taxation and charging.

Agriculture

Agriculture will be somewhat neglected in the UK under World Markets but will be given greater support under National Enterprise by concerns over self-sufficiency. It will have a higher profile, driven by new technologies and desire for higher yields, under Global Sustainability but within a regulated framework, with considerable emphasis on biodiversity and environmental considerations.

Business Clusters/Centres of Business Excellence

A shift to high tech activities and new technologies such as ICT, biotechnology and ultimately nano-technology is expected under World Markets and Global Sustainability. National Enterprise struggles under a lack of necessary investment in skills and infrastructure and an inability to retain strong skill/industry clusters.

Security

Security concerns are high on the agenda, particularly under World Markets and National Enterprise. This leads to new skill requirements and market opportunities, particularly in cyberspace.

Environment

Greater emphasis on the environment and sustainability is assumed under all scenarios, but particularly Global Sustainability. Under National Enterprise the focus will be the British environment and there will be an emphasis on using indigenous energy resources.

Infrastructure

Market opportunities will grow at home and internationally under all three scenarios for slightly different reasons and to a varying degree in nuclear engineering, alternative energy technologies, automation, application of ICT, and a wide array of products and processes that are eco-efficient, in turn leading to a wide spread of new skill requirements.

3.3 'Preferred' Scenario

It is important to recognise that the future is likely to include components of all three scenarios, so it is not a question of selecting a 'preferred' future and drawing up policies directed towards it.

We looked at the skills implications in each scenario. In drawing comparisons between the scenarios, reference should be made to the skills overlay table in Chapter 3. A cross scenario analysis table is also included in Appendix 6.

The skills implications of each scenario are outlined below:

World Markets

This has been the dominant scenario over recent decades, particularly for Western economies. There is a question about whether the global recession will result in a significant move away from this scenario.

This scenario has highest growth and is well suited to a high skill, high value-added economy. Skill shortages will be addressed by the mobility of highly skilled people. Lower quality jobs are likely to be undertaken by migrant workers.

The main negative consequence of this scenario is that it is likely to lead to growing inequality, with disadvantaged people suffering from low skill levels and long term unemployment. This will present significant challenges for government.

National Enterprise

The agreement on 2 December 2009 between 20 emerging economies, including Brazil, Egypt, India and South Korea, to form a trading bloc with reduced tariffs is an indicator of a move towards this scenario. There are also a number of countries in Europe that display the traits of this world. It is a protectionist scenario with a tendency towards trading blocs.

This scenario has the lowest level of economic growth of the three and there are access barriers to both markets and resources. The main skills implication is that the UK would need to be more self reliant. It would therefore be important to ensure that the education and training system produced a labour force with balanced skills. This would be a challenge for government, particularly as there would be limited resources to achieve this.

Global Sustainability

The recent Lisbon Treaty, and the greater international collaboration on tackling the 2008-09 recession are all indicators of a move toward this scenario. There are also a number of European countries that display traits that fit this model.

Growth in this scenario is reduced by the desire to achieve a sustainable socially fair outcome. The main skills implication for government is the need to be able to manage what can be a very bureaucratic and slow to respond decision making process. With a national and global focus on long-term sustainability it is likely that employers will wish to invest more in developing skills for the future, but the labour market will be less flexible. There is also likely to be more regulatory requirement for employer participation.

Mitigating the future impact of climate change will be a high priority in this scenario, which will influence the shape of skills demand.

Comparison between Scenarios

Both the current policies and the proposed vision (see section 4.2) would be difficult to achieve in National Enterprise. The move to increasing ambition and the 'voice and choice' of the demand side is most consistent with World Markets. Achieving the outcomes of New Industry New Jobs is most consistent with Global Sustainability. This demonstrates a potential tension between these policy objectives that will need to be carefully managed.

4 Insights and Opportunities

Chapter Summary

Chapter 2 examined the insights that arose from the scanning, and presented opportunities and challenges for government and employers that these suggested. This chapter presents the insights and opportunities that arose from the parallel interview process, exploring what the interviewees identified as being key elements of the employment and skills landscape in 2020.

Key themes:

- Observations and insights from interviews
- Optimistic scenario for 2020 - Skill is seen as the most important asset
- Pessimistic scenario for 2020 - ‘NEETs with mobile phones’
- A new vision for skills - An increasing commitment from employers and individuals to optimising talent and skills is essential for the UK to be a successful sustainable economy; and is at the heart of a civilised society that provides opportunity for all.

4.1 Observations and Insights from Interviews

Methodology

Interviews were undertaken to gain insight and to inform areas for further scanning and analysis. The 21 interviewees included two senior UK Commission members, a range of stakeholders engaged with the UK Commission and other experts covering economics, technology and society. The interviews were conducted using the ‘SAMI 7 Questions’ technique. Care is needed when interpreting the results of the interviews as some of those interviewed are engaged with the UK Commission, so there may be a degree of “group think”, however the topic guide was designed to encourage free thought and expression. It is also important to recognise that interview responses may have been driven by perceptions, rather than the reality and therefore it is important to question whether even consistent views represent the reality. For example, is the often stated shortage of STEM skills a true reflection of a general problem, or is it restricted to selective areas, such as nuclear engineers? Despite possible inaccuracies perceptions are however still important, as they influence peoples’ judgements.

The quotes in this chapter are the views of the interviewees and should not be seen as representing the policies or views of any of the organisations consulted or of the UK Commission. Also it should be noted that in order to preserve the original wording of the interviewees, comments are presented without further interpretation or explanation if this was not offered during the interview itself.

4.1.1 Observations on Current Skills System

The Skills System is too Complex

There was a common perception that the provision of skills had become over-complicated through the combination of cumulative initiatives.

This is also recognised as a challenge by UK Commission, BIS and others (BIS 2009/2). Actions are planned by the UK Commission and BIS to reduce complexity, hierarchically and regionally. Some interviewees suggested that this work needs to continue alongside and as part of other improvements.

The Skills System is Target-Driven

In many cases targets were seen as distorting the behaviour of providers. Three interviewees raised the issue of targets for training, negatively. It was said that Leitch resulted in a list of qualification targets as an outcome, not the needed skills. One went on to say that qualifications do not reflect the level of skills.

It was also suggested that targets for qualifications caused training providers to reject applicants that might not qualify or finish the course, with a suggestion of attempted “dumbing-down” in some cases to improve attainment of targets.

Setting targets in training, so that they are both aligned with the desired outcome and avoid unwanted side effects, is clearly an ongoing challenge for government.

There is a Mismatch between Skill Levels and Job Requirements

A few interviewees were of the opinion that training does not adequately meet the needs of employers and that training is supply driven.

This view is backed up by scanning evidence that there are mismatches between the perceived level of employees’ skills and the level demanded by their work; primarily that employees believe they are not using the skills they have. But the same source reports that there is no evidence that the UK is producing too many graduates (WF 2009/1).

The on-going challenge for government is to ensure that training provision matches employers’ needs and that potential or current employees are trained to the right levels. This view was supported by the literature, where it seemed to be broadly agreed that good liaison between training providers and employers is crucial and that SMEs should be more involved.

4.1.2 Ambitions for the Future Skills System

The overriding observation from the interviews (and also supported by the literature) was a strong agreement with the policy framework in 'Towards Ambition 2020: Skills, jobs, growth' (UKCES 2009/4). This was equally strong among the interviewees who were not closely related to the UK Commission.

Most interviewees would support even greater emphasis on giving a stronger 'voice and choice' to the demand side of training along with the objectives of raising employers' ambitions. The latter was seen as particularly important for SMEs. This was seen as an important part of achieving an alignment of the supply and demand for skills.

It was generally agreed that government should focus on basic education and generic skills. Education should be more about giving individuals the tools and ambition to learn.

Another common observation was that more emphasis should be given to increasing the ambition of individuals, providing them with improved information to make informed choices; and making it easier to retrain during their working life, including changing career paths. It is recommended that the opportunities and challenges for individuals are considered more explicitly in the next National Strategic Skills Audit, to supplement the current focus on government and employers.

There were a number of views expressed on different funding models. A common feature was that these need to be driven by outcomes and demand, not targets. An innovative suggestion was the use of Social Impact Bonds (SIB). This concept is being developed to bring new investment to address social issues and could be extended to include skills. SIBs provide new capital, with the return paid by government after a number of years based on measurable outcomes. They aim to give access to private capital, encourage innovation and a greater focus on outcomes. This approach could be of increasing interest over the next few years and HM Treasury has been working with the Ministry of Justice on a West Midlands pilot to reduce re-offending rates among young people. It is recommended that the potential for these is explored.

4.1.3 Optimistic Outcomes

Part of the interviews asked: "Optimistic but realistic - If things went well, how would you expect the employment and skills landscape in England by 2020 to develop and what would be the signs of success?" The contributions from all the interviewees have been combined to create the following optimistic scenario for 2020.

Optimistic Scenario for 2020

Skills are seen as the most important asset – ‘human beings are the new coal’.

Economic growth steadily returned after 2010, with an associated reduction in unemployment. This was accompanied by improvements in productivity and wages. The relative economic gap between the English regions has reduced. Despite constraints on public sector spending, particularly during the first half of the decade, the opportunity was taken to simplify and streamline the provision of skills and education, so employers and individuals can now make better informed choices.

The significant decline in manufacturing up to 2010 was reversed. We are a trusted source of services (financial, insurance, ICT etc.) and the financial sector has regained strength but has not returned to the levels prior to the recession. The creative industries have continued to grow strongly. Across all sectors of the economy employees make much more effective use of technology including ICT. We are strong in niche sectors and protect and exploit our ideas and global brands.

The relatively low level of ambition in many employers in 2010, particularly SMEs was overcome. It was recognised that the public sector did not create wealth and the public’s attitude to entrepreneurs improved. As a consequence, the strong preference towards ‘safe careers’ (mainly public sector) has declined. This was accompanied by a move towards a more ‘Continental’ employment model, with wider consensus and partnership. The trade unions started to see negotiating on skills as important as wage bargaining. Employers increased their investment in skills and moved to high-skill based business models. Employers paid more attention to their future skills requirements, rather than just focusing on current needs. They also formed networks to help inform and influence the skills providers. This led to more employer-funded academies.

There is a better match between skills demand and supply, supported by reliable outcome data. For employees, jobs are in general seen as more rewarding. Fewer employees perceive that they are over-qualified for their job. There is more flexibility between learning and work, so the process can continue throughout life. This also made changes of career path easier with a lower potential financial penalty. Measures have been taken to improve the lowest quality jobs, most of which are in the service sector.

Education is seen as a social good and there is a reduction in the number of individuals not in education or contributing to the economy. Government has focused on basic education in schools. This includes the 3Rs, but also “other Rs” such as Relationships. Greater emphasis is also placed on giving children the ability and motivation to learn. Children in both primary and secondary education have an understanding of how the world works.

Government’s investment in basic research has fed into the economy. The investment in high quality smart infrastructure, including the roll out of the next generation internet, has created opportunities. England is a good place to set up a business, which is reflected in significant inward foreign direct investment.

The whole skills delivery system is simpler and trusted. Providers also compete to provide services. It is customer driven by both employers and individuals and the further and higher education establishments are more responsive to employers’ longer term requirements. In response to the greater influence over university courses, employers engage with them and provide investments which they see as providing a positive return.

In 2020 there are increasing signs of disruptive changes due to developments in technology and generational shifts of attitudes. These are expected to create significant opportunities over the next decade.

There is greater social equality, which is reflected in more diverse access to the professions. Overall there has been a major shift in attitudes to skills and England has a reputation as a sophisticated egalitarian society.

4.1.4 Pessimistic Outcome

The interviews also explored the potential pessimistic outcome. Interviewees were asked: “What developments could threaten the employment and skills landscape in England by 2020? What would be the impacts on employment and skills more broadly?”

In general the responses were the reverse of the optimistic outcome outlined above. Contributions from the interviewees have been combined to create the following pessimistic scenario for 2020.

Pessimistic Scenario for 2020

‘NEETs with mobile phones but still excluded’

The economy was slow to recover from the recession, held back by the high levels of debt. We did not create jobs and there have been sustained levels of high unemployment, up to 3 million. We failed to achieve the potential productivity gains from the recession. As a result we now have a weak economy and a declining competitive position. We are continuing to decline down the international league table of national GDP. This is accompanied by declining international influence.

The labour market suffers from too much regulation and intervention, including an eagerness to protect jobs that are not sustainable. This has had an adverse impact on the position of the UK as a place to do business. It has also reinforced the lack of aspiration of many companies, particularly SMEs. Companies’ growth has been held back and they are not willing to invest in the future because of the lack of available skills. We have lost out to the Far East on both manufacturing and ICT. London has lost its position as a leading global finance centre.

Since 2009 we have declined further down the international league table on skills. The situation at the low skills and intermediate level is particularly acute. We have an under achieving population with many employed in low status routine jobs. The vast majority of people feel that their job does not match their level of education and skills; and many of those with higher skills levels are leaving to seek better opportunities abroad.

Government funding of university places has not increased over the last decade and it is now an increasingly elite system due to higher fees. There is a problem of all universities trying to do the same thing, when the economy needs a range of different types of graduates. Interest in the ‘hard sciences’ has also declined. Government’s investment in basic research at universities has not brought any visible returns to the economy. As a result, people and industry have fallen out of love with higher education.

