

Liverpool City Region Innovation Plan

2014-2020

DRAFT



VISION

By 2020 the Liverpool City Region will have:

- A well connected and co-ordinated innovation environment that supports and attracts the very best in business, investment and people which leads on taking ideas to market
- International recognition for innovation in our four priority clusters of excellence
- A track record of delivery of key innovation programmes of scale and significant economic impact.



1. Context

The scale, growth potential and unique mix of innovation assets and market facing opportunities mean the Liverpool City Region can be a driver of national economic growth and innovation.

- **Liverpool City Region is a major economy** comprising of key employment sites and significant global companies, an internationally recognised City, annual Gross Value Added (GVA) of £23.1bn and 574,500 jobs.
- **The Liverpool City Region economy has strengthened over recent years** and investment has transformed urban centres, the supply of commercial property and the quality of life offer ensuring that the City Region has the building blocks for growth in place. The City Region has developed a range of strategic investment locations, and these assets have helped establish a strong record in attracting inward investment and supporting business expansion. In 2014, the City Region will host the International Festival of Business.
- **Liverpool City Region has inherent strengths in Big Science, Life Sciences and Bio-medical, High-Value Manufacturing, Marine/Maritime, Low Carbon and Renewable technologies and Digital and Creative industries.** The City Region has a strong network of knowledge assets including a national innovation campus at Sci-Tech Daresbury and the Liverpool Knowledge Quarter which includes world leading centres of excellence such as the Liverpool School of Tropical Medicine and the Oceanography Institute. These strengths have been important drivers of growth in the City Region, enabling application and exploitation of ideas, skills and innovation. Currently, 83,000 people are employed in knowledge intensive industries in the City Region, with further concentrations of high and medium technology jobs.
- **Liverpool City Region has strong economic and innovation connections to its immediate hinterland, wider national and global markets.** The City Region benefits from excellent accessibility and important national and international transport connectivity. This is coupled with strong innovation links across the North, the UK and globally.

Despite its strengths, Liverpool City Region faces challenges which highlight the need for co-ordinated intervention and investment to ensure the City Region's latent potential is exploited.

Notwithstanding progress to date, resilience during the recession and a recent recovery in growth comparable to other similar City Region areas, Liverpool City Region's £23.1bn economy continues to struggle to punch its economic weight. Average GVA per capita is only 75% of the national average and this gap has remained largely unchanged over the last decade. As a result the City Region suffers from an £8.2bn output gap compared to nationally.

In seeking to address the structural challenges in the City Region, innovation plays a key role in realising wider economic potential. In sophisticated market economies,

innovation is increasingly the key to success. As places become more alike they have to compete on content and value rather than price alone.

Innovation helps provide the new, fresh thinking, products and services with which our businesses, people and place need to meet the challenge of relentlessly increasing competition. Innovation also helps us to develop solutions to the so-called Grand Societal Challenges of population growth, climate change and resource availability.

Furthermore Liverpool City Region has a large public sector, accounting for almost 34% of total employment in 2012 (compared to a figure of 27% for Great Britain). Whilst the public sector makes an important contribution across the sub-region, our long-term competitiveness and wealth generating reality will be dependent on the vibrancy and dynamism of our private sector.

This Plan looks to address both the immediate challenge of place competitiveness and the fundamental issues presented by global change. It sets out the medium-term agenda for success and a clear framework for the work of all stakeholders in the City Region, as they play their part in meeting the innovation challenge and opportunity. The Plan is not a top down initiative but is designed to create space for innovation to flourish and build on existing success as well as upon future opportunities.

It links with the strategic plans of businesses in the City Region as well as with those of our major public sector stakeholders - in the LEP, the City Region Combined Authority and the Mayor of Liverpool, the National Health Service and our four universities, and other leading centres of innovation. It is fully aligned with the policy ambitions of central Government and those of the European Union. It fits squarely with the recent Witty Review, which emphasised the importance of science and technology-based innovation to the UK's economic growth.

2. Key innovation assets to drive growth

The City Region has an impressive portfolio of innovation assets to build on:

Knowledge Clusters

- Liverpool Knowledge Quarter - one of the UK's most concentrated sites for research/innovation in the country. Home to four universities, multiple research centres of excellence, and various NHS assets. Research and innovation strengths in Complementary Health, Bioscience-related disciplines (Medicine, Vet Science and Tropical Medicine); Advanced Materials and Materials Chemistry; Astrophysics; Engineering; Advanced Computing; Accelerator Science & Digital Technology; Sports Science; Energy Research; Aerospace; and Built Environment
- Sci-Tech Daresbury - one of only two national Big Science campuses. Key research specialisms around scientific/high-performance computing (Hartree Centre), nuclear physics, and accelerator science

Firms & Sectors

- Prominent firms in key growth sectors in the city region, with many innovating and undertaking R&D locally, often collaborating with local universities and organisations further afield, include:
 - **Life Sciences and Healthcare:** Novartis, Astra Zeneca, Bristol Myers Squibb Eli Lilly, Actavis, Redx Pharma and Baxter Healthcare, again with a well-established sector network
 - **Advanced manufacturing:** Jaguar Land Rover, BAC Mono, Getrag, UTC, Johnson Controls, ABB, Unilever, Nanoco, MAST Group, Ineos ChlorVinyls Ltd, Sovex, Joloda International and Brainboxes
 - **Low carbon, logistics, marine and maritime, food, drink and agriculture:** Stobart Group, Peel Ports, Maersk Line, Cammell Laird, Bibby Distribution, Acal Energy, Princes Group, John West, Renshaw Napier, Nichols, United Biscuits (Jacobs), Typhoo Tea and Halewood International
 - **Digital and Creative:** Lime Pictures, Conker Media, New Mind, Lucid Games, Milky Tea, River Motion Group and Uniform, with a well-established sector network

People

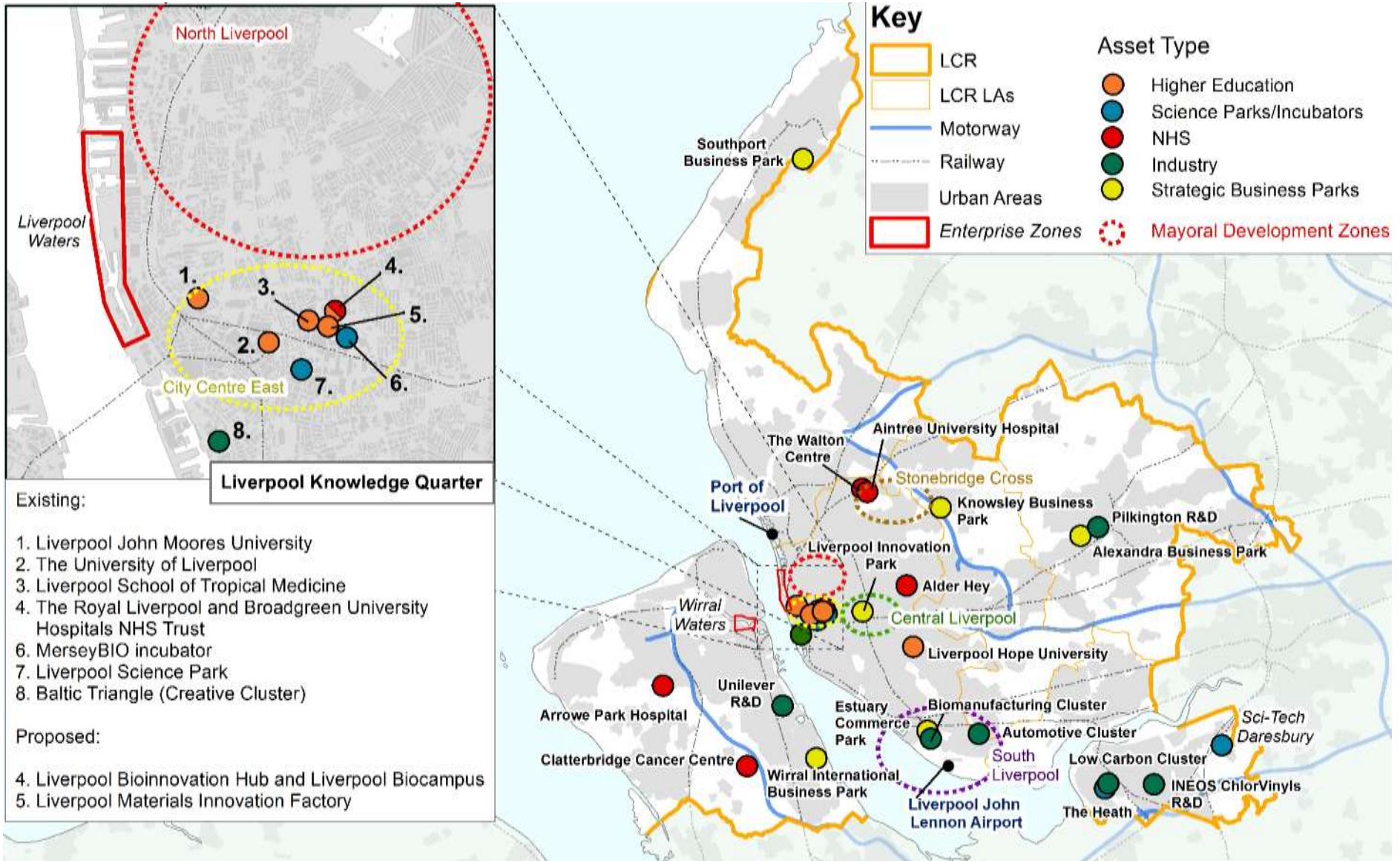
- The city region's labour market is substantial, with the area one of the most densely populated areas of the country, and with working age people making up more of the local population than nationally
- With four universities, a significant pool (50,750 students in the City Region) of highly-qualified graduates is produced every year, with higher level skills having increased in recent years. (Locally over 7,000 Liverpool City Region residents were studying STEM subjects in Higher Education across the UK; accounting for around 14% of the City Region's HE students. This has increased annually from around 6,300 in 2008/09.)

