

3.2 The Biotechnology Sector

Executive summary

This section summarises the main findings for the Biotechnology sector that are detailed in the following chapter. For reference, it highlights the source of each finding. It should be noted that the summary only contains the most significant findings and recommendations. Additional issues and further detail are given in the chapter.

Sector overview: Sub-sections 3.2.1 and 3.2.2

- ❖ Biotechnology is an emerging sector. Its applications and processes have a wide range of uses across industry.
- ❖ For this study, the sector has been defined by the following SIC codes;
 - Manufacture of pharmaceutical products;
 - Manufacture of pharmaceutical preparations; and
 - Research: Natural sciences/engineering.
- ❖ (N.B. It is important to note that this definition is very broad and was adopted to allow analysis of NVQ provision and economic data).
- ❖ The sector is rapidly growing in the South West, but is still one of the smaller ones overall.
- ❖ On the basis of the broad definition above, over 9,300 employees worked in the sector in 2001, compared with 6,000 in 1991. However, the number of business in the region with “core biotechnology interests” is estimated at only 30-35. Thus the number of “core” biotechnology employees is probably less than 1,000.
- ❖ The significance of the sector varies markedly between different parts of the region. Three strong geographic bases exist in;
 - Wiltshire & Swindon around the DERA establishment;
 - Devon & Cornwall in the Plymouth-Exeter “SME arc”; and
 - The West of England in the Bristol-Bath “academic arc”.

- ❖ It is estimated that the sector contributed c.£300 million to the South West GDP in 2001.
- ❖ Aside from the one large DERA establishment, a large number of small businesses form the backbone of the industry in the region.
- ❖ The overall future economic prospects of the sector are good. The key factors affecting the future success of the sector are;
 - technological developments;
 - economic factors;
 - skills shortages;
 - funding availability; and
 - government regulations.
- ❖ However, the single most important factor affecting future prospects is public acceptance of bio-products.

Sector skills needs: Sub-section 3.2.3

- ❖ The growth and development of the sector is regarded as being closely related to one skills issue: that of achieving a “*critical mass of world class bioscience research and scientists*” in the region.
- ❖ In this respect, the sector remains focused on recruiting its workforce from academia, with degree and postgraduate level qualifications making up the core workforce.
- ❖ Consequently, NVQs are viewed by the employers operating in the sector as being very peripheral to their immediate skills needs and their requirements for incubating and establishing their businesses.

- ❖ Nonetheless, it is apparent that there are shortages for various types of skills and training within the sector that NVQs would be well placed to provide both now and in the future;
 - The need for more industry specified modular courses open to SMEs;
 - The need for graduate apprenticeships; and
 - Increased employer investment in training.
- ❖ Furthermore, across the sector there are concerns about the quantity and quality of graduates and about their practical abilities and skills to help drive the sector forward.
- ❖ As the area with the most significant cluster of bio-tech industries in the UK, the Biotechnology Sector Skills Plan of LSC Cambridge was examined. This identified a list of skills issues being confronted by employers in the area, which are of interest to the current study;
 - A shortage of management development courses;
 - Staff recruitment shortages particularly in laboratories;
 - Inappropriate and inflexible “off-the-shelf” training; and
 - A lack of a Steering Group to tackle training and development.

Biotechnology Skills Action Plans and project developments: Sub-section 3.2.4

- ❖ Various plans and strategies exist for the sector, both nationally and in the region, to help with the development of biotechnology businesses.
- ❖ The Biotechnology and Biological Sciences Research Council has a Strategy and a ten year vision. This focuses on graduates and academia.
- ❖ The BioIndustry Association has a manifesto which includes a section in encouraging a UK skills base for the sector and a set of recommendations including;
 - Improved links between industry and academia; and
 - More modular courses for SMEs.
- ❖ In the region, the Biotechnology Skills Development Fund has produced a Skills Action Plan listing seven issues and a set of accompanying actions;
 - Promoting team building, finance, marketing and ideas;
 - Management skills;
 - IT at all levels;
 - Business focus/customer service;
 - Supply of skilled entrants, graduates and PhDs;
 - Quality assurance/H & S; and
 - Employer investment in training.
- ❖ The various strategic documents and plans of the LLSCs contain few direct references to plans or programmes for the sector.

NVQ Provision in the South West for the Biotechnology Sector: Sub-section 3.2.5

- ❖ Ten NVQs were identified on the Qualification Curriculum Authority's Framework as being of relevance to the sector.
- ❖ These were primarily at levels 2 or 3, and offered only limited progression opportunities. There were no courses at level 5.
- ❖ Just two of the ten NVQs were actually provided in the South West in 2001-02, either in the workplace or FE/HE colleges.
- ❖ In 2001-02 there were only three work-based learners on NVQs related to the sector and none in FE/HE colleges in the region.
- ❖ This total is clearly insufficient if the sector is to use staff with NVQs to help it grow or develop in any way at all in the future.
- ❖ Thus NVQ provision and progression opportunities in the region are virtually non-existent for the Biotechnology sector, being constrained by;
 - Numbers of learners;
 - Geography;
 - Qualification level; and
 - Course depth.

Gaps in NVQ Provision: Sub-section 3.2.6

- ❖ To identify gaps in NVQ provision it is necessary to have two items;
 - A list of the (vocational) skills needs and requirements for the sector; and
 - A map of current relevant NVQ provision.
- ❖ At present the amount of available information on the first of these items is very limited. In terms of the second, the mapping showed that there is virtually no provision relevant to the sector.
- ❖ More significantly, Biotech employers do not perceive NVQs as being relevant to their current skills needs.
- ❖ Therefore the identification of “gaps” is not really appropriate or helpful for the sector at this early stage of its emergence.
- ❖ Nonetheless, there will need to be a debate with and within the sector over how it will meet its skills shortages in future in terms of those training requirements that are clearly vocational, rather than academic in their focus.
- ❖ Although the current skills demand focus on graduates and post-graduates, it is evident that for the sector to grow it will increasingly require technicians, laboratory and research assistants to support the higher level staff.
- ❖ This then can be seen as the largest “gap” in NVQ provision in the sector: the provision of appropriate and sufficient vocational training and skills in a manner that is industry led over the next five-ten years.