The time spent ‘rearranging the deck chairs’ on education and training over the last decade has no credibility. Nothing has been achieved on simplification. There is now a very selective skills system, with good high level training for the few and a marked lack of social justice.

Labour market opportunities are limited with significant inequalities, so the disparity between the rich and the poor is now worse. There is no wider participation in professions. NEETs have mobile phones and computers but are not included in society.

4.1.5 Achieving the Optimistic Outcome

Interviewees voiced concerns that the current economic situation, the changing global competitive environment and other factors such as addressing climate change means that the optimistic scenario is far from certain.

The interviews explored actions needed to achieve the optimistic outcome. Interviewees were asked: “From your knowledge of the culture, organisations, systems and resources (including people), what needs to be done to achieve the optimistic outcome? What would stakeholders expect?”

The main comments are listed below:

Skills Supply and Demand

- We need to tackle skill mismatch – establish an early warning system in collaboration with employers
- We need to bring the key actors together, particularly education/training and employment. They also need to develop a ‘common language.’ We need to focus on outcomes
- The whole system needs to be far less target driven. We need to have Government targets set to ensure that provision is based on what business needs
- The business voice needs to say what it needs both now and in the future and this voice needs to include SMEs.

Employers

- The culture of training provision needs to be demand driven. Employers need to be ‘educated’ to be more specific on skills requirements. The provision of skills needs to be driven by both employers and individuals.

Government

- Progress has to be made on all the five drivers of productivity - investment, innovation, skills, enterprise and competition
- We need much better coordination between the worlds of work and education and training. Employment and business ministries need to be ‘joined up.’

Skills

- We need greater recognition and established infrastructure for technician class.

Others

- We need to change the perspective of unions about skills. Negotiating on skills should have equal priority to wage bargaining. We need a more positive environment for work based training.

4.1.6 Looking Back

In looking to the future, it is important to understand what the key influences have been on where we are now. The interviewees were asked: “In looking to the future it is important to understand the past. What key factors shaped the current state of the employment and skills landscape in England?” Some of the key observations are listed below:

Skills Supply and Demand

- The skills system has got far too complicated.
- The labour market and skills have not been connected. The dominant model has been supply side driven. Universities have been incredibly powerful – a ruling elite. You could not talk to Vice Chancellors about skills. The more powerful BIS is now providing a jolt to them. Empowering the customer (students and business) will be important.

Government

- There is a big issue around targets. They have probably been the most negative issue over the last few years. The targets also lack regional flexibility.

Higher and Further Education

- HE engagement with business has been poor. FE also is not engaged or delivering the required skills. The big FE Vocational colleges have suffered from being too micro managed.

Skills

- The focus of ‘professionalism’ has been too focused at the chartered level; it is vital that professionalism is also developed at the technical level
- We have been getting it wrong at the bottom end and are complacent at the top end.

4.2 Developing a Vision

We have looked at a provisional vision for skills in England. For this we used as a starting point UKCES’s existing strategy in *Ambition 2020*. We compared this with the data from the research, in particular the interview ‘epitaphs.’

4.2.1 Ambition 2020

‘Ambition 2020: World Class Skills and Jobs for the UK’ (UKCES) published in 2009 defines the following target:

We should aim to be in the top quartile of OECD countries in all three – jobs, productivity and skills – by 2020

The Ambition 2020 report also outlines the 5 priorities for world class skills and jobs. These are:

- To **create a clear and integrated strategy for economic transformation and renewal**, capable of sustaining the UK through periods of recession, recovery and growth, and that aligns policies and practices in industrial strategy, employment and skills in order to achieve that transformation.
- To **support effective economic development in cities and local communities**, built upon economic and labour market strengths and opportunities, and maximising the skills of the local working age population.
- To **develop more agile and responsive skills and employment provision**, capable of anticipating and rapidly meeting employers’ evolving skills and job requirements.
- To **transform individual aspiration and skills into a World Class workforce**, maximising the motivation and opportunity for all people to develop and exploit their talents and skills to their full potential.
- To **build employer ambition and capacity to be World Class**, capable of competing globally in the high skills, knowledge driven economy, and optimising the talent and skills of their people.

4.2.2 Towards Ambition 2020

The report *Towards Ambition 2020: skills, jobs, growth*, published in October 2009 (UKCES 2009/4) outlines what is required to create a **‘strategic, agile and labour market led employment and skills system.’** It outlines the challenges to be addressed, the vision for the future and how this can be achieved.

There is a high level of agreement between the issues raised in this report and the inputs to our research. This is partly because of an overlap between those closely involved in this report and our study; and also a result of there being a similar analysis of the issues for government, employers, individuals and providers. It would be a matter for concern if this level of agreement did not exist. However, there is also an inherent danger of organisations and individuals being overly influenced by an ‘official’ view of the future. It is therefore important to look for any areas of disagreement.

The titling of both the above reports as ‘Ambition 2020’ reaffirms the key message from our research, namely that the key to reaching the targets for 2020 is increasing the ambition of both employers and employees. These can be influenced by government actions and policies and by changes to the economy. However, a significant component of the change will need to be a change in culture across wide sections of the economy and society.

4.2.3 Interview Epitaphs

Each interview ended with an epitaph question, which asks: ‘If you had a mandate, free of all constraints, what more would you need to do to ensure a successful future for the employment and skills landscape in England? Some of the responses from the interviewees are given below and provide a good insight into the interviewees’ visions of a successful future:

Data

- We have a robust measurement system across Europe, aligned to definitions of sectors
- A robust understanding of why nations grow and prosper.

Skills Supply and Demand

- Evidence and funding combine to achieve the desired outcome so that supply and demand is better aligned. Currently we cannot galvanise providers and companies to meet needs
- HE/FE driven by customers, with open and transparent information
- FE (Technical) level 3 vocational qualifications are attractive. They are attractive to young people and meet the needs of real business. FE colleges close to business with minimum central oversight.

International competition

- We have caught up with the US on high quality skills.

Employers

- Employers at the bottom end have been persuaded to up skill production for high skill and value employment
- Skills are central to union priorities alongside pay and working time.

Identity

- Transformed national pride in who we are and what we do.

Employment

- People will be able to develop the skills to change the direction of careers without going backwards on pay and status
- Resources are devoted to ensuring that we do not have a lost generation. There is a growing rank of inactive people, currently 8 million. Greatest concern is boys aged 16 to 21 where there is a 'lost' 1 million.

Provision

- The pay and reward for teachers was truly market based. For example, if you needed to pay a lot more to attract the best mathematics teachers this would be done. This would also give a strong signal to pupils of how different skills are valued
- A simple system.

Other

- Hope! Obama – the audacity of hope. Last year in USA for the first time in many years the graduation rate from schools and colleges of black Americans rose and reduced the gap with white Americans.

Towards a Vision

The current vision is: a world class and successful nation, built on sustainable economic growth, and providing opportunity for all.

The above epitaphs and other data from the interviews suggest that a vision for a successful employment and skills landscape in England will require the following:

1. Suitable metrics and robust national data on skills and a framework for international comparisons.
2. A robust understanding of the relationship between skills and economic growth and prosperity.
3. Data to inform employers and employees on the added value of different skills and the quality of different providers.
4. A strong 'voice and choice' for employers and employees to ensure a match between the demand and supply of skills.
5. An increase in the ambition of companies, particularly SMEs.
6. An increase in motivation and ambition of individuals and an ability to develop skills during their career.
7. Education valued and focusing on core skills, including softer skills such as an ability to relate (the 4+Rs, rather than the 3Rs).
8. A simplified supply side.

The overall conclusion is that the main focus should be directed at employers and employees to increase ambition and provide the information to enable a move towards a better match between supply and demand. A combination of information and choice is also needed to improve the provision of skills. This suggests that there should be significant shift in Government's emphasis from managing the supply side to informing and increasing ambition on the demand side. This should be directed at employers, individuals and intermediaries, including the trade unions.

The current recession and public finance situation creates an opportunity to implement the major changes of emphasis that are required.

The move from a government-led to a demand-led strategy creates a strong case for an employer-led UK Commission in response to any post general election government changes.

The above eight elements toward a vision are broadly in line with the five priorities in Ambition 2020 and the UK Commission's Strategic Plan 2009-2014. However, there is a greater emphasis on the marketing of the skills agenda to both individuals and employers. This includes a need to better understanding the motivation of individuals and employers, in order to help increase their ambition.

To reflect these changes we propose the following provisional Vision:

An increasing commitment from employers and individuals to optimising talent and skills is essential for the UK to be a successful sustainable economy; and is at the heart of a civilised society that provides opportunity for all.

5 Conclusions

Chapter Summary

This chapter draws out the most important points that have come from this research project based on the professional judgement of the authors.

Key themes:

- Analysis of the drivers and scenarios clearly demonstrates the uncertainty and risk associated with making firm judgements about the potential future
- Despite ambiguity some of the likely key features of the skills picture in 2020 can be identified: globalised markets; a new paradigm for training; the advent of the computer-savvy “Generation Y”; the renewal of UK infrastructure; and the need for up-skilling and multi-skilling
- The biggest challenges (and opportunities) for government skills policy include: dealing with uncertainty; improving the employment and skills system; raising the ambition of employers and individuals; dealing with unspoken assumptions about the future; and understanding technology life-cycles within industrial and skills policy.

5.1 The Skills Picture in 2020 – changing features of the employment and skills landscape

The main changes to the skills landscape in 2020 are likely to be globalised markets, a new paradigm for training, Generation Y, the renewal of UK infrastructure and the need for up-skilling and multi-skilling.

5.1.1 Globalised Markets

Globalisation of markets will increase (unless there is a move towards the National Enterprise scenario) and will have an impact on the UK economy. The scale of investment by countries such as China and India, including investment in higher education, is likely to have moved them up the value-added chain by 2020. They will pose greater competition to knowledge-based and other high-tech industries in the UK. It is not safe to assume that the UK will continue to have a technological lead over them after 2020. This would be exacerbated if constraints on investment in UK universities and other educational establishments diminish the quality and volume of output of appropriately-skilled graduates and other highly skilled individuals.

The potential growth of newly industrialised and developing countries also provides opportunities. To compete in what will be faster moving global markets employers need:

- To be able to build in areas where the UK has competitive advantage
- To grow to competitive scale quickly, requiring ambition in strategy and skills

- A workforce able to sell on the global stage with an understanding of local cultures, finance systems and with the appropriate language skills (e.g. Mandarin)
- To be able to harness entrepreneurial spirit and the innovation required to seek out opportunities abroad.

5.1.2 New Training Paradigms

The nature of training is likely to change, as more and more material becomes available online; user-generated content becomes an important channel; and training becomes more granular, as trainees can access only those modules of training that they require.

Many types of information are becoming increasingly available online, including material to support education and the development of skills, such as the MIT OpenCourseWare.

As training content becomes more widely available on-line, a critical parameter will become knowing which training to access, rather than the training material itself. Government and employers will need to reconsider the way that they provide information and guidance to help potential trainees to choose and find the training material that is right for them.

By 2020 there is also likely to be much more user-generated content, alongside that of official training providers. There are likely to be competing free-to-use or paid-to-view services. These changes will generate new challenges for the relationship between training providers and government.

5.1.3 Generation Y

In the UK, Generation Y is represented by the population centred around the age of 24 that will replace the retiring baby boomers. They are an important component of employment demographics. By 2020 they will fill a significant proportion of the critical middle management roles.

This generation grew up surrounded by technology in the best economic period of the century. They are perceived to be a generation of individuals who are ambitious, demanding and questioning.

Evidence from the interviews suggests that there can be difficulties in communications between Generation Y and older managers, possibly in part due to differing degrees of familiarity with ICT. However, Generation Ys' ambition and challenges to the established way of doing things could make them an important part of responding to uncertainty and realising the opportunities for high technology manufacturing and knowledge intensive services.

It is important that policies take account of the very different needs and aspirations of Generation Y and the opportunities they bring.

5.1.4 Infrastructure

The future of the country's infrastructure is likely to be a major driver of employment and skills, because of the sheer scale of the task ahead. Ageing infrastructure and networks will need to be replaced, and new forms of communication and energy generation are likely. New or enhanced 'smarter' infrastructure will be widespread, with new skills needed to build and maintain them.

There will also be a longer term need for adaptation of infrastructure to accommodate the effects of climate change.

5.1.5 Up-Skilling and Multi-Skilling

It is well understood that new skills will be needed for new and existing jobs. But existing skills in existing jobs will also need enhancing over the next decade. These changes are variously described as up-skilling and multi-skilling.

Up-skilling is the development of existing skills so that tasks can be performed better to meet higher standards. It will involve training to ensure that existing employees can cope with new techniques, materials or standards brought about by regulation, market forces, new products or the search for productivity gains.

New equipment will be increasingly complex and will frequently require more care during installation, commissioning and use if it is to perform properly. Installers and users will need to be able to read, understand and obey installation or operation instructions.

Multi-skilling is an extension of the required broadening of skills. New techniques, materials and products give the opportunity for single operatives to perform tasks that in the past required several different trades or professions to execute. Some companies will require a workforce with both specialist high-level science, technology, engineering and mathematics skills, as well as a set of generic soft skills enabling people to work across disciplines (DIUS 2008/2).

