



South East Diamonds for Investment and Growth

Building a Knowledge Economy

Report 4: Sector Analysis

March 2010


CLES
Centre for Local
Economic Strategies


**SOUTH EAST
DIAMONDS**
for investment and growth



March 2010

***BUILDING A KNOWLEDGE ECONOMY: RESEARCH AND ACTION PLANNING FOR
THE SOUTH EAST DIAMONDS FOR INVESTMENT AND GROWTH***

REPORT 4: SECTOR ANALYSIS

Final report by

CLES Consulting

Presented to

South East Diamonds for Investment and Growth

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1 INTRODUCTION

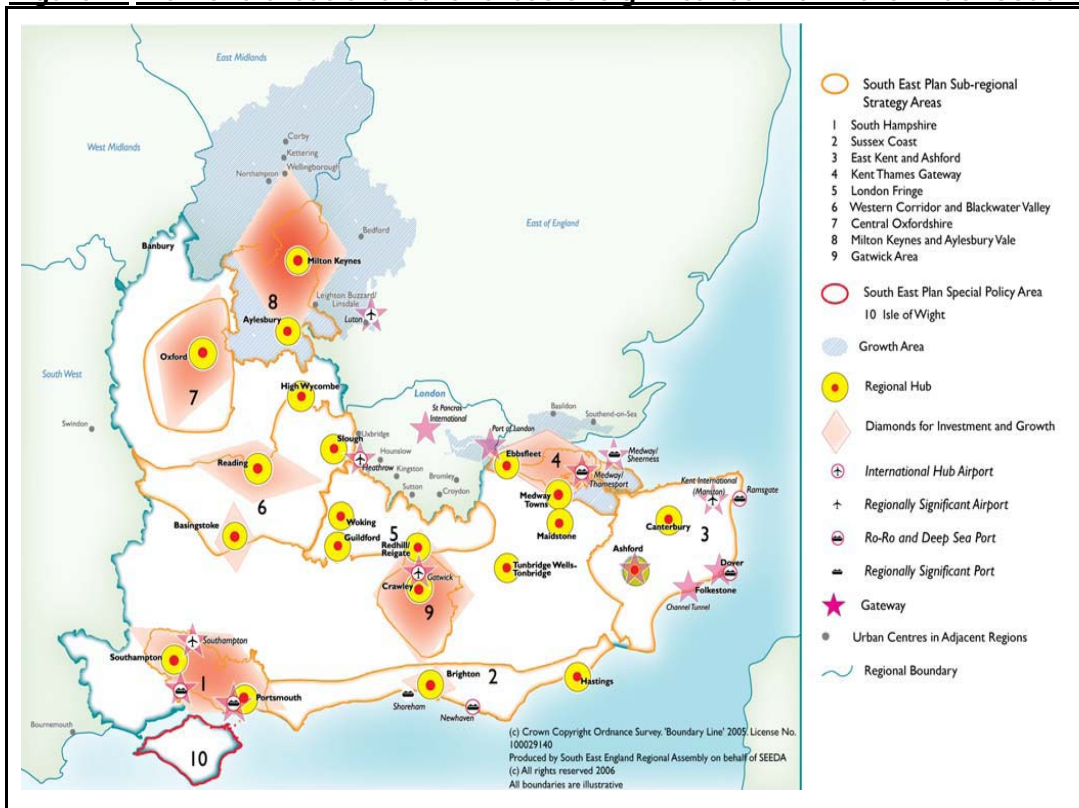
CLES Consulting was commissioned by South East Diamonds for Investment and Growth (SEDFIG Partnership) in October 2009 to undertake research and action planning on the knowledge economy within the ‘Diamond’ areas shown in figure 1 below; i.e. the functional economic areas with the most potential to accelerate long-term sustainable economic growth in the South East of England.

The purpose of the commission was to assess the size and potential of emerging industrial sectors within South East Diamonds focussing on knowledge economy sectors and the development of related policy actions. However, as part of a wider consideration, it also makes reference to the ‘enabling factors’ of growth including regional assets and infrastructure.

The project follows the requirements outlined in the original brief, providing SEDFIG with an evidence base to help identify future priorities around the development of its knowledge economy. As such, it follows the standard geographical definitions set out in the Diamond’s prospectus and uses the same (latest) supporting methodology agreed with partners to quantify each local economy. The work’s outputs consist of the following **five** reports:

- 1) **Executive Summary** – Providing a synthesis of the research findings and recommendations;
- 2) **Policy Review** – Identifying policy initiatives in various sectors of the knowledge economy within the UK and its implications for SEDFIG, together with a narrative on defining the knowledge economy and outlining critical success factors;
- 3) **Place analysis** - of economic performance within the Diamonds, including a review of sector strengths by location and supply side issues including employment, skills;
- 4) **Sector analysis** – detailed analysis of the sectors outlined for potential growth in the Diamond’s ‘Prospectus for Prosperity’ and HMG ‘New Industry New Jobs’ policy documents;
- 5) **Action plan** – outlining a series of development actions for partners and lobbying messages for central and regional policy makers, as well as summarising potential research-paths to drive further strategic thinking and understanding in this area.

Figure 1: Diamond areas and other areas of significance within the wider South East ¹



¹ Source: SEEDA, Regional Economic Strategy 2006

2 SECTOR PROFILES

The following report provides:

- ❑ detailed analysis of key sectors detail on the study sectors, exploring key opportunities and challenges to growth; and
- ❑ mapping of employment across the sector in the South East and its constituent Diamonds.

Location Quotients (LQs) are used within the analysis. These illustrate the relative concentrations of employees within a sector, compared with the national average – anything above 1.0 indicates a stronger performing sector in terms of employment than the national level.

2.1 Creative/Digital/New Media

Background

The term is applied to related sectors with creativity at their core. They all have the potential for wealth and job creation through the generation and exploitation of intellectual property. They are involved in conceiving, producing and disseminating creative goods and services, both to the public and other businesses.

The Creative/Digital/New Media sector produces around 7% of the UK's GVA, generating over twice as much value added as tourism. The sector is now comparable in size to the financial services industry and accounts for almost 120,000 businesses, 1.8 million jobs (1.4 million employees plus a significant number of self-employed) and over £13bn of exports¹. Over the last five years, the Creative/Digital/New Media sector has been growing at a faster pace than the national economy, further enhancing its critical importance to the UK, driven in particular by growth in Digital Content (including Audio-Visual / New Media).

The strength of the ICT sector within the South East Diamonds is important in the success of this sector – convergence of strong Creative Digital and ICT sectors offers the most effective route to growth rather than viewing them, and then subsequently delivering policy actions, in isolation.

Challenges and opportunities

There are a number of drivers of change within this sector which are driving growth and offering challenges. These are:

- ❑ **Social** - Social networking and online communication are changing the way content is shared, shaped and produced; changing demographics, including growing affluence and Personal Disposable Income, and an ageing population, are changing demand patterns and markets;
- ❑ **Political and legal** - Intellectual Property, Piracy and Legal Rights are complicating issues of remuneration; changes to funding structures are affecting the sustainability of sectors reliant on public support, namely Performance and the Visual Arts;
- ❑ **Technological** - Technological progress, convergence and awareness are driving demand for audio-visual products and content; internationalisation, online commerce and digitalisation are opening up new markets;
- ❑ **Economy and business** - Market diversification, segmentation and polarisation are altering demand patterns; rapid changes within the sector are driving significant demand for new skills, with skills gaps emerging (locally and nationally) particularly for ICT- technical skills.

Sub-regional performance

The creative/digital/new media sector is the largest of the key knowledge sectors being assessed for this study, with 114,000 employees in 2007 (6.8% of the total across the Diamonds). Between 2000 and 2007 the sector accounted for particularly high proportions of employment within North Hampshire, Reading (11% of total employment in each Diamond) and Oxford (7%).

All study areas, with the exception of Thames Gateway and Urban South Hampshire, have high concentrations of employment above the national average. There are particular hot spots of

employment in the Reading and North Hampshire Diamonds, where levels are twice the Great Britain average, and considerably higher than both London and the wider South East.

Particular specialisms lie within the manufacture of television and radio transmitters (LQ of 2.8), software consultancy and supply (LQ of 2.0 and one of the main knowledge employers across the Diamonds with around 50,000 employees), the reproduction of recorded media and manufacture of television and radio receivers (each with an LQ of 1.3), and publishing (1.2 and an important employer with around 12,000 employees dominated by Oxford).

Workforce development

The following narrative on the skills issues is based upon the strategic plan from the Creative and Cultural Sector Skills Council.² Around 17% of creative businesses state they are suffering from skills shortages and feel these shortages most acutely in relation to management and business skills.

