



Liverpool City Region Skills for Growth



LIFE SCIENCES

A Skills for Growth Agreement



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Summary

The research set out in this document (both statistical evidence and from consultations with employers, providers and partners) has raised the following themes:

- It has been estimated that the sector contributes over £170 million per annum to the local economy and is responsible for between 6,000-10,000 jobs (depending on the definition used). The sector is an important part of the wider health economy within the City Region across the National Health Service, Industry and Academia
- There is currently an adequate number of good quality skills providers in the Life Sciences sector locally to meet current demand (and the specialist nature of provision in the sector creates high barriers to entry for those wanting to join the market)
- Where there are gaps in full course provision these are in the process of being filled (for example the Sector Skills Council's Cogent and Skills for Health creating new Apprenticeships and Cadetships to better meet industry need)
- However, the skills provision that is available isn't always being used by employers and learners in sufficient volumes and there is a need to stimulate market demand through more effective communication at all levels (from careers education to employer and provider dialogue)
- Alongside this, specialist providers have demonstrated a willingness to be flexible and tailor programmes of study to meet specific industry needs, but this is not always being utilised
- Key to this will be more effective careers education and information, advice and guidance (to inform young people and job seekers about the career pathways available and guide them into appropriate skills provision that meets industry needs)
- Further work is also needed to make Life Sciences employers aware of the benefits of Apprenticeships and the flexible provision on offer including the ability to design bespoke learning packages for example in basic laboratory skills
- Where industry placements for learners do occur, this is clearly highly beneficial for the person undertaking the placement - in terms of practical experience of the laboratory setting, the legal and regulatory frameworks used in the sector and for job outcomes.

The sector contributes over £170 million per annum to the local economy and is responsible for between 6,000-10,000 jobs.



Life Sciences: Why does it matter?

Life Sciences matters to all of us and Liverpool City Region companies and researchers are leading the way in improving Global health and the environment.

Liverpool City Region is home to many important Life Sciences organisations undertaking life changing work, including:

Novartis Vaccines is the world's 5th largest vaccine business and its major UK manufacturing facility is based in Speke. It is the UK's only large-scale producer of influenza vaccines and a new vaccine is developed and manufactured every year. Novartis is continuing to reinvest in new manufacturing facilities at the site. There are 700 people employed on site, including process chemical engineers and scientists in quality and technology development roles.

Redx Pharma uses an innovative platform to adapt existing medicines to create new treatments that offer patient benefits such as greater efficacy and fewer side effects. The company aims to develop a wide range of proprietary small molecule therapeutics to address unmet medical needs in infectious disease and cancer.

Researchers from Liverpool School of Tropical Medicine are among those who have sequenced the genome of a species of tsetse fly (*Glossina morsitans*) to help understand more about the tsetse and other insect vectors to design effective and affordable control strategies. The tsetse fly is the vector for African trypanosomiasis, a potentially fatal disease in people (sleeping sickness) and livestock (Nagana), throughout sub-Saharan Africa, with an estimated 70 million people at risk of infection.

Life Sciences (the study of living organisms) is at the forefront of major advances across science and technology, helping to combat a number of fundamental challenges faced by humanity and the natural environment.

The Life Sciences sector is a fast-paced, important, high value and long-established part of Liverpool City Region's Knowledge Economy. It has been estimated that **the sector contributes over £170 million per annum to the local economy and is responsible for between 6,000-10,000 jobs** (depending on the definition used). Beyond its purely economic value, Life Sciences (the study of living organisms) is at the forefront of major advances across science and technology, helping to combat a number of fundamental challenges faced by humanity and the natural environment.

There are a range of public and private organisations in Liverpool City Region committed to improving human health and well-being and supporting the growth of the Life Sciences sector. For example, the **Mayor of Liverpool's Health Commission** set out a number of initiatives to support and improve skills in the sector including National Health Service (NHS) initiatives for Apprenticeships and local employment and back to work schemes that target people from disadvantaged communities.

The sector holds great potential for continued growth and availability of appropriate skills is a fundamental component for success. This document describes the strengths and opportunities in relation to skills for the Life Sciences sector and will be a valuable resource for training providers, schools, colleges and universities to develop their skills offer to employers and learners.

Creating Life Sciences success: Our approach and actions

As an Employment and Skills Board, we will work with the Life Sciences sector in the Liverpool City Region and with a wide range of partner organisations to ensure:

- we will **grow the Apprenticeship market** for skilled laboratory technicians, clean room operatives and laboratory managers to match industry needs and ensure this training is easily accessible
- the various skills funding schemes on offer deliver the training that employers need in an integrated and timely manner. In particular, **build on a brokerage approach to increase employer ownership of skills and opportunities created by the Science Industry Partnership** (led by Cogent) and Skills Support for the Workforce and Local Response Fund monies (led by Wirral Metropolitan College) to achieve bespoke 'bite size' packages of training
- we continue to **inspire young people to pursue a career in Life Sciences** working with the Department for Business, Innovation and Skills (BIS) STEMNET contract holder for the area MerseySTEM and other partners
- specifically the Local Enterprise Partnership (LEP) will work with interested employers and partners to hold a series of **Life Sciences Challenges for local schools** (based on the successful Robot Challenge model used in Advanced Manufacturing). The aim would be to coincide the final of this competition with a wider Skills Show for the City Region
- **focussed careers education and information, advice and guidance** at GCSE and A level options stage to inform students of Life Sciences career pathways (academic and vocational)
- the regional (North West England) nature of the labour market in this sector is used as an opportunity to **promote Science, Technology, Engineering and Mathematics (STEM) careers in Life Sciences on a cross-LEP basis**
- we build on the collaborative approach already being developed for promoting skills and careers at **Sci-Tech Daresbury** across Liverpool City Region, Cheshire & Warrington and Greater Manchester in a way that adds more value than a single LEP approach
- specifically, over the next 6 months Sci-Tech Daresbury will be including information on Apprenticeships and vocational short courses at its regular Business Breakfasts. This will be supplemented with a **special business skills clinic** which will bring providers and employers together to agree packages of training
- all post 16 year old students studying Life Sciences, whether pursuing academic or vocational routes, should **learn basic laboratory skills** and also receive careers education on the inter-disciplinary, **project management** and **entrepreneurial skills** for the sector
- qualitative evidence obtained from individual employers and providers highlighting a skills gap in **formulation chemists** is acted upon
- we continue a dialogue with the Life Sciences Sector and ensure providers are agile in responding to employer needs. Specifically **the LEP will convene a Life Sciences Skills Clinic** between local employers and specialist providers to implement this including to communicate opportunities for placements (which are important to ensure potential entrants are familiar with and interested in working in a laboratory environment).

Life Sciences explained

Life Sciences is the scientific study of **living organisms**, such as **microorganisms, plants, animals, and human beings**. The industry is high-tech, innovative, and highly diverse, spanning many fields, with applications across a range of sectors. There is considerable confidence in the UK as the place to do Life Sciences and consequently it has been the focus of the national and of local governments.

In the UK, health Life Sciences is one of the 11 sectors that have been prioritised as part of the Government's industrial strategy. The UK Life Sciences Strategy sets out Government's aim to:

- Build a UK Life Sciences ecosystem
- Attract, develop and reward talent
- Overcome barriers and create incentives for the promotion of healthcare innovation

Life Sciences has been identified as a priority sector to develop using various policies combining strategic infrastructure investment, access to finance, a favourable regulatory environment and access to a highly skilled workforce.

The first UK Minister for Life Sciences has also been recently appointed, with a recognition that the UK needs to do more to engage with this rapidly changing sector. The rewards of successfully implementing the Strategy will be improved healthcare for patients, a more effective healthcare system and greater job creation and investment in Life Sciences in the UK.