Validation exercise with employers: Sub-section 3.2.7

- ❖ The findings above were “validated” with some Biotechnology employers and stakeholders drawn from across the sector in the South West.

- ❖ This was done by means of consultations with employers asking them to consider means of addressing skills gaps and shortages.
- ❖ The validation exercise thus:
 - Confirmed the main findings; and
 - Produced recommendations addressing the issues identified.

Key recommendations for NVQ provision and progression within the Biotechnology sector: Sub-section 3.2.8

Two sets of recommendations were produced by the study which were substantiated by the research findings and endorsed by the validation work.

Key recommendations:

- ❖ Review the current and future needs for vocational training in the sector;
- ❖ Review the role of NVQs in meeting these needs in the next 5-10 years:
 - New courses;
 - Improvement to content and coverage of existing courses;
 - Increased number of learners;
 - Improved image of NVQ among employers.

Fit of recommendations with Action and Workforce Development Plans:

- ❖ The recommendations above dovetail with the following three aims in the Biotechnology Sector Skills Action Plan for the South West;
 - To identify the skills needs faced by Biotech companies;
 - To establish a South West Biotechnology Education and Training Forum; and
 - To create a regional menu of provision.
- ❖ They also contribute to two objectives and actions in the Government’s National Skills Strategy;
 - Reforming the qualification framework; and
 - Placing employers’ needs for skills centre stage.

3.2.1 Introduction

This chapter begins with an overview of the Biotechnology sector in the South West. It describes the definition used for the sector and gives a brief examination of its economic characteristics and prospects. It then examines the reported need for training and skills in the sector, based on the available research, before reviewing the relevant workforce development plans and sector strategy documents.

The chapter then maps out the available NVQs that are relevant to Biotechnology companies in the South West. It then examines which of the available NVQs are actually provided in the region. The findings from this examination are then compared with the identified needs in order to distinguish the major gaps in regional workforce training provision. These gaps and needs were also “validated” with some employers and stakeholders in the sector in the region and the chapter concludes with a discussion of the recommendations emerging from the validation exercise.

3.2.2 Overview of the Biotechnology Sector in the South West

The DTI describes the Biotechnology Sector as being the “*application of knowledge about living organisms, and their components, to industrial products and processes*”¹. The sector in the UK is, relatively, very new – having been established for only 25-30 years. The sector in the South West is still very small and is at an early emerging stage. Consequently, the current focus is on the development of a viable and sustainable sector in the region, rather than on the development of the workforce. However, it is recognised that the successful growth of the sector is dependent upon achieving a critical mass of world-class bioscience research and scientists².

3.2.2.1 Definition of the Biotechnology Sector

Defining the Biotechnology sector is not a straightforward task. The reasons for this are threefold;

1. The relative newness of the applications and technologies used by the sector means that most are not covered by the categorisations devised for use in the most common method of classifying business activity – the Standard Industrial Classification (SIC 92) which was last revised in 1992;
2. The fact that much of the work of the sector is undertaken as a part or sub-set of businesses’ whole activities; and
3. The sector is still at the research and development stage, with much of this work being undertaken within university research departments that do not necessarily have “biotechnology” as their single *raison d’être*.

Consequently it is hard to arrive at a useful working definition that can be precise enough for both the purposes of this exercise (the identification and mapping of relevant NVQs) and to accurately reflect the activities undertaken by the sector. This difficulty was reflected in the literature review which produced several definitions. The SWRDA Summary Working Paper 10 on the Biotechnology Sector in the South West does not explicitly define the sector³, preferring instead to describe it as consisting of;

¹ www.dti.gov.uk/sectors_biotechnology.html

² *Strategy for Developing a Biotechnology Sector in the South West of England* Robinson, Dr. C., Great Western Enterprise, 2002, p.2

³ *The Biotechnology Technology Sector in the South West* Priority Sector Summary Working Paper No. 10 South West of England Regional Development Agency, November 2000, p.1

- one large research establishment, DERA, based in Wiltshire undertaking biotechnology and applied scientific research
- biotechnology research in academia in bioremediation, environmental microbiology, agricultural biotechnology and plant biotechnology
- a large SME sector, particularly around Plymouth and Exeter, with strengths in medical devices and instrumentation and protein engineering.

The full version of the Working Paper is more precise in its definition, identifying three relevant SIC 92 four digit codes⁴. However, in doing so it notes the limitations of this approach. Although using these three codes provides an overview of the sector in the South West, they provide a *very broad coverage of the biotech sector*:

- SIC 2441 - Manufacture of pharmaceutical products
- SIC 2442 - Manufacture of pharmaceutical preparations
- SIC 7310 - Research: natural sciences/engineering

Indeed it is important to note that the use of these codes allows for a statistical analysis of such things as government qualification, employment and economic data at the sectoral and sub-regional level, but the resultant analyses will markedly overstate the significance of the biotechnology sector. This is because the three SIC codes listed contain many other non-biotechnology specific activities.

The Great Western Enterprise report cited above is concerned with developing a strategy for developing a Biotechnology sector in the region. Its primary focus is, therefore, on those parts of the sector that can drive development. In this context it defines Biotechnology as “*the application of living organisms, or biological processes, or techniques developed through basic research, which exploit biological mechanisms or components*”⁵. It then refines the DTI definition of the sector to four primary sub-sectors that are relevant for consideration in the development of a sector in the region;

- *Biopharmaceuticals and Healthcare*
- *Agriculture and Food (Agrifood)*
- *Environment and Chemicals*
- *Diagnostics and analytical technologies*

The report also provides a list of activities undertaken by biotechnology companies in the region;

- *Food Biotechnology*
- *Environmental biotechnology*
- *Diagnostics, made up of*
 - *Clinical*
 - *Environmental*
 - *Food*
- *Biopharma R & D*
- *Pharma Manufacturing*
- *Specialist Bioreagent Supplier*
- *Media/reagents supplier*

The South West Skills & Learning Intelligence Module (SLIM) follows the Great Western Enterprise approach to the definitional issue, describing the sector as having four main elements corresponding to the primary sub-sectors listed above.