Having employees who are well trained and possess with the right skills provides a challenge but also offers real opportunities and advantages to employers.

5.2 Challenges and Opportunities for Skills Policy

5.2.1 Dealing with Uncertainty

We live in an increasingly uncertain time and there are a number of factors that have the potential to cause disruptive change to the UK economy. Beyond 2020 there could also be a number of truly transformational changes.

The key drivers of change are explored in chapter 2. Some of these, such as the pervasiveness of technology, are not highly scenario dependant. Others, such as migration and the rate of economic growth in the UK, will vary according to the dominant future scenario. The uncertainty on the route out of the 2008/09 recession and the tensions between the different scenarios (exemplified at the UNFCCC COP15 Copenhagen climate change conference) means that we face a particularly uncertain decade.

This uncertainty will be compounded by the increasing pace of change, driven by globalisation and ever-faster developments in technology. The need to adapt to change will put a premium on a workforce that has the general education and skills to be able to learn and unlearn new jobs and techniques as required. This underlines the importance of the life-long learning agenda and the need for individual ambition.

Government and employers need to have foresight and to take a realistic account of this uncertainty in their respective projections on workforce and skills needs. Projections and any associated policies and strategic decisions should be tested against a range of possible future outcomes in order to test their robustness and to increase understanding of the associated risks.

It is vital that the UK skills system is able to respond quickly to changing future demands. This includes meeting the training needs of the existing workforce: up-skilling, multi-skilling and ensuring that older workers can access new skills.

5.2.2 Improving the Employment and Skills System

If the challenges and opportunities for 2020 are to be properly addressed employers need to be able to have greater influence over the provision of training and the choice of supplier. The excessive complexity of the skills system also needs to be addressed.

Current models of skills provision assume that employers should liaise with training providers, rather than treating employers as the customers of the skills system. Employers and employees need more robust outcome-based data to inform their selection of courses and to encourage competition between training providers.

The employment and skills system can and should learn from other disciplines for example commercial marketing. Marketing can play a key role in delivering objectives and depends on knowing the needs and wants (a critical distinction for government) of the target market and delivering the desired outcome. A critical success factor being the ability to anticipate future needs and wants.

5.2.3 Increasing Employer Ambition

Several interviewees raised the growing proportion of the workforce who considered themselves overqualified for their jobs as a particular issue. Along with other intelligence a number of drivers suggest that rather than focusing on the perceived oversupply of skills the challenge will be to generate employer demand.

Drivers that highlight the need for increasing employer ambition include globalisation and technological change. For some employers the competition created by globalisation will require them to move their business up the value chain and invest in a higher skilled business strategy and workforce. The advances in technology will also provide opportunities to businesses that have the ambition and skills to exploit them.

To increase the levels of ambition amongst employers the rewards from education and training must be seen to exceed the apparent costs involved.

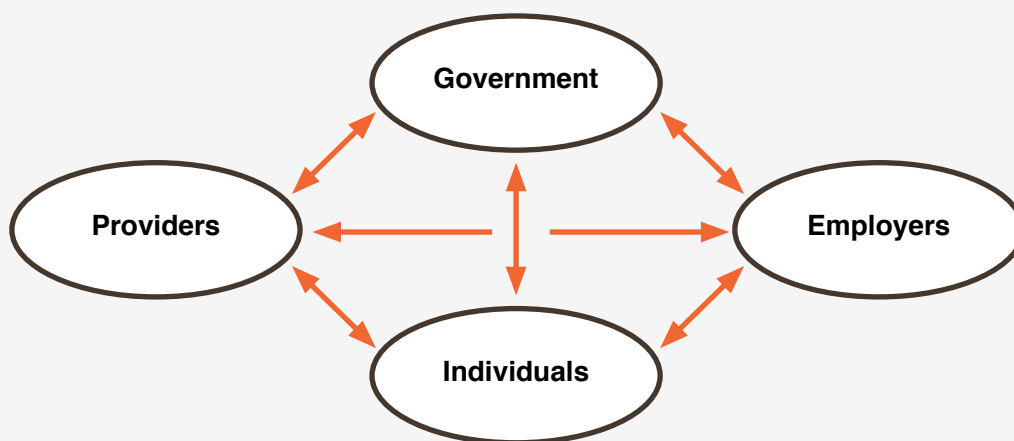
5.2.4 Raising Ambition in Individuals

Raising individuals' ambition to improve their skill base will be an important challenge to employers and government in all scenarios. It will require an understanding of their attitudes and behaviours in relation to skills, as well as marketing to communicate messages. These will vary widely between social groups and different generations, so robust market segmentation will be required. A good example of an effective research based outcome is the Home Office's programmes on binge drinking (Home Office 2003/1).

We recommend that the next cycle of the National Strategic Skills Audit explicitly addresses individuals, in addition to government and employers.

Box 6: Four Constituencies

There are four major players in the Skills arena: government (in which we include the UK Commission and Sector Skills Councils); providers; employers; and individuals. Each has a relationship with the others, as shown. Each of these six relationships needs to be explored to understand the future of the UK skills landscape.



The interaction between government and potential trainees does not receive the same degree of attention as that between government and employers (e.g. mediated through the CBI, SSCs and UK Commission), or between government and providers of training (e.g. mediated through HEFCE). This contrasts with health education, for example, where much central advertising for smoking cessation and the “Five-a-Day” campaign is targeted directly at individuals.

A stronger relationship between government and individuals would provide a clearer understanding to government and its agencies of the needs, motivations and wants of individuals in the skills arena.

Individuals’ desire and ability to have an influence over their training and employment will increase as a result of technological development, pervasive information and societal changes. This will cause the greatest tension in Global Sustainability, due to the regulatory and bureaucratic pressures, and in National Enterprise due to lack of opportunity.

5.2.5 Assumptions About the Future

One of the values of the scenario approach is that it can highlight the various assumptions about the future that are implicit in current strategies, and give the proponents of these strategies the vocabulary to explore these often unspoken assumptions.

It is likely that there will be elements of all three scenarios in play by 2020. However it is apparent that Towards Ambition 2020: skills, jobs, growth is closest to ‘World Markets’; whereas New Industry, New Jobs is closest to ‘Global Sustainability’. An approach of ‘British jobs for British people’ would be typical of ‘National Enterprise’. The fact that a policy is scenario dependant does not mean that it cannot be applied to a different scenario, or that it is incompatible with policies in another scenario. However, it does mean that careful thought needs to be given to the relationship between the policies, their implementation and the respective challenges and opportunities.

5.2.6 Understanding Technology Life Cycles

A new technology will typically experience a life cycle of: basic scientific research; development of an exploitable technology; implementation into useful products; use; maintenance and support; and decommissioning.

A new technology can impact on the employment landscape at any point in its life cycle. When promoting new technologies within an industrial and skills policy, it is important to distinguish where in the life-cycle a technology is, and what sort of impact the policy initiative is trying to accomplish.

The bulk of employment from a new technology is usually in the use and maintenance phases, but for an economy like the UK that aspires to well-paid export-earning industries it is vital that the UK captures new technology jobs in the development and implementation phases.

In terms of skills policy, there are two aspects which seem to be important.

- **Entrepreneurial skills.** These include the ability to set up and grow businesses, and the ambition to reach global scale quickly enough to be competitive. These skills are not easily taught, but are vital to success in converting scientific advances (where the UK is traditionally strong) into world-beating global businesses (where the UK has had limited success in certain sectors). Anecdotally, technology entrepreneurs also need a variety of other factors (access to capital; access to global scale; intellectual property rights; lack of government interference; a culture that celebrates commercial success and forgives failure etc.) in addition to entrepreneurial skills per se.
- **Jobs follow skills.** In the areas of technology development, the availability of skills is one essential factor in determining where in the world a new technology will develop. If the skills are not there, then the need for them will never develop as the industries that will need them are established elsewhere in the world. To counter this effect, a skills policy should focus on “skills opportunities” as well as “skills needs”.

5.3 Implications for the National Strategic Skills Audit research programme

5.3.1 Use of Scenarios to Assess Skills Policy and Strategies

The Scenarios for Skills 2020 presented in this report (Appendix 6) provide a working set of scenarios for the 2020 UK skills landscape. They can be used to test current policies and strategies for workplace skills by exploring the impact of a strategy or policy in the three different futures. This process is known as “wind-tunnelling”. If a strategy is seen to work well in one possible future, but perhaps not so well in another scenario, then this insight can be used to modify the current strategy, or develop contingency plans to make the strategy more robust.

5.3.2 Twenty Year View

Education and skills are longer term investments by government, employers and individuals. There are a number of potential transformational changes that may occur in the next twenty years.

Post-2020 most items will be smart and be linked to the internet; and computing capabilities will open broad new opportunities. Technologies like desk top manufacturing could also fundamentally change supply chains, so that they become local. This could have a major influence on trade and the mix of the economy. Bioscience and healthcare are also going through a period of very rapid development and human enhancements are likely to commence in the post 2020 decade.

We recommend that the horizon scanning activity for the next National Strategic Skills Audit is extended to 2030.

5.3.3 Scenario Framework

An appropriate scenario framework can help to inform the strategic evaluation and implementation of policies. It can also help to make them more robust against a range of possible futures and so reduce the level of risk.

There are many examples of potential transformational changes across a wide range of technologies and social issues, such as healthcare. These changes will be accompanied by major uncertainties in social values and attitudes. Consideration should also be given to the influence of employees and citizens. These involve complex interactions between technology and society that mean that the scenarios to 2020 could not be simply extended to 2030.

We would recommend a scenario framework that includes these additional factors, such as the Ethnographic Futures Framework. This has been successfully used to develop scenarios for government, such as for the natural environment and on health and safety.

Box 7: Ethnographic Futures Framework

A scenario framework is a way of defining and characterising the future. The Ethnographic Futures Framework does this by addressing the following questions:

- **Define** – the social values, culture, economic systems, politics and public policy which shape the world around us
- **Relate** – the social and organisational structures which link people, influenced by demographics, lifestyles, work and the economy, the environment, business models, government and education
- **Connect** – the technologies used to connect people, places and things including information technology, the media, language and planning
- **Create** – how goods and services are produced, including manufacturing, energy generation, life sciences, material sciences
- **Consume** – how we acquire and use goods and services, such as consumer goods, energy, food and agriculture, housing, healthcare, natural resources, and the environment.

Scenarios based on the Ethnographic Futures Framework would provide additional insights into the next decade and enable the time horizon to be extended to 2030.

5.3.4 Further Research

In this study we have focused on current technology trends, where the potential impact on the employment landscape in 2020 is to some extent predictable. But technology takes many years to develop from the science to widespread adoption in the workplace. The science of today may lead to new technologies that are only at the development stage in 2020, but they will still need specific skills available if the development of that technology is to take place in this country rather than elsewhere. To understand these developmental skills needs, we recommend a more extensive and far-reaching technology scan in the next round of the Skills Audit.

Similarly, the next round of the Skills Audit should explore the geo-politics of a world beyond 2020, when China may well have overtaken the United States as the largest economy and when the current Generation Z born after the millennium have entered the workforce.

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APPENDIX 1: Project Brief

The Government has stated their intention of pursuing a new, more active industrial policy to drive growth and create high-value jobs of the future, as framed in New Industry, New Jobs¹. An essential element of such a strategy will be a more proactive approach to skills; one that seeks to create a 'virtuous circle' of skills supply and demand. Government and business will need to work together to ensure that we have the provision, the skills and the workforce needed to meet the needs of a post recession economy; one where the shape of the economy could be much different.

The UK Commission for Employment and Skills (UKCES) was launched on the 1st April 2008, as a key recommendation of the Leitch Review², to help the UK achieve world class standing in employment, skills and productivity. To support the UK Commission's on-going central role in providing a centre of excellence for labour market intelligence, a programme of research is being undertaken to inform a National Strategic Skills Audit. This is to be presented to Government in March 2010. SAMI Consulting are conducting a study to address the following question:

What will be the drivers and impact of change on the employment and skills landscape in England by 2020; what are the challenges and opportunities for Government and employers?

The SAMI Consulting project will be undertaken between October 2009 and March 2010. It will use 'foresight' to investigate the future trends and drivers and prioritise their impact on the future skills requirements. It will also identify early indicators of new and emerging industries and sectors.

The programme of work will include: horizon scanning to identify the key drivers of change and trends; approximately 20 interviews with experts and stakeholders; the development of skills scenarios; the analysis of the challenges and opportunities for both government and employers: and elements of a preferred 'Vision.'

¹ http://www.dius.gov.uk/~media/publications/N/new_industry_new_jobs

² http://www.hm-treasury.gov.uk/leitch_review_index.htm

APPENDIX 2: Interview Brief

Introductions

The UK Commission for Employment and Skills (UKCES) was launched on the 1st April 2008, to help the UK achieve world class standing in employment, skills and productivity. To support the UK Commission's on-going central role in providing a centre of excellence for labour market intelligence, a programme of research is being undertaken to inform a **National Strategic Skills Audit**. This is to be presented to Government in March 2010. **SAMI Consulting** are conducting a study to address the following question:

"What will be the drivers and impact of change on the employment and skills landscape in England by 2020; what are the challenges and opportunities for government and employers?"