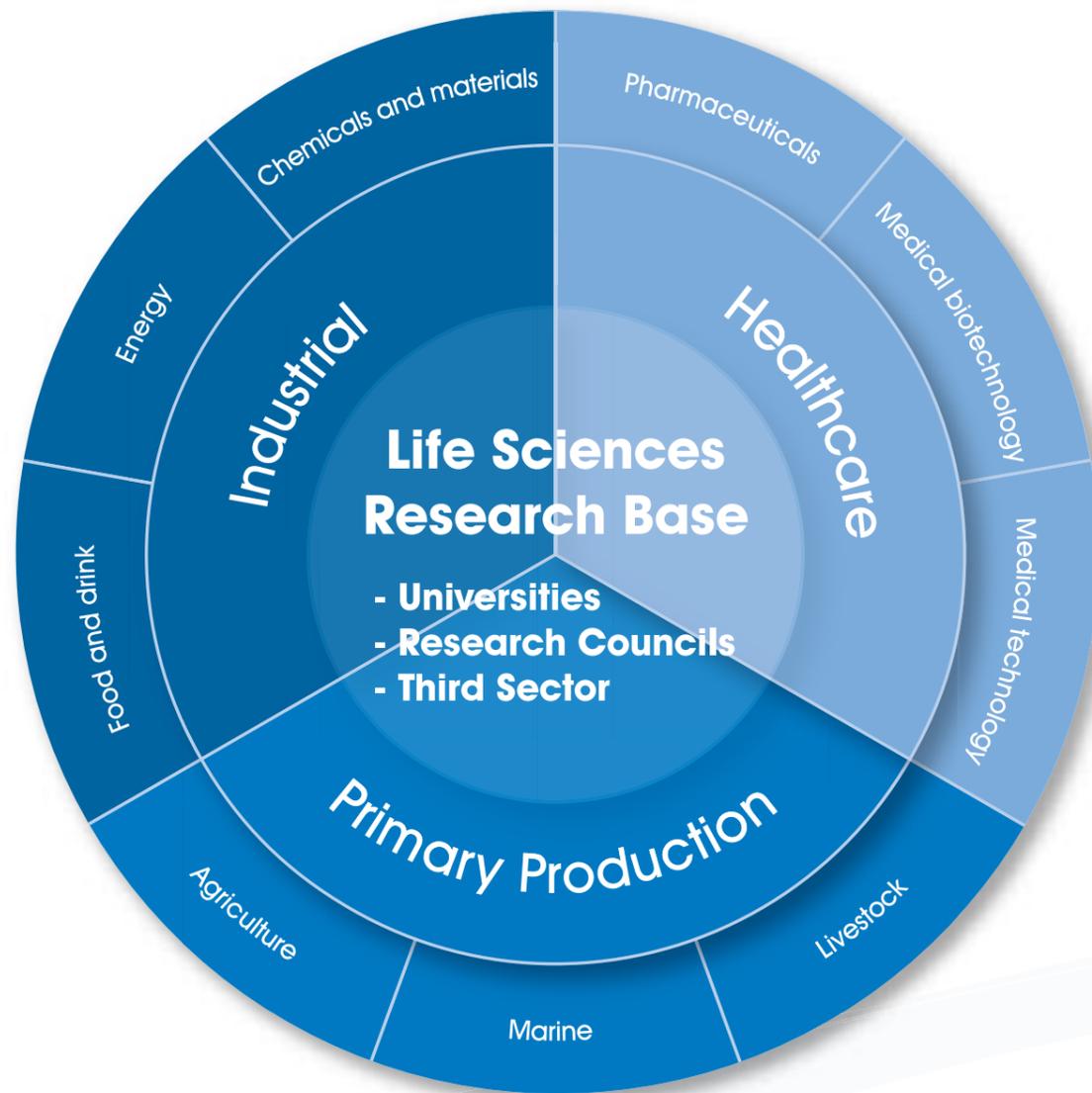
Life Sciences as an economic sector or clear grouping of jobs / occupations is often misunderstood. Cogent - the principal Sector Skills Council for the Life Sciences - has reflected the recent technological and structural changes in Life Sciences to take a competence based definition. From this perspective, **what matters are not rigid statistical classifications, but the technical and functional similarities between skills sets**, and the potential of individuals to spread innovative Life Sciences techniques and ideas into the wider economy.



In classifying Life Sciences, what matters are not rigid statistical classifications, but the technical and functional similarities between skills sets.

Where do you find Life Sciences workers?

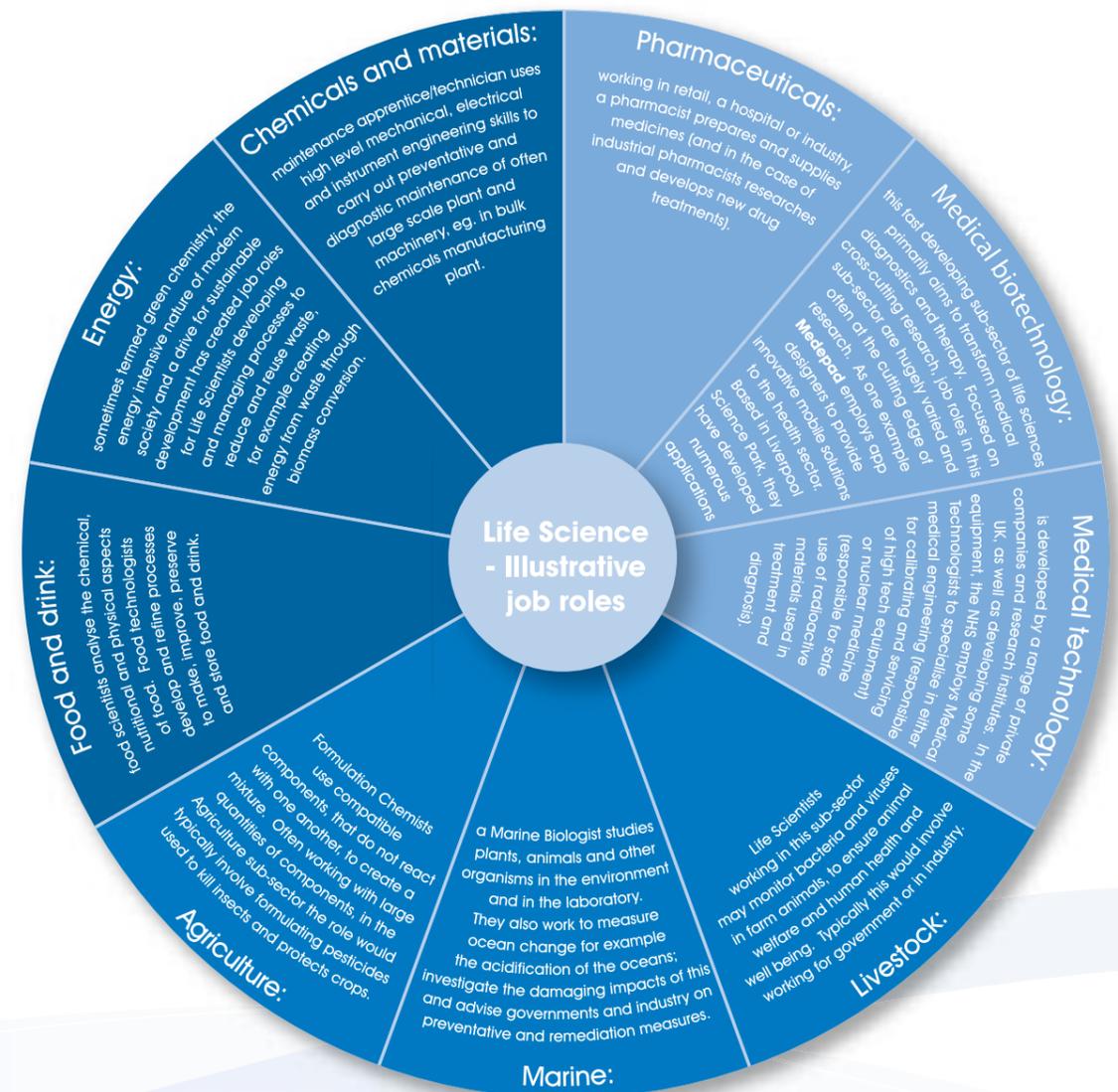
As the chart below shows, Life Sciences workers are based across a range of organisations and sub-sectors of the economy, broadly grouped within Academia (Universities and research institutions), Healthcare (a large majority in the National Health Service) and in Industry (including Primary Production).



From making great discoveries to providing well established products and services, there are a wide variety of exciting Life Sciences Careers. An example diagram of the types of work done in each sub-sector is given overleaf. This gives a flavour of the jobs on offer but of course the labour market is much more detailed in reality.

DIAGRAM

Life Sciences careers by sub sector



In reality, there is a high degree of overlap between component sub-sectors in Life Sciences and an individual may start their career working in one sub-sector only to move into others and back again over time.

This type of cross-over and collaboration is welcome and is driving innovation and scientific discovery. Indeed it is leading to entirely new fields of research and industry. Probably the most prominent example of this in the past three decades has been the application of discoveries in genetics and genomics (which draws strongly on computing and engineering disciplines).

The application of discoveries in genetics and genomics draws strongly on computing and engineering disciplines.

Pioneering new approaches to medicine using Genetics and genomics

Stratified medicine uses genomic information to design drug therapy. These stratified medicine approaches require multidisciplinary expertise (from cell biologists to bioinformaticians) to enable discoveries in the laboratory to become mainstream treatment.

The ultimate aim is that in 50 years' time we can carry our own genetic codes around with us on a smart card. This could be handed to a GP, who could digitally view it to instantly ascertain the best available drug for any given condition diagnosed.

As demonstrated, there are a variety of Life Sciences jobs and career paths. One particularly good site is Skills Development Scotland's www.myworldofwork.co.uk careers site, which has a section devoted to Life Sciences. The National Careers Service also has information on Life Sciences careers (listed under various headings e.g. medical technology): www.nationalcareersservice.direct.gov.uk.

The three Life Sciences populations

Within the 3 sub-groups listed (Academia, the National Health Service, and Industry) the Life Sciences careers ladder in each typically comprises:

- Managers/scientific managers
- Senior Scientists
- Associate scientist and technical
- Non-science/supporting staff

The academic workforce forms the major part of the Life Sciences research base in the UK, with much of the research funded by pharmaceutical companies and the National Health Service. For this document, the definition of the National Health Service workforce is scientists only (so no clinical staff or other support workers). Industry employees are focused in the following sub sectors: pharmaceutical, medical technology, medical biotechnology and industrial biotechnology.

The concentration of Life Sciences employment reflects the presence of two universities with Life Sciences specialisms in the City Region and the strong health economy and industry base (including pharmaceutical manufacture).

At a national (UK) level, Cogent estimate 263,000 workers are employed in the Life Sciences sector. As previously stated, the numbers employed in the Life Sciences sector in Liverpool City Region is between 6,000 and 10,000 workers (depending on how it is defined) with a higher than UK average workforce across each of academia, the National Health Service and industry.

This concentration of Life Sciences employment reflects the presence of two universities with Life Sciences specialisms in the City Region (the University of Liverpool and John Moores University) and the strong health economy and industry base (including pharmaceutical manufacture).



Clustering and Economic Geography

It is recognised that the Life Sciences labour market operates on a regional, national and international basis.

At a North West level, our region has been recognised as a member of the 'European Super League' of biotech clusters by Strategem and placed in the top 50 in the world by Boston Consulting. Clustering allows Life Sciences companies to offset the high costs of operating in established areas with the increased odds of innovation, due to excellent talent pools and infrastructure. One study summarised the features that have traditionally defined a Life Sciences cluster as an:

- Educated workforce
- Venture and Investment capital
- Centres of excellence and innovation
- Industry friendly political structures
- Institutions of higher learning
- Targeted economic development incentives
- Patent protection
- Other associations and supporting infrastructure.