⁴ *The Biotechnology Technology Sector in the South West* Priority Sector Working Paper No. 10 South West of England Regional Development Agency, November 2000, p.5

⁵ *Strategy for Developing a Biotechnology Sector in the South West of England* Robinson, Dr. C., Great Western Enterprise, 2002, pp.6-16

SLIM also provide a slightly more detailed description for three of the sub-sectors: with agri-bio and environmental including agriculture, food technology etc; diagnostics including biological based systems with both clinical and industrial applications while suppliers of biological reagents covers enzymes and monoclonal antibodies, and other proteins (i.e. the raw materials for biotechnology).⁶

To enable the identification and mapping of NVQs this research has adopted the SIC approach used in the SWRDA working paper. This ensures that all NVQs of potential relevance to the sector are included. However, as explained above, using this approach also means that the figures given in this chapter for the size of the sector, etc. are at the upper limits of estimation as they include all businesses/employees covered by the three SIC codes. Where this is the case, the chapter makes reference to the fact and also tries to explore alternative sources of information that may either provide more accurate estimations of scale and size of the sector or at least give an indication of the possible over-estimation caused by using the codes.

3.2.2.2 Economic characteristics and prospects of the Biotechnology Sector

The Biotechnology sector is a rapidly growing sector, but remains one of the smaller sectors in the South West. The SWRDA paper indicates that in 1997, based on the three SIC codes, the sector employed c.7,000 people and that this total had increased from just over 6,000 in 1991⁷. The latest figures from NOMIS indicate that the total in 2001 was over 9,000⁸. This represents a very substantial increase over a relatively short time period, although when assessing the increase it is important to again bear in mind the limitations of the SIC definitions used to calculate the total.

It is also important to note that the bulk of the growth has come in just one of the three sub-sectors - research: natural sciences/engineering sub-sector which increased by over 2,000 employees from c.4,000 in 1997 to c.6,300 in 2001. Of the other two sub-sectors, employment in the manufacture of pharmaceutical products has decreased from c.1,200 in 1997 to c.400 employees in 2001, while in the manufacture of pharmaceutical preparations there was an increase from c.1,800 in 1997 to c.2,600 employees in 2001.

The total figure of c.9,400 in 2001 represents less than 0.5% of all employment in the region. This is lower than the national “biotech average” of 0.6% and can be contrasted with figures of 1.4% in the South East and 1.1% in the Eastern regions, where the sector is a regional specialism. Of the total employment in the sector in England, the South West constitutes just under 6%, compared with its overall contribution of just over 8% to employment in all sectors⁹.

Table 3.2.1 below contains the details and shows that the significance of the sector as an employer varies markedly between different parts of the region. It is particularly important in one sub-region – Wiltshire & Swindon – and also provides significant levels of employment in two other sub-regions - Devon & Cornwall and the West of England. In the other three sub-regions its contribution to employment is very small.

⁶ www.swslim.org.uk/sectors_biotech.asp

⁷ *The Biotechnology Technology Sector in the South West* Priority Sector Working Paper No. 10 South West of England Regional Development Agency, November 2000, p.1

⁸ *Annual Business Inquiry Employee Analysis, 2001* www.nomisweb.co.uk

The total figure of 9,392 is derived from summing the manufacture of pharmaceutical products (396), the manufacture of pharmaceutical preparations (2,676) and research: natural sciences/engineering (6,319).

⁹ Sources: *Region in Figures: South West*, Office for National Statistics, Summer 2002, No.5 ISSN 1472-6254 Section 4 and *Annual Business Inquiry Employee Analysis, 2001* www.nomisweb.co.uk.

Table 3.2.1 Concentration of Biotechnology Employment in the South West

LSC Area	Number of employees	Percentage of Biotech employment in the South West %	Percentage of total employment in sub-region %
Wiltshire & Swindon	4,319	46	1.6
Devon & Cornwall	1,917	20	0.5
West of England	1,685	18	0.4
Bournemouth, Dorset & Poole	798	8	0.3
Gloucestershire	605	6	0.3
Somerset	70	1	<0.1
Total	9,394	100	0.4

Source: NOMIS: Annual Business Enquiry 2001, Employee Analysis

The NOMIS data indicates that there are 277 workplaces within the region that fall within the SIC definitions given above. Table 3.2.2 below provides a summary of this information and shows that the sub-regional distribution of these workplaces does not match the distribution of the employees shown above. There are more Biotechnology workplaces in Devon & Cornwall and the West of England than in Wiltshire & Swindon. However, this is because of the size of one employer – DERA – and the resultant fact that workplaces in Wiltshire and Swindon have a much higher average number of employees.

It is worth noting that 277 workplaces will not equate to 277 separate businesses. Many businesses will have several workplaces or sites of activity.

Table 3.2.2 Distribution and Size of Biotechnology Workplaces in the South West

LSC Area/ Number of employees in workplace	1-10	11-49	50-199	200+	Total number of workplaces	Average no. employees in workplace
Wiltshire & Swindon	28	8	5	8	49	88
Devon & Cornwall	62	9	5	2	78	25
West of England	45	14	2	1	62	27
Bournemouth, Dorset & Poole	21	2	1	2	26	31
Gloucestershire	24	3	2	1	30	20
Somerset	31	1	0	0	32	2
Total	211	37	15	14	277	34

Source: NOMIS: Annual Business Enquiry 2001, Workplace Analysis

In assessing these overall figures for biotechnology employment and business numbers in the region, it should be remembered that the DTI reports that the “UK currently has 395 specialist biotechnology companies, estimated to employ 18,700 people¹⁰”. On this basis, it is clear that the figures of 9,394 employees and 277 workplaces in the South West include a much broader range of businesses than simply the “core” specialist biotechnology companies needed for the development of the sector. Indeed, the Great Western report mentions that in the South West there are “an estimated 30-35 companies with core biotechnology business interests, actively engaged in R & D”.