This is the topic for the interview which is under strict **Chatham House Rules - quoted but not attributed**

Introductory Question

We know that a whole raft of (political, economic, social and technological) forces could influence the **employment and skills landscape in England by 2020**. But in your opinion which factors will be the most important/crucial influences or drivers of change?

1. Clairvoyant.

If you could spend some time with someone who knew the future of the **employment and skills landscape in England by 2020** (a clairvoyant or oracle if such existed), what would you want to know? (i.e. what are the critical issues?)

2. An optimistic outcome

Optimistic but realistic. If things went well, how would you expect the **employment and skills landscape in England by 2020** to develop and what would be the signs of success?

3. A pessimistic outcome

What developments could threaten the **employment and skills landscape in England by 2020**? What would be the impacts on employment and skills more broadly?

4. The internal situation

From your knowledge of the culture, organisations, systems and resources (including people), what needs to be done to achieve the optimistic outcome?

What would stakeholders expect?

5. Looking back 10/20 years

In looking to the future it is important to understand the past. What key factors shaped the current state of the ***employment and skills landscape in England?***

6. Looking forward

What decisions need to be made in the short-term to achieve the desired long-term outcome for the ***employment and skills landscape in England?***

7. The Epitaph

If you had a mandate, free of all constraints, what more would you need to do to ensure a successful future for the ***employment and skills landscape in England?***

Closing remarks

Any further thoughts or comments?

Thank you

APPENDIX 3: Interview Organisations

Individuals from the following organisations were interviewed for this project. All the interviews were under Chatham House Rules, so their names are not being published.

- City and Guilds
- Confederation of British Industry
- Department for Business Innovation and Skills (3)
- Development, Concepts and Doctrine Centre (MoD)
- Economic and Social Research Council
- European Centre for the Development of Vocational Training (CEDEFOP)
- European Commission
- Futurizon GmbH
- Government Office for Science (BIS)
- IBM
- Institute of Directors
- University of Leeds
- South East England Development Agency
- Tomorrow Project
- Trades Union Congress (2)
- UK Commission for Employment and Skills (2)
- Work Foundation

APPENDIX 4: Interview Details

This is the full list of interview answers to questions on the future (how to achieve the optimistic outcome?) and looking back (what key factors shaped the current state of the employment and skills landscape?).

Achieving the Optimistic Outcome

Interviewees voiced concerns that the current economic situation, the changing global competitive environment and other factors such as addressing climate change means that the optimistic scenario is far from certain.

The interviews explored actions needed to achieve the optimistic outcome. Interviewees were asked: “From your knowledge of the culture, organisations, systems and resources (including people) what needs to be done to achieve the optimistic outcome? What would stakeholders expect?” Some of the comments are listed below:

Skills supply and demand

- Need to tackle skill mismatch – establish an early warning system in collaboration with employers
- Skills are not the same as educational attainment. Need to recognise and validate people’s knowledge including that gained through long experience
- There will be an increase in ‘green jobs’ so this needs to be reflected in the education system
- Need to bring the key actors together, particularly education/training and employment. They also need to develop a ‘common language.’ Need to focus on outcomes
- Need to make better use of migrant workers, particularly women. Also women’s skills need to be better used in general
- Links between business and providers is getting stronger. The ‘ivory tower’ is now not such an issue
- The whole system needs to be far less target driven - we need to have appropriate government targets set to ensure that provision is based on what business needs
- The quality of skills is mainly a demand side problem. Employers have low aspirations and do not see the returns to investment in skills
- Business voice needs to say what is required both now and in the future. SMEs voice is absent at present.

Employers

- The culture of provision needs to be demand driven. Employers need to be 'educated' to be more specific on skills requirements. The provision of skills needs to be driven by both employers and individuals
- Small firms need to be strategic and take a longer term view on skills. They currently focus on now and do not think about even five years time
- It is vital to influence the views of employers. Big employers are now more engaged in labour market issues than before. Skills are now part of the Corporate Social Responsibility agenda. Nobody wants to go down the route of compulsion in investing in human capital.

Government

- Government procurement needs to be used to promote skills
- Government must maintain the level of investment in skills. Adult skills should not be first in line for cuts
- Government should be responsible for generic skills – employers for specific skills
- HE - government needs to stop interfering. FE – needs to be more decentralised and better able to provide bespoke courses
- The funding system needs to be much less complicated for all parties
- A threat could be the loss of the RDAs after the election. Who would take over the regional economic role?
- Skills and social services do not talk to each other. There needs to be a strong link between skills and the social agenda
- It is important that the national skills investment strategy allows for regional flexibility
- Government intervention does not have the impact to resolve the current problems. The volume of potential expenditure is not enough to achieve the required transformational change
- The national minimum wage has had a significant positive impact as it has encouraged employers to think about using people more effectively

- England has a well developed skills system– but needs stronger links to the employment side
- Progress has to be made on all the five drivers of productivity - investment, innovation, skills, enterprise and competition
- Need much better coordination between the worlds of work and education and training. Employment and business ministries need to be 'joined up.'

Employment

- Will we get the productivity improvements from the recession?
- We need to create a positive attitude to business and entrepreneurs. Also a strong science of probity
- Anybody can invest in technology – the problem is getting the workforce to use it properly
- Youth unemployment is a particularly important issue. We must find ways to ensure the NEETS engage with and are fed back into the workforce
- People are not seen as a source of competitive advantage or as sufficiently important
- There needs to be a major change in business attitudes. There is a very long tail of private business that is not creating higher value employment
- The good businesses have not driven out the bad.

Individuals

- Learning and skills development needs to become part of everyday life
- There needs to be information, advice and guidance on what it is like to work in any sector. This is not just for young people. There is an important role for SSCs on this
- Reduce the barriers to access education and training for adults
- Individuals need to have an increased demand for skills and education. Many older people had a poor experience of education, so are reluctant to commit to training despite the importance of up/re-skilling
- The biggest impact will be increasing ambition – but there is nothing harder

- We need inspirational individuals, plus a national dimension. We cannot create a UK pride but we can for England/Scotland/Wales
- Need to increase the emotional intelligence score – what does it look like and how can we measure it
- As people move through life their social skills generally increase and their technical skills generally reduce. Social skill will be increasingly important, so older people will be favoured
- We need to believe that we can be great. It is important to create a positive vision for ambition.

Education

- The whole education system creates people who think that they are experts; we need to create people who know that they are not experts and want to learn
- Education needs to be highly valued - people should appreciate and use it. Teachers need to be respected – something that is currently in abeyance
- We lack a robust evidence base for education
- There are no examination papers that test ability to understand and use new knowledge.

Skills

- We are training people for the 1990s knowledge economy. We should be training people for how to deal with people and be adaptable. Need skills on how to think, how to lead and how to interact
- Need greater recognition and established infrastructure for technician class
- There need to be flexibility on skills. STEM skills are needed but this is too narrow and innovation is also driven by non science and technology skills, such as psychology
- The Leitch Review resulted in a list of qualification targets as an outcome. There are two problems with this: first qualifications do not reflect or capture levels of skills and [second] major investment by business does not in most cases lead to any recognised qualification
- 80 per cent of the workforce in 2020 already in work, so we need to invest in training them.

Others

- Need to change the perspective of unions about skills. Negotiating on skills should have equal priority to wage bargaining. Need more positive environment for work based training
- Need to redefine the attitude to retirement with phased retirement for people with high skills
- The supply chain could be a major force for driving an increase in skills – demand a skills pledge from suppliers. This could help drive the necessary behaviour change
- There needs to be better metrics for measuring skills, including international harmonisation. It is important that these measure skills not qualifications.

Looking Back

In looking to the future it is important to understand what have been the key influences on where we are now. The interviewees were asked: “In looking to the future it is important to understand the past. What key factors shaped the current state of the employment and skills landscape in England?” Some of the key observations are listed below:

Economy

- The push from the Lisbon Agenda (not the Treaty) has made an important impact
- Mobility and migration has boosted the economy
- Much of what we valued has now been transferred to other countries
- There has been a consumption driven shift in demand towards higher value goods and services
- 20 years ago a lot of new markets opened up, which created lots of growth opportunities. The EU enlargement has maintained this trend. The opening of the Iron Curtain has also created new demands. At the same time globalisation has increased the level of competition
- The haemorrhaging of manufacturing jobs in the early 1980s was a disaster. Treasury’s view was that the loss of manufacturing jobs was not a problem, as we had North Sea oil. It is a significant cause of the intermediate skills level problem in the UK. The German manufacturing model has proved to be better
- We did not take account of developments in China and India. North Sea Oil and the growth in the financial sector disguised the problems and reduced the perception of the need to address them

- As globalisation advances the opportunities in India and China needs to be recognised and exploited
- Globalisation has acted as an accelerant to the supply side changes.

Skills supply and demand

- The skills system has got far too complicated
- Labour market and skills have not been connected. The dominant model has been driven by the supply side. Universities have been incredibly powerful – a ruling elite. You could not talk to Vice Chancellors about skills. The more powerful BIS is now a jolt to them
- Customers have not been empowered to drive the skills system.

Employers

- Some industries died due to changes in the economy. Other died because of complacency.

Government

- We have been agnostic with regard to protecting our intellectual property and sovereignty over the last 30 years. We have limited national control of many sectors of business that leaves us vulnerable, as critical decisions are taken in other countries that have a stronger link to national policy interests
- There is a big issue about targets. They have probably been the most negative issue over the last few years. The targets also lack regional flexibility
- There has been a lot of Government funding directed at level 2. However, there are still 7 million with a reading age of 11
- We have loved to look at issues theoretically, rather than practical options
- The profile of skills has increased. BIS is seen as more important than in the past (DTI)
- Education has moved up the political agenda
- The skills landscape is very complicated. Government accept responsibility for making it more complex but they are not prepared to take something away at the same time
- Political pressures have defined the current system

- National minimum wage has had a great impact
- Recognition that a low skill economy is not sustainable
- Recognition that the state has a role.

Employment

- White collar jobs are now relatively more valued
- HR directors have been in a weak position on most company boards. Investment in people has been seen as a luxury and training budgets are often first to be cut. However, some feel that during the 2008/09 recession training has largely been maintained in many companies, so perhaps opinion is shifting
- Deregulation of the work force has not necessarily been a good thing as it has tended to encourage sloppy management
- Germany has benefitted from a structure that puts pressure on the system for training and retraining. The difficulty in laying people off in Germany has resulted in pressure to invest in skills.

Individuals

- There has been no wider participation in professions.

Technology

- The internet has made one of the biggest impacts. It is easy to forget that e-mail is only 10-12 years old. The application of ICT has had a major impact across a whole swath of industries and will be a big shaper of the future.

Education

- We have been anti competition. There is a belief that everybody should be educated to the maximum level
- There has been no accountability between education and the labour market.

Higher and Further Education

- HE engagement with business has been poor. FE also not engaged or delivering the required skills. The big FE vocational colleges have suffered from being too micro managed
- HE needs to look at what are called degrees. We have started to devalue the product
- FE has been very weak on both intellectual and political power. As a result Government has driven the agenda.

Skills

- The focus of 'professionalism' has been too focused at the chartered level; it is vital that professionalism is also developed at the technical level
- We have been getting it wrong at the bottom end and are complacent at the top end.

Interview Epitaphs

Each interview ended with an epitaph question, which asks: **'If you had a mandate, free of all constraints, what more would you need to do to ensure a successful future for the employment and skills landscape in England?'** This question gives a good insight into interviewees' visions of a successful future. A selection from the epitaphs is outlined below:

Data

- We have a robust measurement system across Europe, aligned to definitions of sectors
- Developed a robust understanding of why nations grow and prosper. It is currently not possible to reliably answer this question
- Need to measure the contribution to GDP from higher skilled parts of the economy.

Skills Supply and demand

- Evidence and funding combine to achieve the desired outcome so that supply and demand is better aligned. Currently we cannot galvanise providers and companies to meet needs
- HE/FE driven by customers, with open and transparent information
- FE (Technical) level 3 vocational qualifications are attractive. They are attractive to young people and meet the needs of real business. FE colleges close to business with minimum central oversight
- Fewer people for media studies
- Basic science and deductive skills are the most important.

International competition

- We have caught up with the US on high quality skills and understand the best route for England: the Nordic route – throw money at the issue; or the US route – increasing fees for individuals.

Employers

- Employers at the bottom end have been persuaded to up skill production for high skill and value employment
- Skills Funding Agency/RDAs set up local groups with employers at the bottom end and opened their eyes
- Skills are central to union priorities alongside pay and working time. Unions perceived as having skills as a central role
- Unions have an important part in moving towards a sustainable economy, including a strategy for full employment, including addressing youth employment.

Identity

- Put the 'Nation' back in the UK – identity is part of skills
- Transformed national pride in who we are and what we do.

Provision

- Abolished the whole of the school curriculum and put it on a Tomlinson model
- The pay and reward for teachers was truly market based. For example, if you needed to pay a lot more to attract the best mathematics teachers this would be done. This would also give a strong signal to pupils of how different skills are valued
- Make education valued again. Need to ensure that people are meeting the required standards and measure levels of satisfaction
- A simple system. Skills are what business requires not Government targets.