Money and External Business Expertise

- University/SME business gateway support at the Liverpool Knowledge Quarter, SciTech Daresbury, and the Liverpool Science Park is a strength for the city region
- Well-established public/private business funds such as North West Fund, Chrysalis and Merseyside Special Investment Fund, whilst a well-established City Region Innovation Board, brings together universities, business and the public sector

Land, Property and Infrastructure for innovation

- Key physical aspects and infrastructure strengths include one of the UK's major ports, currently undergoing significant investment in the form of the SuperPort initiative, with major air, rail and road infrastructure
- Property assets include a substantial science park and incubation offer – over 22,000 sq.m of office space, and 7,500 sq.m of laboratory. Key sites include Liverpool Science Park, MerseyBIO, The Heath Business and Technical Park, and Sci-Tech Daresbury, serving the Life Sciences, High Value Manufacturing and Low Carbon sectors, whilst the Baltic Triangle represents a rapidly growing cluster of digital and creative SMEs.



3. What are the barriers to growth?

Liverpool City Region has a significant innovation asset base, but this needs better promotion, integration and linkage to drivers of economic growth. Through consultation with 50 senior-level stakeholders, a review of over 80 documents and survey of more than 60 innovative firms, our analysis has highlighted a number of barriers to maximise our innovation potential.

Our key challenges are:

A. More Businesses

To grow and attract more innovative businesses and improve our commercialisation activity.

Despite our achievements, the City Region does not have enough innovative businesses, the most important actors within a successful innovation ecosystem. These firms leverage the R&D activity and knowledge creation to generate new intellectual property, technologies, products or services, which generate wealth and employment. This Plan encourages the creation and growth of more innovative and high-tech or knowledge-based businesses. We also must maximise the economic impact.

B. Productivity and innovation absorption

To close the productivity performance gap and build more absorptive capacity within businesses to adopt innovative practices.

Despite significant recent growth, in 2013 Gross Value Added per full time equivalent worker in the City Region was at £43K, just under 90% of the UK average of £48K. Good ideas without the ability to spot them and the drive to apply them are not enough. Business leaders need to be better trained and new, often younger talented people, need to be embedded in our businesses to embrace change. We will seek to 'grow our own' but will also work to retain our brightest graduates and attract new key workers to the City Region.

C. Skills

To upskill to compete effectively.

The City Region needs to attract, develop and retain more people with higher-level skills. 25% of the City Region's working age population is qualified to NVQ4+, but this is much lower than the UK as a whole. At NVQ3+, the story is similar. In order to compete more effectively in an innovation and knowledge-driven economy, we must equip our workers and entrepreneurs with the requisite skills for success.

D. Finance for innovation

To create a more co-ordinated financing environment.

The poor connectivity between sector networks and the investment community is a key weakness in the City Region's innovation eco-system.

E. Networks

To create stronger networks for innovation and improve our international links and showcasing.

The City Region needs to facilitate a stronger environment of both formal and more informal networks for innovation. More needs to be done to create within-sector and cross-sector dialogue and to disseminate more quickly and effectively innovation news and ideas to give our businesses first mover advantage. We also must showcase better internationally the City Region's research-base and business innovation excellence, particularly in attracting investment and building supply chains and strategic partnerships.

F. Governance

To create accountable but stronger delivery arrangements.

Partners need to understand the nature and scale of the prize that can be won through collaboration. We will create clear governance arrangements, encourage leadership that 'spans boundaries' and hold delivery partnerships to account through the Liverpool City Region LEP and Innovation Board.

The Innovation Plans sets out a framework of priority areas and 11 Key delivery programmes which seek to address these challenges. Business growth, commercialisation and innovation absorptive capacity will be addressed by the key delivery programmes in the four priority area, a geographic focus at Sci-Tech Darsbury and the Knowledge Quarter and cross-sectoral approach delivered through the LCR Innovation Exchange.

The LCR approach for addressing our challenges and maximising our significant asset base is outlined in the following chapter.

4. A framework for success

Given the competition within the UK and overseas, the Liverpool City Region Innovation Plan aims set a framework and portfolio of key interventions to capitalise on our asset base and tackle head on the barriers to maximise growth through innovation.

Econometric projections show that the City Region has strong representation in sectors that are likely to grow over the next 15 years. These include: the service sector; professional, scientific and technical activities; information and communication; real estate, and transport and storage, with the latter being of particular significance given the post-Panamax investments in the Superport.

The Innovation Plan is informed by innovation 'success stories' elsewhere from Bilbao to Austin, Oslo to Cambridge UK, and Sane to one-north Singapore. All the case studies demonstrated the need for:

- A shared **vision** for innovation and its implementation, providing the framework for leadership, management and action on the ground
- **Resources** with which to initiate and sustain actions, ensuring that accountabilities are aligned with such resources
- A **long-term view**, recognising that changing and building innovation cultures takes time, often decades

To build on our asset base, address key challenges and opportunities and learn from success, we will focus on developing a first class **innovation ecosystem** that leads on taking ideas to market and **four priority areas**. The priority areas and interventions are aligned to meeting our needs and maximising our opportunities, with a focus on more productive businesses, higher levels of employment in the private sector and a desire to see more local people in work.

The plan builds on established delivery approaches while challenging partners to work more effectively at scale. The focus is **on deliverability, capturing growth and developing a national and international track record for innovation success**.

Smart Specialisation, which underpins both European and national approaches to economic development, emphasises that by concentrating on a limited set of knowledge assets and linking them to a limited number of priorities, city regions can become increasingly competitive in the global economy. An Innovation Plan that focuses on specific strengths of the city region economy offers a much greater prospect of long-term success.

Innovation Ecosystem

The Innovation Plan will further develop and support the growth of a first rate **innovation ecosystem**, building on nationally and internationally significant science, technology and innovation assets at Sci Daresbury and the Liverpool Knowledge Quarter. We also ensure that our assets, networks and people support business investment and growth across the city region and act as a gateway to partnerships

regionally, nationally and internationally. Our innovation ecosystem will support the growth in four priority areas:

Priority Areas

Our four **Priority areas** focuses City Region innovation activity where, by heritage, scope, scale, and/or excellence, our offer stands out (either currently or has clear potential to do so in the future) relative to what other places in the UK and internationally are doing.

