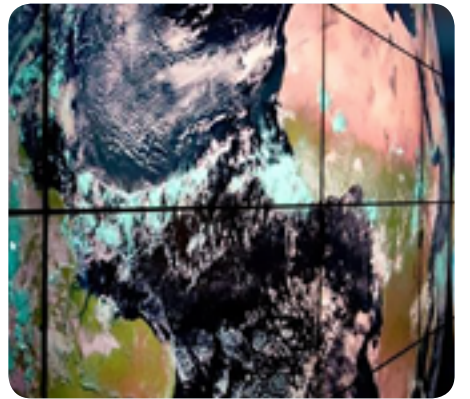


Oxfordshire Local Enterprise Partnership

Innovation Strategy





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1. Foreword

The Government's industrial strategy provides a strong focus for building on the UK's competitive strengths to deliver a high-skilled, competitive economy that benefits people throughout the UK. The strategy, along with the preceding Autumn Statement, place a great emphasis on science, research and innovation-led growth as key to improved economic prosperity and enhanced productivity that will drive national growth and increased international trade. As the UK moves towards a new relationship with the European Union, we have a renewed opportunity to build a strong, confident, successful region that is:

- linked globally through innovation and trade,
- a global leader in international forums from climate change to medicine,
- a world-renowned environment in which new ventures and small businesses can be established and pursued with agility and flexibility and in a culture of encouragement, and
- a trusted partner in international ventures based on a stable, open economy.

Oxfordshire can be at the forefront of national policy. The county is one of the best-performing and most innovative areas in England and has unique assets to support growth in the national economy. Whilst many other UK areas lay claim to having innovation-rich knowledge intensive economies, Oxfordshire can truly claim to be world-leading given the exceptional mix of academic and facility-based research that supports new and established businesses.

We are world-renowned for the excellence of our universities innovative business culture and for the quality of our built and natural environment. Our vision is to build on the existing vibrant innovation-led economy in Oxfordshire to drive additional high value growth. Our Strategic Economic Plan (SEP) points to innovation as the key driver for growth; however, continued investment in innovation will be required to capitalise on our assets and strengths and support growth in both the local and national economy.

Prepared in consultation with the key innovation organisations in Oxfordshire, this document sets out a strategy to better understand, increase, and maximise innovation in Oxfordshire. This is part of a series of plans which underpin the delivery of the SEP, and reflects its four priority themes:



People – delivering and attracting specialist and flexible skills at all levels, across all sectors, as required by our businesses, filling skills gaps, and seeking to ensure full, inclusive, employment and fulfilling jobs



Place – ensuring a strong link between jobs and housing growth, and providing a quality environment that supports and sustains growth; and offering the choice of business premises and homes (including more homes that are genuinely affordable) needed to support sustainable growth whilst capitalising on and valuing our exceptional quality of life, vibrant economy and urban and rural communities



Enterprise – emphasising innovation-led growth, underpinned by the strength of Oxfordshire’s research, business collaboration and supply chain potential; recognising and reinforcing the significant contribution made by all sectors, all parts of Oxfordshire and all types of business



Connectivity – enabling people, goods and services to move more freely, connect more easily; improving broadband and mobile coverage and capacity; and providing the services, environment and facilities needed by a dynamic, growing and dispersed economy.

The strategy is structured around ten key themes, each of which underpins innovation across all sectors. For each theme, the needs, drivers and existing work are explored (illustrated by case studies of current initiatives) as well as the challenges that remain for an innovation-driven economy and a list of proposed projects that would deliver this vision. Together, these themes form the basis of the innovation framework that aims to inspire further investment across the themes and accelerate delivery. Delivery of this innovation strategy will be the responsibility of our new innovation sub-group reporting into the OxLEP Board. The sub-group will engage stakeholders from across our innovation ecosystem, and will take responsibility for delivering, monitoring and updating the strategy. 2016 was a momentous year on the national stage, the British public’s referendum vote to leave the European Union in June will have far-reaching consequences, not least for our regional innovation community. Whilst the post-Brexit world remains unclear we must ensure we continue to support our businesses, researchers and innovators to prepare for change.

Our Innovation Strategy therefore seeks to build on our world-class innovation credentials, to drive growth nationally and to harness innovation for the benefit of all, in Oxfordshire and across the world.



Professor Ian Walmsley
Pro-Vice-Chancellor
(Research and Innovation)
University of Oxford