Employment

- People will be able to develop the skills to change the direction of careers without going backwards on pay and status
- Resources are devoted to ensuring that we do not have a lost generation. There is a growing rank of inactive people. Greatest concern are boys aged 16 to 21.

Other

- Hope! Obama – the audacity of hope. Last year in USA for the first time in many years the graduation rate from schools and colleges of black Americans rose and reduced the gap with white Americans.

APPENDIX 5: Cross-Scenario Analysis Table

Impact Summaries and Comments	World Markets (WM)	National Enterprise (NE)	Global Sustainability (GS)
<p>Global trading environment</p> <p>The centre of economic power has shifted towards the east.</p> <p>WM & GS point to the Far East as being both a competitive threat and market opportunity. Less so under NE due to trade barriers and protectionism.</p> <p>Concern over resource depletion and security of supplies under all three scenarios, leading to greater focus on eco-efficiency particularly under GS and greater self-sufficiency under NE.</p>	<p>Open.</p> <p>Market forces rule.</p> <p>Global economy & trade expand at a solid pace.</p>	<p>Growing international tensions, competition for scarce resources and protectionism. Belief in international institutions wanes. Lower levels of trade and more regionally-focussed.</p> <p>Despite a market-driven philosophy, government provide an element of protection and support to key industries (such as utilities, infrastructure, pharmaceuticals, aerospace, finance and media), while at the same time pursuing corporate tax, labour and other policies seen as friendly to inward investment.</p>	<p>People aspire to high levels of welfare within communities characterised by shared values, more equal distribution of opportunities and a sound environment. There is a belief that these goals are best secured through active public policy and provision, and by means of international co-operation.</p> <p>Competition is fostered in open international markets within a regulated framework.</p> <p>The centre of economic power has shifted towards the east.</p> <p>Some of the greatest commercial opportunities arise in fast-growing developing countries experiencing catch-up.</p>
<p>Income levels & distribution</p> <p>Due to different issues of emphasis, all three scenarios require significant focus on educating and training the population as a whole in ICT skills – to facilitate growth in the application of new technologies and activities.</p>	<p>Growing income inequality between social classes and regions.</p> <p>Digitalisation of economy exacerbates social exclusion as many low-skilled lack computing skills/access to the internet</p>	<p>Real disposable income growth is low. Income inequality increases.</p> <p>Current regional disparities continue, with growth being strongest in London and the South East. Other regions rely predominantly upon existing economic activities, with lack of investment in new industries. Areas historically reliant on international trade or on public sector employment are particularly disadvantaged.</p>	<p>Growth is reasonably robust, interest rates low, and investment high.</p> <p>There is less income inequality under this scenario, both between nations, between social groups within the UK and between UK regions. The environmental consequences of sprawl in the South East, the social consequences of under-employment elsewhere, result in planning controls, transfer payments, and investment in advanced communication and transport infrastructure which allow extended knowledge and supply networks and clusters. Nevertheless, in regions heavily dependant upon traditional manufacturing, the management of the economic transition remains a challenge for both national and regional policy.</p>

Impact Summaries and Comments	World Markets (WM)	National Enterprise (NE)	Global Sustainability (GS)
<p>State provision of public services</p> <p>Considerable opportunities for private provision of education, health and other public services under WM, rather less so under NE (income constraints) and GS (due to level of state provision).</p> <p>Need to ensure skills training moves in line with international standards under GS.</p>	<p>State pulls back. Greater private provision. State focuses on basic levels of provision. More public services delivered on-line. Voluntary organisations play a bigger role.</p>	<p>Financial pressures force the state to make heavy cuts in public spending. Levels of public service provision resemble little more than a basic safety net. Activities seen as non-essential are cut.</p> <p>The role of the third sector becomes increasingly important, consequently receiving heightened government recognition and support. A greater level of community, family and individual self-support is encouraged.</p> <p>Those who can afford to do so make increasing use of privately-funded services, but this remains a niche rather than the norm.</p>	<p>Government plays a prominent role in the provision of education, healthcare and other social services, but the welfare state functions increasingly at an international level where governments co-operate to make business and the rest of society work together to achieve social improvement.</p> <p>The EU takes on a greater co-ordinating role across many areas of policy, providing a comprehensive health, education and welfare safety net for disadvantaged groups.</p>
<p>Regulation</p> <p>Loose under WM and NE, high under GS. Will all nations play by the rules?</p>	<p>International institutions largely focus on providing a high-level regulatory framework with limited detailed intervention.</p> <p>Greater reliance on self-regulation comes to the fore.</p>	<p>People value the freedom to do as they choose and the state does little more than overall strategy, policy and basic minimum standards of safety and compliance.</p> <p>Planning controls are weakened at local level in an attempt to encourage economic development.</p>	<p>Fairly highly regulated environment which is likely to slow the rate of uptake of new technologies.</p>
<p>Consumerism</p> <p>High on agenda under WM and to a lesser extent under GS. Has greatest impact on product and service and markets under WM.</p>	<p>Comes to the fore. Much greater emphasis on customised marketing.</p>	<p>Consumerism still dominates.</p>	<p>Consumerism declines. There is also greater emphasis on sustainable and socially aware consumption.</p>

Impact Summaries and Comments	World Markets (WM)	National Enterprise (NE)	Global Sustainability (GS)
<p>Consumer & business services</p> <p>Healthcare, leisure travel, financial services, media, entertainment, education and information services likely to see strong growth under WM and GS with attendant market opportunities and skill requirements.</p> <p>Growth under NE more modest.</p> <p>Particularly under GS, services are likely to become more integrated with other elements of the economy as greater emphasis is placed on wider service supply packages.</p> <p>There may be a blurring of traditional skill boundaries and processes, particularly as new ICT technologies are progressively applied.</p>	<p>Strong growth particularly in healthcare, leisure, travel, financial services, media entertainment, education, information services.</p>	<p>The service sector grows moderately, particularly in the areas of finance, healthcare, tourism, and retailing. New markets develop for specialised personal services for high-income groups. The informal service economy also flourishes.</p> <p>Compared with World Markets, technology is a less important driver of service growth.</p>	<p>The UK economy experiences fairly rapid structural change. While energy and resource-intensive sectors decline, there is strong growth of services and high-tech industries offering low environmental impact and high social value.</p> <p>Intangible goods and services generate the largest element in UK national economic value. The service sector becomes increasingly integrated with other areas of the economy as more goods are supplied as part of wider service packages, many aimed at ensuring “whole-life” thinking, efficient resource utilisation and recycling. Service sectors experiencing rapid growth include software and ICT support, communications and media, education, leisure and finance. The development and widespread application of ICTs also heavily influence the design, shape and delivery of many other goods and services.</p>
<p>Manufacturing</p> <p>Shift to high tech activities and new technologies such as ICT, biotechnology and ultimately nano-technology under WM & GS but with competition to attract the companies involved. NE struggles under a lack of necessary investment in skills and infrastructure and an inability to retain strong skill/ industry clusters.</p>	<p>Primary manufacturing declines due to impact of financial crisis low-cost overseas competition.</p> <p>Complex and extended international supply chains are common-place.</p>	<p>A lower level of international competition moderates the pace of decline in more traditional and lower-skilled areas of activity compared to World Markets.</p> <p>Trade barriers, security concerns, heightened awareness of costs of transportation and CO2 emissions cause many supply chains to become more regionally structured and focussed.</p>	<p>UK manufacturing, and its processes and products, are transformed by high levels of investment and a drive towards the global provision of resource efficient goods and services.</p> <p>Heavy industry tends to migrate abroad, with new high tech manufacturing sectors requiring a strong knowledge base being successfully established in the UK.</p>

Impact Summaries and Comments	World Markets (WM)	National Enterprise (NE)	Global Sustainability (GS)
<p>Construction</p> <p>High rate of take up of ICT and modern construction methods under WM and GS. Again new skills will be required, particularly with respect to ICT, higher levels of literacy and numeracy, and as traditional skill boundaries become blurred.</p> <p>Under NE emphasis is likely to be heavily on retrofitting the existing stock to conserve energy, a move which is likely to be seen also under WM and particularly GS the latter due to a combination of regulation, taxation and charging.</p>	<p>Growth driven by innovation and productivity improvements.</p> <p>Rapid take-up/application of IT & modern methods of construction.</p> <p>Risk of cost increases due to shortage of skills to apply new methods/practices.</p>	<p>The construction sector struggles from a low rate of underlying economic growth, cuts in public expenditure, an overhang of vacant space and a low level of investment.</p> <p>There is, however, greater emphasis upon maintaining, upgrading and converting the existing built environment, particularly with respect to its carbon efficiency.</p> <p>Compared with World Markets, the rate of technological innovation and application of ICT and modern methods of construction is much slower, with traditional methods continuing to play a major role.</p> <p>Much activity remains labour-intensive with fragmented supply chains.</p>	<p>The built environment is transformed through substantial investment in the rapid replacement of existing buildings and infrastructure.</p> <p>Strict development controls, constrain new housing construction primarily to existing urban centres and “brownfield” land.</p> <p>Emphasis is placed on training and acquisition of skills relevant to the application of ICTs and modern construction methods as part of the drive to improve eco-efficiency.</p>
<p>Agriculture</p> <p>Somewhat neglected in UK under WM. Given greater support under NE by concerns over self-sufficiency. Driven by new technologies and desire for higher yields under GS but within a regulated framework with considerable emphasis on biodiversity and environmental considerations.</p>	<p>There is investment in high technology farming and increased adoption of genetically modified crops.</p> <p>Limited attention given to biodiversity and environmental impacts.</p> <p>Little attention paid to long term food security, as global markets are seen as the mechanism to supply all food requirements.</p>	<p>The vulnerability of agricultural output to climatic fluctuations becomes increasingly evident. Reflecting this and growth in domestic demand, various food exporting nations impose export controls.</p> <p>Ensuring long-term security of national food supplies moves up the government policy agenda. The decline in UK agriculture consequently slows.</p>	<p>Efforts are directed towards achieving high agricultural yields with high levels of biodiversity and low environmental impact.</p> <p>There is limited uptake of genetically modified crops to produce tailored inputs for food and energy production.</p> <p>Tight regulatory controls are in place to screen for adverse environmental and biodiversity impacts.</p>
<p>Business clusters/centres of business excellence</p> <p>Shift to high tech activities and new technologies such as ICT, biotechnology and ultimately nano-technology under WM & GS but with competition to attract the companies involved. NE struggles under a lack of necessary investment in skills and infrastructure and an inability to retain strong skill/industry clusters.</p>	<p>Expand internationally.</p> <p>Strong clusters prosper with the required range of skills/infrastructure.</p> <p>Successful interconnected clusters grow in areas such as science & engineering</p>	<p>Lack of investment and innovation threaten to undermine existing successful clusters of UK economic activity.</p>	<p>The strength of the UK professional, scientific and engineering skill-base is internationally recognised, leading to greater investment by multi-nationals in establishing research, design and development centres in the country.</p> <p>New clusters of activity are built around centres of internationally recognised universities and other centres of scientific and engineering expertise, with a particular focus on exploiting newly emerging eco-markets at home and abroad.</p>

Impact Summaries and Comments	World Markets (WM)	National Enterprise (NE)	Global Sustainability (GS)
Security Security concerns are high on the agenda, particularly under WM and NE, leading to new skill requirements and market opportunities, particularly in the cyber area.	Growth in cyber crime and security concerns, leading to expansion in security services and industries.	A stronger sense of national identity coupled with greater concerns over security result in greater spending on defence and other measures aimed at protecting national boundaries.	International collaboration reduces some government security concerns but risk analysis points to continued need for vigilance. Industrial espionage and cyber crime remains a concern to corporates.
Education & Training	Individual takes greater personal responsibility for skills development.	The state school system remains the main source of basic education provision for most people. Greater private sector delivery of further and higher education is encouraged.	Systems of education and training are increasingly internationalised, particularly at a European level, with ITCs playing a prominent role and with growing international recognition of professional qualifications. Education and training policy aims to encourage equal opportunities in a job market with rapidly changing qualification requirements. There is equality of access to high quality public education, which reinforces social and environmental values throughout the curriculum.
Healthcare	More holistic approach. Biotechnology transforms healthcare.	Within the NHS there is continued pressure for efficiency gains and improved performance. Greater private sector delivery of publicly financed health services is encouraged.	An increasingly Europeanised welfare and health care system provides a comprehensive safety net for disadvantaged groups, financed by higher taxes. New technologies lead to the introduction of more tailored provision whilst also leading to smarter working and cost efficiencies. In the health sector, there is a shift in focus from the treatment of sickness to high technology health promotion and preventive care with emphasis on greater personal responsibility.