The SWRDA Summary Working Paper estimated that the Biotechnology Sector as a whole (using all three SIC codes) contributed around £220 million to South West regional output in 1997¹¹. This figure can be extrapolated to produce an up-dated estimate of c.£300 million in 2001 (calculated on the basis of the growth in employee numbers over this period, changes in productivity and growth in regional GDP).

One large research establishment in Wiltshire, DERA having around 400 employees, is a potential focal point for the sector in the South West. Others include the Exeter-Plymouth arc, based SMEs in the Exeter Innovation Centre and the Tamar Science Park, and the

¹⁰ www.dti.gov.uk/sectors_biotechnology.html

¹¹ *The Biotechnology Technology Sector in the South West* Priority Sector Summary Working Paper No. 10 South West of England Regional Development Agency, November 2000, p.1

Bristol-Bath arc based on the international academic reputation of the universities. Despite the importance of DERA and the universities, it is small businesses that form the backbone of the sector, with those having less than 10 employees accounting for three quarters of Biotechnology workplaces in the region¹².

The SWRDA paper on the sector states that the future economic prospects for the sector are good, given the public acceptance of biotechnology products. As the current focus on research and development moves into the manufacturing phase there will be potential for significant growth in the sector. The paper concludes that skills gaps in the region may be an issue in the development of the sector, particularly for staff with skills in combining academic knowledge with commercial expertise¹³.

The Great Western report examines the future prospects of the sector and identifies that a majority of biotechnology employers consider the availability of skilled technical and scientific staff to be a major constraint to the successful development of the sector. The report also identified the key interlinking factors affecting the future prospects of the sector in the region¹⁴:

- Technological;
- Economic;
- Personnel;
- Funding;
- Regulatory framework; and
- Public perception.

3.2.3 Biotechnology Sector Skills Issues

Before assessing the sector skills action plans, it is worth reiterating a few key statements from the *Strategy for Developing a Biotechnology Sector in the South West of England*:

“Growth of a successful biotechnology sector has specific prerequisites. Key among these is a critical mass of world-class bioscience research and scientists, to provide the centres of intense intellectual property generation from which commercial activity arises, as well as technical know-how, and the vision to understand the potential implications and applications of research discoveries.”

“Prospective (biotechnology) employers raise many issues in respect of the suitability of prospective employees. One of the most common is the lack of commercial awareness among scientific staff, both at the level of the graduate and the post graduate. Integrating entrepreneurship and commercial awareness into graduate and postgraduate training is essential”

These statements emphasise the perceived importance to the sector of training and recruiting its workforce from academia. While the focus of the sector remains on research and development, it is likely that staff with appropriate degree and postgraduate qualifications will make up the majority of the “core” workforce. On this basis it is likely that NVQs will continue to be seen as being peripheral to employers skills needs in the sector.

As such, it is to be expected that the existing skills and workforce development plans will focus on graduate and postgraduate provision in universities, rather than NVQ provision within either FE/HE colleges or in the workplace.

¹² Annual Business Inquiry Workplace Analysis, 2001 www.nomisweb.co.uk.

¹³ The Biotechnology Technology Sector in the South West Summary Working Paper No. 10. pp1-.2, Ibid.

¹⁴ Strategy for Developing a Biotechnology Sector in the South West of England *ibid*, pp.9-10

3.2.4 Skills Action Plans relevant to Biotechnology Sector

The following sub-section reviews the skills action plans relevant to the Biotechnology sector, covering the sector itself both nationally and regionally, the local LSCs and other existing sub-regional plans.

3.2.4.1 The National Level: Biotechnology Sector Strategies and Plans for the UK

The Biotechnology and Biological Sciences Research Council (BBSRC) has produced a Strategic Plan and a ten year vision for the sector¹⁵. The Strategy contains six objectives, of which one focuses on training people to “*provide a motivated scientific community (with the) relevant skills to meet national needs*”. Given the role of the BBSRC as a Research Council, it is to be expected that the focus of the relevant parts of the strategy and the vision is on the development of graduates and postgraduates. Consequently, the actions proposed by the BBSRC in the strategy cover improvements to the quality and monitoring of training for people undertaking such qualifications.

Further to this, the BBSRC’s ten year vision identifies that in order to achieve its goal of “*a greater integrative understanding of biology*”, leading to “*improved quality of life and economic prosperity in the UK*”, the sector must attract and retain the best people in research. Furthermore, as disciplinary boundaries become less well defined, greater numerical skills will become more important. Again the focus is on academia, although the vision also refers to the need for the BBSRC to “*strengthen its portfolio of knowledge transfer activities*”, by undertaking such things as “*industrially relevant training*”.

The BioIndustry Association (BIA) is the trade association for emerging small to medium sized enterprises in the UK’s bioscience sector. In 2001, the BIA published its “manifesto”¹⁶ for the sector, which included a section on encouraging a UK skills base for the industry. This identified that the competitive strength of the industry was dependent upon the scientific, intellectual and practical skills of its people and that many graduates and postgraduates *lack training in practical skills which are essential in industry*. These practical skills included IT competence, communications and presentation skills.