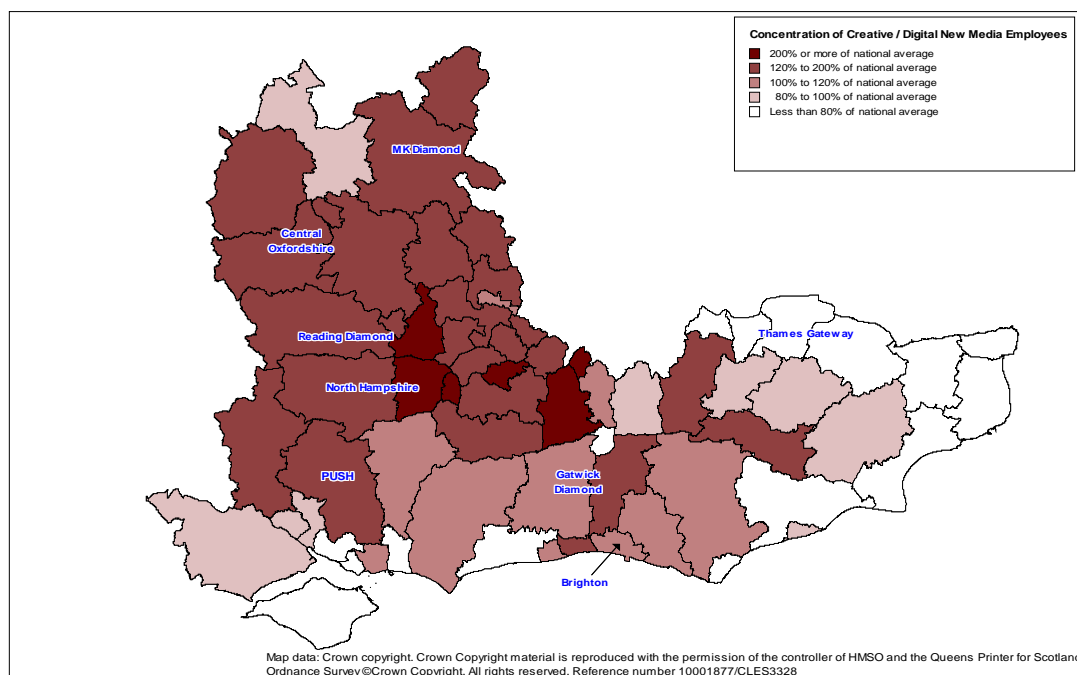
Creative businesses are facing competition from within more diverse and demanding markets, meaning that management skills are becoming more important within this sector. Many creative businesses require business and management skills tailored to their business requirements, and need advice and training from people who understand how creative businesses work. Creative businesses are typically small with only limited budgets and, as such, they under-invest in training and skills.

The sector is oversupplied and new recruits are lacking in relevant skills for core jobs. Entry into the sector, occupational routes and career progression, and knowledge around business growth in innovative small organisations is not clear. Creative industries lean heavily toward graduate and postgraduate recruits, however employers frequently cite 'lack of job-ready skills' as a key shortage.

The industry relies on a principle of on-the-job learning, ad hoc and informal training. In addition, the industry sees it as vital that training has an educational context and mentoring and apprentice schemes are considered key. Yet, in many cases, learners are not taught practical or technical skills rather theoretical and historical contexts.

Employers frequently cite technological skills gaps, particularly with regards to the digital and new media aspects of the sector, which acts as a brake on growth. A key knowledge gap also exists around intellectual property (IP) - there is a wide lack of understanding to secure knowledge rights through IP, which is resulting in leakage of knowledge from the sector.

Figure 2: Creative/digital/new media share of employment compared to the GB average, 2007²



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² Due to the nature of software mapping, employment share cannot be weighted by district to create the exact Diamonds – the intention of these maps is simply to outline some of the key trends throughout the region.

2.2 Information and Communication Technology (ICT)

Background

ICT is made up of various sub-sectors such as:

- Communications equipment;
- communications services;
- computing and peripherals;
- film/TV broadcasting;
- ICT equipment;
- information processing;
- multimedia communications;
- multimedia publishing;
- multimedia services;
- software services;
- systems integration; and
- vision and sound equipment.

The ICT infrastructure of the UK is highly influential for organisations in every sector and depends on communications to operate on a global scale. The sector is vital to the Diamonds and the wider South East not only as a generator of jobs and growth in its own right, but also as an enabler for other industries. Previous research has suggested that digital content is worth £8.7 billion per annum (20% of the total UK figure). Over half the employees within the sector are university graduates. Recent key growth areas within the sector include data storage/retrieval, virtual/online gaming and face recognition software (led by Sony), among many others.

Challenges and opportunities

Software³

The major driver of demand in this sector is the growth of multimedia in the home and the expanding role of the family PC (security software is a rapidly growing market). The UK software market needs to evolve at a rapid pace in order to protect its standing (threats from the increasing popularity of digital downloading software and consolidation/price competition).

Strengths within the sector include:

- Growing home PC market;
- broad ownership base and rising levels of affluence;
- growth in the number of people working from home brings opportunities for business software;
- growth in online communications;
- increasing offer of software suites as opposed to individual software components;
- buoyant gaming sector; and
- dynamic retail environment with many consumers adding/update software on a regular basis.

Weaknesses in the sector include:

- Free online sources, meaning people are becoming more IT literate but not paying for it;
- building software into new PCs is still a problematic function;
- piracy problems are severe;
- high costs of market entry; and
- the impact of intense competition is lowering prices/profit margins.

It should also be noted that it was not possible within the scope of this work to split high value software development from lower value support activities. However we note that South East Media Network are currently working on a study to provide more fine grained detail of software and the wider digital media sector.

Hardware

This sub-sector is becoming saturated meaning the focus for this industry is now less about capturing new to market prospects, but more about driving demand for replacement and secondary devices. The laptop is the fastest growing hardware device, with Acer being the market leader, followed by the likes of Dell, HP and Toshiba. Green initiatives is a major feature of the hardware market, with Dell leading the way in creating environmentally friendly PCs for the consumer market. The other driving force within hardware is in aesthetics and styling in the new product design of laptops.

Telecommunications

Aggressive expansion by mobile operators has changed the dynamics of the market and increased employment. There are concerns within the sector (e.g. Carphone Warehouse) of consumer expectation towards lower pricing and non-essential spending, with lower levels of disposable income, and the clear potential impact of margins and capacity for future technological developments. With regard to technologies, 3G penetration has hit 20% and is rising rapidly and i-phone (1 million sold by O2 alone in the UK) is popularising smartphones and their extended capabilities. Mobile broadband is popular and faster download speeds are key to driving the uptake of 3G services.

Sub-regional performance

The ICT sector is one of the most dynamic and important within the Diamonds. Total employment within the sector, at 105,000, accounts for 6.2% of total Diamonds employees, the second highest of the knowledge sectors after creative/digital/new media.

On the surface, the Diamonds were resilient to the dot.com crash with employee losses nationally, in the South East and London between 2000 and 2007, with the Diamonds employee levels increasing, albeit modestly, by 1,300 in the same period. This growth was uneven however, with North Hampshire driving the sector (increase of 4,400 employees or 24.6% over the period). The other ICT employment node, Reading, experienced a net decrease of 3,500 (-11%) since 2000.

The evidence suggests a niche industry within ICT across the Diamonds, with employment share higher than the national, regional and London averages. In particular, North Hampshire and Reading stand out, with employment share between three to four times that of the UK average, and Milton Keynes, with a concentration twice the national average.

The key specialism (and employer) across the Diamonds is in software consultancy and supply (LQ of 2.0), with the other major employers in the sector being telecommunications (employing around 20,000 with an LQ of 1.4).

There are also several other niches with nearly all sub-sectors being higher than the national average, including:

- ❑ data processing (2.5 and a significant employer with approximately 6,000 employees);
- ❑ manufacture of office machinery and computer hardware (2.3);
- ❑ manufacture of control equipment (1.9);
- ❑ hardware consultancy (1.6 with 3,000 employees, a much smaller employer than software);
- ❑ other computer related activities (LQ of 1.5 and a considerable employer of around 10,000);
- ❑ maintenance and repair of computer machinery (1.4); and
- ❑ reproduction of recorded media (1.3).

Workforce development

It is challenging to summarise skills issues within this sector, as much of the existing intelligence is around the general ICT workforce, which clearly spans most industrial sectors and could be captured under different sectoral definitions. The analysis below, based upon reporting from the Sector Skills Council (e-skills UK), highlights existing issues around ICT professionals.⁴

Over the coming decades, significant numbers of people will be needed to enter the ICT workforce, filling increasingly high value added complex roles. Skills within the workforce are changing rapidly, with the need for greater return on ICT investments and the effects of 'global geo-sourcing' leading to the demand for broader and deeper skills like never before. There is also a major gender imbalance in the ICT workforce, with the sector largely being dominated by males.