(Jones Lang La Salle, 2012)

At a UK level, the three centres habitually identified by commentators when discussing British Life Sciences locations are Cambridge/Oxford, Scotland and the North West. These sites are all anchored by significant research institutions and a high level of interdependence between employers.

The industry base is complemented by the flourishing Life Sciences research base within the universities, hospitals and other research institutions.

Life Sciences Companies

The Liverpool City Region is at heart of one of the UK's most important and vibrant Life Sciences clusters. The Liverpool City region has particular strengths in four areas:

- Breadth of industry type
- Strong and developing links with and between industry, and clinicians and public health bodies
- A clear specialism in the biopharmaceutical industry
- An excellent clinical and scientific research base

Many of the enterprises located in Liverpool City Region are engaged in one or more elements of the components that make up the overall Life Sciences business process. **In general, the sector is divergent; at one end of the spectrum, there are a range of small companies focused on the discovery of new products.**

At the other end of the scale are large manufacturing units of multinational drug companies. These are involved in the mass-production of products that have been developed elsewhere. In general, the region does not have large corporate laboratories focused on the development and scale-up phase of new products.

The industry base is complemented by the flourishing Life Sciences research base within the universities, hospitals and other research institutions. There is considerable strength in health and bioscience related disciplines in the Liverpool City Region including breadth across medicine, veterinary science and tropical medicine. Universities have a particular role to play in ensuring knowledge transfer to aid company development, working with major companies and small innovative businesses on world class research and development (R&D) activities and developing leading edge solutions for the sector.

Based on Cogent's analysis of national statistics and consultation with the LEP and local employers there are currently **an estimated 100 Life Sciences related companies based in the Liverpool City Region, employing 6,000-10,000 people and accounting for 10% of economic output.**

A selection of the Life Sciences companies in the City Region and their products/services is given below:

- Unilever- development and manufacture of home and personal care products
- Nutricia - advanced medical nutrition
- Bristol Myers Squibb - global BioPharma company focused on the discovery, development and delivery of innovative medicines that help patients prevail over serious diseases
- Medimmune - develops, manufactures and markets formulations for use in immunization programs
- Novartis - flu vaccine production
- Elanco (Eli-Lilly) - manufacturing operations for human and veterinary products
- Actavis (Eden Biodesign) - specialty pharmaceutical company focused on developing, manufacturing and commercializing high quality affordable generic and innovative branded pharmaceutical products
- Baxter - healthcare pharmaceutical product manufacturer
- Mast - manufacturer and supplier of diagnostic products for clinical, industrial and veterinary testing
- Astra Zeneca (Liverpool) - manufacture nasal flu vaccine

The National Health Service and the Life Sciences Enterprise Hub

Each National Health Service Trust in the City Region will employ Life Scientists and Technicians, across a range of hospital sites.

Liverpool Health Partners has been set up to deliver improvements in patient care by collaborating across local hospitals and The University of Liverpool and Liverpool School of Tropical Medicine on a single research agenda including strengthening biomedical research co-operation and attracting and retaining the best Life Scientists and allied professions.



Health Enterprise Hub

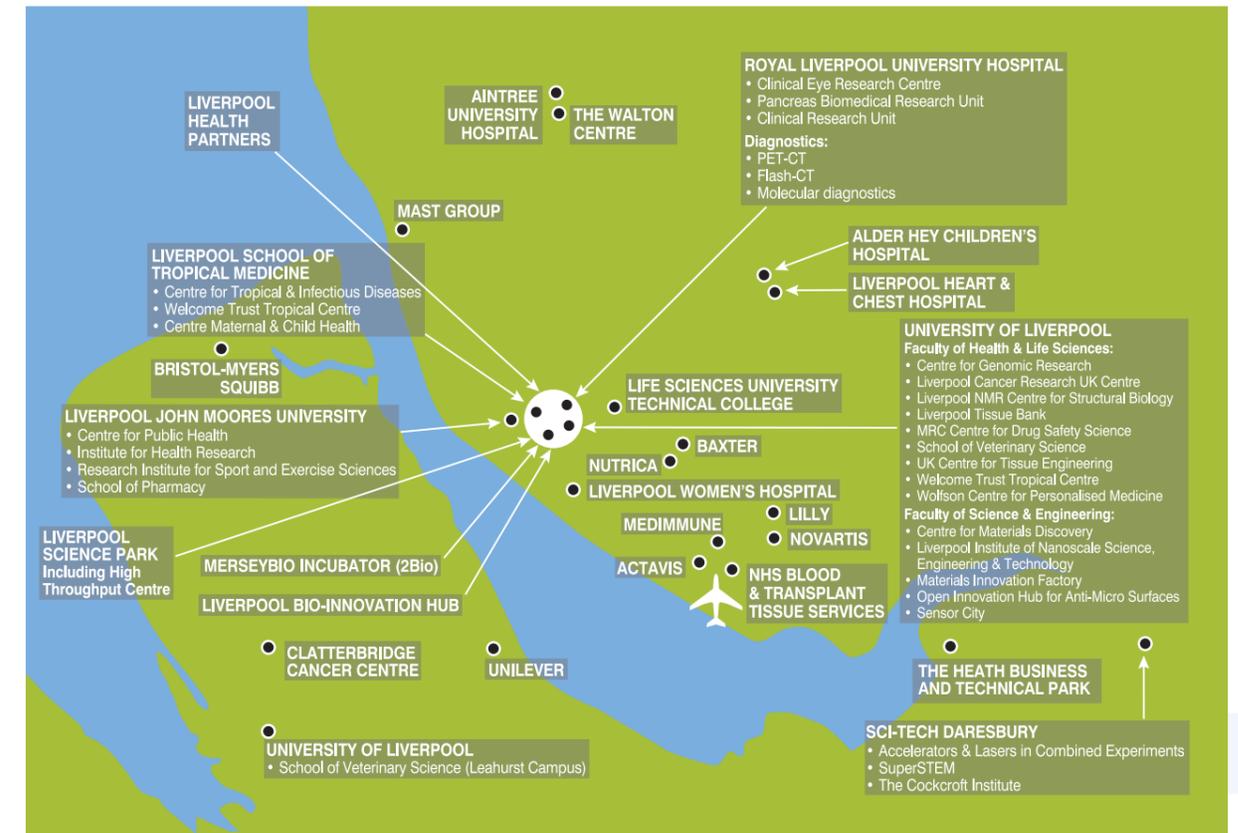
The Liverpool City Region Health Enterprise Hub is an integrated network of world class specialists, researchers, academics and companies collaborating, innovating and investing in health and life sciences to bring new ideas and products to market quickly.

www.healthenterprisehub.org

Key employment sites and university / industry research collaboration

The following map shows some of the key (specialist) locations in the City Region for Life Sciences employment, listing both employers and research institutes.

LIVERPOOL CITY REGION: KEY (SPECIALIST) LIFE SCIENCE EMPLOYMENT LOCATIONS



The Medicines for Children Research Network (MCRN)

The region has particular strengths in paediatric medicine. The Medicines for Children Research Network (MCRN) which supports non-commercial, investigator-led partnership studies and also works in close partnership with pharmaceutical, biotechnology, contract research organisation (CRO) and other companies to maximise the development of safe and effective medicines and formulations for children. The network facilitates studies in National Health Service sites serving approximately 12 million children.

The coordinating centre is physically located at Alder Hey Children's National Health Service Foundation Trust which is one of Europe's biggest and busiest children's hospitals providing care for over 200,000 children and young people each year. Building on the enormous potential of the new 'Alder Hey in the Park' development the new hospital will be complemented by a new centre of research excellence in the Life Sciences sector which is dedicated to innovation and engaging with local companies.

Sci-Tech Daresbury and Skills

Sci-Tech Daresbury is a Government designated Enterprise Zone located between Warrington and Runcorn and an established major UK centre for science.

There are a wide range of occupiers at the site anchored by the Science and Technology Facilities Council, international companies (such as Intel, BAe Systems and IBM) and a whole range of activities being undertaken by a mix of small high-technology companies. Some of the specialisms at Daresbury include accelerator science, high performance computing, and sensors and detectors.

With support from the Skills Funding Agency, a programme of awareness raising events and workshops to promote Apprenticeships, particularly Higher Level Apprenticeships, to high-tech businesses on site is currently being developed.

Sci-Tech Daresbury also has an important role in STEM public engagement, out-reach and growing the market for STEM related Apprenticeships and work-ready graduates. For example, a skills group convened by Halton Borough Council and the Science and Technology Facilities Council meets on a cross LEP basis (comprising Liverpool City Region, Cheshire and Warrington and Greater Manchester) to ensure businesses at Sci Tech Daresbury have the skills they need to grow.

The SciTech Daresbury science and innovation strategy has a key chapter on skills and the Science Technology Facilities Council (STFC) has created a skills and engagement advisory group to advise STFC on these issues namely:

- How STFC should invest in or otherwise encourage the development of the skills needed to ensure the continued strength of the STFC science programme delivered in Universities, Laboratories and Facilities
- Action needed to address current or predicted gaps in the skills needed to maintain the strength of STFC science
- How STFC can capitalise on and further develop the transferable skills acquired in the delivery of the STFC science programme and facilities, to benefit the wider UK society and economy
- The role that the science and innovation campuses and the laboratories can play in hosting, fostering or providing advanced skills training for the benefit of the wider UK economy
- How STFC should develop the engagement of the public with its science and technology, including work at facilities. The development and implementation of an overall STFC skills strategy, and how STFC's contribution to skills can best be promoted to stakeholders and Government.

Halton Council is representing Daresbury partners on this board.