The manifesto included a series of policy recommendations concerning education and training, of which the most pertinent to NVQ and work-based training were;

- The (then) DfEE should continue to encourage universities to work closely with industry to identify their needs and requirements in designing/amending courses. Flexibility of course design is important.
- Industry/academia need to increase skills and competence sharing schemes
- There needs to be more industry specified modular courses developed by a consortium of universities. These courses would be available to the employees of small and medium-sized businesses, who could access them to keep their training and knowledge up to date.
- Current schemes which encourage links between industry and universities should be reviewed and simplified to ensure their greater effectiveness.

Thus at the national level there is concern about the quality of available graduates and postgraduates, specifically in terms of their abilities in the more practical skills required to help drive the sector forward.

¹⁵ Biotechnology and Biological Sciences Research Council
Work Class Bioscience: Strategic Plan 2003-08 www.bbsrc.ac.uk/about/strategic_plan/bbsrc_stratplan.pdf
A Ten Year Vision “Towards Predictive Biology” www.bbsrc.ac.uk/about/strategic_plan/bbsrc_vision.pdf

¹⁶ The BioIndustry Association (BIA) *Manifesto for Biotechnology 2001*
www.bioindustry.org/dbfiles/CGltemp26010.pdf

Whether these concerns can be, or should be, addressed through work-based NVQ training has not been addressed. The inferences that can be drawn from the BBSRC strategy above are that what is required is amendment of the existing degree/postgraduate courses to incorporate more “practical” elements. Nonetheless, the BIA manifesto takes this a step further with its recommendation that *“there needs to be more industry specified modular courses developed by a consortium of universities. These courses would be available to the employees of small and medium-sized businesses”*. It might be that the NVQ framework and course set-up would be suitable for meeting these types of training needs.

3.2.4.2 The Regional Level: Biotechnology Sector Skills Action Plan for the South West

Within the South West, the RDA has funded the Biotechnology Skills Development Fund Project (2001-2003) which has six key aims;

- To identify the skills needs faced by biotechnology companies in the region;
- To establish a South West Biotechnology Education and Training Forum;
- To create a recognised, regional ‘menu’ of provision;
- To support the development of graduate level staff;
- To raise the awareness and profile of careers opportunities in biotechnology;
- To ensure the future sustainability of the project.

Within these aims, the Project has produced a Sector Skills Action Plan, listing seven issues to be addressed and a set of accompanying actions.

Issue 1: Management development, particularly skills which promote team-building, business development, finance, marketing and ideas generation;

- Priority focus on small and micro organisations;
- Attempt to address management development through modular training and investigate website learning opportunities; and
- Good opportunities to meet needs through Learning Through Work;

Issue 2: Management skills which enable business growth through spotting opportunities and promoting workforce development and succession planning;

Issue 3: Information technology at all levels, to focus on advances in software as analytical processing systems come on line;

- Professional and technical development of existing staff, maintaining and enhancing knowledge and application of techniques;

Issue 4: Business focus and customer service;

- Ensure that each employee understands their role within the business, towards meeting the common goal;

Issue 5: Supply of skilled entrants, graduates and PhDs capable of taking forward products and services. Implications for employers and universities within the skills and knowledge supply chain;

- Introduction of Graduate Apprenticeships would enable more focused work content to become part of the degree programmes, normally aimed at first-degree students;
- Other graduate placement programmes should also be considered with funding mechanisms to support as appropriate;
- Put in place training provision to address the drivers that will influence future business needs as stated elsewhere in the plan;

Issue 6: Quality assurance, health and safety requirements;

Issue 7: Lack of employer investment in training – a cultural issue;

- Initiatives to support and improve employers' knowledge of funding opportunities and how to access them;
- Delivery mechanisms needed, to promote a variety of approaches to provision, possibly through a consortium or network of providers, to ensure a pool of expertise is available to deliver entire learning packages.

This plan and the accompanying actions reflect the issues that need to be addressed that were identified by the national strategy, but they also take a further step in pinpointing the need for graduate apprenticeships and increased employer investment in training. Both of these actions could have relevance to and implications for NVQ/AMA provision and planning in the region.

3.2.4.3 Relevant LSC Annual Plans, Strategies and Workforce Development Plans

The relevant strategic documents and plans of the six LSCs in the South West region were reviewed for evidence of future programme provision relating to the Biotechnology Sector. Given the geographic spread of the sector within the region, it was to be expected that the only the LSCs with any significant numbers of Biotechnology employers within their boundaries would make reference to or have specific provision for the sector. Because of this, and the relative importance of the Biotechnology sector in the East of England, the plans for the LSC Cambridgeshire are also examined in this section.

Wiltshire and Swindon LSC

The Wiltshire and Swindon LSC has produced several key documents either directly concerning workforce development or providing a strategic overview¹⁷. The Annual Plan and the Skills needs documents make reference to the Biotechnology sector as being a priority sector for the LLSC and the RDA. The Annual Plan indicates that as part of the process of engaging employers in workforce development one of the LSC's key activities in 2003-2004 will be supporting the development of a new CoVE in Biotechnology. No further details were available about this and none of the LLSC's other strategic documents mentioned the sector.

Devon and Cornwall LSC

The Devon and Cornwall LSC Annual Plan describes the sector as being “*a fragmented sector employing 10,000 that is underrepresented in the region. Has experienced some decline in recent years. Skills needs difficult to predict.*” The Local Strategic Plan 2002-2005 makes reference to the Biotechnology sector as one of the RDA's emerging sectors that have the potential to be important to the economy of the region in the future.

As such the Plan states that “*it is essential that skills development in Devon and Cornwall is in line with the needs of the selected sectors, all of which are important in Devon and Cornwall. The development of centres of excellence and vocational, further-education and higher-education provision needs to be co-ordinated to support these sectors.*”¹⁸ Neither the Workforce development plan nor the needs analysis mention the sector.