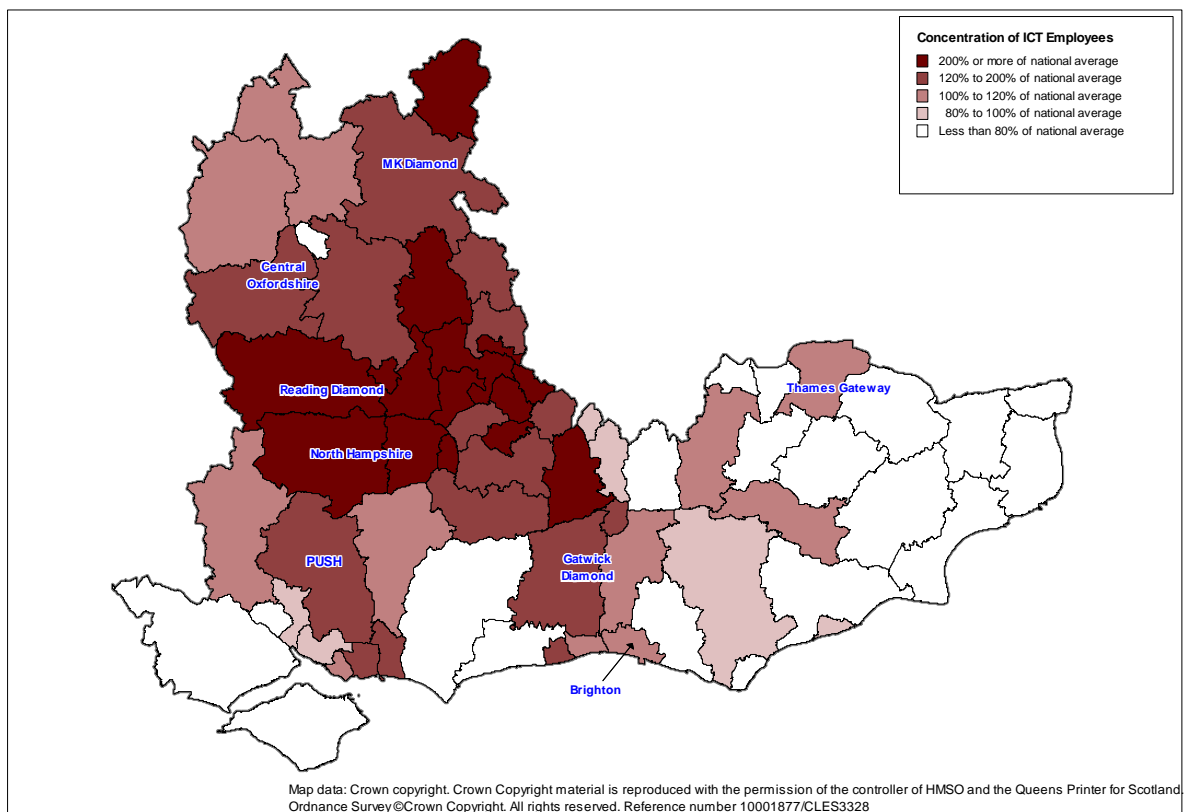
ICT professional training is provided overwhelmingly by the private sector, with ICT firms spending more on training than any other sector, with the vast majority of these courses for NVQ Level 3. In fact, the ICT sector demand for professional training is above Level 3; however there is little Further Education provision at these levels.

In general terms (irrespective of whether or not firms are experiencing ICT specific skills shortages), when asked about skills held by candidates for ICT posts, recruiters are likely to hold issue with business skills, which are often below the level required for the organisation. In general, the problems around ICT skills are reported more by small firms, particularly in the case of business skills and, to a lesser extent, sector knowledge.

Recent surveys from e-skills highlighted that for existing ICT staff, the overall match between the skills held by them and those required by employers, was reasonably close. However, there were gaps noted in:

- ❑ Business process and change management;
- ❑ information management and security;
- ❑ personal skills and leadership; and
- ❑ service management and delivery.

Figure 3: ICT share of employment compared to the GB average, 2007



2.3 Engineering / Advanced Manufacturing

Background

Advanced manufacturing is a sector with engineering at its core. The sector includes the manufacturing of machinery and equipment and involves anything from cars through to electrical equipment, medical instruments, weapons and domestic appliances. Advanced manufacturing is crucial to future national prosperity, being at the forefront of the transition towards a low carbon economy.

Challenges and opportunities

The Government's *Manufacturing: New Challenges, New Opportunities*⁵ document outlines a number of dynamics in transforming the sector:

- ❑ **increasing prevalence and complexity of global value chains** – linked to changes and developments within the sector and fragmentation of processes which encourage specialisation;
- ❑ **accelerated pace of technology exploitation** – as pace and demand for change implementation is increased;
- ❑ **growing importance of investment in intangibles** – including design, branding and R&D;
- ❑ **people and skills** – increasing recognition that investment in people is absolutely crucial for advanced manufacturing and engineering to be successful; and
- ❑ **move to a low carbon economy** – manufacturing firms will face a number of new challenges, but will also have access to a wide range of new opportunities.

In broad terms, there are opportunities across a wide range of sub-sectors (e.g. in electronics, strong growth areas are within homeland defence and security, medical, industrial and wireless technologies). There are also opportunities around leveraging investment into low carbon technologies, such as wind turbines. We provide more detail on manufacturing sub-sectors below.

Aerospace

Second only to the US, the UK has a highly developed aerospace and defence sector, with an annual turnover of £20 billion, accounting for an estimated 13% of the total turnover of the global aerospace industry and 23% of the European market by value. Aerospace is one of the largest export industries of the UK and directly employs 113,000 people, equivalent to 0.5% of national GDP. Its size, capability and trade value (and associated R&D/supply chain) makes the sector a key national asset which has international comparative advantage – a global leader in systems design and integration and electronic avionics – in particular defence where the UK has an estimated 33% of total global market share.

Demand for air travel is forecast to grow by at least 5% a year over the next decade. The new economies of India and China are driving the greatest growth in air travel and it is likely involvement in the design and manufacture of the extra aircraft will be sought. This, in turn, is stimulating new global supply chain models and technology transfer. The rising cost of fuel and increasing environmental concerns are demanding new technology solutions, while new infrastructure such as airports and air traffic management systems (which will also contribute to greater fuel efficiency) will also be necessary.

The South East of England is an international centre for the aerospace industry because of the concentration of aerospace production and supporting critical assets located within the region. 43,800 people (16% of the UK total) regarded as the highest qualified in the UK work within the sector in the South East, within an estimated 3,500 enterprises (22% of UK firms in the sector).

Home to two of the world's leading airports at Heathrow and Gatwick, the South East has specialised clusters of firms providing spares, repairs and maintenance, simulator manufacturing and training, interior design centres, aircraft certification and charter services. The region is also home to a number of leading global firms and consortia, including BAE and Rochester Airfield (Kent), a significant employer and centre for advanced research services and development, including avionic displays and software technologies. Farnborough Aerospace Consortium (FAC) also represents one of the largest aerospace and defence trade associations in Europe, with a global network of partners.

Other UK niche and sub-sectors associated with both the aerospace sector and international centres of innovation and research located in the South East include:

- ❑ Space technology;
- ❑ defence systems;
- ❑ autonomous vehicles (UAVs);
- ❑ homeland security;
- ❑ aviation/civil aerospace and airports;
- ❑ automotive maintenance and repair;
- ❑ environmental technologies; and
- ❑ composites and materials sciences.

Automotive

The UK possesses world-class capability in advanced automotive engineering, covering industrial sectors of motor vehicle manufacture, transport equipment, machine tools and equipment. UK-based companies are prominent in global supply chains covering a number of other major sector areas such as aerospace, automotive, energy, environmental technologies, and material sciences.

The UK automotive industry employs around 820,000 people with 180,000 directly in manufacturing and currently accounts for over 11% of the UK's total exports. Over 40 companies manufacture vehicles in the UK – ranging from global volume car makers, van, truck and bus builders, to specialist niche players. The industry is supported by a supply chain including many of the world's major Tier 1 component manufacturers, technology providers, design and engineering consultancies.