Nigel Tipple
Chief Executive
OxLEP

2. Introduction

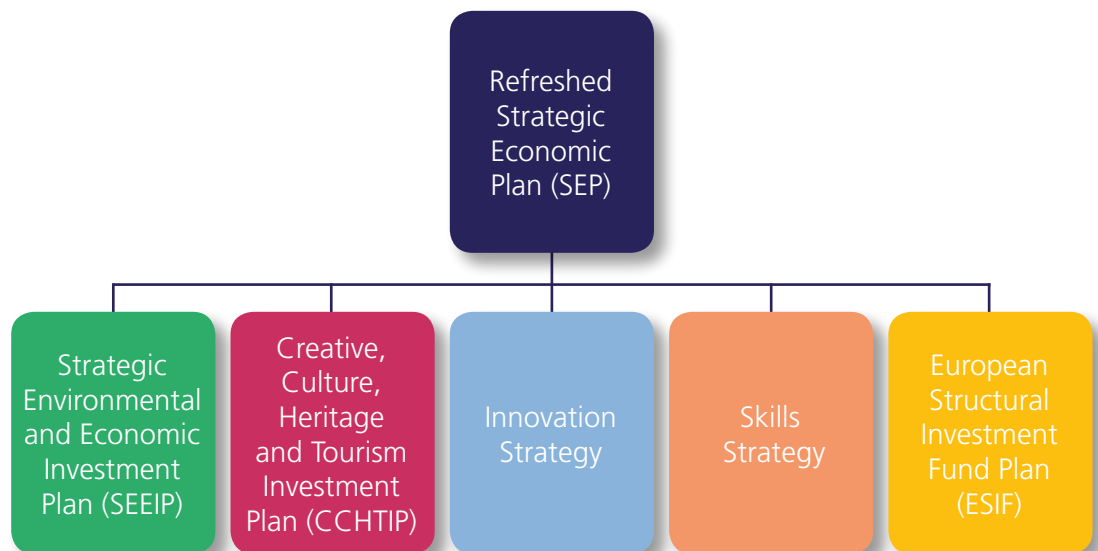
2.1 Purpose of this Document

This document sets out a strategy to better understand, increase, and make use of innovation in Oxfordshire.

This document sets out a strategy to better understand, increase, and make use of innovation in Oxfordshire. Our recommendations feed into the recent refresh of the Strategic Economic Plan (SEP)¹, and will serve as the Innovation Strategy alongside its sister documents the Creativity, Cultural, Heritage and Tourism (CCHT) Strategy², European Structural and Investment Funds Strategy³, the Skills Strategy⁴ and the Strategic Environmental Economic Investment Plan (SEEIP)⁵. It is intended to harness the component parts of our excellent innovation base and experience and to enable, where practical, activity to be aligned and coordinated to ensure we are all working towards a common goal for Oxfordshire that spawns new ideas, new processes, and new ways of working that together combine to create high value job opportunities and increased productivity.

This strategy has been prepared in consultation with a working group representing some of the key innovation organisations and sites in Oxfordshire,⁶ and has been circulated throughout the wider innovation community for input.

Figure 1 – Oxfordshire Strategic Plan/s



1 <http://cleverpaper.co.uk/oxlep/358563/358563%20xLEP%20SEP.html>

2 <http://www.oxfordshirelep.org.uk/content/cchtip>

3 <http://www.oxfordshirelep.org.uk/content/eu-strategy>

4 <http://www.oxfordshirelep.org.uk/content/people-and-skills>

5 <http://www.oxfordshirelep.org.uk/content/seeip>

6 Working group members: Tim Bestwick (Science & Technology Facilities Council), Bob Bradley (MD2MD), Rob Buckingham (UK Atomic Energy Authority), David Burrows (Invest in Oxfordshire), Phil Clare (University of Oxford), David Hartley (Oxford Brookes University), Simon Jackman (Satellite Applications Catapult), Steven Moss (UK Atomic Energy Authority), Stephen Ringler (Science & Technology Facilities Council), Nick Scott-Ram (Oxford Academic Health Science Network), Phil Shadbolt (The Zeta Group), Lynn Shepherd (Venturefest Oxford), Stuart Wilkinson (University of Oxford). Additional support was provided by Isis Enterprise, Oxford University Innovation Ltd.

2.2 National context

The government launched the 'Building our Industrial Strategy' green paper in January 2017. Its objective is to improve living standards and economic growth by increasing productivity and driving growth across the whole country. It identifies 10 pillars government believes are important to drive growth. Innovation is at the heart of the emerging Industrial Strategy - we'll continue to monitor the opportunities it brings for Oxfordshire as it moves through the policy development framework and ensure we're in a good position to help deliver its priorities moving forward whilst we continue to explore how we can strengthen collaboration with other regions to maximise UK's PLC global advantages across all eight great technologies.

The Industrial Strategy has a welcome focus on science, research and innovation. It recognises the UK's inherent science based advantages and seeks to build on these to increase commercialisation, drive productivity improvements and maximise the take up on new technologies. Whilst this is to be welcomed it also states:

'Furthermore there are regional disparities in how the public sector and companies spend money on research and innovation, with the UK public R&D funding heavily focussed on the 'golden triangle' of Oxford, Cambridge and London. As well as continuing to unleash the excellence of institutions, we need to build on the excellence in research and innovation that exists in other parts of the country too, and ensure that capital, institutional influence and government attention is targeted there effectively.'

Driving growth across the whole country is one of the fundamental objectives of the Industrial Strategy. We must be cognisant of this policy imperative and be robust in making the case for continued investment in our world class innovation infrastructure that drives growth locally, (and thus produces significant return to the Exchequer), regionally, nationally and internationally. This policy isn't new, it's been around in various guises for many years, however it comes at a time of increased global uncertainty as we navigate our post Brexit position.

We welcome that the Industrial Strategy confirms government will substantially increase investment in R&D, providing an additional £4.7bn by 2020 – a 20% increase in total government R&D spending – our challenge is to maximise take up to drive growth locally and nationally.

2.3 Oxfordshire's Innovation Ecosystem

Oxfordshire is world-renowned for its academic excellence, innovative business culture and for the quality of its built and natural environment. The county is one of the best-performing and most innovative areas in England and has unique assets to support growth in the national economy. A significant regional economy, Oxfordshire contributes £21.9 billion a year to national output, and forms part of the Thames Valley sub region, one of only three positive contributors to the Exchequer. Oxfordshire performs well on key metrics of productivity and it is consistently in the upper echelons of league tables relating to the economic performance of LEP areas:

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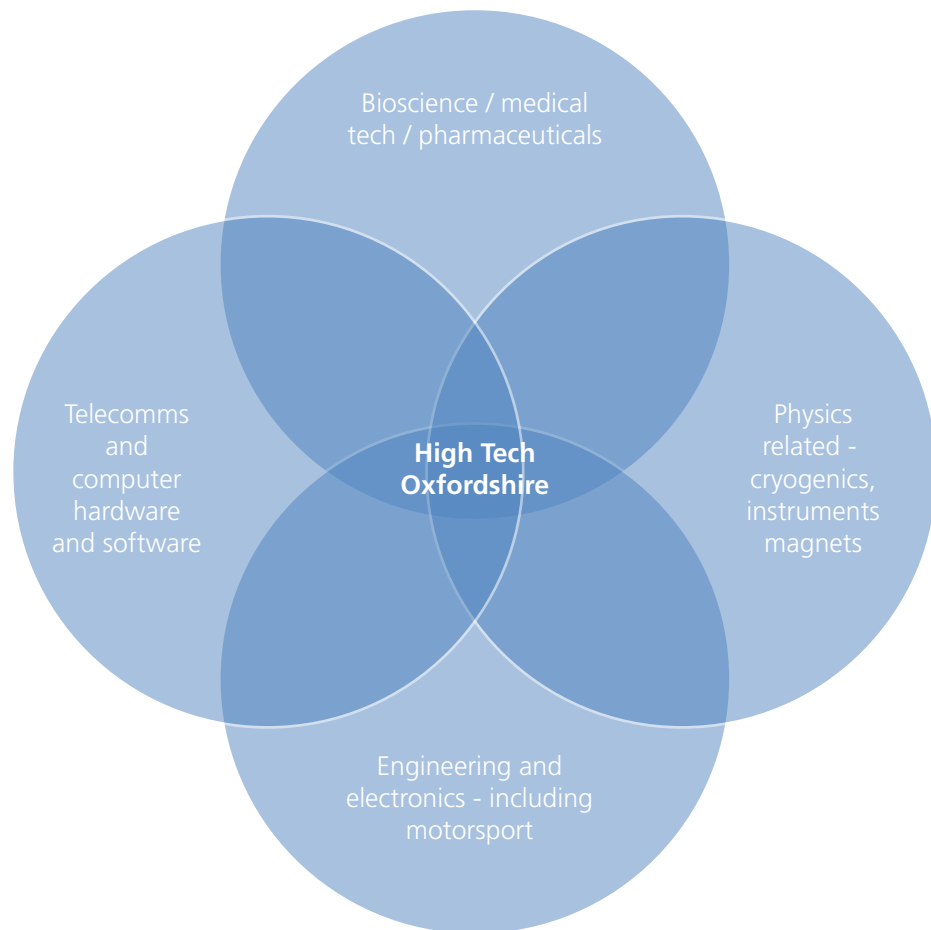
A significant regional economy, Oxfordshire contributes £21.9 billion a year to national output, and forms part of the Thames Valley sub region, one of only three positive contributors to the Exchequer.

- in 2014, GVA per hour worked in Oxfordshire was an estimated £32.70 – compared to a UK average of £31.00
- in 2013, GVA per filled job was estimated to be £51.2k; the UK average was £48.8k

GVA has increased significantly in the last decade or so, and in 2013, Oxfordshire had the 6th highest GVA per capita among 38 LEPs.

Located 40 miles from Heathrow airport and 50 miles from London, Oxfordshire supports an internationally recognised cluster of ‘big science’ and research facilities, over 1,500 high tech businesses, and a highly skilled workforce.⁷ Underpinning Oxfordshire’s strong economy and labour market is the area’s very particular strengths in higher education and research. The assets and characteristics of the Oxfordshire high tech economy have been extensively described, notably in The Oxfordshire Innovation Engine report of 2013 and its subsequent 2016 update, and offer huge opportunities for business growth.

Figure 2: Understanding high tech Oxfordshire: core overlapping technologies⁸



Source: The Oxfordshire Innovation Engine Update, Realising the growth potential, SQW, October 2016

⁷ The Oxfordshire Innovation Engine Report, 2013

⁸ Source: The Oxfordshire Innovation Engine Update, Realising the growth potential, SQW, October 2016

Innovation is already a fundamental element of Oxfordshire's economy: a survey by ERC found that firms in the Oxfordshire LEP area reported the most innovation activity compared to other regions in the UK.

2.4 Innovation strategy as a driver for economic growth

The Strategic Economic Plan points to innovation as the key driver for growth in Oxfordshire, which has the raw materials to support a knowledge-based economy founded on the generation, use and innovative application of knowledge. There is strong research evidence that shows the interdependence between innovation, high growth and exporting in businesses, such that a successful and growing Oxfordshire will bring benefits far beyond its own boundaries and enhance its already significant contribution to the national exchequer.

Innovation is already a fundamental element of Oxfordshire's economy: a survey by ERC found that firms in the Oxfordshire LEP area reported the most innovation activity compared to other regions in the UK.⁹ Despite the wealth of assets in the area, it is recognised that Oxfordshire has not yet reached its full potential, particularly when compared with other internationally renowned areas around world-class universities such as Massachusetts Institute of Technology, Stanford University or Cambridge. There is strong research evidence that shows the interdependence between high growth, innovation and exporting in businesses.¹⁰ However, continued investment in innovation is required to capitalise on our assets and strengths and support growth in both the local and national economy.

Our high-level over-arching strategy is to support and build economic growth by implementing measures which focus on the underpinning elements and processes required for innovation and which apply across all sectors and technologies. The convergence of technology and know-how, and the high diversity of businesses within the area will allow for enhanced levels of innovation through cross-fertilisation and serendipity and result in a rich and connected matrix of opportunity. This applies to high-tech businesses developing new product innovations, as well as to traditional businesses and social enterprises applying business model innovations.

2.5 Scope of the Innovation Strategy

The vision of this strategy is to enhance and support our innovation-led economy. Successful delivery will sustain and grow our economy and contribute to the social good by supporting the development of innovative businesses and technologies.