¹⁷ *Annual Plan 2003-04 Championing the Power of Learning, Local Strategic Plan 2002-05, Wiltshire and Swindon Skills Needs 2001* LSC Wiltshire and Swindon

¹⁸ *Annual Plan 2003-04, Local Strategic Plan 2002-2005* LSC Devon and Cornwall

Bournemouth, Dorset and Poole LSC, West of England LSC and Somerset LSC

As with the Devon and Cornwall LSC, all three Annual Plans produced by the LSCs for Bournemouth, Dorset and Poole, West of England and Somerset describe the sector as being “a fragmented sector employing 10,000 that is underrepresented in the region. Has experienced some decline in recent years. Skills needs difficult to predict.”^{19 20 21}. No other references to the sector were found in any of these LSCs other documents.

Gloucestershire LSC

No references to the Biotechnology sector were found in the documents for this LSC.

Overall the LSC plans and strategies contained few specific references to the Biotechnology sector, either in terms of the strategic development of the sector or in the provision of individual programmes/training targets tailored to the needs of the sector. This was the case even in most of those geographic areas where the sector is of some significance. However, the references to the development of a CoVE made in the Wiltshire and Swindon documents indicate that a little progress is being made.

Cambridgeshire LSC

In addition to reviewing the plans and strategies of the six LSCs in the South West, the literature review also examined the comparable documents from the LSC Cambridgeshire in the East of England. This is the area of the country in which the Biotechnology sector is most well established and in which much of the focus of development for the whole sector resides. The Cambridgeshire “bio-incubator” contains over half of the 350 bio-businesses in the Eastern region. Many of these companies are now regarded as being on the brink of maturing and shifting from scientific research and development to production and marketing. As such, it was thought that plans and programmes for the development of the workforce in Cambridgeshire might be at a more advanced stage than was the case in the South West.

Indeed, the LSC Cambridgeshire has a specific Sector Skills Plan for the Biotechnology sector²², which identifies three key challenges for the sector in the county;

- Intense competition with other sectors for highly qualified employees;
- To co-ordinate one central point for advice and guidance on training; and
- To promote good practice within management and HR.

The Plan also identifies the skills shortages, skills needs and key training issues confronting employers in the area. In terms of NVQ provision, several of these are of note. Many of the skills needs identified could be addressed through vocational training:

- Identifying customer needs
- Marketing and product development
- Development of business plans
- Raising finance
- Finance for non-financial managers
- Contract and licence negotiation
- IPR protection and exploitation
- Communications
- Time management
- Human resource management

¹⁹ *Annual Plan 2003-04* LSC Bournemouth, Dorset and Poole

²⁰ *Annual Plan 2003-04* LSC West of England

²¹ *Annual Plan 2003-04* LSC Somerset

²² *Biotechnology Skills: Challenges for Biotechnology Training in Cambridgeshire* LSC Cambridgeshire

- Technical training
- Project management
- Facilities management
- Export documentation

The key training issues being confronted by employers were identified as being

1. An urgent requirement for relevant management development courses;
2. Recruitment shortages and skills gaps particularly in laboratories;
3. Off the shelf-training packages are inflexible and inappropriate; and
4. Lack of a Steering Group to tackle training and development.

The plan then goes onto outline how these concerns could be overcome and a flexible multi skilled workforce could be developed;

1. Brokering effective solutions to “recruit, train and retain”
 - Improving communications channels to achieve higher standards and results across the board;
 - Work-based learning with employers support;
 - Promoting local clusters of employers, training providers, to create access to effective training and accreditation.
2. Identifying and sourcing funding for training development
 - Providing an impartial assessment of funding opportunities locally, nationally and EU-based;
 - Supporting well-founded applications for existing programmes and new training initiatives;
 - Reviewing funding options and ensuring that training schemes are adequately funded;
 - Helping to get the most out of existing funding options and national training schemes.
3. Sustaining and encouraging better training programmes
 - Assisting managers in the day-to-day maintenance issues affecting training schemes;
 - Providing tailored management development to help strengthen local business for growth;
 - Advising training providers about the needs of companies in the sector;
 - Ensuring that training provision meets the needs of both employers and employees.

In order to facilitate this process, the LSC has invited local bio-businesses to engage with them on a number of skills development issues, such as partnering with suitable providers, registering their interest in specialist training provision, participate in a pilot “cluster” group of local employers and providers and to link with educational and training providers. This then, marks a significant step forward from the current plans of the six local LSCs in the South West. Nonetheless, it is, because of the newness of the sector even in Cambridge, still far from being a fully worked up “Workforce Development Plan”.

Several of the actions noted above are of relevance to NVQ provision, with the most specific being the brokering of work-based learning with employers support. The next stage is to map the skills gaps for the sector onto the pattern of current provision and to identify what changes are required to accommodate the needs of employers and employees.

3.2.5 NVQs Provision in the South West for the Biotechnology Sector

3.2.5.1 A map of accredited NVQs relevant to the Biotechnology Sector

Table 3.5.1 lists the NVQs of relevance to the Biotechnology Sector, as identified from the Qualification Curriculum Authority’s Framework of 738 accredited and available NVQs on May 19th 2003.