Each area has been developed in close consultation with each of the other priority areas, with activity designed to achieve individual priorities but also complement and enhance activity across the wider plan.

Our four priority areas are:

- **Health and Well-being**
- **Advanced Manufacturing**
- **Solutions for Sustainable Growth**
- **Creative Content and Digital Capabilities**

Each priority area provides a focus for activity by building our capacity and capability to drive growth and will be supported by a proactive business-led network to animate, deliberate and articulate priorities, identify synergies between and across businesses, and promote the opportunities to wider markets.

Activities will include

- Building and growing our major 'translational' centres which bring together university, R&D, and industry to commercialise and develop innovation
- Appropriate access to finance products and platforms
- 'Innovation challenges' (both technology and social) to incentivise development of new technologies and business processes
- Delivery of our skills for growth agreements to ensure employers have access to the skills they need
- Strong internationalisation strategies to access new markets and to attract and retain inward investment
- Investment in physical infrastructure

Delivery programmes

In developing our Innovation Ecosystem and within each priority activity area, the plan identifies a **major programme or set of programmes of delivery**. These headline projects and programmes will spearhead and focus delivery in each priority area and allow the Liverpool City Region to further develop our track record for innovation success.

Activity highlighted in this plan does not cover innovation activity in the city region but prioritising our focus and energies on a portfolio of key innovation programmes of scale and significant economic impact. These projects will be complemented by further programmes as other opportunities evolve and emerge through the priority areas.

The **12 delivery programmes** are:

Priority	Delivery Programmes
Innovation Ecosystem	<ol style="list-style-type: none"> 1. LCR Innovation Exchange 2. Sci Tech Daresbury 3. Liverpool Knowledge Quarter 4. Big Data North West (BD NoW)
Health and Well-being	<ol style="list-style-type: none"> 5. Mi Liverpool 6. Stratified Medicine
Advanced Manufacturing	<ol style="list-style-type: none"> 7. Sensor City 8. Materials Innovation Factory 9. Manufacturing Technology Centre
Solutions for sustainable growth	<ol style="list-style-type: none"> 10. Marine Energy Deployment and Operations Centre (MEDOC) 11. LCR Hydrogen network
Creative content and Digital capabilities	<ol style="list-style-type: none"> 12. Liverpool: Plug + Play

1. Priority areas and delivery programmes

Innovation ecosystem

For Liverpool City Region to drive growth and embed long-term innovation success, partners will need to maximise the fluid interaction between people, businesses, knowledge institutions, and infrastructures for the benefit of the economy. Innovation must be at the heart of a connected “ecosystem” that creates an enabling environment in which business innovation and growth can thrive.

There is a large concentration of nationally and internationally significant science, technology and innovation assets embedded within the Liverpool Knowledge Quarter and Sci-Tech Daresbury, as well as elsewhere across the city region. Sci-Tech Daresbury is one of only two centres of innovation of such a scale nationally, whilst the Liverpool Knowledge Quarter represents one of the most concentrated sites of innovation and research in the country.

However, access to these assets for SMEs in particular needs to be enhanced as the city region develops an integrated innovation ecosystem. Our capabilities of the city region map well onto identified strategic priorities for the UK and Europe. Similarly, these capabilities and assets mean that the city region should be well positioned to exploit emerging opportunities in growth sectors as well as cross-sector ‘white spaces’.

Innovation happens in physical places but also the soft infrastructure must be in place, working optimally and facilitated with money, high quality professional services, and expertise. Partners will also need to tackle to barriers to growth outlined in section three through a smarter approach to business support and effective use of resource.

There are key elements that we can build on and develop:

Enabling Science and General Purpose technologies

Science and technology are also central drivers of change. By promoting and facilitating more effective academic and industrial collaboration, and translation of our leading research to market through direct meaningful interaction with industry, we can deliver a step-change in innovation performance.

There is a good track record in the city region of applying R&D for commercial gain and reward but this needs a greater scale and greater economic impact. The Innovation Plan will seek to align R&D efforts to our four priority areas and in turn build a virtuous circle of excellence in research, commitment in development, and drive in commercialisation

Regional, national and global connectivity

Our innovation environment must be outward facing, and entrepreneurial in thinking about where, and with whom, we can work with on innovation opportunities. City Region partners need to building deeper linkages and maintain the key relationships with centres and sources of innovation elsewhere.

As we seek to genuinely to be excellent in what we do innovation-wise within the city region, we must get close to those places where leading R&D, science, technologies, and innovation talents can be found.

A crucial role for People

Harnessing and empowering individuals to contribute and drive innovation success is critical to unlocking the City Region's growth potential. Innovation role models and deal makers need to be supported and celebrated. The City Region collectively needs to embed a passion for thinking and acting differently throughout the wider business community and public sector.

The long-run view is that fundamental innovation change often is not achieved through big 'campaigns' and 'initiatives', but rather by the steady progress that individuals make by doing their day jobs just that little bit differently because of what innovation imperatives are calling for.

Understanding future market opportunities

Liverpool City Region needs to develop a sophisticated and pragmatic understanding of breaking market and technology change / trends, and how this intelligence can support our competitive advantage and new market opportunities for accurate and intelligent market and technology foresight

Key programmes 2014-2020

Liverpool City Region Innovation Exchange

The Liverpool City Region Innovation Exchange will be the programme of activity and vehicle to provide a coherent approach to innovation support in the City Region.

The Innovation Exchange will provide a co-ordinated focal point to support the generation of 2,000 knowledge-led businesses in the city region over the next 15 years and help to lever private resource and government and agency funding. Innovation Partners in the City Region need to co-ordinate better to maximise our assets and address the key challenges facing our innovation economy.

The Innovation Exchange will look to enhance, support enable greater co-operation between existing activity and organisations to create scale and impact. The approach should not look to centralise all activity in a single agency or programme rather look to blend budgets, jointly brand activity and provide a joined up approach to innovation development within the City Region and with partners across the North, UK and the globe.

The Innovation Exchange would create a joint budget utilising ERDF and partner funds to commission joint activity and programmes to delivery organisations. This joint budget should lever in private sector contribution (real and in kind) and central government funding.

Activity will be aligned to address the six barriers to growth outlined in section three:

A. More Businesses

- A calendar of major innovation activities - focal point for enterprise creation and

funding

- An innovation entrepreneurs programme to target students to stay and create business in the city region

B. Productivity and innovation absorption

- A virtual online innovation marketplace for growth connectivity across the whole city region, including crowd sourcing resource and partnership development.
- A program of exchange, secondment and mentoring with people across the City Region and in other innovative city regions, UK, and internationally
- Commission a joined up programme of Innovation Activity including: Innovation vouchers, KTPs, graduate placements, contract research, consultancy in SMEs, B2B collaboration, innovative public procurement

C. Skills

- Programme of higher level skills to align with the skills for growth agreements
- Support for University Technical colleges
- Innovation and Apprentices programme
- Targeted support for innovation businesses to access the Skills for growth Bank

D. Finance for innovation

- Enhanced variety and co-ordination of access to finance offer
- Building on offer of MSIF, North West Fund and West Coast Investment Hub
- Develop better networks of private, sovereign and early stage funds

E. Networks

- Build on and support sectoral networks and outreach programme such as ACME, Open Labs, BioNoW, Low Carbon Innovation Hub, GERI, Anti-Microbials Hub (etc) to provide a more integrated, coherent and targeted innovation support
- Work alongside established networks in locations Sci-Tech Daresbury, Liverpool Science park, Baltic Creative etc to build integrated networks across the City Region, the UK and abroad
- Work alongside partners to develop and drive a innovation inward investment programme
- Marketing our offer globally

F. Governance

- Programme of activity overseen by Innovation Board and supported by Innovation delivery group
- Commission foresight and information to stay abreast of the leading innovation approaches in the world and harness them to the city region

The Local Enterprise Partnership will lead the development of the programme of activity and ensure alignment to Liverpool City Region growth hub. Partners, including the Combined Authority, Universities, Employment and Skills Board, ASHN, STFC and the TSB will explore appropriate delivery model including a special purpose vehicle to align resources and commission activity.