Sci-Tech Daresbury has a vibrant Life Sciences business community and a range of prominent research centres and institutes:

The Accelerator Science and Technology Centre supports the particle accelerator research and development programme, focusing on accelerator science and technology development.

The Cockcroft Institute houses teams of scientists from the Science and Technology Facilities Council and the Universities of Liverpool, Lancaster and Manchester carrying out research in accelerator science with applications across a range of disciplines.

The Hartree Centre uses High Performance Computing to undertake scientific research in fields such as engineering and medicine, and assists companies with research and development of new products.

Medical Technology Exchange Centre (MedTEC) brings together expertise from Science and Technology Facilities Council, the National Health Service and other related fields.

The Knowledge Centre for Materials Chemistry is a virtual Centre, operated in partnership with the Universities of Bolton, Liverpool and Manchester allowing multi-disciplinary research and innovative knowledge transfer based on world-class capabilities in applied materials chemistry.

Engineering Technology Centre provides integrated engineering solutions for Science and Technology Facilities Council programmes and facilities, campus tenants and other stakeholders.

Detector Systems Group provides world class instrumentation and detector systems in support of the Science and Technology Facilities Council.

The Innovations Technology Access Centre offers entrepreneurs and businesses flexible and affordable access to £3m of scientific equipment in fully-equipped biological, imaging, materials and physical science laboratories for research and development.

Liverpool City Region Innovation Plan

Health and Well-being is one of the four focus areas of the Liverpool City Region Innovation Plan. The plan outlines a high level framework for the achievement of growth and development of places through SMART specialisation (collaboration) between industry and universities on research and commercialisation.

Realisation of the plans will stimulate local economic growth, create jobs and attract business to the city region resulting in increased demand for employees with the requisite talents and skills.

These industries require a versatile workforce that is highly skilled with the right mix of technical skills, academic knowledge and vocational understanding able to respond to company needs. Examples of this versatility, and priority projects for the Innovation Plan are Sensor City and the materials inoculation factory.

Sensor City - University Enterprise Zone (UEZ)

Sensor City has been designated by Government as one of the first University Enterprise Zones and is an initial £15 million investment between the University of Liverpool and John Moores University.

The Zone (soon to be built within Liverpool) will exemplify the cross-disciplinary nature of Life Sciences research, bringing together researchers and companies from engineering and medical fields to develop the latest sensor technologies for products such as wearable clothing with sensor technology embedded to monitor the vital signs of patients.

The UEZ will also develop customized packages of business and technical support to drive such innovations. Government has high hopes for Sensor City, with the Chancellor of the Exchequer commenting:

"we are all going to use the technologies being developed here and we are going to be able to say that they were developed in Liverpool".

Life Sciences and related Innovation Opportunities

Private sector leadership body North West Business Leadership Team (NWBLT) launched a report during 2014 into the science and innovation potential of the North West. The report highlights areas of world class research in the region, including high performance computing at Sci Tech Daresbury and advanced materials science at the University of Liverpool. The report also called for greater investment in research and development to encourage innovation. For the full report please visit www.nwblt.com.

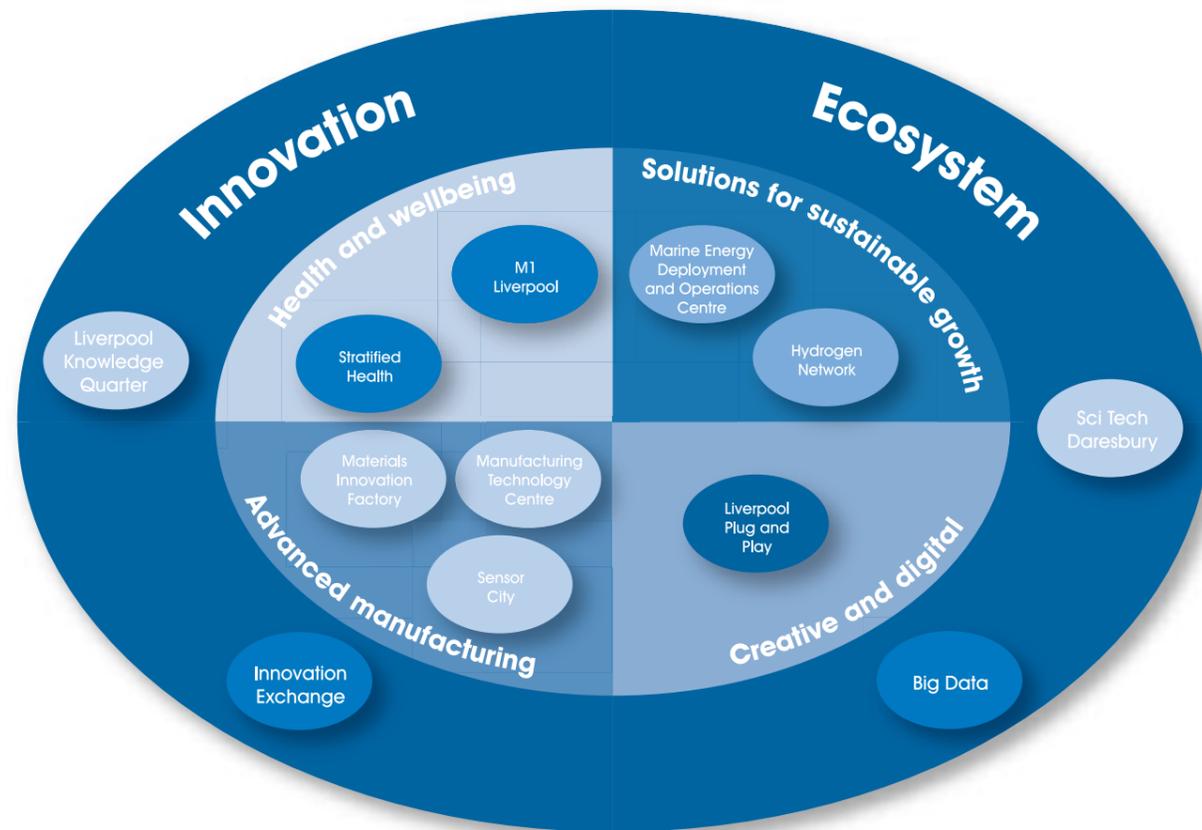
Health and Well-being is one of the four focus areas of the Liverpool City Region Innovation Plan.

Materials Innovation Factory

A partnership between Unilever and the University of Liverpool, centred on a new development due to open in 2016 in the Liverpool Knowledge Quarter to address materials research challenges by integrating physical sciences, engineering and Life Sciences.

The centre will operate on an open innovation model with a focus on SMEs. A range of specialist measuring and testing instrumentation will be on offer including microscopy and magnetic resonance equipment.

Unilever's involvement in the project reflects its commitment to open innovation and the increasing importance of this approach to project deliverables for the company across food and refreshments and home and person care.



The Biocampus, Liverpool

The new Royal Hospital, due to be completed in 2017, is an important component in realising the ambition for Liverpool to be regarded as a leading international hub for Life Sciences. Central to the plans is the development of a thriving biomedical park, The Biocampus, positioned alongside the new Royal Liverpool hospital and close to the University of Liverpool.

As a pivotal development for the Liverpool City Region and a key part of the regeneration of the Knowledge Quarter, the proposed development of the surrounding hospital site into a Life Sciences park has the potential to accelerate Liverpool into becoming a key science centre. The building of the Bio-Innovation Hub on Crowne Street, an incubator building with open access to leading edge technology, is the first step in realising this vision.

Mast Group and Industry/University Innovation

Mast Group is a local innovation company involved in the manufacture and supply of diagnostic products for hospital laboratories. The company recently worked with the University of Liverpool to develop a new testing system for urine infections. Urine samples are the most common specimen processed by hospital microbiology laboratories making it a costly activity. Working with the University's Department of Electrical Engineering and Electronics, Mast developed a system that would enable hospital laboratories to process more samples, using fewer resources and reporting results in half the time.

The rapid development of technology opens up many new market opportunities for business. It requires an interdisciplinary approach blending engineering and IT disciplines with medical knowledge.

Liverpool City Region: Life Science and Health Discoveries

The Liverpool City Region has been responsible for a number of Life Sciences and health related breakthroughs over time. For example:

1774	Dr Matthew Dobson detects sugar in the urine of diabetic patients by tasting.
1834	Robert Bickersteth gives a haemorrhaging patient a blood transfusion from her sister.
1847	Britain's First Public Health team: Dr William Henry Duncan - Medical Officer of Health Thomas Fresh - Inspector of Nuisances James Newlands - Borough Engineer
1848	Royal Liverpool Children's Hospital is world's first purpose built children's hospital.
1883	The Old Northern hospital is the first hospital in Europe to own an ambulance.
1889 -1974	Dr Robert James Minnitt develops the first gas and air machine for use during childbirth.
1896	The first X-ray before surgery is taken by Sir Oliver Lodge.
1898	Liverpool School of Tropical Medicine Founded. Among the discoveries made is that mosquitoes are the source of malaria by Sir Ronald Ross who is the 1st Briton to be awarded the Nobel Prize for Medicine.
1932	Sir Charles Scott Sherrington discovered that roughly two thirds of the fibres in a nerve supplying a muscle are responsible for movement whilst the remainder are carrying motor impulses away from the central nervous system. This discovery is known as Sherrington's Law and he was awarded the Nobel Prize in 1932 for the discovery.
1975	Liverpool John Moores University becomes the first UK university to recognise the subject of Sports Science. Since then researchers have worked in a range of disciplines to help British athletes perform better.
2007	Researchers at the University created a model that can be used to predict the risk of any person developing lung cancer within a five-year period.
2010	The first draft sequence of wheat genome is published. It is hoped that this work will increase worldwide food security.
2010	A pheromone in urine that makes male mice irresistible to the ladies is named darcin - after Mr Darcy from Pride and Prejudice.
2013	Professor Sue Wray opens the Centre for Better Births which aims to make childbirth safer for women worldwide, looking at issues like diabetes in pregnancy and the use of drugs such as oxytocin and progesterone.