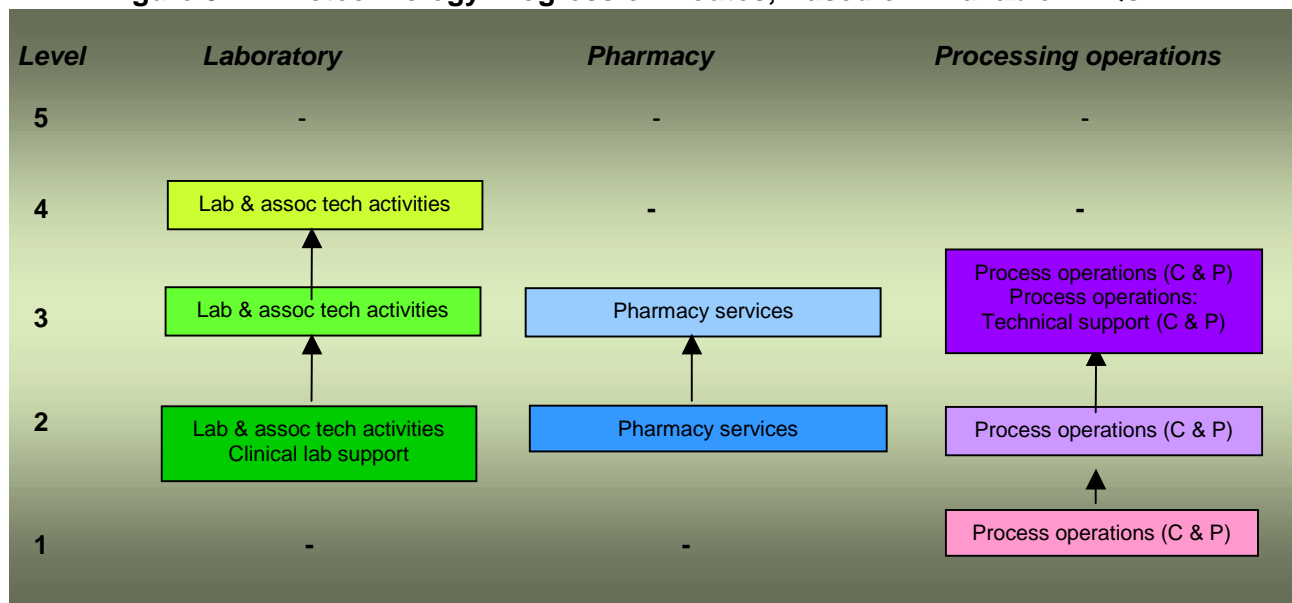
Table 3.5.1 NVQs relevant to the Biotechnology Sector

Title	NVQ level
Clinical Laboratory Support	2
Laboratory and Associated Technical Activities	2
Laboratory and Associated Technical Activities	3
Laboratory and Associated Technical Activities	4
Pharmacy Services	2
Pharmacy Services	3
Process Operations (Chemical and pharmaceutical)	1
Process Operations (Chemical and pharmaceutical)	2
Process Operations (Chemical and pharmaceutical)	3
Process Operations: Technical Support (Chemical and Pharmaceutical)	3

Source: www.qca.org.uk/nq/subjects/framework_listing.asp

The table shows that ten NVQs are available covering five course areas and at four different levels. However, most are at either level 2 (4) or level 3 (4). These findings are illustrated in a different manner below in Figure 3.2.1. This shows that the small number of available NVQs do offer some limited opportunities for progression. One NVQ is available from level 1 to level 3 and another from level 2 through to level 4.

Figure 3.2.1 Biotechnology Progression Routes, Based on Available NVQs



Source for figure: QCA Framework, ibid

In assessing the table and the figure above it should be noted, of course, that the NVQs identified are *not specifically for the Biotechnology sector alone*. Rather, they have been identified from the list of all NVQs that are currently available as the most likely to be of use to Biotechnology employers. Therefore it does not necessarily follow that they will actually be of use to the sector or offer the “progression opportunities” shown.

3.2.5.2 Work-based NVQ provision specific to the Biotechnology Sector in the South West

The analysis of the LSC database found that NVQ provision for the Biotechnology sector in the region is virtually nil. Table 3.5.2 below contains the detail and shows that only three learners were identified on the relevant NVQ courses: two in Bournemouth, Dorset and Poole and one in Devon and Cornwall. Only two NVQs were actually being provided in the South West as a whole: Laboratory operations (chemistry and pharmaceutical) level 3 and pharmacy operations level 3.

Table 3.5.2 South West NVQ work-based provision for Biotechnology: No. of learners 2001-02

Course Title/LSC	LSC Devon & Cornwall				LSC Bournemouth, Dorset & Poole				Total
	1	2	3	4	1	2	3	4	
NVQ Levels	1	2	3	4	1	2	3	4	-
Laboratory operations (Chemistry and pharmaceutical)	-	-	-	-	-	-	2	-	2
Pharmacy services	-	-	1	-	-	-	-	-	1
Total of learners	-	-	1	-	-	-	2	-	3

Key: 1, 2, 3 & 4 = NVQ level 1, 2, 3 & 4 level qualifications

Source: LSC Central Work-Based Learning (WBL) Interim Individualised Learner Data 2001-2002

This meant that there was no provision at all of the following eight NVQs in the region;

- Clinical Laboratory Support Level 2
- Laboratory and Associated Technical Activities Level 2
- Laboratory and Associated Technical Activities Level 3
- Laboratory and Associated Technical Activities Level 4
- Pharmacy Services Level 2
- Process Operations (Chemical and pharmaceutical) Level 1
- Process Operations (Chemical and pharmaceutical) Level 2
- Process Operations: Technical Support (Chemical and Pharmaceutical) Level 3

And that there was no provision at all in the following four LSC areas:

- Somerset;
- West of England;
- Wiltshire & Swindon; or
- Gloucestershire.

Thus in summary, it can be reported that work-based NVQ provision for the Biotechnology sector is so limited that it offers no real progression opportunities within the South West. This is true in terms of either geography; qualification level; or course type.

3.2.5.3 FE/HE NVQ provision relevant to the Biotechnology Sector in the South West

Similarly the analysis of the LSC central database of FE/HE provision revealed that there were no learners who were;

- Registered for the academic year 2001-2002;
- Registered on an NVQ relevant to the Biotechnology sector;
- Registered with a FE/HE college situated in the South West.

Given the findings relating to work-based provision this was not unexpected.

3.2.6 Gaps in Provision of NVQ Training

To undertake the process of identifying gaps in NVQ provision in the South West, it is first necessary to have two items;

- A comprehensive picture or list of the (vocational) skills needs and requirements for the sector in the region; and
- A map of current relevant NVQ provision in the region.