Sci Tech Daresbury

Sci-Tech Daresbury is an internationally-recognised location of science and

technology. It is one of four major national science and innovation campuses (the only one located in the north of England) and home to the Cockcroft Institute and STFC Daresbury Laboratory.

It is also one of the government's leading enterprise zones with a specific focus on science and technology and currently accommodates 100 high-tech companies from start-ups to IBM and Lockheed Martin.

Sci TechDaresbury is a national exemplar of integration of world-class science and technology, dynamic innovation and business enterprise at scale. Key activity to support the development over the next five years includes:

1. Investment in world-class scientific facilities to sustain the scientific excellence at Daresbury Laboratory.
2. Development and growth of strategic partnerships with government, business, universities and where appropriate leading to the establishment of collaborative centres and facilities.
3. Growth of the Sci-Tech Daresbury campus through investment in infrastructure and facilities in line with the master plan for the site and supporting the "home for life" philosophy for businesses located at Daresbury.
4. Attraction of high quality technology businesses to the site specifically medium/large SMEs and international corporates, with increased marketing nationally and internationally.

Priority activity includes further development of existing capability in High Performance computing, Big Data and Visualisation through the Hartree Centre and the Virtual Engineering Centre.

Sci-Tech Daresbury aims to establish 10,000 – 15,000 jobs over a 25 year period and to leverage in £150m of private sector investment into facilities and infrastructure on the site in addition to ongoing investment in scientific facilities. Activity is coordinated by the joint venture board of the Science and Technology Facilities Council, Halton Borough Council and Langtree Group

Liverpool Knowledge Quarter

Located as a gateway to the city centre, and with a strong cultural offer, the Quarter is home to the University of Liverpool and Liverpool John Moores University and partner institutions, including Liverpool School of Tropical Medicine, Royal Liverpool University Hospital, Liverpool Hope University, Liverpool Science Park, National Oceanographic Laboratory, Liverpool Community College and the Liverpool Institute for Performing Arts. The Knowledge Quarter covers a breadth of disciplines including;

- Probably the largest national grouping of complementary health and bioscience related disciplines in Medicine, Veterinary Science and Tropical Medicine alongside international expertise. Teams in the Quarter are working on scientific and practical responses to many of the world's most serious health challenges, including HIV and other retroviruses, malaria and obesity, oncology, and microbial infections, sports science and public health.
- Leading edge research in Accelerator Science, Micro and Nanotechnology, Bio-engineering, Materials Chemistry, Astrophysics and Advanced Computing. This

expertise supports the ongoing development and expansion by the Universities and their business partners, of nationally and internationally important research centres, including in Aerospace, Astrophysics, Materials Development, General Engineering, Mechanical Engineering, Accelerator Science and Digital Technology.

- A combined research portfolio approaching £300m in value between the University of Liverpool and Liverpool Moores University.

The University of Liverpool, Liverpool John Moores University, the Royal Liverpool University Hospital and the Liverpool School of Tropical Medicine together support 14,000 FTE jobs and generate some £1bn GVA. The largest two Universities in the Knowledge Quarter produce around 14,000 graduates every year.

The Knowledge Quarter is a Mayoral Development Zone, a key component of the Liverpool City Centre Strategic Investment Framework and development is overseen by the Knowledge Quarter Board.

Key developments include

- Liverpool John Moores Coppras Hill – central campus
- New £451m Royal Liverpool University Teaching Hospital
- Liverpool Science Park iC3 (third innovation centre) expansion and rollout
- Expansion of Liverpool School of Tropical Medicine and rollout of Maternal and Child Health centre
- Development of Royal Life Sciences Accelerator

Big Data North West (BD NoW)

The digitally stored data available on the planet is expanding exponentially through the proliferation of the Internet, social media, digital services, digital devices and sensor networks, ecommerce and the internet of things. All these devices produce a digital stream of data which for the most part up until now has been discarded or unanalysed. We are entering an age where this data can now be mined for value.

Big Data is identified as one of eight great technologies the role of the Big Data North West would be to transfer this capability into new products and services. DBIS report that The global market for business data analysis products grew by 14% in 2011 and is expected to continue to £31bn by 2016.

By 2020 the International Data Centre (IDC) predict that there will be over 40 ZettaBytes of data of stored data. This stored data will take be a number of different sources and will be structured (tables, databases, XML files) and unstructured (pictures, video, reports and tweets).

Big Data has the ability to use both structured and unstructured data to uncover value which can be applied to give competitive advantage. This technology is already being applied in web only business to personalise customer interactions and services. The potential for Big Data to benefit manufacturing business by providing additional services beyond sales of goods and in personalised medicine are just some examples of the potential use of cross cutting general purpose technology.

Liverpool City Region has considerable capability, expertise and infrastructure to

maximise commercial opportunities afforded by Big Data. In particular, **The Hartree Centre** at Sci-Tech Daresbury has already invested in a Hardware infrastructure Big Data Analytics platform for analysing data at rest and in motion as part of energy efficient computing investment.

The Hartree Centre is a Collaboratoy in association with IBM and is working on the reference architecture to allow multiple projects to co-exist on the system in a secure environment. There is already a strong pipeline of projects to use this infrastructure and success will demand a need to expand the infrastructure beyond the Petascale.

As well as Big Data Analytics there is also another class of computing problem that will be important in coming years based around Data Intensive Computing, these systems have large memory footprints or fast solid state disks close the computing which in combination with Big Data Analytics platforms process the data on gain insight graph network problems (disease mapping and systems Biology) and large statistical analysis of data sets (Insurance and environmental data).

Over the next five year the methods, infrastructure and applications to will be developed :

- Capture and add metadata to streams of data.
- Store and manipulate.
- Analysis, model and simulation.
- Visualise and return timely and actionable results.

It is anticipated that this will lead to a catalogue of applications, patterns and workflows for the analysis of data to create insight and value.

Future investments in the City Region will build on top of Hartree Centres existing capability in High Performance computing, Big Data and Visualisation. This would deliver a co-investment from public and private sector at Sci-Tech Daresbury to take advantage of the paradigm shift in computing focusing on data currently under development. The centre focuses on the development, demonstration and deployment of industrial and scientific workflows (Square Kilometre Array) to demonstrate the potential and value in Big Data platforms integrated with High Performance Computing.

Expanding out from the existing partnership including Liverpool University and IBM, Big Data North West will develop applications and workflow that develops insight and value within the innovation ecosystem across North West and provide an platform for national and international impact.

Key activity includes

- Working the **eHeath cluster** to create a platform for statistical analysis of linking health population data to Big Data application.
- The **Internet of Things** (smart meters and wearable devices) and **Sensor networks** (within road, rail and vehicles for example) produces streams of data.
- **Supply chain optimisation** with industrial partners to follow supply and value chains into high value manufacturing plants combines data in flow (RFID) and in rest (catalogue of potential other suppliers optimised for cost or speed).

HEALTH AND WELL-BEING

Building on existing academic, clinical, and industrial strengths within Healthcare and the Life Sciences, the Innovation Plan aims to position the city region as an internationally significant health and well-being innovator, delivering R&D excellence and supporting significant economic growth.

Context

Locally, the sector accounts for over 10% of employment and c9% of GVA, much higher rates than for the UK more generally. GVA and employment has risen considerably in the city region over the last 10 years, with GVA growing by over 20% to reach £2.1bn by 2013. Looking forward, this is expected to continue growing into the future, reaching £2.6 billion in GVA terms by 2030.

The policy context is extremely supportive, both at European and UK levels. The sector is a key focus for the Horizon 2020 programme, with its emphasis on seeking to build European leadership in key enabling technologies, and their combination. Similarly, the Strategy for UK Life Sciences, and the TSB's initiatives, defines a clear agenda for developing the UK's capacity and capability, including the development of a Life Sciences ecosystem – a system of collaboration between HE, research, business, and the NHS.

Market prospects generally for the sector in OECD countries are positive for the future. Outside the OECD, however, the position is more disruptive with radical changes in demand anticipated in the BRIC economies and perhaps, most notably, those in Asia. This is leading to consequential shifts in the 'geography' of Life Science R&D, clinical trials and manufacturing. It is also stimulating major investments in new translational medicine capability in new geographies, to serve new, growth markets.