Source: MerseySTEM / Liverpool City Region LEP

Life Sciences workforce profile¹

The academic and National Health Service workforces have broadly similar age profiles, with a bias towards 25 year old + age groups, but with a less noticeable problem of an ageing workforce than some other sectors of the economy.

This was felt to be the result of these sectors having a well established system of skills planning and replacement. In comparison the industry component of Life Sciences has an ageing workforce that has not been refreshed to the same extent (with a spike in 45-49 year old workers). This is thought to be a consequence of international changes in the structure of the industry, with fewer large employers with established apprenticeship and graduate programmes, combined with a general decline in vocational training in the sector during the 1990s-early 2000s in the UK.

The Life Sciences sector has a fairly even gender split, although there is convincing evidence that the sector sheds females as employees move further up the career ladder. Female scientists account for almost 70% of the National Health Service's scientific workforce. At the same time, women represent only 64% of whole-time equivalent staff, indicating a tendency for more women than men to select part-time contracts.

In the consultant and manager grades, females only represent 31% and 43% respectively. This pattern is closely aligned with the average in other National Health Service workforce sectors. The current student/trainee population is slightly more female than the average for the workforce as a whole.

One option to address the issues of a noticeably ageing Life Sciences workforce in industry and a gender imbalance could be further local activity to link Life Sciences graduates with placement and jobs opportunities in local employers.

Higher, Wider and Interdisciplinary

The rapidly changing nature of the Life Sciences sector and increasing collaboration between disciplines and sectors makes it important to consider what people do, how they do it and their potential in spreading innovation and new techniques throughout the science based economy. National partners including Cogent consider there to be both quantity issues (in terms of the numbers of suitably skilled people working across the Life Sciences workforce) and quality issues (in terms of boundary spanning skills to allow collaboration across sectors and disciplines).

In practical terms this emphasises the importance of higher level technical cross sector roles such as bioinformatics and health (outcomes) economics, as well as the wider skill sets that all scientists need to communicate and spread innovation.

These wider skill sets include the need for:

- A common scientific understanding to communicate important discoveries. This is dependent on appropriate statistical and mathematical knowledge and ability.
- The need for strong interdisciplinary collaboration - ensuring ideas and good practice spread throughout the value chain.
- The importance of practical skills at all levels and competencies - with an emphasis on adaptability, technical prowess and commerciality.
- An ability to reconcile skills to rapid structural and organisational change.

In turn, for the workforce to need these skills, employers need to promote flexibility and portability extends to vertical career pathways between different employers.

In addition there are multiple initiatives designed to improve specific knowledge transfer between academics and their industry counterparts including use of specialist equipment. If universities can present these in a coordinated and easy-to-use offer for industry, particularly small and medium sized enterprises (SMEs), there is a greater opportunity to then call on industry to in-turn provide work experience placements so that students can gain the necessary practical skills.

From Cogent's 2013 survey work with Life Sciences employers nationally, it is clear skills needs had increased most in the areas of 'Basic skills' (70%), 'Professional/Higher Level skills' (65%), 'Competence Based' skills (55%) and 'Technical Level' skills (55%). Looking a year ahead, the same skills remain relevant, with an increase demand for 'Leadership and Management' skills.

As part of the consultations related to the establishment of the national Science Industry Partnership, Cogent have held board level discussions with the majority of large pharmaceutical manufacturing companies operating in the UK. These have been followed up with one-to-one conversations focusing on workforce demand over the next one to two years. Manufacturers consulted included: locally based companies such as Novartis, Actavis, Elanco (Eli Lilly), Mast and Medimmune - as well as national and international companies.

A clear message from industry as a whole is a real and urgent need for new vocational entry routes (focusing on expanding Apprenticeships and Higher Level Apprenticeships) and a need for significant replacement demand. Another clear message is that recent graduates still aren't considered by industry to have the necessary project, interpersonal and scientific understanding necessary for the modern workplace. The sessions revealed an underlying and largely unmet need for formulation chemists able to operate in a wider biopharma environment and difficulty in attracting engineers of any kind as career pathways and opportunities were not well understood by potential candidates.

Need for new vocational entry routes (focusing on expanding Apprenticeships and Higher Level Apprenticeships) and a need for significant replacement demand.

As a City Region, the existing opportunities we offer through various partners (work experience placements for university students, increasing use of modular course etc), plus new course provision being developed such as the proposed MSc in Sensor Technologies should be welcomed.

Novartis

Novartis produce a diverse range of healthcare products, including innovative pharmaceuticals, eye care products, generics, consumer health products, vaccines and animal health products. Within Novartis UK, specific skills shortages and challenges remain in the areas of process engineering, validation, instrumentation and microbiology.

Roles from these discipline areas have been historically difficult to fill and typically the hiring process is long. In addition, the Novartis Vaccines plant in Speke operates in close proximity to a number of direct competitors which increases the competition for talent and puts pressure on total compensation (pay & benefits).

In response to these skills challenges, Novartis aims to continue with their apprentice, technical leadership and internship programmes, in order to attract and grow their own talent. Novartis also recognises that in order to replenish the depleting talent pipeline they have a responsibility to develop new ways of increasing the attractiveness of working for the company.

This will involve investing in education and overall professional development. Going forward, they would like to see career guidance improved so that young people consider Apprenticeships and industrial training as a full time alternative to a traditional university education.

¹ The trends identified in this section are based on Cogent's own research at a UK level using a number of different statistical sources (including ONS, HESA and UKCES). In the absence of a comparable information set at a city region level the trends have been confirmed by qualitative consultation with local employers.

Life Sciences in Liverpool City Region: Main findings

Key feedback from the session with Liverpool City Region employers for this research (supported by a City Region consultation with Life Sciences employers by IMANI Solutions and previous work for Halton Council on skills for science and technology) established:

- **When companies refer to local** (in terms of the training services they access and where they recruit from) **they are largely talking about the North West**. In general, the lower the required skill level for a job, the more locally they expected to recruit.
- There was an **overall high level of satisfaction with local availability of labour** (noting caveats below), and businesses reported that they would generally 'look local' when recruiting and only look nationally and internationally for specialised posts, or where skill requirements are highest. This is especially true at the smaller company end of the Life Sciences sector, largely related to the risk and resources involved with recruiting and re-locating staff.
- The **key shortage cited in local recruits was proven industry experience**. This is thought to be related to the lack of depth in the local Life Sciences sector.
- The majority of **employment growth** over the next 12 months is anticipated **within production business units**. Occupations required include process technicians and clean room operatives. These people will require the following competencies: routine replication of tasks, science qualification or background, and preferably laboratory experience.
- Opinions were mixed on whether the posts of process technicians and clean room operatives required a relevant degree. Most agreed that they currently recruited graduates into these posts, but admitted that it probably was not that necessary. Cogent provide further detail of this in their research where **there is evidence that 25% of graduates enter occupations at a lower level than the indicative value of their qualification**.

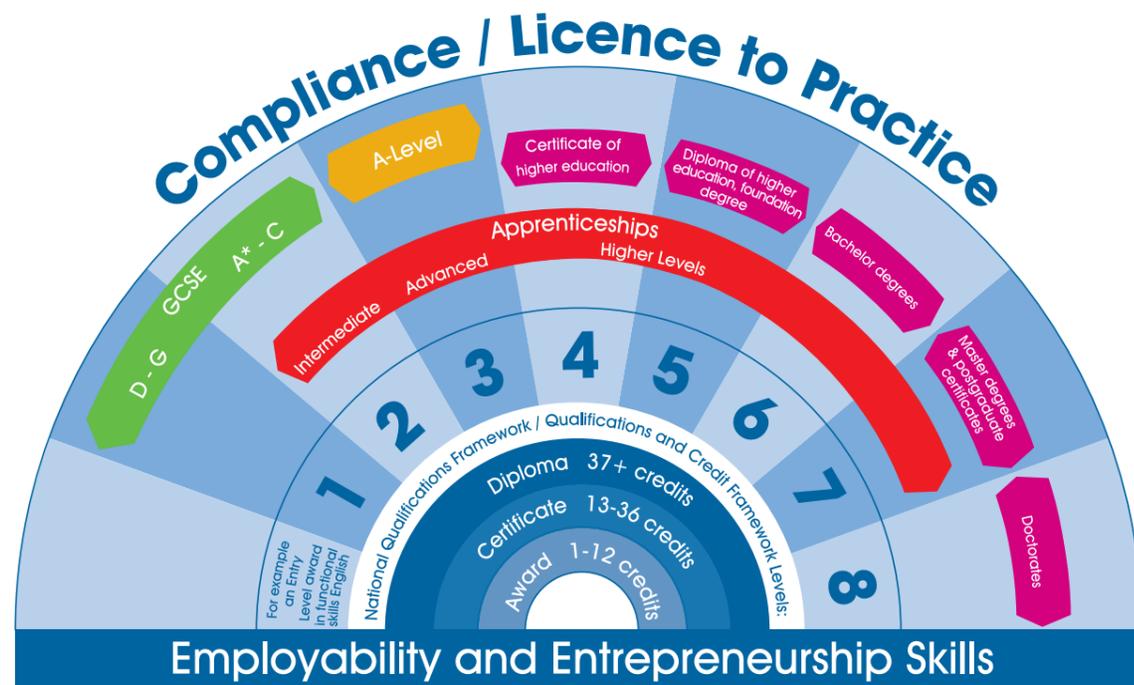
- Related to the business cycle, **small and medium sized growth companies all cited the importance of recruiting technical individuals with sufficient commercial acumen and sales experience**. Companies noted that these skills were required at all levels of the business. Some reported difficulties in recruiting individuals able to lead the business in the expansion phase, and others required junior sales positions. When pushed on what specific skills were required, employers generally noted that it was the cross-over between enough technical knowledge to sufficiently explain a product within an industry setting; and more generic business development competencies such as marketing, business planning and financial management.
- Concern was expressed by a number of companies about the regulatory environment that their company was operating in. This is leading to a **desire from employers to find people with experience of working in a regulatory environment, legal backgrounds and also quality assurance management experience**.
- The approach taken to skill development varied across companies. **Some employers strongly backed the principles of 'develop from within'**. **These companies tended to be more flexible about entry requirements** - they would be more likely to look locally for new employees, they would be more likely to consider employees with lower levels of competency but look to quickly develop the individual. Others take a much more short-term view of employees, recruiting the most suitably qualified individuals - they would cast a wider net for recruitment, be less likely to access employee development programmes, and expect greater staff turnover. This seems to depend on the outlook of the individual business manager.