Despite the challenges of the current economic downturn and its impact in the sector and supply chain, the Automotive sector remains a highly successful - productive industry, with GVA per worker comfortably above the average over the economy as a whole. The South East is home to a number of automotive production sites including for example BMW (shell production, paint and assembly at the Cowley Plant), Rolls-Royce (Chichester), and a significant motorsport cluster (including McLaren and Renault) – with links to international racing circuits including Brands Hatch and Goodwood.

The shift to a low carbon – fuel efficient economy represents a significant opportunity for the Automotive (and supply chain) sector. There are many continuing improvements which all represent advances in the automotive technology that will help the UK shift to a low-carbon future. These include advances in the efficiency of internal combustion engines through improved fuel injection systems, improved aerodynamics / light weighting or drag reduction, advanced transmission spread, electro-mechanical movement, automatic start-stop technologies, energy recuperation, 'omnivore' and hybrid cars running on different fuel types, hydrogen powered and electric vehicles (for example the South East's - Mini E Consortium).

Marine

According to SEMTA,⁶ nationally there are around 57,000 direct employees in shipbuilding and repair, boat building and repair, and marine equipment manufacturers. Together they contribute more than £1.9 billion to GDP. There are many new opportunities but also challenges emerging for the sector to become more competitive and increase productivity.

Within shipbuilding and ship repair, major orders from the MoD will provide significant levels of employment for shipyards and suppliers over the next fifteen years. Ship repair and conversion are growth sectors, both globally and in the UK, and there is also a developing market for smaller specialist cruise ships, in addition to converting former naval and fishing craft into super yachts with bespoke design, build and outfitting of luxury yachts. This is an important growth area for naval ship builders and a niche market for marine equipment suppliers. The South coast has an increasing share of employment, much of which is likely to be along the Solent and concentrated around Portsmouth and Southampton.

The boatbuilding and leisure marine equipment manufacture is a growth area employing around 16,000 people in the UK. Yacht building is a successful export sector with strong international competition, with employment in the sector growing and new types of skilled occupations being created in response to innovation. There are around 900 marine equipment companies throughout the UK, including world class marine equipment manufacturers seeking to strengthen their position in export markets.

Sub-regional performance

There may be potential for growth within this sector, with a significant proportion of employment within the Diamonds (5% of total jobs representing 82,000 employees). Advanced manufacturing has experienced considerable decline in employment over recent years primarily due to industrial restructuring, outsourcing and the sector becoming more efficient in its operational activities, although employee losses between 2000 and 2007 (-27%; 30,000 jobs), on a relative par with the national picture, have not been quite as marked as in both London (-47%) and the wider South East (-30%).

Spatially within the Diamonds, decreases in employment have been uniform across the sub-regions, with the largest relative effects felt in Brighton and Hove (-47%) and Reading (-35%).

The Diamonds sub-regions have a share of employment slightly higher than the national average, with particular concentrations in Urban South Hampshire (one and a half times the average share) and within Gatwick and North Hampshire. Share of employment is particularly low in Brighton and Hove and Reading. Key specialisms (among others) include:

- ❑ The manufacture of optical instruments (LQ of 3.3, with the vast majority of the employment in this sub-sector within Urban South Hampshire of around 2,500 employees);
- ❑ manufacture of television and radio transmitters (LQ of 2.8, with key employment nodes in North Hampshire, Reading and Urban South Hampshire);
- ❑ manufacture of office machinery and computers (LQ of 2.3 concentrated in Urban South Hampshire, Oxford and Milton Keynes);
- ❑ manufacture of generators (LQ of 2.1 and concentrated within Gatwick and Thames Gateway);
- ❑ manufacture of industrial process control equipment (LQ of 1.9);
- ❑ building and repairing of ships and boats (LQ of 1.7 concentrated mostly within USH);
- ❑ manufacture of other electrical equipment (LQ of 1.5 and concentrated primarily in Oxford and, to a lesser extent, Urban South Hampshire and Gatwick); and
- ❑ manufacture of weapons and ammunition (LQ of 1.5 mainly within Urban South Hampshire).

Workforce development

The analysis of skills gaps, undertaken by the relevant Sector Skills Council (for Science, Engineering and Manufacturing Technologies – SEMTA⁷), focuses on a range of sub-sectors around engineering/advanced manufacturing.

Aerospace

Skills gaps for technical engineering skills (75%) were the most significant, particularly for general engineering skills, CNC machine operators, Computer Aided Design (CAD) and Computer Aided Manufacture (CAM). Other skills gaps included management skills and key/personal skills. Skills that are required most by aerospace employers at high and advanced levels are team working, technical and practical skills, and communication skills. The increased emphasis on high value added activity within the industry has been reflected in increasing skills gaps.

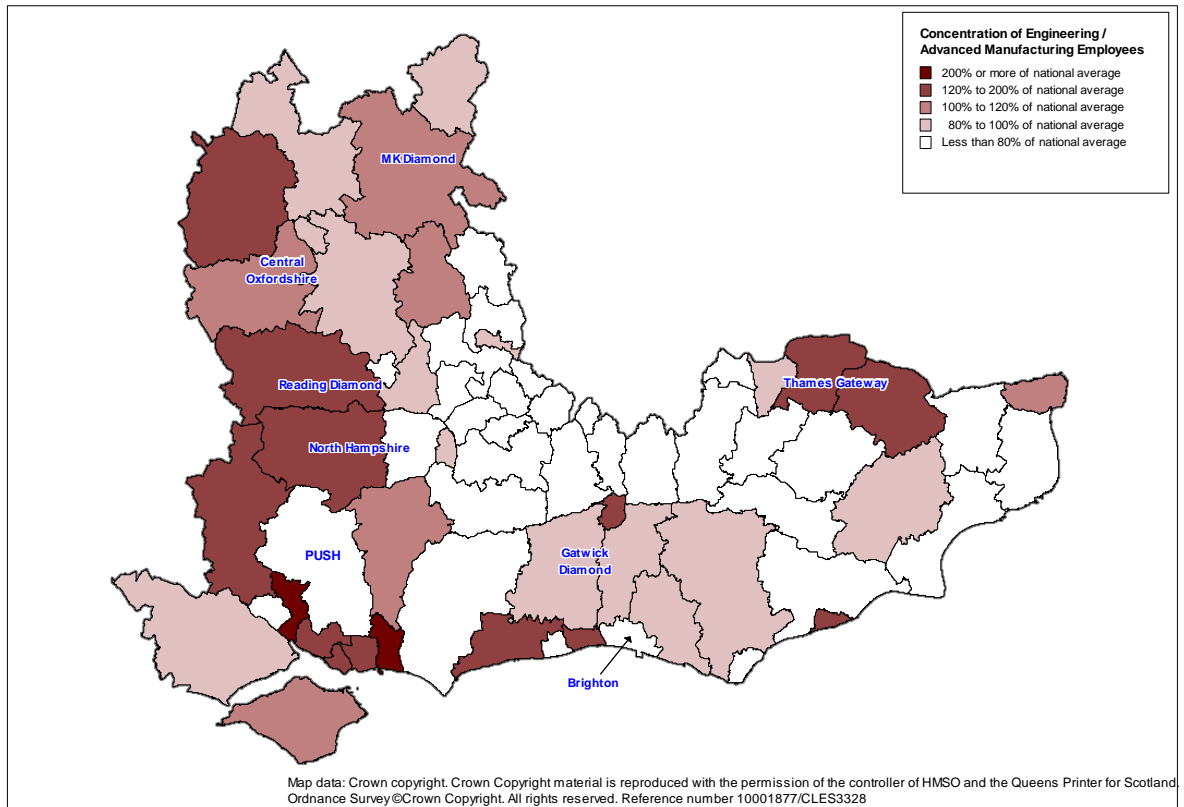
Automotive

Automotive employers experience skills gaps amongst operators, crafts persons and technicians, with these occupations having the most significant impact on their business. Skills gaps lead to increases in operating costs and difficulties introducing new working practices. Skills gaps for technical engineering skills are particularly important as well as the key/personal skills of communication, team working and problem solving. Technical engineering skills gaps in the automotive sector include CNC machine operators, assembly line/production robotics and CAD.

Marine

There are a number of key strategic skills issues in the marine industries. The sector needs specific technical skills of Level 3 and above. There is a need for multi-skilled craftspeople that can absorb new technologies and processes. More specifically, there is a need for more graduates with relevant degrees who are ready for productive employment, including naval architects and marine electrical engineering graduates capable of using the latest technologies and materials in design. There are also calls for more employer training initiatives (e.g. Marine Schools Challenge in South West England). Such initiatives can help increase STEM participation and improve school performances.