Through our work leading inward investment we have identified and selected five priority sectors that represent strengths and opportunities for growth and that attract significant levels of foreign direct investment: Automotive & Motorsports; Creative & Digital; Electronics - Sensors & Instrumentation; Life Sciences; and Space and satellite Technologies. These are more established sectors than those selected for our Science & Innovation Audit which is focusing on emerging, disruptive technologies with potential to transform their specific sectors as well as the wider economy.

9 Enterprise Research Centre, "Benchmarking Local Innovation: The innovation geography of the UK" 2015 <http://www.enterpriseresearch.ac.uk/wp-content/uploads/2015/05/Benchmarking-Local-Innovation1.pdf>

10 Enterprise Research Centre, "SME Innovation, Exporting, and Growth: ERC White Paper No.5", April 2013. http://www.enterpriseresearch.ac.uk/wp-content/uploads/2013/12/ERC-White-Paper-No_5-Innovation-final.pdf

However this strategy does not focus on any specific sector, but rather on the underpinning elements and processes required for innovation across all sectors. People and skills, ideas, and capital are key to delivering innovation and must be supported across three phases of development: discovery and generation; interaction and mixing; and application and adoption. We must look for ways to move from 'potential' to 'actual' innovation, encouraging adoption by existing companies while also attracting, growing, or creating new companies that are hungry for innovation. A challenging aspiration for the future will be to look at innovation beyond academia – engaging more readily with the business base in Oxfordshire will enable innovation to be transferred to the commercial framework and allow value to be extracted, thus working towards our vision of an innovation-led economy.

Building on the elements and processes required for innovation, our innovation strategy focusses on ten themes:

1. Understanding the Ecosystem
2. Strengthening our Networks
3. Building Innovation Spaces
4. Reinforcing the Science and Research Base for Innovation
5. Innovation for All
6. Innovation for Social Good
7. Nurturing Talent and Developing Skills
8. Attracting Significant Business
9. Attracting Capital
10. Embedding Innovation in the Ecosystem

These themes provide a framework for validating our innovation activity, and for communicating our ambitions to governments, funders, and the broader community. Going forward, this framework will also enable us to elucidate and prioritise a series of investment proposals that further one or more of the strategic themes.

In the following section each theme is elaborated, highlighting the work that has already been done and the challenges that remain to enable an innovation-driven economy. We have also proposed a “Delivery Framework” at the end of this report (**Chapter 6**), to articulate the requirements for developing and delivering this strategy going forward.



3. Innovation Themes

Here we present each of the ten themes, discussing the underlying challenges, needs and drivers, the current initiatives, and our vision.

A summary of proposed projects and initiatives that will deliver against these themes is outlined in **Chapter 6**, with the list presented in full in Appendix 1.

3.1 Understanding the Ecosystem

Prioritising and selecting what we do based on a deeper understanding of our strengths

A great deal of work has already been done to better understand elements of the innovation ecosystem that drives our economy. These include the Oxford Innovation Engine Reports, Invest in Oxfordshire Sector analyses, and the NESTA network analysis (see Case Study in Appendix 2). However we need to develop an even deeper understanding in order to make sensible evidence-based interventions. A more comprehensive view across the range of innovation activities will allow us to provide better support interventions for those areas that are underdeveloped, while also identifying synergies and opportunities for interactions and convergence across disciplines.

Oxfordshire is remarkable for the sheer range of scientific disciplines and business sectors in which there is real strength and depth. Innovation frequently occurs as a result of bridging between different sectors, often as a result of serendipitous interactions. The very richness of the ecosystem underpins an opportunity for innovation that very few places can replicate, while also emphasising the complexity and importance of better understanding our own strengths.

Audit schemes such as the government's Science and Innovation Audit (SIA) programme could be useful tools to better understand some of the key science and innovation resources and infrastructure available locally, and the opportunities to engage businesses both local and national in bringing innovations to market (e.g., through collaboration development, manufacturing, or sales).

Oxfordshire's world leading research organisations, facilities and capacities make it a region for invention and innovation that stands out within the UK. Our SIA will enable the consortium's regions to remain competitive, continue investment in growth, and help make the UK a global leader for transformative technologies.

The geographic scope of our proposal has OxLEP at its centre, in alliance with other LEPs, namely the North East, Greater Cambridgeshire, Berkshire, Leicestershire and Enterprise M3. Our SIA focuses on four sector areas with significant global potential and points of intersection; "Digital Health", "Space-led Data Applications", "Autonomous Vehicles" and "Technologies underpinning quantum computing".

These areas reflect our Strategic Economic Plan for innovation-led growth and the 'eight great technologies' previously identified by the UK Government that drive

Oxfordshire's world leading research organisations, facilities and capacities make it a region for invention and innovation that stands out within the UK.

future growth. Although at different stages of maturity and market penetration, our SIA areas are complementary and face similar challenges and opportunities with regards to enabling growth, and developing regional and international capacity. We are looking at emerging, disruptive technologies that could transform their specific sectors as well as the wider economy. There is a global race to lead the market in these areas to benefit from inward investment from users and suppliers and to confer competitive advantages for industries that adopt them. The UK is currently at the forefront, but our world leading research alone cannot sustain this position. Continued investment is essential to translate innovative R&D into the market.

The anticipated value of the SIA is that we will be able to: map our research and innovation strengths and infrastructures; identify new ways to accelerate the development of selected areas; maintain our world leading position by leveraging and connecting our existing strengths, and then target our investment into the four areas for the greatest potential impact across the UK. The key points to be addressed by our SIA are:

- to accelerate the adoption of the research and innovation by business
- to develop the skills base for future growth; and
- to develop connected supply chains for emerging technologies.