In addition, in many markets, the cost-cutting pressures on healthcare are finding form in increasing demand for cheaper alternatives. In response, the industry is making substantial efforts to change business models, which include investing more in developing 'niche buster' therapies. More pervasively, there is also move to greater involvement of SMEs through the growth of 'open innovation'.

Key assets

- The Liverpool city region has a strong research intensive HE base that brings together leading Life Sciences, Biomedical and Medical research with sophisticated facilities for genomics and personalised medicine.
- The University of Liverpool is unique in having schools of medicine, dentistry, veterinary science, psychology, and allied health professions within a single organisation. At Liverpool John Moores University, the Centre for Public Health (CPH) is an internationally-recognised research centre.
- Liverpool's School of Tropical Medicine (LSTM), recently confirmed as a University, forms another key component in the research landscape, with its cutting edge work on the fight against infectious, debilitating and disabling diseases.

- Research groups based in the Liverpool Knowledge Quarter are currently engaged in the delivery of over £470 million of research with partners from across the globe, with a high average grant value of £940,000 per award. These research groups currently have 134 patents granted.
- The city region has an significant hospital system of major general teaching hospitals along with highly specialised trusts..
- The city region has localised strengths in innovation and industry too when it comes to Healthcare and the Life Sciences. Along with its neighbours in Manchester and North Cheshire, it forms one of three main concentrations of Life Science clusters in the UK.

The city region is one of the leading bio-manufacturing clusters in Europe with major corporates such as Eli Lilly, Actavis (including Eden Biodesign, which has a significant R&D facility in south Liverpool) Astra Zeneca and Novartis based in Speke. LCR has a rapidly expanding biotechnology community, many healthcare technology companies and a strong analytical and clinical supply presence.

Key Programmes 2014-2020:

Mi Liverpool

Mi Liverpool is a £16m programme run by the Liverpool Clinical Commissioning Group with the Technology Strategy Board. The programme focuses on the design, delivery and inclusion of assistive or 'life enhancing' technology across statutory and retail sectors. Activity focuses on four main areas:

- **Technology Provision**
 - developing pathways in statutory health and care services to make effective use of assistive technology.
 - Procurement of assistive technology and support services to ensure safe and effective use.
 - Monitoring of impact and dissemination of best practice.
 - Retail development, advice and supply of assistive technology in a consumer environment.
- **Technological and Design Innovation**
 - Use of insight research and co-design to develop existing and produce new technologies in response to user and professional need.
 - Key industry partnerships to accelerate access to and development of new technologies to improve health and social care services and outcomes.
 - Investigation of novel technologies and potential for implementation in health and social care environments. Examples include Person Held Record platform, home blood analysis, House of Memories App.
- **Community Support**
 - Novel community solutions such as digital hubs to increase internet access
 - Active@60 community activities to develop older people's knowledge of and access to technology
 - Recruitment of community champions to increase community penetration and address social isolation.
- **Smart Economy (eHealth/mHealth)**

- Development of an 'eHealth Cluster' in Liverpool to foster the development of SME growth, accelerate market maturity and increase local supplier access to statutory agencies.

The current programme runs until 2015 and brings together key delivery partners including Philips, Tunstall, PSS, NHS Liverpool Community Health, Informatics Merseyside, Hft, Riverside Housing. The programme has developed a international reputation for excellence and secured EU Reference Site Status

Post 2015 partners are currently developing a wider programme focus on self-care, social elements of health and well-being and technologies in partnership with Liverpool City Council, North West Coast Academic Health Science Network and industry.

Stratified Health

Liverpool is home to excellent genomic facilities that have underpinned significant research and development programmes, locally, nationally and internationally. This provides the city region with a distinct competitive advantage in stratified health.

Key assets in this areas include:

- The University of Liverpool holds the NHS Chair in Pharmacogenetics, the Wolfson Centre for Personalised Medicine, Centre for Drug Safety Science, Centre for Genomics Research, and the Bio-Innovation Hub (housing an open-access biobank).
- The Royal Liverpool Hospital, partnership with the university has invested in biomedical research unit in personalised medicine.
- The Liverpool School of Tropical Medicine's Centre for Drug and Diagnostic discovery opens up wider opportunities linked to the developing world and Alder Hey's legacy of the Medicines for Children Network alongside the new hospital and research centre offers complimentary studies in the paediatric population.
- North West Academic Health Network is the national lead for stratified medicine.

Understanding individual genomics opens up new possibilities for the design of new products lines, reprofiling current drugs, better drug targets and greater discrimination of drug candidates to prevent failure in early clinical trials. This offers hope to counter the well-known drug discovery crisis in the pharmaceutical industry and it is predicated by 2020 that industry will invest as much as 20% of R&D budgets in genetics and genomics¹.

The Stratified Medicine programme will deliver a coherent and joined up partnership to cement Liverpool at the forefront of commercialisation of Stratified Medicine opportunities for the UK and internationally.

Joint activity focuses on

- Business development and engagement
- Open Innovation Hub fostering co-location

¹ UKTI - UK stratified medicine 2013

- Communications, Branding and networks
- Joint research and application into the market
- Clinical trails

Early priorities include:

- Rollout of Liverpool Biomedical Research Centre (BRC) for Personalised Health and NIHR Liverpool Pancreas Biomedical Research Unit
- Progress the Biomedical Research Unit (BRU) in Medicines for Children in Alder Hey
- Establishment of Liverpool Health Genomics Laboratory

Partners will ensure that our assets and programme form a central part of the emerging Technology Strategy Board Precision Medicine Catapult. The Stratified Medicine programme is co-ordinated by Liverpool Health Partners.

Advanced Manufacturing

This priority area seeks to exploit fully the academic and industrial potential of our manufacturing assets, to position the city region as an internationally significant provider of smart products, process, systems and services.

Context

Sectors within the area account for 6% of GVA in the city region, 5% of employment – a larger component of the economy than is the case for the UK. GVA is forecast to grow from £1.2bn to £1.6bn between 2013 and 2030.

Employment in the sector is not forecast to match the growth seen with GVA, falling by c20% from 25,000 in 2013 to c.20,000 jobs over the same period. The Advanced Manufacturing sector is projected to grow by 22% over the next ten years in the city region, compared to 19% nationally

The City Region is already home to 3000+ manufacturing companies, many of them household names like Jaguar Land Rover, Johnson Controls, ABB, Unilever, United Biscuits and Cammell Laird. Others are smaller SME's embracing innovation and working flexibly to create new and world-changing products.

Market opportunities for Advanced Manufacturing have seen a significant shift towards a more globalised manufacturing economy and this is set to continue into the future. The growth of economies such as Brazil, Russia, India and China, and global increasing wages will drive a growth in consumer demand. Emerging economies present significant untapped consumer markets. Supply chains will continue to be fragmented and international in scale, reinforcing the importance of logistics and good networks

The rising 'digital economy' affects traditional products, services and processes as well as creating new demands. Manufacturers will need to meet this and stay ahead of the shifting tide to remain competitive and current. Producing in the UK could incur a high cost of production which may affect how much products are sold to the consumer for, and thus their popularity. The growing and ageing population will increase demand as well as waste imposing a challenge for health, social care and food.

Key challenges and opportunities for high value manufacturing include:

- Resource efficiency, against the backdrop of a scarcity of energy and other resources, will impact on the LCR manufacturing sector. Exploiting a low carbon market, reducing the usage of and securing materials will be increasingly vital.
- Manufacturing systems must be more effective and efficient. This can make the sector globally competitive as it strives to maximise its manufacturing technologies.

- To truly realise the potential of innovation new materials must be integrated. Original products, new materials, coatings and electronics are at the heart of new manufacturing technologies
- The manufacturing process itself must be more agile and cost-effective. This is set against a backdrop of an ageing workforce and an increasing skills shortage with a low mobility. The necessary skills must be built and young people must be attracted to manufacturing.
- To create superior value systems, new business models must be realised. This will help to exploit innovation and to capture value.