Figure 4: Engineering / Advanced Manufacturing share of employment compared to the GB average, 2007



2.4 Bioscience (including biotechnology, technical equipment and pharmaceuticals)

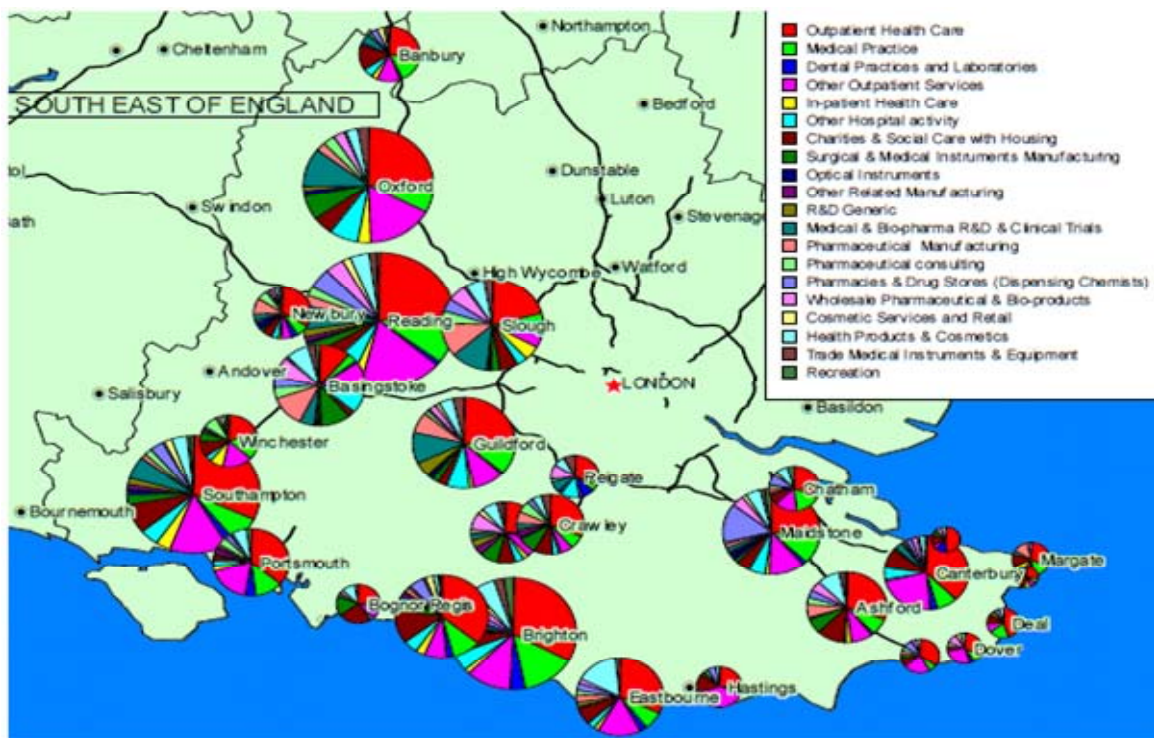
Background

Bioscience incorporates R&D in developing pharmaceuticals, medication and drugs, manufacturing of therapeutics and devices, medical and surgical equipment, and the development of biotechnologies.

The bioscience sector is around 30 years old and has begun to mature. It is likely to become crucially important over the coming decades and at the forefront of knowledge intensive industrial activity. The reasons for the increase in bioscience related fields over the last few decades have been numerous, including the discovery of DNA manipulation, which led to gene sequencing and the human genome project. There have been many other scientific breakthroughs around disease identification and medication, allowing knowledge to be exploited for human use.⁸ As in the wider bioscience sector, medicine and pharmaceuticals has the potential to grow significantly in the UK with increased levels of R&D being afforded to it. There are also the challenges and opportunities of an ageing population to be accounted for, with the demand for medicines and other pharmaceutical products likely to be significantly increased. There is a major presence of several large pharmaceutical companies within the South East, with a strong research and supplier base complementing it, including contract biological medicine manufacturers.

The South East has the highest concentration of health technology companies in the UK. It is home to world renowned universities, medical schools and institutes undertaking pioneering health research. Almost a third (30%) of the UK's life science R&D activity is carried out in the South East, with 9 out of 10 of the world's leading life science companies, and the top 12 global pharmaceutical companies operating in the South East. Independent studies have suggested that the region contains the largest cluster of health technology in the world outside the US. 0 highlights the significance of the South East, in particular around Oxford and Reading, illustrating the spread across the whole region.

Figure 5: Bioscience clusters across South East England



Source: SEEDA (2009)

Challenges and opportunities

Pharmaceutical industry⁹

The UK is the most important market in Europe for the development and marketing of pharmaceuticals. The UK market for pharmaceuticals was worth £13.6 billion by the end of 2007. The industry's exports were also worth £13.8 billion with a trade surplus of £4.3 billion. The demand for pharmaceuticals continues to be high, with important areas of development likely to remain in those related to the ageing population, such as cardiovascular and cancer treatments. Demand for treatments around neurological conditions such as Alzheimer's and psychiatric conditions are also likely to grow.

The global market for pharmaceuticals will continue to grow as developing countries demand higher standards of healthcare, however there is a focus on cost control in major markets which is likely to be reflected in levels of R&D; therefore only the most visibly cost effective treatments will survive.

It is the emerging markets, such as India and China, which are showing stronger sales than European, US and Japanese counterparts, highlighting considerable future opportunities. Within the internal UK market, the decision making processes of the NHS will determine the future direction of the market. It is likely that the NHS will be carrying out more cost/benefit analysis regarding existing and new treatments which will weed out treatments that do not bear long term scrutiny.

R&D activities are intensifying and UK investment is growing year-on-year, with 951 compounds in pre-registration clinical development in 2006, compared with 561 in 2002, and pharmaceuticals accounted for around 60% of investment in UK medical R&D in 2005. An increasingly important area within R&D is vaccines. R&D is highly globalised and medicines are developed in the UK for worldwide distribution. One in five of the world's top medicines are developed in the UK (more than any country outside of the US, and as much as the rest of Europe combined).

Regarding the nature of pharmaceutical firms, there are three different types:

- 1) **global research based** – such as GSK;
- 2) **medium sized** – which operate within specific markets and may often be a market leader;
- 3) **small** – research driven and privately financed start-ups through venture capital sources which often form partnerships with licence technology to larger firms. These small companies are often based within tech clusters in science parks, for example Kent Science Park.

Companies will be either drug delivery or generic manufacturers. Within the UK, many of the companies working within pharmaceuticals are very small, often employing fewer than ten people. Similarly to aerospace, it is the large firms (dominated by 10 or so multinationals) which drive the growth of the sector, hungry for new technologies and often buying out small companies who have made breakthroughs to achieve this.

There are very few medium sized companies - often when small companies grow they are bought out, a result of the structure of the venture capital system in the UK, where often the finance through such sources does not help small firms in the sector grow to be competitive, unlike in the US which has a strong portfolio of medium sized pharmaceutical companies.

Apart from access to finance constraints, the key issue for the smaller companies is the domestic markets and not being able to access the NHS effectively, constraining growth of the sector. Access to the NHS would help transform the sector and increase levels of innovation across the board.

Manufacture of technical medical equipment

The UK market for medical equipment and consumables was worth an estimated £3.8bn in 2008, having grown by 7.6% over the course of the year. The sector has witnessed significant growth over the last decade driven by increases in spending on the NHS, as well as increased spending on private healthcare during more buoyant economic conditions. The sector is represented by over 800 firms across the region with concentrations of specialist equipment manufacturers in Oxfordshire and Kent.

Whilst this export led sector is made up of many small companies who have not suffered particularly badly through the recession - due to Government commitment to investments in the NHS - it is likely that growth will continue but at a slower rate over the next five years, as a result of lower spending becoming more pronounced after 2010. However efficiency gains by medical-devices are still likely to attract continuing investment, in particular when the NHS is tasked with improving productivity.

Rapid technological progress has been one of the key features of the medical-equipment market. Across the industry companies are investing heavily in developing new products that integrate the latest information technology in order to reduce operating costs, improve accuracy and quicken the pace at which information is processed. Medical diagnostics has witnessed particularly strong growth – where previously labour intensive activities have been increasingly replaced by automated technologies, reducing analysis time.

Sub-regional performance

Employment within this sector accounts for 1.3% of the total within the Diamonds sub-regions, a total of 22,000. Despite the potential importance of bioscience to the Diamonds, employee figures have declined between 2000 and 2007, a trend in keeping with London and the wider South East, but not with the national pattern, where growth of 7.5% has been experienced. Geographically within the Diamonds there is a mixed pattern, with considerable growth within North Hampshire (2,600) and Reading (1,400).