It should be emphasised that the four areas outlined for the Science and Innovation Audit Programme are not “priorities”, but rather four areas of strength among many possibilities that were chosen for this particular audit submission. These four areas - while distinct - have significant overlap and points of intersection both locally and nationally, and share a common need to develop connectivity into complementary communities beyond the region and their specific technology sectors.

Whilst Oxford’s bid to be the European Capital of Innovation Award 2016 was unsuccessful the process of putting the bid together was of great value. All parties involved in pursuing and promoting innovation in Oxfordshire provided input to the bid, and for the first time the breadth of Oxfordshire’s innovation eco-system was observed.

Oxfordshire’s innovation landscape is ever-changing; as our strengths and capabilities evolve over time, there will be an ongoing need to evaluate and understand the ecosystem. We will need to establish what data is currently measured and well understood, where the gaps exist, and what activities will be undertaken to fill in the gaps in order to build a stronger picture and a better understanding of our ecosystem. Going forward, we will look for opportunities to collaborate with other groups interested in gathering data both within and outside of Oxfordshire, allowing us to benchmark and compare to other ecosystems.

3.2 Strengthening our Networks

Enabling innovators to navigate Oxfordshire’s networks and connect across boundaries

Networks and events to foster interactions and cross-connections are essential for innovation. The networking community is thriving locally, driving many of our entrepreneurs and innovators to develop their ideas and new businesses. These range



from sector specific networks to more general groups; from small to large. Examples include: Oxford Technology and Media Network (see Case Study in Appendix 2); the Bicester Breakfast Club; OBN (formerly Oxfordshire Biotech Network); Oxford Young Entrepreneurs; the Cryogenics Cluster (see Case Study in Appendix 2) and Venturefest (conceived in Oxfordshire – now part of a larger national activity).

Oxfordshire has a high concentration of world-leading research, companies and organisations. The breadth and scale of activity in Oxfordshire amplifies the potential for interdisciplinary interactions, and can be a valuable catalyst for innovation; yet it also adds a layer of complexity, making it difficult for innovators to know what happens outside their own domain. There have been multiple attempts to map Oxfordshire's networks, most recently including a map for life science companies in Oxfordshire created by the Oxford Academic Health Science Network (ASHN)¹¹, the Enterprising Oxford resource maps and journeys¹² (see Case Study in Appendix 2), and a map of the 'grass roots' tech meetup sector by the Oxford Trust (see Case Study in Appendix 2).

Another challenge we must address is the need for a strong industry voice across the region, which can be proactive in calling for infrastructure and support

While in some sectors there are well developed networks, the challenge of creating and maintaining a comprehensive view in other sectors as well as between sectors remains. This may be due to the dynamic and overlapping nature of the existing networks. Another activity that has evolved in response to this challenge is our 'Network Navigator' programme, which has been highly effective in linking together and enhancing our existing networks in nine sectors (see Case Study in Appendix 2). Our recent £2m European Regional Development Fund start up and growth business support programme provides continuity for the Network Navigator programme to Sept 2019.

11 <http://wealthcreationmap.oxfordahsn.org>

12 <http://eship.ox.ac.uk/physical-resources/ecosystem-maps>

By improving our understanding of our innovation ecosystem – and how its complex networks interact – we will be able to develop strategies to strengthen those networks and the connections between them.

Another challenge we must address is the need for a strong industry voice across the region, which can be proactive in calling for infrastructure and support, similar to that done so successfully in Cambridge. Oxfordshire business sectors have tended to be more siloed; so networks need to be created that span across different sectors more effectively.

In addition, despite a plethora of successful formal networks (a top-down approach), Oxford is often felt to have insufficient grass-roots, user generated networking activity. A characteristic of successful ecosystems that is often cited is the proliferation of entrepreneurial meetup groups and events organised by passionate individuals. By and large these groups are dynamic and vital and help to generate a great sense of entrepreneurial culture. Oxford Startups is one such example (though there are many more), and it will be important that we don't lose sight of these grass-roots efforts in the bigger picture.

By improving our understanding of our innovation ecosystem – and how its complex networks interact – we will be able to develop strategies to strengthen those networks and the connections between them. Network theory¹³ suggests it is 'weak ties' – rather than strong ones – that enhance innovation. We will deliberately seek to build linkages between networks to encourage the development of such 'weak ties' and the disruptive innovations that occur at the boundaries of groups¹⁴ We will consider new ways to develop stronger innovation networks throughout Oxfordshire, to identify and support the overlapping interests, and facilitate more cross-networks connections.

3.3 Building Innovation Spaces

Building a transparent and connected landscape to help knowledge-intensive companies be stronger and more scalable from day one

There is an urgent need for more spaces, large and small, for innovative companies to start and grow that offer a variety of options and models to the sector. In particular, there is a shortage of innovation space in Oxford city centre. We have begun a number of initiatives to meet this need – from the development of new 'hangout' spaces and innovation centres to the expansion of our science parks – and this work will continue.