Impact Summaries and Comments	World Markets (WM)	National Enterprise (NE)	Global Sustainability (GS)
Innovation & Technology	<p>International spread of best practice proceeds apace.</p> <p>Rapid adoption of new technologies.</p> <p>Particular emphasis on research, development and application of ICT and biotechnology.</p> <p>Nanotechnology emerging. Biotechnology transforms health and food production.</p>	<p>Protectionism and reduced FDI by multinationals constrain spread of best practice.</p> <p>Low growth and investment also act as a drag on managerial and technical innovation.</p> <p>Innovative and fleet-footed small and medium-sized enterprises (SMEs) serving niche domestic markets fare relatively well.</p> <p>The ICT sector continues to flourish, particularly in areas such home entertainment and logistics, but its impact is less pervasive than under the World Markets scenario and it does not provide the same overall impetus to innovation and structural change.</p> <p>Biotechnology proves to be the other main driver of technological innovation.</p>	<p>There is a high level of innovation and technological development driven by user needs and geared towards eco-efficiency, giving a spur to R&D in biotechnologies and nano-technologies.</p> <p>Development of ICTs accelerates and their application becomes widely pervasive. The application of ICTs is particularly strong in the education and training sectors.</p>
Workforce	<p>Highly mobile internationally.</p> <p>Application of ICT increasingly kills distance. Considerable competition for highly skilled who favour locations with exceptional job opportunities and/or living environments.</p> <p>Immigration to UK of low-skilled workers helps to compensate for effects of ageing UK population but unskilled become further marginalised.</p>	<p>There is limited international mobility of the labour force and protectionism of national employment. The approach is "British jobs for British people."</p> <p>Priority is given to developing the skills needed for the UK economy and retaining highly skilled individuals.</p> <p>Labour markets are further deregulated, in part in an effort to attract inward investment and discourage international relocation of exiting activities, but the positive effects on job creation, in terms of improved labour flexibility and cost, are insufficient to offset the impact of slower growth in the new dynamic sectors of the economy.</p>	<p>The demands of the economy for a dynamic labour force are limited to a degree by regulation, for example on working hours, conditions and fixed-term contracts.</p> <p>Resource and labour productivity show significant improvements, and unemployment and working hours decline.</p>

Impact Summaries and Comments	World Markets (WM)	National Enterprise (NE)	Global Sustainability (GS)
Employment	<p>People aspire to personal independence, material wealth and mobility to the exclusion of wider social goals.</p> <p>The labour force is highly mobile, reflecting increased globalisation, economic growth, a general weakening of labour market regulation, and heightened international competition for skilled workers. Tele-working and flexible employment arrangements become more commonplace. Individuals with professional and other marketable skills flourish. Skill shortages will be addressed by the mobility of highly skilled people. Lower quality jobs are likely to be undertaken by migrant workers.</p> <p>UK labour productivity improves strongly. There continues to be some growth in low skill, low pay service jobs in local markets. However, the long-term unemployed and unskilled workers tend to be further marginalised as benefit systems are squeezed.</p>	<p>Informal service sector provides more jobs for those excluded from the mainstream job market.</p> <p>The job market initially remains relatively open for unskilled and semi-skilled workers, who continue to be in demand in agriculture, manufacturing and construction, but income differentials between skilled and unskilled workers increase with the latter turning increasingly to the informal economy to supplement their incomes.</p> <p>The consequence is higher unemployment, increased wealth disparities, longer working hours, particularly for the lower-skilled, and an increase in social tensions. Government consequently moves to limit the level of immigration, particularly that of unskilled workers.</p>	<p>There is a high level of global mobility of labour, both nationally and internationally.</p> <p>Stable economic conditions combine with UK training and labour market policies to support a regulated high-skill, high wage labour force accompanied by greater income and social equality, although rapid technological development and change excludes some from mainstream employment.</p>
Environment Greater emphasis on the environment and sustainability under all scenarios, but particularly GS. Particular emphasis under NE on using indigenous energy resources	<p>Slow progress on reaching agreement on substantial carbon emission reductions but R&D of carbon efficient processes and products does gather pace driven primarily by market pricing mechanisms.</p> <p>Application of alternative energy technologies is limited due to relative cost factors.</p>	<p>Regulation of the environment resides at national, rather than international, level with relatively little institutional or policy change. Policy implementation is largely market driven, aimed primarily at maintaining energy and environmental security.</p>	<p>Substantial progress is made internationally in agreeing carbon reduction targets and actions.</p> <p>The need to use finite natural resources sustainably is recognised, and eco-efficiency is placed high on the international agenda. Although inflation remains subdued, carbon pricing and taxation result in a shift in relative prices in favour of energy-efficient processes, products and services.</p>

Impact Summaries and Comments	World Markets (WM)	National Enterprise (NE)	Global Sustainability (GS)
Infrastructure Market opportunities at home and internationally under all three scenarios (for slightly different reasons and to a varying degree) in nuclear engineering, alternative energy technologies, automation, application of ICTs, and a wide array of products and processes that are eco-efficient, in turn leading to a wide spread of new skill requirements.	<p>Substantial private sector funding of infrastructure.</p> <p>More investment in transport generally.</p> <p>Rail system modernised and construction starts on new high speed lines.</p> <p>New programme of nuclear power stations in UK.</p>	<p>Investment is low constrained by cost and availability of capital.</p> <p>Cost and security of energy supplies is a primary concern. There is a government drive to encourage energy efficiency and exploit domestic sources of energy including coal, gas, nuclear power and renewables, but progress on nuclear power and renewables is slow. Market mechanisms including pricing are primarily relied upon to achieve the desired increase in energy efficiency.</p> <p>The transport and communications sectors suffer from low levels of investment, reflecting both the cost and availability of capital and a lower rate in growth of demand.</p> <p>There is continuing reliance on privately-financed transport with little additional provision of public transport services, but sluggish GDP growth limits the growth in car ownership. Nevertheless, many roads operate at full capacity and congestion increases.</p> <p>Investment in the rail network stagnates, with the result that freight continues to move primarily by road. Slower growth in international trade and business coupled with limited growth in real disposable incomes reduces the pressure for additional airport and harbour facilities.</p>	<p>Low interest rates and government policy objectives together produce high levels of investment in areas such as public transport, new and renewable energy, water, and information infrastructures.</p> <p>Under mounting pressure to replace existing, ageing energy generation capacity while reducing carbon emissions.</p> <p>Work also commences on a new generation of UK nuclear power stations, a programme mirrored elsewhere around the globe.</p> <p>Research into carbon capture and storage technologies accelerates.</p> <p>Supported by an international and UK cross-party political consensus around the need to cut carbon emissions, incentives are also put in place by the UK government to support research, development and investment in renewable energy sources. A range of renewable energy technologies are exploited leading to an expanding market share. By 2020, dominant renewable sources include onshore and offshore wind, biomass, and solar together with an emerging contribution from tidal energy.</p> <p>Encouraged by regulatory incentives, energy suppliers also move towards the provision of integrated energy services. Together with high energy prices, these greatly enhance the take-up of energy efficiency measures.</p> <p>Modernisation and restructuring of freight and passenger transport infrastructure occurs with the long-term goal of building an eco-efficient, integrated system. The cost of private car transport rises substantially, as does air travel, through a combination of pricing, tax and regulatory measures. Growth in usage is consequently constrained, while public transport is heavily subsidised.</p>

APPENDIX 6: The Scenarios for Skills 2020

What are Scenarios?

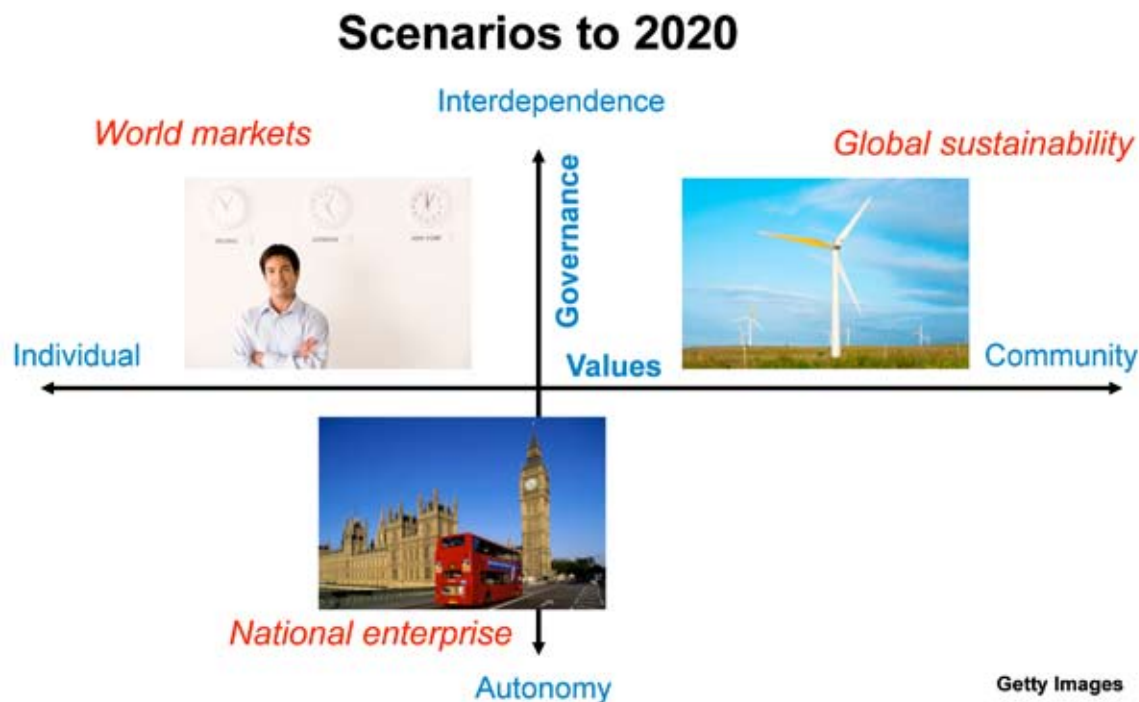
Scenarios are stories that describe how ‘the world’ might look in the future. They describe possible paths to the future, based on an analysis of drivers of change. To be useful, they must tell a story with internal logic and consistency, in a way that allows the critical uncertainties and predetermined elements to be separated. They are not predictions or forecasts; they are just plausible stories about how the future might unfold.

Three Scenarios for Skills

We have developed three scenarios as follows:

1. The **World Markets** scenario reflects a world driven by aspirations of personal independence, wealth and mobility, to the exclusion of wider social goals; a belief in the continued efficacy of integrated global markets; and internationally co-ordinated policy light regulation and a philosophy of “minimal government”.
2. Under **National Enterprise**, people aspire to personal independence and material wealth, embracing liberalised national markets to secure national self reliance and security; and political and cultural institutions are strengthened to buttress national autonomy in a more fragmented world.
3. In a world of **Global Sustainability**, people aspire to high levels of welfare within communities characterised by shared values, more equal distribution of opportunities and a sound environment; they believe these objectives are best achieved through active public policy and international co-operation; and markets are regulated to encourage competition

The relationship between these three scenarios is shown graphically below:



Development of these scenarios

We used three of the government’s “Foresight Futures 2020” scenarios as an initial basis for providing alternative visions as to how the international and national UK economic and political environment might have evolved by 2020. Scenarios based on these were also used for the report on Future Services to the Public³ and other skills projects.

We selected the three scenarios that have the greatest impact on employment and skills and have developed them to reflect the key global developments since the original scenario storylines were drafted. These have been linked to potential economic recovery paths following the 2008/2009 recession. We have also added content to highlight the drivers which our horizon scanning and interviews have suggested will be especially relevant in shaping future UK skill requirements.

³ The Future of services to the public – reviewing the pressures and challenges for long term change. <http://www.samiconsulting.co.uk/2fspvol1.pdf>.

Further Information

The SAMI Consulting project was undertaken between October 2009 and March 2010. It addressed the following question:

“What will be the drivers and impact of change on the employment and skills landscape in England by 2020; what are the challenges and opportunities for government and employers.”

It used ‘foresight’ to investigate the future trends and drivers and prioritise their impact on the future skills requirements. It also identified early indicators of new and emerging industries and sectors.

The programme of work included: horizon scanning to identify the key drivers of change and trends; approximately 20 interviews with experts and stakeholders; the development of skills scenarios; the analysis of the challenges and opportunities for both government and employers: and elements of a preferred ‘Vision.’

While the UK Commission for Employment and Skills commissioned this work, the scenarios have been prepared by SAMI Consulting and do not represent the UK Commission’s policies or views of the future.

Scenario One World Markets



The **World Markets** scenario reflects a world driven by aspirations of personal independence, wealth and mobility, to the exclusion of wider social goals; a belief in the continued efficacy of integrated global markets; and internationally co-ordinated policy light regulation and a philosophy of “minimal government”.

The International Economic and Political Backdrop

Following the financial crisis and recession in 2008/2009, massive international fiscal and monetary stimuli have succeeded in stabilising the global economy.

While the economic and financial environment for the first few years of the 2010 decade remained somewhat volatile and uncertain, growth remained more or less in positive territory, subsequently gathering momentum in the latter half of the decade. This in turn led to increased demand and upward price pressure for commodities; many of which had suffered from reduced investment in new supply capacity in the wake of the 2008/2009 financial crisis. There is a shift in relative GDP growth rates and economic and political influence away from heavily indebted economies such as the US and UK towards the Asian continent, and in particular China.

Immediately following the financial crisis there was a threat of a retreat from unfettered capitalism, and greater government intervention and regulation of markets but this receded as growth resumed. However, the need for better global policy co-ordination and regulation, notably with respect to financial markets, was generally acknowledged.