However, this employment growth has been offset by decreases within Thames Gateway (-1,600) and most notably Oxford (-6,000), although Oxford remains a key employment centre. These figures should be interpreted with caution as change in classification codes for R&D activities, particularly prominent in London and the South East, meant a significant drop between 2002 and 2003 in this sector. Employment in recent years (between 2004 and 2007) has lowered by around 800, with Oxford's employment remaining static. Indeed, according to the relevant Sector Skills Council, the sector is expected to expand considerably over the coming years.

The Diamonds, together with the wider South East, has employment share well above the national average, with several sub-regions where employment concentrations are particularly high, most notably North Hampshire and Oxford (close to four times the national average) and Gatwick and Reading (over twice the national level). The key sub-sector is R&D on natural sciences and engineering (LQ of 2.3 with a spread across several Diamonds, although the key nodes being Oxford and Reading). Other niches include the manufacture of medical and surgical equipment and orthopaedic devices (LQ of 2.0 spread throughout the Diamonds, with the main concentration in Oxford), and the manufacture of pharmaceuticals, (LQ of 1.2 across many Diamonds).

Workforce development

Overall, the picture that emerges is of a sector that encompasses a wide range of companies in a number of distinct sub-sectors, from large multi-national enterprises to micros with fewer than ten employees. The sector is expected to grow significantly over the coming years.¹⁰ There are high levels of recruitment activity, mostly due to the expansion of the sector, rather than high levels of replacement demand. As a consequence, there are high levels of hard-to-fill vacancies and skills shortages.

These hard-to-fill vacancies and skills shortages are very wide ranging and occur across all scientific disciplines and in all scientific occupations in the sector. This suggests that employers require a general expansion in the supply of a range of appropriate biological and chemical science skills, particularly at graduate and postgraduate levels. The consequences of such hard-to-fill vacancies are serious and include projects not being taken forward, the loss of products in the pipeline and having to turn work away. There is evidence that skills shortages are limiting the industry's expansion. Similarly, the sector is suffering from skills gaps, particularly in senior researchers, senior scientists, product design engineers and laboratory scientists.

Figure 6: Bioscience share of employment compared to the GB average, 2007

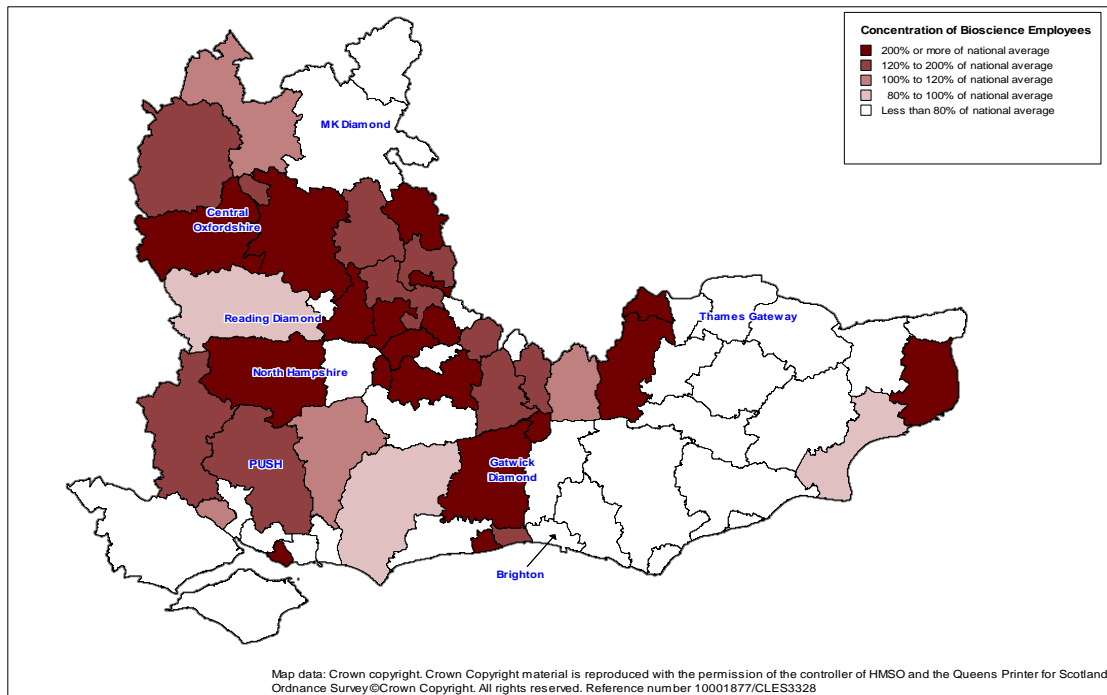
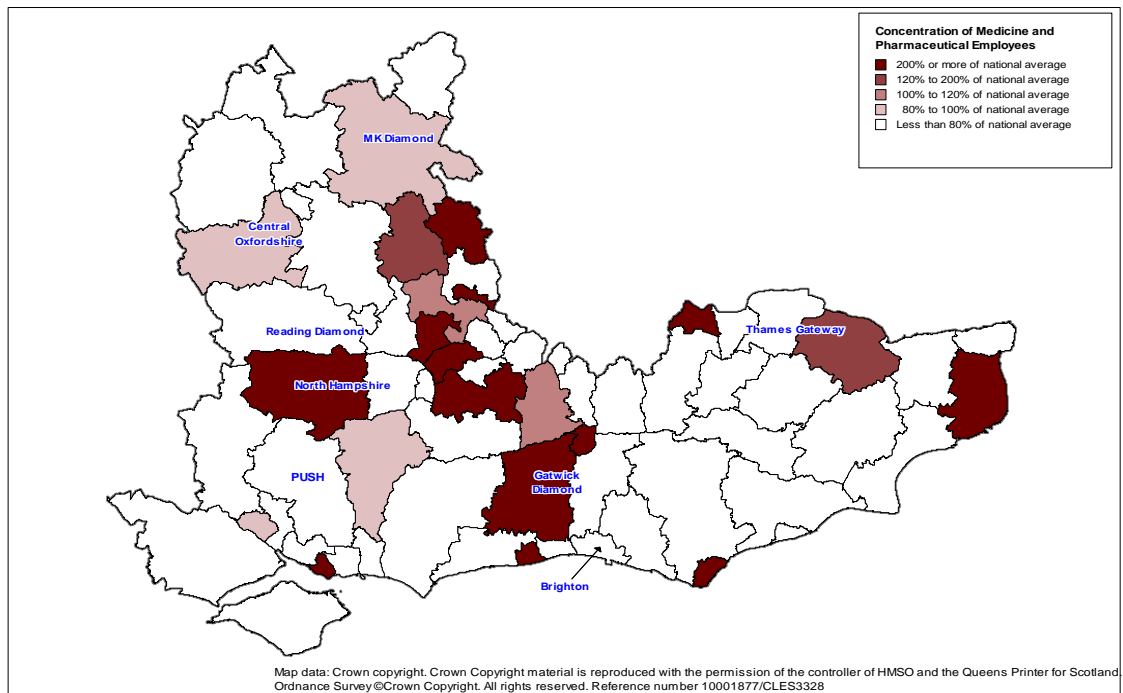


Figure 7: Medicine and pharmaceuticals share of employment compared to the GB average, 2007



2.5 Environmental technologies

Description

The environmental technology sector covers a number of activities whose common characteristic is that their products and services directly concern the environment, including the protection and management of natural resources or the development of cleaner, more efficient processes and products. For the purpose of this study, it is defined as those activities directly related to the environment, rather than incorporating a whole host of sectors which can result in an unwieldy and large sector, distorting the data of other knowledge based sectors being analysed. It is a difficult sector to analyse with current available statistics, as the cross-over with engineering/advanced manufacturing will be complex in the future and, in the case of the key sub-sectors, R&D in natural sciences and engineering has cross over with biosciences. However despite this cross over, high levels of existing R&D suggests a strong foundation for future work in this sector. For this reason, it is suggested that statistical analysis of this sector be interpreted with caution and as much thought should also be given to the prospects of other sectors in contributing to its success.

Significance

Environmental technologies are increasing in importance as regulation calls for more efficient and cleaner methods of operating. This will no doubt increase the need for effective recycling services, industrial cleaning and collection and treatment of waste, together with increased levels of R&D in natural sciences and new methods in advanced manufacturing. Without a skilled workforce capable of performing in a highly technical environment, the operation, enhancement and maintenance of this infrastructure would be considerably problematic. According to the *'Regional Funding Advice for South East England'* this is a priority sector, with plans to increase the level of support made available to support the ambition of the Diamonds to deliver a reduction in their ecological footprint two years earlier than the rest of the region.