Existing innovation spaces in the region include a spectrum of offerings for businesses and innovators, from co-working space & incubators to innovation centres and science parks. For large or growing companies, the region has access to twelve business and science parks (Abingdon Business Park, Banbury Business Park, Howbery Business Park, Oxford Business Park, Begbroke Science Park, Colin Sanders Business Innovation Centre, Culham Science Centre, Grove Technology Park, Harwell Campus, Leaffield Technology Centre, Oxford Science Park, Milton Park, and Quadrant Abingdon Science Park). Some of these spaces feature co-location with significant research facilities (e.g. Begbroke, Colin Sanders, Culham and Harwell campuses), which can provide opportunity for innovative collaboration across disciplines (see Case Study in Appendix 2). There are also more than twenty venues providing flexible workspaces, co-workspaces, and incubators for early stage ventures, including: a number of the

13 Granovetter, The Strength of Weak Ties, American Journal of Sociology, 1973 https://sociology.stanford.edu/sites/default/files/publications/the_strength_of_weak_ties_and_exch_w-gans.pdf

14 NESTA, Creating value across boundaries, May 2010 https://www.nesta.org.uk/sites/default/files/creating_value_across_boundaries.pdf

business and science parks, University of Oxford Launchpad and Start-up Incubator, Oxford Hub, ESA BIC (European Space Agency's Business Incubator Centre Harwell, see Case Study in Appendix 2), STFC ITAC (Science and Technology Facilities Council's Innovation Technology Access Centre, see Case Study in Appendix 2), Oxford Centre for Innovation, Oxford Innovation, the Oxford Hackspace, One St Aldates, Workspace Oxford and Oxford Innospace.¹⁵ In addition to office space, laboratory space and/or specialist equipment access, some of these organisations provide added services such as access to angel funders, and/or coaching services (such as Oxford Innovation and ESA BIC, see Case Studies in Appendix 2); whereas others (such as MobOx) offer an incubator support services without a physical space.

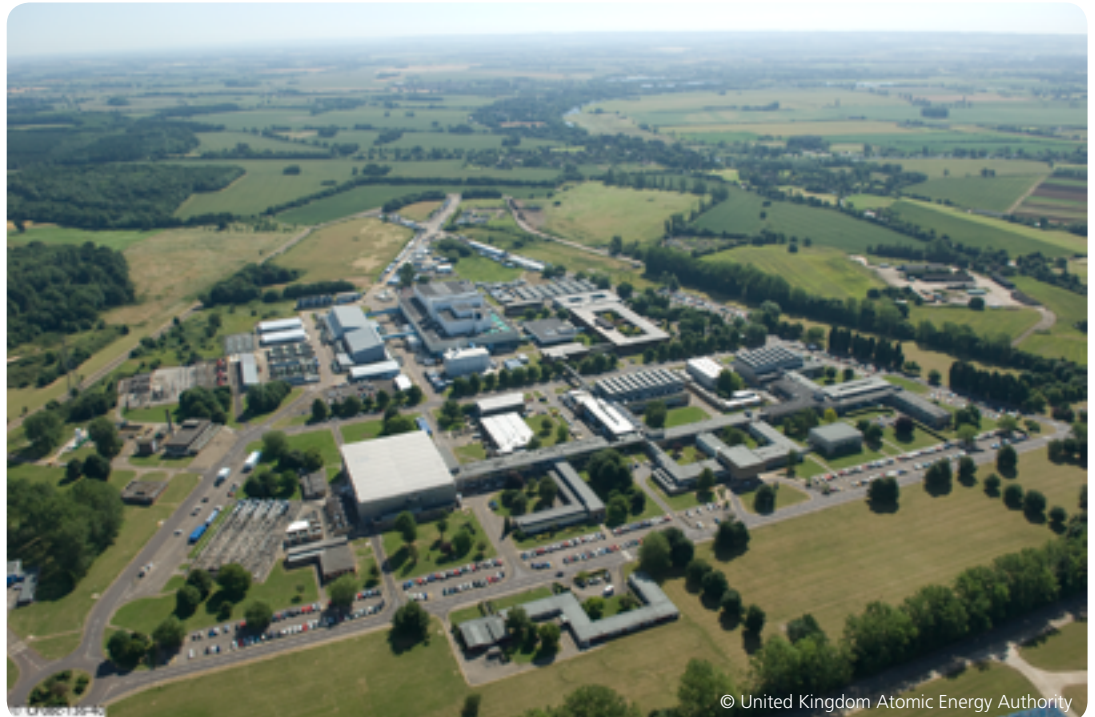
Oxfordshire is one few specialist scientific and technology communities of its kind in Europe.

Oxfordshire is one few specialist scientific and technology communities of its kind in Europe. In November 2015 Didcot Growth Accelerator was named as one of 18 new Enterprise Zones nationally – and sits alongside Science Vale Oxford Enterprise Zone to build on the enormous potential for leading the next wave of UK science and technology growth.



Despite this plethora of facilities, many different actors across the ecosystem have identified a need for more innovation spaces and are acting, or planning to act, to address the need. This includes research institutes that want to commercialise technologies, property agents or landowners with space for facilities, investors who want to nurture companies, scaling companies who have outgrown their current space, and entrepreneurs looking for cost-effective start-up space. For example, Milton Park and Oxford Science Park have plans to expand, the Oxford Launchpad is looking for ways in increase capacity, and The Oxford Trust, owners of Oxford Centre For Innovation, have announced plans for a new innovation centre in Headington to

¹⁵ From *Enterprising Oxford* and other sources, retrieved February 2016 <http://www.eship.ox.ac.uk/physical-resources/accelerators-incubators-workspaces>



support growth in this area of the city (see Case Study in Appendix 2). In particular, there is a recognised shortage of laboratory space (in suitable locations) and a burgeoning pipeline that is expected to increase demand in future. As part of the City Deal project, the Begbroke Innovation Accelerator and BioEscalator projects should start to address this particular gap (see Case Studies in Appendix 2).

Oxfordshire must also better understand where to cluster and develop new innovation spaces. The Rise of the Innovation Districts¹⁶ report suggests that highly dense areas within an urban geography are important in driving innovation. This research touches on the wider question of housing and connectivity – successful innovation districts have given thought to the proximity of appropriate housing and transport solutions to growth areas – and Oxfordshire’s planning and transport functions must take account of this.