Developments in the UK

During the early 2010s, the growth of the UK economy remained sluggish under the impact of increases in taxation and cuts in public spending, as the government of the day grappled with the need to reduce the public sector budget deficit and maintain the confidence of financial markets. While tax increases inevitably figure in the equation, public expenditure cuts bear the brunt of the burden.

The Role of the State and the Individual

Harking back to what are seen as better times, individuals wish to improve their own lives and are less concerned about equality and the effects that inequality may have on society as a whole. Economic and income growth are strong but uneven, and the gap between rich and poor countries, and between rich and poor individuals within the UK, continues to widen.

In the UK, public expenditure cuts enacted to tackle the level of public indebtedness and state of public finances, coupled with pressure to limit the burden of personal and corporate taxation, have resulted in a sharp pull-back in the activities of the state, including provision of welfare payments and services where charitable and voluntary organisations having been relied upon to take up some of the slack. Despite the best endeavours of the latter, inequality and social tensions increase.

Various aspects of economic and financial management, commerce and trade pass to and are co-ordinated by global institutions, while domestically there is some further devolution of power to regions. Following the ratification of the Lisbon Treaty by all EU members states in 2009, Europe has assumed a greater role in economic and social policy.

While in certain respects the influence of Europe becomes stronger, there is also recognition of the costs of excessive bureaucracy and the negative consequences for European competitiveness. Consequently, self-regulation asserts its importance in a number of market areas, with a belief that corporate social responsibility can be relied upon to deliver desirable outcomes.

Consumerism is to the fore; business is focussed on developing global markets; global competition intensifies; and fewer firms and brands, many multinational, come to dominate many sectors. Global standards emerge for many products and services.

Business and Consumer Services

In the UK, the main engine of growth is the business and consumer services sector, particularly healthcare, leisure and travel, financial services, media and entertainment, education and information services.

Growing national and personal income inequalities; the increased level of social tensions; the increased intensity of international competition; and the increased prevalence of the digital economy and potential for cyber-crime all combine to heighten personal, business and government security concerns, thereby spawning growth of related products and services.

Manufacturing

UK manufacturing is further marginalised as traditional manufacturing in primary industries declines. This is partly a result of business failures stemming from the impact of the 2008/2009 recession but also as a result of increasing competition from rapidly developing economies, notably China, in higher value-added manufacturing activities, as well as from other lower cost centres of production in Europe, Asia and Latin America.

Driven by the growth and investment programmes of multinationals and by increased global competitive pressures, centres of world-class specialisation expand, linked into interconnected clusters of expertise in areas such as science and engineering. Conversely, weaker centres decline. Certain UK high-tech manufacturing centres particularly in areas such as ICTs and biotechnology continue to see growth, as a result both of strong established clusters of expertise and technologically driven change. However, this proves to be insufficient to offset decline in weaker centres (where insufficient focus has been placed on ensuring that the total requisite package of skills and services is available) and in the more traditional manufacturing sectors.

Successful assembly industries that remain tend to be linked to complex global supply chains and are generally small scale and agile, refashioned in part by developments in ICTs and other advanced manufacturing techniques.

Construction

UK construction demand is seriously constrained in the early 2010s due to the lingering impact of the 2008/2009 recession, the level of consumer and public sector indebtedness, public expenditure cuts and the cost and availability of credit to both the business and personal sectors. However, as the decade progresses, construction demand recovers, driven by innovation in technologies for the built- environment and the need for infrastructure renewal. Planning controls are relaxed.

Greater exposure to international competition results in substantial innovation and productivity improvements in UK construction with rapid take-up of ICT and other modern methods of construction. Nevertheless, construction costs rise, significantly in some areas of activity, due to the loss of skills in the post recession shake-up and an inadequate level of training in the skills required by the new technologies and methods of construction.

Agriculture

Agriculture becomes increasingly concentrated, industrialised and global in scale. Farms increase in size, adopting new technologies with more widespread acceptance of genetically modified crops, in the search for productivity improvements and higher yields. There is growing differentiation between “engineered” foods and organically-produced food.

The Provision of Public Services

Popular pressure to cut taxation and the search for greater efficiency in a smaller public sector is mirrored in a reduced level of direct government involvement in the actual delivery of healthcare, education and other social services. More public services are privatised or become privately managed.

There is greater focus of public resources on the poor and disadvantaged, accompanied by more widespread user charges and fees on those who are deemed to have the ability to pay.

Private services run by global providers become more commonplace as more people join health and social insurance schemes and opt out of public services. In education, individuals and their employers are expected to assume a greater level of responsibility for financing tertiary education and vocational training. There is greater growth in demand for high-tech health care focusing on curing disease and a more holistic approach to preventive healthcare.

Innovation and Technological Change

Driven by international competitive forces and the international spread of best practice, UK productivity improves strongly and accelerates structural change.

New technologies are adopted rapidly. Much technical change is consumer-focussed and dominated by the wide use of information and communication technologies (ICTs) which has a profound effect on how products and services are developed, produced and delivered. ICTs also play a key role in establishing strong consumer relationships, for example through new methods of online market research, customised marketing and design on demand.

The application of biotechnology increases, transforming health and food industries in particular, and nanotechnology starts to have an increasing effect in a number of sectors.

Labour Markets

The labour force is highly mobile, reflecting increased globalisation, economic growth, a general weakening of labour market regulation, and heightened international competition for skilled workers. Tele-working and flexible employment arrangements become more commonplace. Individuals with professional and other marketable skills flourish.

There continues to be some growth in low skill, low pay service jobs in local markets. However, the long-term unemployed and unskilled workers tend to be further marginalised as benefit systems are squeezed. The “digitalisation” of the economy and society also acts to deepen social exclusion as internet access is required to use many public and private services and as many low-skilled, low-income workers lack the requisite internet and computing skills.

The potential impact of an ageing UK population continues to be balanced through immigration with many of the immigrants filling low-paid service jobs. However, as the gap between rich and poor widens internationally, in-migration of unskilled labour from the poorer less developed regions is increasingly viewed as a threat by many in the more developed countries leading to greater political pressure to stem the flow and pursue more selective immigration policies.

Regional Development

Most UK regions benefit to a degree from continued economic growth, but London and the Greater South East, with its financial and service base, and clusters of high tech industry, attract the bulk of new business investment.

Social conditions in deprived urban areas and in those which are heavily dependant on traditional manufacturing deteriorate. Segregation between the wealthy and the disadvantaged becomes more pronounced and “gated communities” become more commonplace. The trend to smaller households increases the demand for housing close to urban centres of growth. New towns and communities are constructed on green-field sites.

Environment and Sustainability

Energy prices, although relatively high, remain fairly stable in the absence of supply disruptions and greater international collaboration to develop available oil and gas reserves. In turn this acts to moderate immediate concerns over the cost and security of energy supplies.

Coupled with difficulties in achieving an international consensus over how the cost of reducing carbon emissions is to be met and shared between developed and developing nations, progress in reaching legally binding international accords on climate change is consequently modest. Those agreements and targets that are reached are relatively limited in scope and vary between countries. Minimum standards of social and environmental policy are achieved through the international legal framework and further enhanced through using a market-based approach of pricing, traded permits and incentives.

Such action proves insufficient to cut greenhouse gas emissions, although there is some limited success in constraining the overall rate of growth in carbon consumption. However, increased consumer awareness and focus on corporate social responsibility, coupled with business recognition of the competitive and cost benefits of reduced energy consumption and carbon emissions, drives international research and innovation in carbon efficient technologies, design, production, products and services.

Energy and Transport Infrastructure

Within the UK, the electricity market continues to be dominated by fossil fuels, increasingly natural gas from Russia and Central Asia. A new programme of UK nuclear power station construction is initiated to replace ageing stations and increase the future share of nuclear. Within the 2020 time horizon, planning and technological constraints coupled with cost relative to the price of energy together limit the contribution made by alternative generation technologies such as wind and tidal power. Other emerging energy generation and fuel technologies remain largely at the research and development stage.

High levels of mobility, increased leisure and business travel, further residential and urban development into the green-belt and continued growth in international trade together create a demand for additional investment in UK transport systems including road, rail, air and ports.

With the aid of private finance, the rail network is modernised, more routes are electrified and in the latter half of the decade, a start is made on the construction of new high speed links.

Progressively greater use is made of ICT in managing traffic flows and volumes on major arterial routes although congestion increases on smaller roads and the secondary network, particularly in urban areas. Smart infrastructure and metering also starts to create new opportunities in the energy sector.

Scenario Two National Enterprise



Under **National Enterprise**, people aspire to personal independence and material wealth, embracing liberalised national markets as an effective means by which they can achieve their personal goals within a nationally-rooted cultural identity and with a high degree of national self-reliance and security. Political and cultural institutions are strengthened to buttress national autonomy in what is a more fragmented and regionally unstable world.

The International Economic and Political Backdrop

The international financial crisis and recession of 2008/2009 left serious scars on the global economy, particularly on the most heavily indebted developed nations. The resulting government fiscal and monetary policy response temporarily succeeded in stabilising activity and engineering a weak upturn in activity, in part reinforced by restocking. However growth once again stalled, as the initial and substantial monetary and fiscal stimuli faded and as the scale of public sector deficits and pressure from financial markets forced a combination of tighter monetary policy, tax increases and public expenditure cuts.

The longer term modest economic recovery proved to be highly uneven and sluggish, oscillating between short periods of upturn and downturn with a relatively anaemic underlying upward trend, particularly among the major developed economies.

The loss of jobs and level of unemployment in the heavily indebted developed economies resulted in an upsurge in tensions and pressures culminating in a series of protectionist moves, both between individual countries and regional trading blocks. Growth in international trade is consequently lower and more regionally focussed, and the level of international competition and spread of best practice is reduced.

Belief in the efficacy of international institutions has waned, marginalising their role and influence. Growing disparities between rich and poor, leading to greater social and political instability in certain of the less prosperous areas of the world, and competition between countries to secure scarce natural resources have all acted to heighten global and regional security concerns and a greater focus on achieving self-sufficiency.

Developments in the UK

Burdened with excessive personal and public sector indebtedness and a continued background of tight credit and a sluggish global economy, the UK has experienced a decade of low and fitful economic growth accompanied by only a very modest increase in real disposable incomes. Investment is low, constrained by the availability and cost of capital. Achieved rates of managerial and technical innovation and productivity growth are also consequently lower.

Cutbacks in public expenditure have been swingeing, with the state withdrawing, or reducing to a minimum, direct provision of a number of services to the public as well as many activities seen as non-essential. Whilst recognising the need for cuts in public spending, public dissatisfaction with the intervention and efficacy of both international and national government and state institutions has increased.

The Role of the State and the Individual

People consequently value the freedom to do as they choose with the minimum of government interference, within the context of a more independent United Kingdom, less fettered by regulation emanating from the EU. Political power now resides primarily at national level, while further regional devolution within the UK has been limited. However, coloured by evidence of past inefficient and wasteful expenditure by big government, the view has also taken hold that the nation state should set overall policy objectives, strategy and basic minimum standards in areas such as health and safety and consumer protectionism, and that execution and delivery should occur through smaller, more locally accountable delivery units.

National interests and identities within Europe came more to the fore in the wake of the tensions created in the wake the financial crisis and recession of 2008/2009, and a growing realisation that one policy does not fit all. The UK's relationship with the EU has become arm's length.

More widely, international collaboration has become primarily limited to traditional areas such as security and defence, trade and immigration; but even here progress on reaching agreements is difficult because of many and varied vested interests within a generally difficult economic climate.

While market values still dominate, issues of national interest result in government implementing policies that provide an element of protection and support to key national industries (such as utilities, infrastructure, pharmaceuticals, aerospace, finance, media) and constrain the full force of international competition.

UK-based business becomes more focussed on UK and European markets against a background of greater instability and/or barriers in various other parts of the world. Reflecting international barriers and security concerns, together with heightened awareness of costs of transportation and CO2 emissions, many hitherto truly international supply chains become much more regionally structured and focussed.

A stronger sense of national identity coupled with greater concerns over security also lead to a greater level of spending on defence and other measures aimed at protecting national boundaries, coupled with a reduced engagement in military operations in the international arena.

Business and Consumer Services

The service sector grows moderately, particularly in the areas of finance, healthcare, tourism, and retailing. New markets develop in the area of specialised personal services for high-income groups, while services for low-income brackets tend to decline. Technology is a less important driver of growth in the service sector.

The informal service economy also flourishes, providing work for the increasing numbers of people excluded from the mainstream job market.

Manufacturing

Manufacturing is less exposed to international competition, moderating the pace of decline in more traditional and lower-skilled areas of activity. However, levels of innovation and investment in the higher tech sub-sectors are also correspondingly lower as is foreign direct investment, despite government attempts to attract the latter. Innovative and fleet-footed small and medium-sized enterprises (SMEs) serving niche domestic markets fare relatively well.

Construction

The construction sector struggles from a low rate of underlying economic growth, cuts in public expenditure and a low level of investment in both housing and infrastructure. An overhang of space in the industrial and commercial property sectors, coupled with the scale and cost of refinancing faced by property companies and developers, act to constrain the rate of recovery in the level of private sector non-residential construction.

There is, however, greater emphasis upon maintaining, upgrading and converting the existing built environment, particularly with respect to its carbon efficiency.