Sub-regional performance

With employee levels at 57,000, environmental technologies constitute 3.4% of employment within the Diamonds. Again, how much of this activity is R&D in bioscience cannot be deciphered from the statistics. Complementing environmental technologies and warranting further analysis is the energy and water sector, representing 10,300 employees within the Diamonds, with an increase of 1,300 (14.2%) over the period 2000 to 2007, contrasting with decreases at the national, regional and local scales.

Location

Environmental technologies have a share of employment in the Diamonds that is higher in the South East and on a par with London. The key geographic concentrations are in North Hampshire, Oxford and Reading (although the statistics will also include bioscience R&D), with employment share greater than the national average in all sub-regions, with the exception of Milton Keynes and Thames Gateway.

Skills challenges

Intelligence on skills challenges within environmental technologies is accessed through the energy and utility Sector Skills Council, with overlaps between environmental technologies and energy.¹¹

There will be challenges around replacement demand, exacerbated by an older than average workforce. At the national level, in the case of the largest occupational category, skilled trades, 41,000 workers will be needed to replace those in the existing workforce who are expected to retire or otherwise leave the sector between now and 2014. Aside from the skilled trades category, a further 94,000 workers will be needed in the same period.

More than one quarter of employers across the sector in England have identified a skills gap amongst its current workforce – in the South East the skills gap identified for the sector is 18%. The occupations most associated with skills gaps tend to be technical, industry specific and management in nature but softer skills, such as team working, were also highlighted as lacking. The main causes of skills gaps amongst employers were cited as changing technologies and working practices. Developments and advancements in technology impact the sector significantly when changes are made to work practices, which subsequently affect the skills base of the workforce.

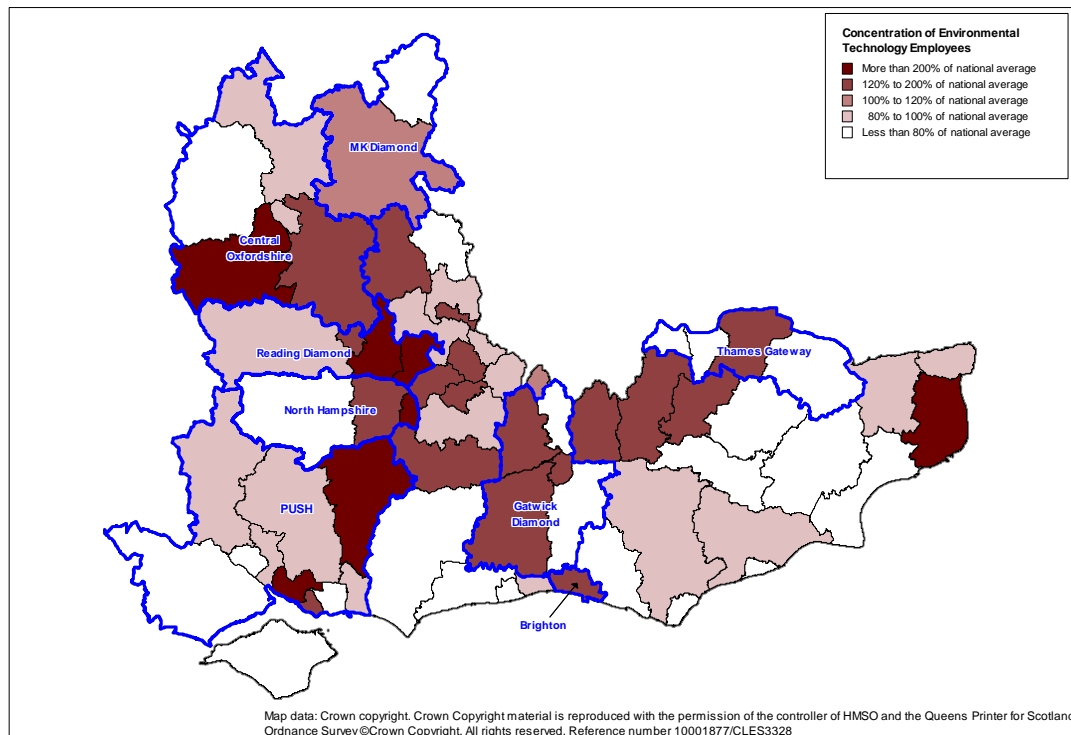
Within the South East, there are a number of demand side issues that have been identified:

- ❑ the employer demand for upskilling and the requirement for apprenticeships across the energy and utility industries are fairly high. Skills demand in the South East region is strongest around various engineering specialisms, mainly at Level 4; however there is also a need for professional skills, including contract management;
- ❑ there has been a reduction in the number of young people undertaking engineering and technical courses. Therefore, with this reducing supply of appropriately skilled graduates and increasing competition from other industrial sectors, it is vital that a radical approach is developed to attract new entrants into and across the energy and utility sector;
- ❑ there is a retention and recruitment problem in the region. Engagement with employers found a requirement for encouraging and attracting new entrants, particularly young people;
- ❑ linked to the above point, there is a need to increase engagement between HEIs and employers, together with a need to encourage young people to enrol onto technical and/or STEM related degree programmes;
- ❑ there is a need to recruit and retain highly skilled people. In addition to the problems of an ageing workforce, their skills position has been made worse by the transfer of skilled staff to third parties as part of outsourcing strategies. The stop/start nature of the economic regulatory environment also discourages long term investment in skills. Within the next regulatory cycle, it is likely that the water industry will encounter significant skills issues if action is not taken.

With regards to skills provision within the South East:

- ❑ there is very limited training provision in the sector. Where provision exists, it is quite often very academic and general in content;
- ❑ the development of qualifications and training courses is a key requirement for the industry. Here, the sector requires industry specific skills qualifications and frameworks for all four industries, in particular the Level 2-4 range; and
- ❑ there is a need to increase the supply of industry specific training and qualifications.

Figure 8: Environmental technologies share of employment compared to the GB average, 2007



2.6 Engineering construction

Description

This sector involves the construction of plants, gas and oil platforms, nuclear decommissioning, and the erection and dismantling of processing and manufacturing and power generation plants. This sector does not map onto standard industrial and occupational classifications and is therefore contextually assessed in this study. It is likely that many of the activities undertaken in this sector are captured in some of the engineering/advanced manufacturing operations.

Significance

UK engineering construction is a global force, leading Europe and second only to the USA in the world. Accounting for 0.4% of UK GVA, it is critical to the UK's future investment in vital infrastructure. As a contracting industry, UK trained personnel are responsible for leading innovation and quality on sites worldwide. Domestically, the £16 billion industry is fundamental to the economy. It employs approximately 80,000 in the UK and is essential to the infrastructure of major economic sectors, accounting for up to 20% of GDP through the design, project management, construction, installation, testing, commissioning and maintenance of the structures described above.

Although not strictly engineering construction (which does not account for civil construction activities), it is appropriate to assess some of the regional issues in other high value construction, which will provide the infrastructure for knowledge intensive industries in the future. Although not mentioned within *'New Industry New Jobs'*, construction accounts for 10% of GDP and has experienced 20% growth in the last 15 years. The concern amongst those in the industry is that by not being included within *'New Industry New Jobs'* the sector will suffer in the long term with cuts to funding and resources.

Despite these issues, there are significant opportunities for high value construction activities, many of which are linked closely to engineering construction. Renewables are a major opportunity, investing in the retro-fitting of existing stock. Retro-fitting is one of the key activities being undertaken at the Institute for Sustainability in Thames Gateway. Reducing energy is likely to stimulate growth and retro-fitting in commercial/retail/industrial buildings is a key opportunity for the low carbon economy; however at present not enough is being done to maximise this. Other opportunities include:

- ❑ 2012 Olympic Games, branded the first 'Green Games';
- ❑ intelligent building, better management and operation systems in building space to improve occupier performance;
- ❑ ways of working, providing potential opportunities with more remote working technology;
- ❑ tele-care.

New buildings will need to make these major changes a reality.

Within the South East, the Diamonds are perceived to be key areas for potential within high value construction; however there is a key threat to the sector with major anticipated cuts over the next few years in government construction projects. There is also a lack of R&D spend within the sector, with commercial and housing markets still depressed, reflected in the levels of R&D. General R&D spend is only around a tenth of pre-tax profits compared to the aerospace sector.

Skills challenges

Engineering construction is a craft skill intensive sector. With the large growth in workload anticipated in the future, there are worries within the industry that there will be insufficient skilled people for the anticipated increase within the industry (it is estimated that there will be around 30,000 extra job opportunities by 2014/15).

However, the number of people employed within the industry varies depending upon the number of major projects underway, making it almost impossible to project future skills needs with precision. This seasonal and cyclical nature of employment means that companies do not invest enough in training as the benefits are lost if the employee leaves.