In December 2016 we commissioned SQW to undertake a review of innovation spaces in Oxfordshire to help us map and categorise innovation spaces, to better understand how to create ‘innovation districts’ and to build a collaboration system between them.

¹⁶ Brookings, The Rise of Innovation Districts: A New Geography of Innovation in America, 2014 <http://www.brookings.edu/about/programs/metro/innovation-districts>



The key findings of the review from the perspective of future supply include:

- There is already a variety of innovation spaces in Oxfordshire, and this variety is increasing. In particular, the number of co-working spaces has increased in recent years and is planned to increase, particularly in Oxford. This reflects national and international trends in the provision of innovation spaces. There is also more laboratory and workshop space in the pipeline
- Occupancy rates in existing spaces are generally very high, and some have waiting lists. Turnover is also low, which limits the amount of space available for new firms wanting to use innovation spaces
- A key issue is the lack of grow on space in the county, which would enable more firms currently in innovation spaces to move into larger, more self-contained units and free up innovation space for new firms. The science parks currently provide the best opportunities for firms to do this
- There are also concerns about a lack of specialist space such as laboratories and workshops, and shortages of various types of space within Oxford and in the north of the county
- Just under half of all innovation spaces in the county offer a virtual service to firms which want to make use of the services and facilities such as a business address, use of meeting rooms and access to networking events, without taking space in the facility
- Broadband speeds appear to vary hugely across the innovation spaces surveyed. Whilst some provide very high speed connectivity, some spaces are unlikely to be suited to firms which require high upload and/or download speeds
- There is considerable variation in the amount of administrative, business and innovation support available to entrepreneurs and firms in innovation spaces. However, in general business and innovation support appears to be quite limited, except for those spaces linked to larger organisations or which form part of science parks
- Networking events are more common than the availability of dedicated business and innovation support.
- Several of the spaces provide access to specialist funding sources, but again this is limited
- Both universities are increasingly active in providing innovation spaces in which students can develop business proposals, and work in small start-ups or with more established companies on academic-industry collaborations. However, there are some concerns that there is not the same increase in opportunities for entrepreneurs and firms not connected with the universities or research institutions

In parallel there are multiple conversations about Oxfordshire's innovation spaces touching on issues related to the shortage of laboratory space, digital start-ups and digital health, the geography of the city, and funding. The review helps us to clearly define where there is insufficient capacity (both currently and in future), and whether

this can be addressed through private sector development or if other initiatives are needed to fill the gap. A regional strategic and tactical approach is required, which takes into account space constraints, areas that can be expanded, and the types of companies that should be attracted into the region, responding both to current needs and future indicators of growth. We need to build a transparent and connected landscape so that all types of innovative companies can find and access the appropriate facilities and support for their current and future needs. We must ensure that new companies (at all levels) have access to appropriate facilities and support to become more innovative and scalable, while also better communicating the assets and amenities that are available for large companies who wish to invest in, and move to, Oxfordshire. This must include more informal, accessible start-up spaces that will underpin the grass-roots entrepreneurial activities.

3.4 Reinforcing the Science and Research Base for Innovation

Investing in and increasing the accessibility of our research base to create economic growth

The world class science and research base in Oxfordshire is one of the fundamental drivers and ingredients behind our innovation-based economy.

The University of Oxford is among the best universities in the world

The University of Oxford is among the best universities in the world: Oxford Brookes University is a top performing new university with particular strengths in Mechanical Engineering for motorsport, Computing and Robotics, Architecture and the Built Environment, Publishing and aspects of Bio-Science and Health Science; the Defence Academy at Shrivenham provides post-graduate education to the tri-services from home and abroad. This globally renowned academic cluster has spawned in excess of 50 Nobel prizes and supports a grouping of 'Big Science' and other research facilities, including: the UK Atomic Energy Authority Culham Centre for Fusion Energy; the Science and Technology Facilities Council's (STFC) Rutherford Appleton Laboratory; Diamond Light Source, the national synchrotron facility; the Medical Research Council's facilities at Harwell; the newly established European Space Agency's European Centre for Space Applications and Telecommunications (ECSAT) and the Satellite Applications Catapult. Many of these are co-located on the same campus at Harwell, allowing innovation within and across sectors (see Case Study in Appendix 2). A number of other research institutes serving the environment sector form an important part of the local knowledge base: the British Geological Survey, Centre for Agriculture and Biosciences International (CABI), Centre for Ecology & Hydrology (CEH) Wallingford, and HR Wallingford. When coupled with the STFC Centre for Environmental Data Analysis, the combined Oxfordshire capability represents the largest environmental data holding in the UK.

This science and research base provides fuel for translation of ideas into new businesses and products in the technology and knowledge sector, while also serving to attract companies that benefit from this cluster of expertise, facilities, and a knowledge-based workforce. Continued public investment in science and research is required for us to maintain and grow these assets and associated outputs. In particular, the public sector also has an essential role to play in supporting early



The presence of organisations such as the Satellite Applications Catapult, the Begbroke Innovation Accelerator and the BioEscalator, together with teams engaging in innovation and business development within the Universities and the Science and Technology Facilities Council, further enables the pull-through of research into translation and application.

stage ideas that may be too risky to attract industry investment but whose impact could be transformative; industry-academia engagement and collaboration; and the development of skills and knowledge of those working within the research and science base, including skilled professionals supporting knowledge exchange and commercialisation activities. It is also vitally important that government continue to invest in curiosity-driven research, as this world class research base is the source for future innovations.