Developments that enable and encourage growth of these new ways of working, include the discovery of new materials, the roll-out of additive manufacturing/3D printing, ever more integrated and complex ICT systems, continuing miniaturisation, and the drive towards sustainable manufacturing. The growing trend towards repatriation and on-shoring also represents an opportunity for the city region to complement and strengthen its current industrial base.

The policy context is aligned both at European and UK levels. The sector is a key focus for the Horizon 2020 programme, the Making it Programme uses the same structure used by the Technology Strategy Board to develop a landscape for the future of advanced manufacturing in the UK. This ties into government desire to grow the UK manufacturing economy and rebalance the economy.

Making it

This priority area has been informed by the Making It Programme which was developed by partners and launched by the Secretary of State for Business, Innovation and Skills in October 2013. Making It brought Liverpool City Region's manufacturing community together to map the city region's competencies and develops a roadmap for the next 15 to 20 years

The Making It process engaged with over 70 partners to better understand our asset base and identify market opportunities for the City Region. Working with businesses across sectors with Universities and local and national Government, Making it set out a framework for activity.

Making it identified six short-term market opportunities founded in the Liverpool City Region's existing strengths and asset base. These are complemented by developing strengths in 16 'competencies' to provide the building blocks for longer-term sustained competitiveness. The programme will be driven forward by the Making it board – bringing together large and SME manufacturers with government, EEF and universities led by a private sector chair.

Key programmes 2014-2020:

Materials Innovation Factory

The Materials Innovation Factory is an Open Innovation partnership at the heart of

Liverpool Knowledge Quarter, bringing researchers and fundamental innovation in manufacturing at the molecular level to create a new generation of commercial products.

The flagship asset of the MIF will be a **four storey, 11,600m², £37m building** opening in 2016. The MIF will provide an advanced modern research environment designed to facilitate collaboration, networking and knowledge exchange. It will be equipped with £10m of new equipment within the Open Access Area (OAA).

The MIF will also have a **Research Hotel** offering third parties private laboratory space whilst enabling use of the OAA and MIF Equipment with a focus on SME engagement. Offering such facilities enriches the research community within the MIF and broadens its network. A full business engagement programme is already underway to attract businesses including SMEs.

The building is designed for the **co-location of over 130 university and 130 industry** researchers to foster both fundamental and more applied research innovation in materials chemistry and formulation science. This brings together and greatly extends the experimental equipment base in the Northwest, creating an unparalleled suite of state-of-the-art, open-access facilities that are unique in Europe.

This will encompass automated, 'high throughput' automated methodologies that will accelerate the research process by factor of up to 200.

The operating model builds on an existing and highly successful 10-year partnership with Unilever in the Centre for Materials at the University of Liverpool which shares both capital facilities and dedicated research staff between university and industry researchers.

Sensor City

Sensor City is a public private partnership, led by Liverpool John Moores University and University of Liverpool establishing a unique sensor-systems business incubator in Liverpool's Knowledge Quarter.

Sensor City is focused on creating, nurturing and establishing commercially-viable, hi-tech companies; and, over a 10-year period, drive growth both locally and beyond, creating a cluster of over 300 new businesses and over 1000 jobs in emerging technologies. Sensor City was endorsed as one of UK's four University Enterprise Zones in July 2014.

Sensors are underpinning technologies, which while important as a sizeable market in their own right, have an enormous multiplier effect in the major markets they enable. Namely the "Underpinned Markets" for sensors are -

- Healthcare
- Energy (including renewable energy)
- Environment & Safety
- Aerospace, Automotive and Transport
- Built Environment

Overall growth in the sensors market has been unaffected by the worldwide recession, with the market growing around 9% per year between 2008 and 2010, rising to 10.6% per year in 2013. For sensor systems, the market is estimated to be seven times that of sensor components and currently is around \$490bn globally

Key activity for Sensor city includes:

- Establish and sustain a unique best practice hi-tech sensor business incubator
- Assist graduate entrepreneurs in forming hi-tech businesses, using coaching, mentoring and networks to sustain them and facilitate access to investment
- Increase SME innovation through exploitation of state of the art facilities and academic expertise within the Universities
- Foster urban regeneration through business start-ups and growth
- Integrate an established academic base, existing businesses and new partners to take the sensor sector to critical mass and scale

Manufacturing Technology Centre

(potential for MTC north based in LCR – to be discussed)

The Manufacturing Technology Centre (MTC) represented one of the largest public sector investments in manufacturing housed in a 12,000 square metre purpose built facility at Ansty Park, Coventry. The centre opened in 2011 and was founded by the University of Birmingham, Loughborough University, the University of Nottingham and TWI Ltd, industrial members include some of the UK's major global manufacturers.

MTC provides a high quality environment for the development of cutting edge technologies into manufacturing processes with the aim of delivering truly innovative solutions to UK industry. The MTC is an open access centre providing a flexible approach to working with companies of all sizes from SMEs to Tier 1s and large OEMs, supplemented by a collaborative R&D membership scheme.

The MTC converts ideas into viable processes that can be transferred into industry which includes testing the practical applications of equipment in the centre.

MTC specialises in a range of manufacturing processes that are particularly valuable to the high value manufacturing sector:

- Net shape manufacturing
- Intelligent automation
- Advanced tooling and fixturing
- Electronics manufacturing
- Computerised engineering (modelling and simulation)
- High integrity fabrication (HIF).
- Metrology and non-destructive testing (NDT)
- Non Conventional Machining

The original green book assessment targets for MTC were to have 10 industrial members, 140 staff and £10M turnover by 2020. Having moved into the custom designed building in December 2011 all these measures were exceeded within the first 2 years of full operation. Industrial membership now stands at 67 and just under 300 people are employed at Ansty. MTC is rapidly growing and attracting industrial income along with Catapult and collaborative R&D funds from UK and Europe. In

the 2013/14 financial year MTC secured an additional £49M of capital investment from UK public sources to increase physical size, technical scope and create skills provision capability.

SOLUTIONS FOR SUSTAINABLE GROWTH

One of the City Region's important differentiators is its mix of locational characteristics – its coastal, marine and maritime, estuarial, urban, agricultural and rural environments. This is combined with impressive R&D capabilities in oceanography, energy, the built environment, food and agri-tech, veterinary science, clean water and well-embedded industrial strengths.

These provide a strong platform for expanding the development and commercialisation of a broad range of solutions for sustainable growth against increasing national and global market demand.

The so-called 'blue and green' economy sectors covered by this priority, account for c10% of the city region economy in terms of GVA and employment. GVA is forecast to grow from £2.8bn to £4.1bn in the period 2013-30. Employment stabilises at c.77,000 jobs over the same period.

In 2013, the weight of the city region Sustainable Living commercial base was illustrated by the following figures:

- SuperPort: 22,000 jobs, £743m in GVA
- Food, Drink, and Agriculture: 9,000 jobs, £422m in GVA
- Low Carbon: 43,000 jobs, £1,614m in GVA

Market opportunities are drawn from the sustainability challenges for the City Region's urban areas and their communities, as well as for related key public services such as transport, waste management, energy efficiency and the well-being of a rapidly expanding elderly population. Social innovation, particularly in the 'future city' agenda, is an essential cross-cutting strand of activity.

Over the next six years, the city region will see substantial investment across the energy sector, including off-shore wind investment (driven by the proximity of the Irish Sea offshore wind development zone and Centre for Offshore Renewable Engineering [CORE] status), waste-to-energy plants in some of the area's largest manufacturers, and research required for a Mersey Tidal scheme creates a powerful supply chain for research and technology application.

Other emerging areas such as development of the city region's Hydrogen economy-scaling-up the early stage H₂-cluster at Runcorn and the creation of a Liverpool Advanced Grid-Scale Electrochemical Energy Storage R&D facility are being developed.

This is in addition to the general market demand to lower energy costs and become more sustainable. Investment in sustainable energy solutions is strongly backed by the local manufacturing/engineering sector, with the identified first steps to focus on local energy generation, capture skills and competencies in power management, and invest in local energy infrastructure.