There are a number of developments within this sector which will be likely to affect demand for skilled staff according to the Engineering Construction Industry Training Board. These include:

- ❑ a large number of repair contracts for the UK offshore sector;
- ❑ any decisions to build nuclear reactors will clearly have a significant impact in activity and skills demand;
- ❑ many of the skills required for renewables are likely to come from engineering construction and more appropriately qualified people will be required to fill the gap;
- ❑ if UK climate change obligations are to be met, there will be an increase in the need for carbon technology within plants and the early retirement of employees;
- ❑ much of the engineering construction workforce is ageing therefore demand is set to increase;
- ❑ it is expected that a 5% per annum increase in staffing levels needs to be met;
- ❑ increasingly, there is a need for Level 3 skills to complement the increasing numbers of Level 4 and 5.

Around three fifths of the engineering construction companies have reported difficulties in recruiting professional engineers, scientists or technologists, with the same proportion finding difficulties in recruiting managers. Over 10% have reported difficulties in recruiting the supporting workers such as welders, pipefitters, instrument technician and electrical technicians. With regard to the current workforce, over half of the companies believe that professional engineers, scientists and technicians are fully competent.

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APPENDIX 1

Sector definitions

Sector Definitions

The following provides the SIC classification codes for the key knowledge sector assessed as part of this study. They are not all mutually exclusive, with natural cross-over between the sectors. There are limitations to the data – SIC classifications do not always capture the nature of an areas' economy, as they are weighted in favour of manufacturing, and do not accurately highlight, for instance, high value elements of a knowledge economy and the range of research functions, and very high end manufacturing activity. For this reason we consulted with several area managers and members of sector consortia to add further context and intelligence to the statistics being used in the analysis. Where possible we have defined the sectors using Sector Skills Council definitions, but we have added to these where SSC's cover different parts of what could be considered to be one industry sector. As with all sector analyses there is an element of evidence based judgement. By setting out our definitions below we aim to be fully transparent and consistent in our approach.

Bioscience

- 2441 : Manufacture of basic pharmaceuticals
- 2442 : Manufacture of pharmaceutical preparations
- 3310 : Manufacture of medical and surgical equipment and orthopaedic appliances
- 7310 : Research and experimental development on natural sciences and engineering

Creative, Digital, New Media

SIC 2003 class (4 digit)

- 2211 : Publishing of books
- 2212 : Publishing of newspapers
- 2213 : Publishing of journals and periodicals
- 2214 : Publishing of sound recordings
- 2215 : Other publishing
- 2221 : Printing of newspapers
- 2222 : Printing not elsewhere classified
- 2223 : Bookbinding
- 2224 : Pre-press activities
- 2225 : Ancillary operations related to printing
- 2231 : Reproduction of sound recording
- 2232 : Reproduction of video recording
- 2233 : Reproduction of computer media
- 2464 : Manufacture photographic chemical material
- 2465 : Manufacture of prepared unrecorded media
- 3210 : Manufacture of electronic valves and tubes and other electronic components
- 3220 : Manufacture of television and radio transmitters
- 3230 : Manufacture of television and radio receivers, sound or video recording
- 3630 : Manufacture of musical instruments
- 7221 : Publishing of software
- 7222 : Other software consultancy and supply
- 7420 : Architectural and engineering activities and related technical consultancy
- 7440 : Advertising
- 7481 : Photographic activities
- 9211 : Motion picture and video production
- 9212 : Motion picture and video distribution
- 9213 : Motion picture projection
- 9220 : Radio and television activities
- 9231 : Artistic and literary creation and interpretation
- 9232 : Operation of arts facilities
- 9240 : News agency activities
- 9251 : Library and archive activities
- 9252 : Museum activities and preservation of historical sites and buildings
- 9253 : Botanical and zoological gardens and nature reserve activities

Medicine and Pharmaceuticals (subset of Bioscience)

- 2441 : Manufacture of basic pharmaceuticals
- 2442 : Manufacture of pharmaceutical preparations

Engineering/Advanced Manufacturing

- 271 : Manufacture of basic iron and steel and of ferro-alloys
- 272 : Manufacture of tubes
- 273 : Other first processing of iron and steel not elsewhere classified; production of non-ECSC ferro-alloys
- 274 : Manufacture of basic precious and other non-ferrous metals
- 275 : Casting of metals
- 281 : Manufacture of structural metal products
- 282 : Manufacture of tanks, reservoirs and containers of metal; manufacture of central heating radiators and boilers
- 283 : Manufacture of steam generators, except central heating hot water boilers
- 284 : Forging, pressing, stamping and roll forming of metal; powder metallurgy
- 285 : Treatment and coating of metals; general mechanical engineering
- 286 : Manufacture of cutlery, tools and general hardware
- 287 : Manufacture of other fabricated metal products
- 291 : Manufacture of machinery for the production and use of mechanical power, except aircraft, vehicle and cycle engines
- 292 : Manufacture of other general purpose machinery
- 293 : Manufacture of agricultural and forestry machinery
- 294 : Manufacture of machine tools
- 295 : Manufacture of other special purpose machinery
- 296 : Manufacture of weapons and ammunition
- 297 : Manufacture of domestic appliances not elsewhere classified
- 300 : Manufacture of office machinery and computers
- 311 : Manufacture of electric motors, generators and transformers
- 312 : Manufacture of electricity distribution and control apparatus
- 313 : Manufacture of insulated wire and cable
- 314 : Manufacture of accumulators, primary cells and primary batteries
- 315 : Manufacture of lighting equipment and electric lamps
- 316 : Manufacture of electrical equipment not elsewhere classified
- 321 : Manufacture of electronic valves and tubes and other electronic components
- 322 : Manufacture of television and radio transmitters and apparatus for line telephony and line telegraph
- 323 : Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods
- 331 : Manufacture of medical and surgical equipment and orthopaedic appliances
- 332 : Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment
- 333 : Manufacture of industrial process control equipment
- 334 : Manufacture of optical instruments and photographic equipment
- 335 : Manufacture of watches and clocks
- 341 : Manufacture of motor vehicles
- 342 : Manufacture of bodies (coachwork) for motor vehicles: manufacture of trailers and semi-trailers
- 343 : Manufacture of parts and accessories for motor vehicles and their engines
- 351 : Building and repairing of ships and boats
- 352 : Manufacture of railway and tramway locomotives and rolling stock
- 353 : Manufacture of aircraft and spacecraft
- 354 : Manufacture of motorcycles and bicycles
- 355 : Manufacture of other transport equipment not elsewhere classified

Environmental Technologies

- o 0141 : Agricultural service activities
- o 3710 : Recycling of metal waste and scrap
- o 3720 : Recycling of non-metal waste and scrap
- o 4100 : Collection, purification and distribution of water
- o 4511 : Demolition and wrecking of buildings; earth moving
- o 4524 : Construction of water projects
- o 7310 : Research and experimental development on natural sciences and engineering
- o 7470 : Industrial cleaning
- o 9001 : Collection and treatment of sewage
- o 9002 : Collection and treatment of other waste
- o 9003 : Sanitation, remediation and similar activities

Information and Communication Technologies

SIC 2003 class (4 digit)

- o 2231 : Reproduction of sound recording
- o 2232 : Reproduction of video recording
- o 2233 : Reproduction of computer media
- o 3002 : Manufacture of computers and other information processing equipment
- o 3220 : Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy

SIC 2003 group (3 digit)

- 323 : Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods
- 332 : Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment
- 333 : Manufacture of industrial process control equipment
- 365 : Manufacture of games and toys
- 642 : Telecommunications
- 721 : Hardware consultancy
- 722 : Software consultancy and supply
- 723 : Data processing
- 724 : Data base activities
- 725 : Maintenance and repair of office, accounting and computing machinery
- 726 : Other computer related activities
- 921 : Motion picture and video activities
- 922 : Radio and television activities

Engineering Construction

This sector is difficult to quantify in SIC code, as highlighted below in a quote from the Engineering Construction Industry Training Board – this sector is very much about construction of plans, gas/oil platforms, nuclear decommissioning, erection and dismantling of processing and manufacturing plants etc, that do not fit easily into the SIC codes. We have used a more contextual analysis for this instead.

“The clearly defined scope of the ECITB is determined by a Statutory Instrument does not map on to standard industrial and occupational classifications. ECITB is unable draw upon standard statistical data sources similar to those used to produce Sector Skill Agreement (SSA) reports by Sector Skill Councils (SSC), such as the Labour Force Survey (LFS). Instead, a range of administrative data sources and other materials are used to meet the UK Commission of Employment and Skills (UKCES) requirements to deliver the labour market information reports.”