- There was **strong endorsement for the competency based approach, and in particular the concept of bundling desired competencies together when designing and developing curricula**. Those who had previously engaged with public sector programmes suggested that this was a key factor in success - and were particularly attracted to education programmes focused on combined STEM subjects.
- In this context, there was **strong employer support for the approach taken by the Liverpool Life Sciences University Technical College (UTC)** (see separate case study).
- **Most employers recognised the value of the new higher apprenticeship pathways** as a way of developing this competency approach. (Life Sciences and Chemistry Higher Apprenticeships frameworks have recently been developed as part of the Government's Trailblazer programme).
- It was, however, noted that specific recruitment needs could not be identified due to the variety of companies and their requirements and in part because employment requirements in the sector are responsive to the success of individual product launch and sales. This **job growth tends to occur in thresholds for example following proof of concept stage** significantly more laboratory technicians and other roles tend to be recruited.



The current skills qualification system

The following chart gives a basic understanding of the levels of qualifications available:



Running through each qualification level should be the core competencies for support staff of physical and Life Sciences. These competencies are likely to be deployed in two distinct environments. Firstly, for staff undertaking scientific studies within laboratories, skills needed would include supporting the discovery and development of new products and accuracy and good record keeping in delivering medical and other testing services. The second group are based in factories operating the large scale processes that produce the company's products and providing quality and process control to manufacturing operations, quality assurance and diagnostic skills are likely to be important.

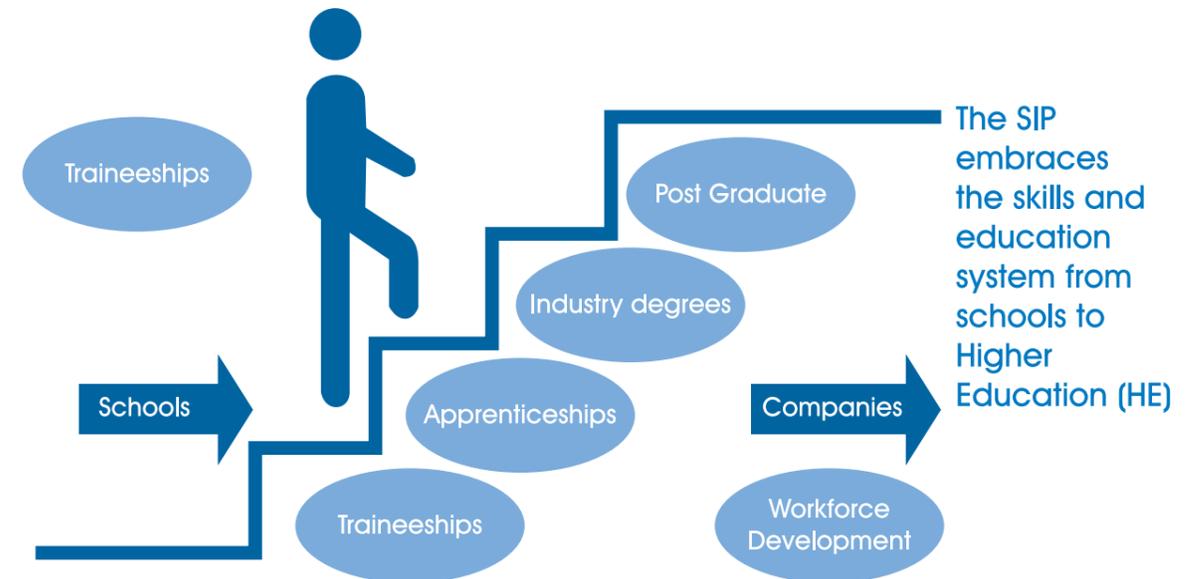
Skills needed would include supporting the discovery and development of new products and accuracy and good record keeping in delivering medical and other testing services.

The Science Industry Partnership

The Science Industry Partnership (SIP) has been set up by Cogent on behalf of science employers and is funded via the Employer Ownership of Skills Pilot (EOP) and industry investment.

The aim is to build a new skills system for the science based industries and raise the capability of the entire science workforce to ensure it is fit for the future.

The Science Industry Partnership will offer the following:



For more details please see: <http://www.scienceindustrypartnership.com/home/>

Trailblazer Apprenticeships:

Cogent has worked with the Skills Funding Agency to produce employer-led Apprenticeship Frameworks at Level 3. The 3 Apprenticeship Frameworks are set out below, with information on what each job role typically involves:

Laboratory Technician - will carry out both routine and one-off laboratory testing and technical support, working safely and accurately to high quality, regulatory and ethical standards. Work individually and as part of a team.

Science Manufacturing Technician - responsibilities could include starting up, operating and shutting down systems and equipment to produce products. Often required to wear specialist safety equipment, work on a shift basis and operate efficiently within stringent organisational safety and regulatory requirements.

Science Industry Maintenance Technician - diagnose and resolve technical problems and ensure through inspection and regular maintenance the good operation of various mechanical and electrical components and systems. Required to wear specialist safety equipment, often to work shifts and, depending on the employer, to work over multiple sites in the UK.

The 3 Frameworks are based on the occupational skills, knowledge and behaviours employers have themselves requested and the Apprenticeships will take from 18 months to 42 months to complete (depending on Framework). The intention is for the new Frameworks to eventually replace the current Apprenticeship Framework system.

In keeping with the nature of the sector, candidates for these Apprenticeships may be expected to have achieved English and Maths at Level 2 (GCSE equivalent) or at Level 3 (A-Level equivalent) as a minimum. However, the requirements can depend on the employer and where it is not an entry criteria apprentices will achieve a Level 2 in Maths and English by the end of the Apprenticeship.

Higher Level Skills

Many of the management and research and development roles within the Life Sciences sector require a minimum of a Science related degree, with some requiring postgraduate and doctoral qualifications. Often they can be studied for flexibly alongside part or full time employment.

As with intermediate roles, employers also like to see evidence from applicants to higher level roles of prior work-based learning and employability skills. In response, learning providers are increasingly building in work placements and employability skills into their full time courses e.g. the new Industry Degrees (BSc Hons) as part of the Science Industry Partnership.

There are a wide range of roles in the sector requiring higher level skills and the job market is national and international. Examples of job roles include:

Microbiologists - study the biology of micro-organisms such as bacteria, viruses, fungi and algae, mainly in laboratories. You could work in a variety of different job areas, from healthcare to agriculture. For example, in healthcare you would aim to identify pathogens and diseases to protect the community from the spread of infection.

Chemists - investigate the make-up of chemicals and materials. They also investigate how they interact and behave under different conditions. Chemists help to develop products and processes in a wide range of areas, for example inventing new artificial fibres and plastics.

Chemical Engineers - research and design the machinery and processes used to turn raw materials into everyday products such as fuel, plastics and food. This job type has both research and development and manufacturing pathways, dependent on role. Biotechnology and Biochemical engineering also provide related career pathways for Chemical Engineers.

Modernising Scientific Careers

The NHS Scientific workforce forms the second largest population of science professionals in the UK and is responsible for some 80% of diagnoses nationally.

The Modernising Scientific Careers (MSC) programme is a Department of Health initiative to address the training and educational needs of the healthcare science workforce in the National Health Service (NHS). The programme does the following:

- identifies qualification and careers pathways
- relates this to their equivalency with professional standards
- ensure courses give a core understanding of scientific method and knowledge.

In Liverpool City Region, the Sector Skills Council for Health (Skills for Health) are very active in promoting National Health Service careers including Life Sciences training schemes. For example the Healthcare Cadet Programme and the Healthcare Informatics Cadet Apprentice Programme. For more details please see: www.skillsforhealth.org.uk.



Supply of skills

Laboratory Technicians

The volumes of learners for Laboratory Technicians is very low generally and many technician positions are filled by graduates. There is still work to do to grow the market from a low base, communicating opportunities to students alongside informing Life Sciences employers in industry who aren't currently using Apprenticeship schemes about the advantages of them.

Key skills requirements from the regional talent pool are for support staff in both the laboratory and factory environment capable of operating at levels 2-5. These will complement the higher level skills available from the university and FE degree course population.

Data from the National Apprenticeship Service indicates that there are adequate skills providers who can support the established science apprenticeship frameworks at level 2-3 for both laboratory technicians and manufacturing staff. One possible area for greater provision is bioprocessing (for the manufacture of products in the Life Sciences sector).

A well-established NVQ 4 offered by Wirral Metropolitan College is in Laboratory and Associated Technical Activities (LATA). This qualification and the Trailblazer Healthcare and Science Apprenticeships, which Wirral Metropolitan College have been closely involved in the development of, should form the basis of an alternative offer to employers to employing graduates for Laboratory technician roles. The nominal under-employment of graduates in technician roles is not an ideal long term solution and graduates can become frustrated at not being given high level tasks to complete.