This priority aligns with policy at national and EU Levels:

- **Low Carbon, Environmental Goods, and Services**

Sustainable Growth' is one of three priority themes for the Europe 2020 growth strategy. Studies such as the UK's Stern Review (2007) have forecast extensive socio-economic stress for those economies failing to respond adequately to climate change, resource depletion, and environmental degradation.

More recently, a 2012 Steria review of low carbon market prospects forecast EU expenditure on low-carbon technologies will reach €2.9 trillion by 2022.

- **Marine and Maritime**

The strategic importance of the sector is evident in the EU's 'Action Plan for a Maritime Strategy in the Atlantic Area'. The strategic emphasis on the Atlantic is reinforced by the North West Atlantic Gateway Initiative, a £14 billion programme of investment with the potential to create 140,000 jobs in the North West.

- **Advanced logistics**

Closely allied to the Marine and Maritime and Advanced Manufacturing agendas, logistics is a key enabler underlying many of the sectors viewed as critical to the city region's (and wider UK's) future competitiveness.

Reflecting this importance, logistics and associated technologies feature in a number of the TSB's 'Catapult Centres' (investments aligned to strategic opportunities for the UK), they include: Connected Digital Economy Catapult; High Value Manufacturing Catapult; Transport Systems Catapult.

- **Food, Drink, and Agriculture**

Responding to a global debate on security and sustainability in the food system, Defra's 'Food 2030' strategy (2011) targets the following objectives: enabling and encouraging people to eat a healthy, sustainable diet; ensuring a resilient, profitable and competitive food system; increasing food production sustainably; reducing the food system's greenhouse gas emissions.

At the same time, the food and drink manufacturing base is one component of the high value manufacturing sector viewed as a source of national competitiveness in the UK's Industrial Strategy (2013).

- **Smart Cities**

Increasing pressure on urban areas in the face of growing sustainability challenges underpin the Government's 'Smart City' strategy and the imperative of re-engineering critical public services.

Key assets

- The geographic makeup of the city region is fundamental to its Sustainable Growth proposition; a major well-connected urban centre co-located with an **established deep-water port infrastructure** (with Atlantic trade connectivity) proximal to rural bases in Lancashire and Cheshire, plus strong links to major markets across the North and Midlands.
- The proposition is further enhanced by the city region's proximity to the Irish Sea's designated offshore wind development zone and wider wind and tidal regime (estimated at £15 billion in economic value), as well as major nuclear clusters elsewhere in the North West and North Wales.

- Liverpool John Moores University: Research Centre for Electrical Energy Efficiency; Built Environment and Sustainable Technologies (BEST) Institute; Liverpool Logistics, Offshore and Marine (LOOM) Institute; Lairdside Maritime Centre and Liverpool Maritime Academy.
- The University of Liverpool: Centre for Global Eco-Innovation; Department of Earth, Ocean and Natural Sciences; Department of Electrical Engineering and Electronics; Department of Geography and Planning; Nuclear Physics Group; Institute of Integrated Biology; NERC National Oceanography Centre; School of Civic Design; Centre for Autonomous Systems Technology; Stephenson Institute for Renewable Energy; University of Liverpool Food Security Network; and Leahurst Campus (Agri-science).
- An analysis of the city region's commercial strengths, current and potential, performed by Gyron LLP highlighted the following sector capabilities: Low Carbon Knowledge and Advisory, Cleantech Manufacturing, Recovery, Recycling, and Waste Management (including Water Treatment and Biomass), Low Carbon Building Technologies, Civil Nuclear Power Engineering.

Key Programmes 2014-2020

Marine Energy Deployment and Operations Centre (MEDOC)

The UK marine energy sector will see investment of over £110bn over the next 15 years. The UK is internationally recognised as a world leader in the design, development and deployment of marine energy systems. Liverpool Bay alone hosts more offshore wind turbines than the whole of Asia and the Americas combined.

A fundamental issue facing the sector is the need to reduce costs, both in construction and operations. The MEDOC will be a key asset in the UK's marine energy programme and consequently of international significance. It harnesses the City Region's long expertise in innovative maritime engineering and operations to an emerging global market. It compliments existing UK centres such as NAREC, EMEC and Wave Hub as it focuses on operations and deployment technology and systems rather than pure R&D of components.

The Centre focuses on developing technology, operational and maintenance innovation and best practices to accelerate the cost reduction and cost effective deployment targets of the delivery of marine energy technologies at scale and at commercially viable rates.

There is currently no centre in the UK dedicated to these aspects of the industry. The centre would bring together a number of facilities already in use along the Mersey under a single, coherent brand and add new facilities to form a Marine Energy Campus centred on Birkenhead.

In the context of the Innovation Plan, Marine Energy refers to three distinct types of technology and deployment; offshore wind, tidal and wave energy.

The Deployment and Operations Centre would utilise the existing assets along the River Mersey including Cammell Laird, LJMU's Lairdside facility and the NW Marine Engineering College.

Three additional facilities would be required at an early stage.

- A large-scale **test tank facility** is a pre-requisite. The tank will be multi-purpose and be commercially viable from day one as it would also offer offshore survival certification and training including helicopter ditching. There are only three centres in the UK (Peterhead, Aberdeen and Fleetwood) offering these facilities. All have waiting lists and charge over £1,000 per person per day.
- The second facility will be a facility akin to the Virtual Engineering Centre at Daresbury. This could be a standalone facility or an expansion of the Lairdsid centre. This would allow techniques and technologies to be refined prior to deployment, upgrade or maintenance.
- The third element will be an **in-river ship handling simulator**. The City Region is already a major international centre for ship handling and command training and certification. The new facility would deploy elements of turbines including transition pieces in the river to allow real-world training and familiarisation in hostile conditions

LCR Hydrogen Network

Liverpool City Region has unique supply chain assets, including pipeline connected bi-product hydrogen, and a growing cluster of high tech, innovative companies that could enable the City Region to be one of the first in the UK, if not Europe and the world to develop an integrated hydrogen network.

The Hydrogen Network programme supports the aims of the LCR2Energy project within the Growth Plan. The programme will create opportunities for jobs & growth from

- Utilising bi-product produced hydrogen and existing pipeline infrastructure
- The demand response, grid balancing and energy storage opportunities from an integrated hydrogen energy network
- Providing cost effective, distributed, low carbon energy from hydrogen for electricity generation, heat and transport.

An integrated network can be achieved over the next 6 years by building collaborative and supported innovation across the city region. The programme will deliver:

- Novel System integration
- Energy Modelling
- Policy, planning and standards
- Reducing cost by using scale
- Leveraging external funding
- Connecting Other forms of transport – ferry, commercial vehicles
- Bus development & innovation
- Hydrogen transport and storage

The programme brings together key public and private partners such as Ineos Chlor, Dong Energy, SOG, SciTech Daresbury, ACAL Energy, Halton Council, ULEMCo, Liverpool City Region LEP and MerseyTravel.

CREATIVE AND DIGITAL

The Liverpool city region has a strong cultural brand and landscape, demonstrated by the highly successful Liverpool European Capital of Culture 2008 programme as well as its rich heritage in popular music, film, television, theatre, literature, gaming, media and digital applications.

Central to the innovation agenda is the small but rapidly growing digital and creative cluster in the Baltic Triangle area of Liverpool, a growing Data Storage capacity and scientific capabilities around big data and informatics and sensor development.

Context

Nationally, the digital and creative industries have been in growth for the past decade and have bucked the trend of the recession in the second half of that decade. In 2011/2012, the Creative Industries accounted for 1.68 million jobs or 5.6% of the total number of jobs in the UK. Employment in the sector increased by 8.6% between 2011 and 2012, a higher rate than for the UK economy as a whole (0.7%).

The GVA of the sector was £71.4 billion in 2012 and accounted for 5.2% of the UK economy and has increased by 15.6% since 2008 compared to an increase of 5.4% for the UK economy as a whole.² This growth reflects wider global trends in the digital entertainment, media and IT sectors.

In Liverpool City Region, GVA in the combined creativity and digital content sectors has risen substantially over the last 10 years, growing from £740 million in 2003 to reach £878 million by 2013. Latest ONS/DCMS data points to 18,906 jobs in the sector (excluding the freelance economy). This represents 3.0% of employment in the LCR.