As was described in sections 3.2.3 and 3.2.4, the amount of available information on the first of these items is very limited. The available workforce development plans and Skills Action Plans make little direct reference to NVQs themselves or vocational training generally. Their focus is on graduate level staff and, in terms of skills shortages, management development and business growth.

In terms of the second item, the mapping exercise in section 3.2.5 showed that there is virtually no provision in the South West that is directly relevant to the sector. Just three learners were on two relevant NVQs in 2001-02. A further eight NVQs of relevance were identified that were not provided at all in the region. However the range of these available NVQs was very narrow, covering just four areas (two of which were closely related). Therefore, even if provision were expanded to include these eight it is unlikely that they would provide a sufficient range of skills and opportunities for the sector.

The Skills Action Plan identified seven skills issues that the sector needs to address. In relation to several of these (i.e. “IT skills at all levels”, “customer service” and “lack of employer investment in training”) there are NVQs and training opportunities available across the region that could help to address these issues or “gaps”. However, none of these are specific to the Biotechnology sector and the course content would, almost certainly, need substantial amendment to meet the requirements of the sector before they could be successfully utilised.

Further to this, the perception among most Biotech employers is that NVQs are not relevant to their current skills needs. As stated in the WDPs and the Skills Action Plans, the employers’ focus is on the need for *more and better graduate and postgraduates*. They do not, therefore, see their skills needs or gaps in terms of vocational training requirements at present.

In this context the identification of “gaps” in NVQ provision is not really appropriate or helpful for the sector at this early stage of its emergence. Its focus is on establishing itself and on the staff who will lead and secure this position.

Nonetheless, it is evident that will need to be a debate with and within the sector over how it will meet its skills shortages in future in terms of those training requirements that are clearly vocational, rather than academic in their focus. If the sector is to grow substantially it will increasingly require technicians, laboratory and research assistants to support the higher level staff. Their training needs may not currently be central but they will become increasingly important.

This then can be seen as being the largest “gap” in NVQ provision in the sector: the need to identify the level of provision of appropriate and sufficient vocational training in a manner that is industry led. As the sector grows and develops this issue will become increasingly pressing over the next five to ten years. The debate on how this could best be addressed could usefully be integrated into the South West Biotechnology and Education Training Forum identified by the Sector Skills Action Plan as a key aim.

3.2.7 Validation exercise with Biotechnology employers and stakeholders

The validation exercise involved consultations with employers and stakeholders from the South West Biotechnology sector. It is important to note that that exercise was designed as a “check” on the main findings of the earlier parts of the research on which recommendations were to be based. That is, the main findings were presented to the consultees to test whether they were consistent with their own experiences and also to discuss the emerging recommendations for the sector.

The first finding from the validation exercise confirmed that the level of provision in the region, both in terms of numbers of learners and relevant NVQs was virtually non-existent. This was not a “surprise” as none of the employers expected there to be any provision. It was also confirmed that the employers did not, at present, see this as being a problem. This was because;

- Firstly any training needs they had were either met in house or via identified colleges or external providers; and
- Secondly their main skills requirements was for appropriately qualified graduates.

Some of their comments included;

“The recruitment drive we’re doing at the moment is pitched at degree-level...we don’t foresee the need to recruit technical people.”

“We need engineering skills – CAD, experience, electronic design, etc at degree level, we wouldn’t normally look to NVQs.”

In terms of the NVQs identified as being relevant to the sector, there was a suggestion that there were some other, broader NVQs that also might be of generic interest to Biotech employers. These included warehousing, dispatch and distribution of goods and customer service. (The provision of these NVQs is reviewed in chapter 3.4 on Environmental Technologies).

For the future of the Biotech sector, there was also recognition that business and marketing skills would be important if the sector is to develop successfully. Further to this it was also acknowledged that as companies became larger skills and training would be required in all those areas associated with running “big business”, such as administration, personnel, accounting, etc.

There was also general agreement that the small size of the sector meant that it was currently inappropriate to attempt to devise workforce development plans, when there was not yet really a workforce of any scale. Consequently plans needed to be laid now for the future, especially the next five to ten years when it was hoped and anticipated that the sector would take off.

It was also agreed that while the current focus of the sector was on graduate level recruitment, this would change in the future to more vocationally and practically-orientated skills that NVQs would be well placed to provide. Some comments included;

“There will definitely be room for vocational training: we’ll need a little more drive on how to get the business going, e.g. sales and marketing.”

“We will need to recruit staff to support us once we’ve bedded in.”

3.2.8 Recommendations for NVQ provision and progression in the Biotechnology Sector

The following section has two parts:

1. The detail of recommendations addressing the issues identified by the study;
2. The “fit” of these recommendations with the strategic documents reviewed earlier in the chapter.

3.2.8.1 Detail of recommendations

On this basis, the validation exercise produced two sets of recommendations substantiated by the research findings and endorsed by the employers.

Key recommendations:

- ❖ Review the current and future needs for vocational training in the Biotechnology sector, working closely with the HE/FE sector;
- ❖ Review the role of NVQs in helping to meet these needs for the sector over the next five to ten years, in terms of :
 - New courses;
 - Improvement to content and coverage of existing courses;
 - Increased number of learners;
 - Improved image of NVQ among employers.

3.2.8.2 Fit of recommendations with Action and Workforce Development Plans:

- ❖ The recommendations above dovetail with the following three aims in the Biotechnology Sector Skills Action Plan for the South West;
 - To identify the skills needs faced by Biotech companies;
 - To establish a South West Biotechnology Education and Training Forum; and
 - To create a regional menu of provision.
- ❖ They contribute to two objectives and actions in the Government’s National Skills Strategy;
 - Reforming the qualification framework; and
 - Placing employers’ needs for skills centre stage.
- ❖ They also dovetail with two key themes in the Government’s White paper on *The Future of Higher Education*;
 - Strengthening the relationship between HEIs and business; and
 - Expanding HE to meet (employers) needs.