There is still work to do to grow the Life Science Apprenticeship market from a low base.

GCSE Provision

The proportion of Liverpool City Region pupils achieving A*-C in GCSE Science subjects has remained broadly consistent with - and in some cases, considerably better than - national performance levels. In keeping with wider attainment trends, Science achievement rates vary across local schools with some showing excellent levels of performance and progress.

In the 3 years leading up to 2013, the percentage of learners being entered into Science GCSEs has increased within the City Region but still remains lower than the national average. The difference between local and national pupil participation in GCSE Science has reduced in the same time period and continuing to encourage pupils to study Science will be key in closing this gap.

Nationally and locally, the reducing numbers of pupils undertaking single subject Science GCSEs (i.e. biology, chemistry and physics) in favour of the more common Dual Award has been identified as a concern. Local employers have identified the value of single subject Science GCSEs for future Life Sciences professionals and insight from businesses in other local growth sectors (e.g. Advanced Manufacturing and SuperPORT) continue to highlight the benefits of STEM skills being taught at an early age.

A - Level Provision

In 2011/12 around 4,380 pupils in the Liverpool City Region achieved science or maths A-Levels. This equates to almost one in four of all A-Level achievements in the year - a rate that has increased annually since 2008/9. While 2 percentage points lower than the England average, the gap has closed over recent years. The 2011/12 figures show A-Level maths to be most popular subject among STEM learners with physics being the least popular. This reflects national participation trends.

Higher Education

North West universities are seen as being of a high standard and of producing good scientific research. In Liverpool City Region, the University of Liverpool and John Moores University both have a number of courses and research institutes in the Life Sciences sector.

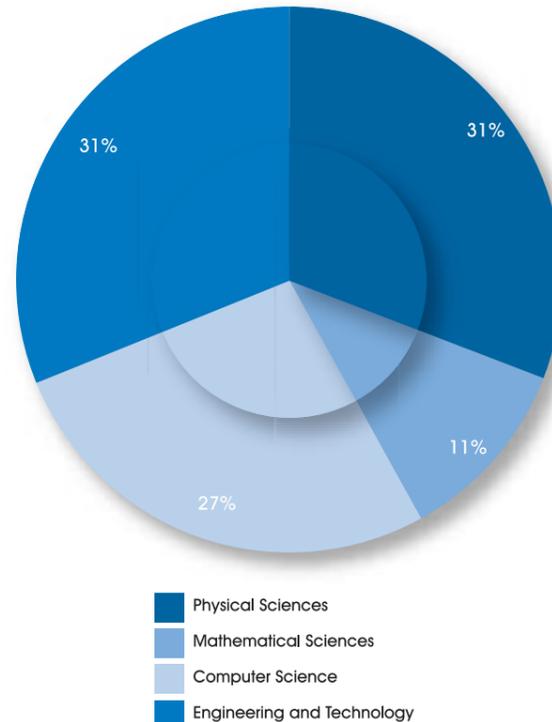
In addition, Further Education Colleges are increasingly partnering with Universities to deliver flexible Life Sciences course provision in a community setting. For example some of the courses on offer include:

- St Helens College offer a full time or part time Foundation Degree in Applied Microbiology
- Wirral Metropolitan College offer a Foundation Degree (full time or part time) in Chemistry
- City of Liverpool College offer a part-time Foundation Degree in Dental Technology

Alongside the higher level theoretical learning obtained through a traditional academic course, practical experience was seen as an essential way of equipping graduates with the practical skills that employers require. This can be achieved through industrial placements and internships that are built into academic degrees. One employer described how large amounts of European graduates apply for their positions, forcing UK graduates to compete, often unsuccessfully, with highly skilled international candidates who have likely completed several internships as part of their course.

UK Data from HESA shows an 11% growth in the number of City Region residents studying STEM subjects between 2008 and 2012². As can be seen below during 2011/12 participation by 7,039 learners was spread across STEM disciplines. Just under one third of students (31%) were enrolled in physical sciences which includes chemistry, physics and other materials sciences.

STEM-RELATED SUBJECTS AT HIGHER EDUCATION, LIVERPOOL CITY REGION RESIDENTS 2011/12



Source: HESA (2012)

Among the universities located within and serving the City Region there are some 28,264 students studying for undergraduate and postgraduate qualifications in science and technology subjects. The following chart shows student numbers for all science and technology disciplines by institution.

SCIENCE AND TECHNOLOGY STUDENTS AT UNIVERSITIES SERVING THE CITY REGION

Higher Education Institution	Student Numbers
University of Chester	5,800
Edge Hill University	6,498
Liverpool John Moores University	7,938
University of Liverpool	8,028
Total³	28,264

Source: HESA (2013)

In reality, many of the above Science and Technology learners will be pursuing non-Life Sciences courses. For a more instructive view of the level of provision, it is useful to view specific learner numbers for the above universities grouped by course code.

In analysing the data more closely (listed in detail in the table overleaf) in this way, excluding clinical courses and professions associated to Life Sciences (e.g. psychology), **core Life Sciences student numbers at City Region Universities total approximately 8,000 learners**, with half of those learners at one institution: the University of Liverpool.

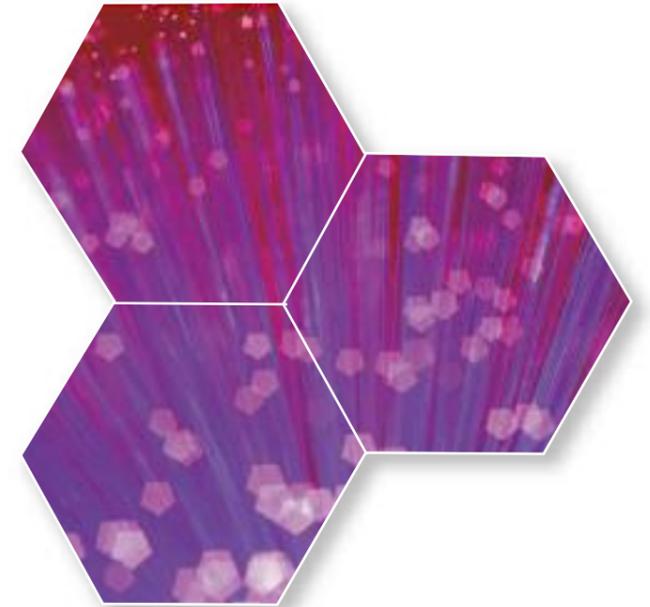
At an individual institution level, it is also possible to identify concentrations of learners by volume in particular course areas. For example, the following concentrations by volume are evident:

- University of Chester (Medical Technology / Animal Science)
- John Moores University (Pharmacology, toxicology & pharmacy / zoology / forensics and archaeological science)
- University of Liverpool (a broad range of strength by volume across the Life Sciences)

It is also possible to identify gaps in provision. For example the 2011/12 data shows only 18 students were studying Biotechnology in the Liverpool City Region. Yet this is a strategic priority growth area (as detailed above) and for this reason the Local Enterprise Partnership are supporting local employers and John Moores University to develop an MSc in Biotechnology to increase the volume of learners.

This Higher Education Statistical Agency dataset, if allied with graduate destination data on job outcomes as a result of studying, could be used in combination with the messages from this report to market courses to prospective learners as being in growth areas. Conversely, where job outcomes are low, the data could allow universities to re-assess their level of provision.

Core Life Sciences student numbers at City Region universities total approximately 8,000 learners.



² HESA (2012)

³ Liverpool Hope University data not included in 2013 HESA data

	Chester	Edge Hill	Liverpool JMU	Liverpool University	Total
(B1) Anatomy, physiology & pathology	0	0	11	321	332
(B2) Pharmacology, toxicology & pharmacy	0	0	871	195	1066
(B8) Medical technology	107	0	15	254	376
(B9) Others in subjects allied to medicine	786	330	698	370	2184
(C0) Broadly-based programmes within biological sciences	0	22	127	0	149
(C1) Biology	96	93	192	589	970
(C2) Botany	0	0	0	0	0
(C3) Zoology	0	0	343	100	443
(C4) Genetics	0	0	7	54	61
(C5) Microbiology	0	0	55	71	126
(C7) Molecular biology, biophysics & biochemistry	0	0	118	183	301
(C9) Others in biological sciences	11	0	0	0	11
(D3) Animal science	427	0	0	107	534
(F0) Broadly-based programmes within physical sciences	0	22	12	0	34
(F1) Chemistry	0	8	134	438	580
(F2) Materials science	0	0	0	8	8
(F3) Physics	0	8	0	348	356
(F4) Forensic & archaeological science	57	0	239	8	304
(F7) Science of aquatic and terrestrial environments	0	28	0	120	148
(J7) Biotechnology	0	0	17	1	18
Total	1484	511	2839	3167	8001

Source: HESA (2013)



Life Sciences Good practice examples

Unilever - Higher Level Apprenticeships and University Progression Route

Apprentices from foods and personal products group Unilever became the first to complete Unilever's R&D Apprenticeship after graduating from the University of Liverpool. The three joined Unilever's R&D Higher Apprenticeship scheme in September, 2010, after completing their A-levels.

Port Sunlight was Unilever's first site to introduce R&D Apprenticeships, but following its success more apprentices have been taken on in Port Sunlight and in the company's two other R&D sites in Leeds and Bedfordshire.

Over their four year Apprenticeship they worked as part of R&D teams responsible for the latest innovation in hair care, personal care, laundry and homecare, working on brands like Dove, Persil and Sure.

While gaining on-the-job experience they were also studying, initially at the Wirral Metropolitan College and then in the University of Liverpool's Chemistry Department from where they graduated with Bachelor of Science Honours degrees in Chemistry.