Looking forward to 2030, employment is expected to grow, with GVA continuing to grow at a considerable rate, more than doubling in size by 2030 (£1.68 billion) and the sector is recognised a key driver for growth at UK and EU levels.

The EU, in 'An Integrated Industrial Policy for the Globalisation Era: Putting Competitiveness and Sustainability at Centre Stage', acknowledges the cultural and creative industries as important drivers for economic and social innovation across sectors – with design, architecture and advertising playing an important role in supporting investments.

There are many well-embedded creative and digital related companies within the city region, with a reputation for highly creative product and content development. As the .The sector needs to build a critical mass of mid and larger-scale companies based and better support companies to access appropriate finance, support and management expertise during the early stages of their growth and development

Market opportunities highlight the increasing convergence between the digital and creative domains through strong market demand for: mass participation; mobile

² ONS and DCMS Creative Economy Estimates – January 2014 (Official Statistics)

distribution; smart-technologies; big data analytics; cloud computing; embedded computing; visualisation; digital curation; and compositing.

Furthermore, the City Region is home to some of the UK's leading online retailers and is also implementing a SuperPort strategy that seeks to establish the city region as a low carbon advanced logistics/distribution hub, Both afford the opportunity as a leading centre of excellence for e-commerce technologies and innovation focussed on e-commerce, retail and supply chain.

Key assets:

- The Baltic Triangle and Ropewalks (more historically) areas of Liverpool have acted as key hubs for the digital and creative sectors, with the Foundation for Art and Creative Technology (FACT) based in the latter and **Elevator Studios** (c9,000 sq.m) and **Baltic Creative** (c4,500 sq.m) providing commercial space in the former.
- **Liverpool Science Park and Liverpool Innovation Park** provide additional accommodation and incubation space.
- Research assets include **LJMU's Open Labs**, Liverpool Screen School, Centre for Cultural Leadership and a School of Computing and Mathematical Science. Academic competencies also lie in the Liverpool School of Art and Design, the Liverpool Hope Creative Campus and the University of Semantic Web Technology.
- Based at Daresbury, the **Hartree Centre** is a valuable asset to the city region, giving it access to a leading centre in high performance computing. Backed by a Government investment of £37.5 million, Daresbury also has strong relationships with international companies through its Computational Science and Engineering Group. .
- Linking the local business community through **ACME** at Liverpool Vision, the city region has a well-established sector support organisation for the Creative Industries. **The Liverpool Film Office (LFO)** is the longest established film commission in the UK. The LFO attracted over £100 million worth of investment from programme and film makers during the last decade.
- In **gaming**, the city region also has a strong presence and a very rich heritage. The legacy of former large-scale gaming studios (such as Sony and Bizarre etc.) has given rise to a new pipeline of rapidly growing SMEs and start-ups in the area, with an international reach. This is complemented by the Liverpool Studio school focusing on gaming.
- The city region also has a strong presence in **multi-platform content providers**, with examples including Conker Media, New Mind, Lucid Games, Milky Tea, River Motion Group and Uniform. The city region has also hosted a number of annual Software City events, showcasing technology and matching ideas with investors.
- Whilst not in the city region, the nearby **MediaCityUK** development represents a major opportunity for the city region in the digital and media space, tapping into the sector's growth across the North West and beyond, not just locally.

Liverpool: Plug and Play

Liverpool Plug and Play (LPP) is a coordinated programme to maximise opportunities from the growth of the digital economy for businesses, government and education. The programme generates a new dynamic for the City Region by creating a brand identity and a cohesive approach to city-wide digital engagement.

Liverpool will become a connected digital city region by allowing content creators, data managers and distributors to simply plug in at a host of sites and access resources held at a number of centres in the LCR.

Data management, content and high performance computing

The first phase of LPP develops attractive 'data play' offer for the city region. This data centre connects three new assets – a VFX computing centre, a new post-production hub and a content factory/soundstages.

Bespoke fibre connections already link elements of the assets to sites around the city – Liverpool Innovation Park and Baltic Creative. This connectivity will shortly link directly to Sohonet, connecting innovators in Liverpool City Region to the heart of the richest digital media network in Europe. This will also look to connect to High Performance capability at Sci Tech Daresbury

The capacity to manage data, manipulate content and access high level computing facilities is critical to the continuing development of the city's rich vein of digital and creative industries companies. The Plug and Play concept differentiates Liverpool as a flexible, collaborative, developmental and digitally savvy city.

Plug and Play development company

This model has at its heart a new development company – 'Liverpool Plug and Play' – which drives the delivery of these new assets, collaborates with partners on an accelerator programme, plugs companies into investment opportunities and starts to deliver cross-sector working through an Entertainment Technology Forum which links creative companies with cross-sector projects, applications and opportunities. The Liverpool City Region will be one of the first UK locations to articulate its Creative and Digital Sector in terms of its relationship with other growth sectors.

The development company will become the city region conduit for digital and creative inward investment and the manager of a creative & digital SME network and business support programme. It will facilitate a unique Learning Framework for the regions schools, colleges, Universities and digital businesses to teach 21st century digital skills and build on Liverpool's reputation as the go-to city for a talent base in digital asset management, retail, tourism, maritime and logistics as well as entertainment, mobile platforms, games and VFX technologies.

By 2020, Liverpool Plug and Play aims to facilitate an increase in employment in the sector across the LCR by 6,937 jobs (5% per annum from 2015) and generate an additional 2,428 digital and creative jobs within the wider economy delivering additional Creative Economy employment of 9,364 jobs by 2020.

Strategic Governance and delivery arrangements

The Liverpool City Region Innovation plan is a framework to further develop our innovation capability and delivery programmes while challenging partners to work more effectively at scale and address our barriers to growth. The focus of the plan is on deliverability, capturing growth and developing a national and international track record for innovation success.

The Liverpool City Region Innovation Board will, on behalf of the Combined Authority and the Local Enterprise Partnership, have a strategic oversight of the development of our innovation ecosystem, four priority areas and 11 delivery programmes.

Delivery of the plan is supported by a growing community of 'quadruple helix' partners (industry, government, academia and end-users) throughout the Liverpool City Region and beyond. The individual projects and programmes will be delivered by identified lead partners or consortia and they will be supported by a robust commissioning, delivery and performance management processes.

The Liverpool City Region has extensive and growing experience of delivering innovation programmes at scale and the Innovation Board will ensure effective use of local funds to lever national funding and maximise private sector investment.

The Liverpool City Region Innovation Board

The Innovation Board builds on a long track record of partnership working over the last decade such as the Knowledge Economy Board and works alongside key delivery board such as the Sci Tech Daresbury EZ board and the Knowledge Quarter board. The role of the Innovation Board is have a strategic oversight of the development of our innovation ecosystem, four priority areas and 11 delivery programmes. This Board brings together appropriate public and private sector expertise and is the primary Liverpool City Region advisory group on Innovation.

Key activity includes:

- Review and update strategic investment priorities.
- Agree structure and process for programme management/delivery, encourage partnership working and identify best practice / collaboration opportunities regarding wider funding streams.
- Review and endorse calls/commissioning criteria in relation to the LCR EU programme 2014-2020, ensuring strategic fit with LCR priorities and Local Growth Plan
- Review programme performance, ensuring strategic objectives of LCR Innovation Plan are met through efficient delivery
- Oversee the development of the Innovation Exchange programme
- Oversee a programme of foresight for on behalf the Liverpool City Region

An Innovation delivery group will be established, to support the work of the Innovation Board. The Innovation Board will develop an annual Innovation Strategic action plan to ensure progress and prioritisation

Priority areas leadership

Each priority area provides a focus for activity by building our capacity and capability to drive growth and will be supported by a proactive business-led network to animate, deliberate and articulate priorities, identify synergies between and across businesses, and promote the opportunities to wider markets.

The Innovation Board will support the development of public private leadership in each of the priority areas mirroring the successful establishment of the Advanced Manufacturing – Making it Board. These will build on established partnerships and look to work across LEP boundaries and develop programmes locally and nationally.

Delivery Programmes

Each of the 11 City region delivery programmes will be managed and delivered by the programme lead or consortia.