There is a comparatively slow rate of technological innovation and application of ICT and modern methods in construction is much slower, with traditional methods continuing to play a major role. Much activity remains labour-intensive with fragmented supply chains.

Agriculture

Continued production subsidies continue to provide a certain degree of control over increases in food costs as the pressures on global food demand grows. The vulnerability of agricultural output to climatic fluctuations becomes increasingly evident and a number of exporting nations elsewhere in the world impose export controls in order to satisfy domestic demand at affordable prices.

Agricultural practices remain based on high inputs of pesticides and fertilisers. The uptake of genetically-modified crop strains is patchy.

Retailers retain a strong influence over farmers, manifested in demand for uniform, inexpensive products. Indigenous products remain an important part of food markets and are increasingly seen as playing a critical role in contributing towards ensuring long-term security of national food supplies. The decline in UK agriculture consequently slows.

The Provision of Public Services

There is an overwhelming need to reduce the public sector budget deficit, a belief in private enterprise as a means of revitalising the UK economy, together with a relatively low level of public concern about social equality and exclusion. This leads to pressures to reduce personal and corporate taxation and also reinforces the move to constrain government spending.

While the NHS and state school system remain the main source of provision for most people, there is continued pressure for efficiency gains and improved performance. Greater private sector delivery of publicly financed health and education services is encouraged.

On the welfare front, overall provision declines and the role of the third sector becomes increasingly important, consequently receiving heightened government recognition and support. A greater level of community, family and individual self-support is encouraged. Those who can afford to do so make increasing use of privately-funded services, but this remains a niche rather than the norm.

Innovation and Technological Developments

The pace of technological change is moderate. The pace of innovation slows due to constraints on availability of capital, the reduced intensity of international competition and the consequentially lower rate of spread of international best practice.

The ICT sector continues to flourish, particularly in areas such as home entertainment and logistics; but its impact is less pervasive and does not provide the same overall impetus to innovation and structural change.

Biotechnology proves to be the other main driver of technological innovation.

Labour Markets

Labour markets are further deregulated, in part in an effort to attract inward investment and discourage international relocation of exiting activities. However, the positive effects on job creation, in terms of improved labour flexibility and cost, are insufficient to offset the impact of slower growth in the new dynamic sectors of the economy.

The job market initially remains relatively open for unskilled and semi-skilled workers, who continue to be in demand in agriculture, manufacturing and construction; but income differentials between skilled and unskilled workers increase with the latter turning increasingly to the informal economy to supplement their incomes. The consequences are higher unemployment, increased wealth disparities, longer working hours, particularly for the lower-skilled, and an increase in social tensions. Government consequently moves to limit the level of immigration, particularly unskilled workers.

Regional Development

Current regional disparities continue, with such growth as there is being strongest in London and the South East. Other regions rely predominantly upon existing economic activities, with an absence of investment in new industries. Those areas that have historically relied upon international trade in traditional sectors of industry or where public sector employment has been comparatively high are particularly disadvantaged.

Regional policy continues largely to be set at national level. Planning controls are weakened at the local level in an attempt to encourage economic development.

Environment and Sustainability

Regulation of the environment resides at national, rather than international, level with relatively little institutional or policy change. Policy implementation is largely market driven, aimed primarily at maintaining energy and environmental security. The focus is on adaptation, rather than mitigation.

Energy and Transport Infrastructure

Cost and security of energy supplies are the primary concerns. There is consequently a drive by government to encourage energy efficiency and exploit domestic sources of energy including coal, gas, nuclear power and renewables, but progress on nuclear power and renewables is slow. Market mechanisms, including pricing, are primarily relied upon to achieve the desired increase in energy efficiency.

The transport and communications sectors suffer from low levels of investment, reflecting both the cost and availability of capital and a lower rate in growth of demand.

There is continuing reliance on privately-financed transport with little additional provision of public transport services but sluggish GDP growth limits the growth in car ownership. Nevertheless, many roads operate at full capacity and congestion increases. Investment in the rail network stagnates, with the result that freight continues to move primarily by road. Slower growth in international trade and business, coupled with limited growth in real disposable incomes, reduces the pressure for additional airport and harbour facilities.

Scenario Three Global Sustainability



In a world of **Global Sustainability**, people aspire to high levels of welfare within communities characterised by shared values, more equal distribution of opportunities and a sound environment. There is a belief that these goals are best secured through active public policy and provision, and by means of international co-operation within the EU and at a global level. Competition is fostered within a regulated framework. Reconciling growth and sustainability, seen from a global perspective, is a key guiding principle under this scenario.

The International Economic and Political Backdrop

International action to shore up the global economy following the 2008/2009 financial crisis proves to be successful in stabilising activity and in securing a recovery in business and consumer confidence. As a result, there is a return to modest growth. Robust and credible plans announced by governments in countries such as the US and UK to reduce public sector deficits to sustainable levels over an acceptable time-frame instil confidence in financial markets and allow a phased, rather than precipitate, withdrawal of monetary and fiscal stimuli. Underlying inflation remains subdued and interest rates remain low, encouraging high levels of investment. Government policy action in China and certain other Asian countries, aimed at rebalancing their economies away from reliance on export driven growth through supporting expansion in domestic consumer demand, helps to underpin the global economic recovery.

The policy and regulatory failures of the early years of the current millennium are recognised and accepted. A consensus emerges on the need for greater international collaboration and co-ordination of policies aimed at avoiding past excesses and ensuring a greater degree of economic and financial stability. Despite a greater degree of international regulation and policy intervention, stable economic conditions coupled with a commitment to open markets, trade and international competition in most sectors, results in the resumption of a fairly high rate of global economic growth.

Substantial progress is made internationally in agreeing carbon reduction targets and actions. The need to achieve a more sustainable approach to the use of finite natural resources in general is also recognised, and eco-efficiency is placed high on the international agenda. Although the overall rate of inflation remains subdued, carbon pricing and taxation result in a shift in relative prices in favour of energy-efficient processes, products and services.

Although the pace of growth in indebted developed nations such as the US and UK lags behind that of rapidly developing nations (such as China, India, Brazil), unencumbered by excessive debt, GDP growth rates in the former ultimately approach sustainable historic levels as deficits and debt levels are progressively reduced. The global balance of economic power, however, has shifted further towards the east. Some of the greatest commercial opportunities arise in fast-growing developing countries experiencing catch-up.

Developments in the UK

In the wake of debt reduction and shifting public attitudes towards the type of society in which they wish to live, the UK economy experiences fairly rapid structural change. While energy and resource-intensive sectors decline, there is strong growth of services and high-tech industries offering low environmental impact and high social value. Relatively low interest rates support a renewed upsurge in investment.

The Role of the State and the Individual

Under Global Sustainability, people wish to be part of a wider national and international community. Reflecting public attitudes, business strives to balance the pursuit of profit with social responsibilities, working where possible in partnership with government and consumers.

Government plays a prominent role in the provision of education, healthcare and other social services; but the welfare state functions increasingly at an international level where governments co-operate to make business and the rest of society work together to achieve social improvement.

The EU expands and takes on a greater co-ordinating role across many areas of policy, providing a comprehensive health, education and welfare safety net for disadvantaged groups. Regional government also gains greater power at the expense of government at national level.

International collaboration and co-ordination cover areas such as security, economic development, trade, resource management and environmental protection; involving networks of governmental, non-governmental and private sector organisations. Global communications systems drive cultural and political systems closer together. Equal access to high quality public education reinforces social and environmental values. There is collaboration, helping a catch-up process by many developing countries.

Business and Consumer Services

Intangible goods and services together generate the largest element in UK national economic value. The service sector also becomes increasingly integrated with other areas of the economy as more goods are supplied as part of wider service packages, many aimed at ensuring “whole-life” thinking, efficient resource utilisation and recycling. Service sectors experiencing rapid growth include software and ICT support, communications and media, education, leisure and finance. The development and widespread application of ICTs also heavily influence the design, shape and delivery of many other goods and services.

Manufacturing

UK manufacturing, and its processes and products, are transformed by high levels of investment and a drive towards the global provision of resource efficient goods and services. Heavy industry tends to migrate abroad, with new high tech manufacturing sectors requiring a strong knowledge base being successfully established in the UK. In particular, the strength of the UK professional, scientific and engineering skill-base is internationally recognised, leading to greater investment by multi-nationals in establishing research, design and development centres in the country. New clusters of activity are built around centres of internationally recognised universities and other centres of scientific and engineering expertise, with a particular focus on exploiting newly emerging eco-markets at home and abroad.

Construction

The built environment is transformed through substantial investment in the rapid replacement of old and low-quality buildings and infrastructure. Due to strict development controls, housing construction is primarily concentrated in existing urban centres and on “brownfield” land. Particular emphasis is placed by the construction industry on training and acquisition of skills relevant to the application of ICTs and advanced construction techniques and new materials, use of all of which gathers pace.

Agriculture

Under the Global Sustainability scenario, efforts are focussed on achieving high agricultural yields and sustainable economically healthy farming communities with high levels of biodiversity and low environmental impact. There is limited uptake of genetically modified crops to produce tailored inputs for food and energy production. Tight regulatory controls are in place to screen for adverse environmental and biodiversity impacts. Under a reformed Common Agricultural Policy, support payments for farmers are tied to sustainable management of ecosystems and the full range of services they provide, including economic and social.

The Provision of Public Services

Increasingly Europeanised education, welfare and health care systems provide a comprehensive safety net for disadvantaged groups, financed by higher taxes. New technologies lead to the introduction of more tailored provision in both health and education, whilst also leading to smarter working and cost efficiencies. There is equality of access to high quality public education, which reinforces social and environmental values throughout the curriculum. In the health sector, there is a shift in focus from the treatment of sickness to high technology health promotion and preventive care with emphasis on greater personal responsibility.

Innovation and Technological Change

Relatively strong growth, open international markets and structural change supports innovation and technological development. Technology is driven by user needs and geared towards eco-efficiency, including further research and development of biotechnologies and nano-technologies.

The development of ICTs continues to accelerate and their application becomes widely pervasive. The application of ICTs is particularly strong in the education and training sectors.

Labour Markets

The demands of the economy for a dynamic labour force are limited to a degree by regulation, for example on working hours, conditions and fixed-term contracts. There is a relatively high level of managed global mobility of labour, both nationally and internationally.

Systems of education and training are increasingly internationalised, particularly at a European level, with growing international recognition of professional qualifications. Education and training policy aims to encourage equal opportunities in a job market with rapidly changing qualification requirements. ICTs play a prominent role on the provision of education and training

In the UK, stable economic conditions combine with UK training and labour market policies to support a regulated high-skill, high wage labour force accompanied by greater income and social equality.

Resource and labour productivity both show significant improvements, and unemployment and working hours decline.

Regional Development

While London and the South East remains a major centre of growth, regional development is more evenly distributed under this scenario as a result of planning controls and transfer payments. These recognise the environmental consequences of environmental sprawl in the South East; the social consequences of under-employment elsewhere; quality of life issues; and advanced communication and transport infrastructure which allow extended knowledge and supply networks and clusters. Nevertheless, in regions heavily dependant upon traditional manufacturing, the management of the economic transition remains a challenge for both national and regional policy.

Environment and Sustainability

Reconciling growth and sustainability is one of the guiding principles of this scenario, including significant increases in environmental quality, and major efforts in industry and planning systems to reduce the effect of economic activity on the environment. Ideological concerns about the environment are translated into practical action. Sustainability is seen from a global perspective, including the maintenance of biodiversity, the protection of global commons (the atmosphere, oceans, and wilderness areas) and fair access to environmental resources. Policy is increasingly co-ordinated at the EU and international level.

Energy and Transport Infrastructure

Low interest rates and government policy objectives together produce high levels of investment in areas such as public transport, new and renewable energy, water, and information infrastructures.

Under mounting pressure to replace existing, ageing energy generation capacity and reduce carbon emissions, work commences on a new generation of UK nuclear power stations. This programme is mirrored elsewhere around the globe.

Research, development and investment in carbon capture and storage technologies accelerate.

Supported by an international and UK cross-party political consensus around the need to cut carbon emissions, incentives are also put in place by the UK government to support research, development and investment in renewable energy sources. A range of renewable energy technologies are exploited leading to an expanding market share. By 2020, dominant renewable sources include onshore and offshore wind, second generation biomass, and solar together with an emerging contribution from tidal energy.

Encouraged by regulatory incentives, energy suppliers also move towards the provision of integrated energy services. Together with smart infrastructure and high energy prices, these greatly enhance the take-up of energy efficiency measures.

The cost of private car and air travel rises substantially, through a combination of pricing, tax and regulatory measures. Their use is consequently constrained.

Modernisation and restructuring of freight and passenger transport infrastructure occurs with the long-term goal of building an eco-efficient, integrated system. There is an increasing use of heavily subsidised public transport.

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the UK Commission for Employment and Skills.

UKCES

3 Callflex Business Park
Golden Smithies Lane
Wath-upon-Deane
South Yorkshire
S63 7ER

T + 44 (0)1709 774 800

F +44 (0)1709 774 801

UKCES

28-30 Grosvenor Gardens
London
SW1W 0TT

T + 44 (0)20 7881 8900

F +44 (0)20 7881 8999

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