The advantage of this route is that they gained a degree and four years of work experience while remaining debt-free, and being given full-time roles. Unilever Port Sunlight R&D has since recruited another nine chemistry apprentices who are now at various stages of their apprenticeship programme.

UK Life Sciences Skills Awards 2013/14 - Wirral Metropolitan College

At the national Life Sciences Skills Awards (run by Cogent on behalf of the Life Sciences sector) the City Region has been successful in gaining the following awards:

Advanced Apprentice of the year Award 2013 (Winner Diane Skillen)

Working at Wirral University Teaching Hospital NHS Foundation Trust (and trained by Wirral Metropolitan College), Diane undertook an Advanced Apprenticeship in Health Pathology Support. Her job requires her to accept and book tissue samples into the laboratory and she is also responsible for the material kept at the off-site storage facility, amongst other things. Diane was recognized for her commitment to learning and the important contribution she made as an Apprentice to her employer.

Provider of the year Award 2014, Sponsored by The Science Council (Winner: Wirral Metropolitan College)

The college's association with the Life Sciences and chemical sector has been ongoing for over 60 years and the College was the lead provider in the North West for Learning Support and Improvement Services (LSIS) STEM network. They have piloted Higher Apprenticeships at levels 4 & 5 using the HNCs and HNDs in Chemical and Biological Science for Industry. They are also closely involved in developing the new Trailblazer Life Sciences Apprenticeships. For this work and the quality of their training provision in the Life Sciences the College gained the Provider of the Year Award.

Life Sciences University Technical College

Liverpool's Life Sciences UTC is the first and only Life Sciences university technical college in the country and has been developed in close consultation with industry partners. The curriculum is designed to provide the core skills list that students will have to master in order to be able to secure a job in the sector. The school has well equipped laboratories enabling students to recreate the industry environment, gain essential laboratory skills and experience projects in areas from antibiotic testing through to researching cancer drugs. As many students may choose a career path in healthcare there is also a hospital ward equipped with a dummy patient 'sim man'. The UTC has the ambitious promise to ensure a job, apprenticeship or university place for every student that successfully completes their programme of work.

Most schools, colleges and many University courses deliver experimental science through set-piece laboratory classes. The UTC has adopted a ground breaking research oriented approach. Whether students are in Year 10 or Year 12, they are all encouraged to express their own research ideas and interests and wherever possible, these interests will be accommodated.

The Life Sciences UTC is challenging student perceptions of STEM subjects and making biological sciences a way to lead into other aspects. It introduces wider science and engineering opportunities within the Life Sciences sector, particularly making physics, maths and chemistry more attractive to girls through innovative relationships between the subjects.

In addition, extensive careers work, including a 3-day Build My Future Festival, showcases the countless opportunities open to students for progression from physics, maths, and chemistry into the Science and Healthcare sector.

UTC students have also worked in teams to systematically solve a problem relating to development of an extraction process for DNA. Students were able to devise 30 different extraction processes for DNA from organisms and carry out quality control experiments of the extracts to determine the optimal method for one of their industrial partners. This was completed within one month, when previous work by a University on behalf of the industry partner on the problem had failed to produce results for almost 2 years. This demonstrates that pre-A-level students are capable of developing working laboratory skills as long as the right environment is created.

The Liverpool Life Sciences UTC has worked to develop a sector specific skills passport in association with its business partners. Industry inspired projects, delivered in collaboration with the business partners, engage and inspire students in themes from the sector whilst allowing the development of experimental problem solving, technical competence, resilience and enterprise measured through the skills passport for students aged as young as 14.

City of Liverpool College

The City of Liverpool College has developed and enhanced its delivery and offer in the field of Life Sciences.

A new Level 5 HND in Applied Biology gives students that do not view university as a natural pathway the opportunity to continue their studies and develop their skills both in terms of theory and practical application.

The College has used a grant from the Royal Society to support teacher partnerships with practising scientists in higher education. Working with scientists at Edge Hill University, A level and Level 3 students and their tutors will work in a research environment on some challenging biotechnology projects, using techniques such as light and electron microscopy, electrophoresis and DNA extraction and analysis approaches.

The College has also responded to employer demand to expand its pharmaceutical sciences offer. A flexible Level 2 Apprenticeship programme has been introduced working with local NHS trusts and Level 3 Apprenticeship provision increased focusing on local community pharmacies.

There has also been a new drive to improve the enrichment experience of A-level, GCSE and Access students by offering, for example ecology field trips, a bee keeping society, weekly dissection practical activities and involvement in the Biology Olympiad.

Laboratory skills What is required

A number of Life Sciences employers have highlighted the need for entrants to the labour market (particularly at graduate level) to hold key laboratory skills and that they aren't consistently held by new employees at the moment.

One area of market development could be short course provision for new employees and/or refresher courses for existing workers who may not have worked in a laboratory for a number of years. This would likely focus on SMEs within industry, as many larger employers and the National Health Service have well established training schemes which could cover these issues.

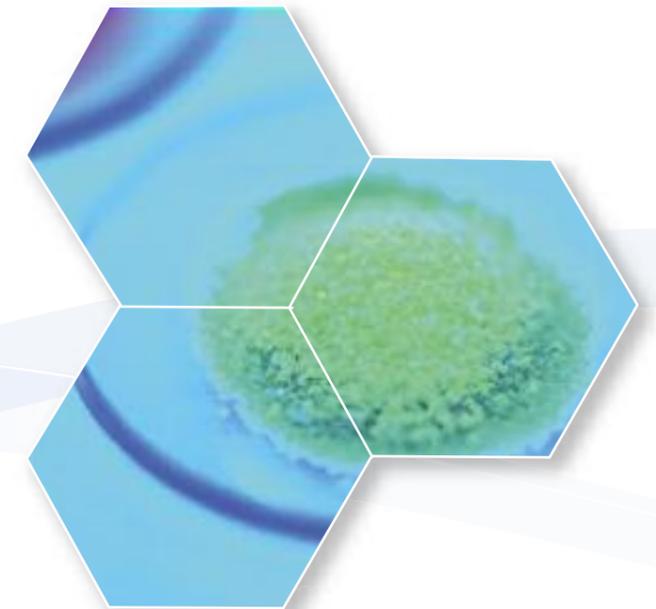
This is already happening at source to some extent. For example, John Moores University are currently examining options for top up provision for their own science students to ensure they have the laboratory skills needed by employers.

From speaking to employers and a review of likely modules within wider Laboratory technical courses, key skills could include:

- **skills in experimental planning, data capture and analysis**
- **equipment operation**, including routine maintenance, cleaning and checking
- **carrying out risk assessments** on scientific or technical activity, (e.g. completing COSHH forms) and conducting activities in accordance with procedures
- **appropriate use of general lab equipment** including balances, pipettes, pH meters, the concept of the mole, pH, preparing solutions, buffers, dilutions
- **basic assays** (a unit of measurement) to analyse and test the properties of a biochemical substance
- **molecular separation**; review of the tools available for molecular separation for analytical or preparative purpose
- **working with samples and chemicals**
- Characterising molecules by **spectroscopy**

Life Sciences employers have highlighted the need for entrants to the labour market to hold key laboratory skills.

In addition, for learners to gain practical experience it is also necessary for employers to be encouraged to provide meaningful work experience placements (which it is recognised that a number already do. However, this needs to become the norm).



Life Sciences

Jobs for tomorrow

As part of communicating job opportunities in an accessible manner to young people and job seekers across the City Region, the Employment and Skills Board has developed a series of careers materials. This includes an example for Life Sciences (example below) and this is supplemented by a wide range of information available at a national level from the National Careers Service and various professional bodies for Life Sciences. The full list can be obtained via: www.lcrskillsforgrowth.org.uk.

In addition individual institutions have tailored ca-

reers information for the sciences including the Life Sciences sector, for example John Moores University's World of Work is developing a series of careers guides for science students.

Life Sciences

James Brown, Senior Quality Control Analytical Scientist, Eden Biodesign

James attended Brookfield High School and left at 16 with 9 GCSEs (One A, seven Bs and one C). He decided not to continue in education, even though he had the grades. He got a job in a factory and worked there for 4 years.

After leaving the factory, he got a place on a training course for 3 months and then saw an Apprenticeship job with Eden Biodesign in the Echo, looking for people with GCSEs in Maths, Science and English, and applied. At the interview, they told him about the training and qualifications that would be available to him and James saw that this would lead to better opportunities.

James got the job, becoming an Apprentice after a year, and eventually progressing to an analyst role. He is now a Senior Quality Control Analytical Scientist. James carries out various tests on the pharmaceutical products to ensure that the products achieve the quality required for use.

During the time he has worked for Eden Biodesign, the company have supported James to attend college and University on a part-time basis and he has now gained the following qualifications, which help him in his day to day work:

- BTEC NC in Applied Science
- Laboratory and Associated Technical Activities (LATA) NVQ Level 3
- HNC in Applied Chemistry
- In year 2 of a 3 year BSc (Hons) in Applied Chemistry

The monotony of the factory job he worked in for 4 years taught James that he wanted to be challenged and learn something new every day. In his current job, he feels he is constantly learning new techniques and processes and enjoys working with his colleagues.

James's progression route from here will be as team leader, manager or via Technical Specialist roles. James thinks that Biologics (pharmaceuticals created by biological processes, rather than being chemically synthesized) is the way that science is going to progress, and that many medicines will eventually be tailored to individuals, based on their specific DNA or genomes.

From his experience at the company, he can see that the business has grown and evolved into a centre of excellence for Biologics. And Biologics is growing throughout the world, not just Liverpool, so there are lots of new and different techniques to learn and plenty of opportunity.

www.lcrskillsforgrowth.org.uk

In partnership with Liverpool City Region:



www.healthenterprisehub.org