In addition to reinforcing our research and science base, we must continue to improve how research is translated into innovation in the wider community. Innovative approaches to the exploitation of such research have included: The Oxford Centre for Applied Super Conductivity, which has been designed to react to the needs of local industry (see Case Study in Appendix 2); the development of the new RACE (Remote Applications in Challenging Environments) building, a world class test environment for robots and autonomous vehicles at the Culham campus (see Case Study in Appendix 2); the UKAEA's Material Research Facility that offers low-cost rapid testing to accelerate the speed of materials research (see Case Study in Appendix 2); and the SME Smart IP Scheme (SSIPS), a UKIPO Fast Forward Award, which enabled Isis Innovation to de-risk technology licensing for small and medium enterprises through a flexible, phased programme.

The presence of organisations such as the Satellite Applications Catapult, the Begbroke Innovation Accelerator and the BioEscalator, together with teams engaging in innovation and business development within the Universities and the Science and Technology Facilities Council, further enables the pull-through of research into translation and application. This capability enables large, global businesses to tap into the research activities being conducted in the county and it enables the growth of SMEs and the generation of new start-ups, for which Oxfordshire is renowned.

We will continue to strive to be the best in the world in the research that we do, while also making our research facilities and expertise more accessible to the entrepreneurs and businesses that can derive economic benefit. This will need to be done in a way that enhances the local research base, taking care to develop collaborative, rather than overly competitive, relationships. We need to identify new ways to support industry in working alongside our research institutes, and where appropriate, encourage larger national institutes to locate in Oxfordshire as a means for building and enhancing our role as a national asset.

3.5 Innovation for All

Ensuring the accessibility of research and the adoptions of innovation across all sectors

Innovation is often seen as being solely about big science, but is much better described as being the application of new ideas in any context.

Innovation is often seen as being solely about big science, but is much better described as being the application of new ideas in any context. There is no part of the economy where innovation (hence 'change') is not important for long-term success. Innovation includes technology and research, but also innovative thinking and the application of new business models and ideas to a changing economy, environment, and society. Our challenge is to raise the aspiration to innovate within every business locally, and to ensure that such innovation is supported by the knowledge and research base.

Innovation is pervasive and widely applicable across the knowledge-focused economy. It includes the generation, assimilation and application of new ideas to do things differently for business, healthcare, and public service. There is a strong focus on the application of the outputs of world class scientific institutions and facilities, but this is not the whole of it. Through this strategy we need to challenge businesses to seek innovation to compete, enable them to improve their capability to manage innovation, and facilitate the creation of collaborations for innovation. We will seek to improve



grant funding for Oxfordshire businesses to develop innovative ideas. An example of this is the Oxford Cultural Leaders programme, which is designed to encourage leaders in museum and cultural sectors to experiment with new business models, explore innovative ways of working, and create organisational cultures that encourage new ideas (see Case Study in Appendix 2).

This strategy must also challenge the research base to ensure that outputs from its activities and resources are more widely accessible.

This strategy must also challenge the research base to ensure that outputs from its activities and resources are more widely accessible. The CCHT and SEEIP strategies provide further opportunities to explore and demonstrate how innovative thinking and practice can be widely shared across boundaries in both the for-profit and not-for-profit sectors. The Healthcare Values Partnership, the Thames Valley Country House Partnership Project and Solid State Logic offer further examples of researchers working with small businesses and public sector organisations to apply innovative thinking to their respective fields (see Case Studies in Appendix 2). Another example of an innovative process to ensure update of new ideas, products and services is the Oxford Academic Health Science Network, which focuses very heavily on the adoption of innovation into practice within the health system working with academia and industry (both large and small companies) (see Case Study in Appendix 2).

Innovation should be incorporated into our environmental, skills, cultural and heritage programmes, and should drive growth in the region. We will need to define high-level actions for how this will be achieved, ensuring that all sectors are represented. We will encourage the procurement of innovative, local, products and solutions by local public sector organisations, thereby encouraging adoption of innovation across sectors.

3.6 Innovation for Social Good

Building on our strength in social enterprise by linking social innovators and encouraging sustainable businesses for social good

Oxfordshire has a strong and growing social enterprise sector, as well as many businesses who contribute to the community through Corporate Social Responsibility (CSR) or other socially beneficial activities.

Oxfordshire's economy is built on innovation, the benefits of which extend into society and the environment. Oxfordshire has a strong and growing social enterprise sector, as well as many businesses who contribute to the community through Corporate Social Responsibility (CSR) or other socially beneficial activities. We celebrate the successes of social enterprise in Oxfordshire and seek to encourage social enterprises who wish to implement innovative ideas for the delivery of products and services to the local and wider communities.

As noted in the recent Oxfordshire LEP Green Paper¹⁷, we need to “nurture place that is both more prosperous and more liveable.” Social enterprise plays a key role in linking economic growth and quality of life in Oxfordshire by improving the lives of our citizens and creating financially sustainable businesses for social benefit. Through innovation and the creation of sustainable business models, the long-term survival and economic impact of social innovators and entrepreneurs will be supported.

Our social enterprises are also taking on some of the structural challenges around the transition to a low carbon economy – such as energy efficient buildings, renewable

¹⁷ <http://www.ox.ac.uk/news/2016-05-05-oxfordshire-green-paper-outlines-vision-region-innovation-engine>

energy, smart electricity grids, community transport, waste and recycling, and sustainable food or agriculture systems. They include the Low Carbon Hub, Cultivate Oxford, Orinico and Bicester Green. They also attract significant investment through crowdfunding and share schemes (e.g. Southill Community Energy, Westmill Solar Farm, the Low Carbon Hub).

In an area of high employment, such as Oxfordshire, tackling residual unemployment can have significant social and economic impact.

Social enterprises are very important creators of jobs in the economy, especially in their early growth stages. Moreover, many social enterprises (such as Yellow Submarine¹⁸ and the Turl Street Kitchen¹⁹) explicitly aim to provide jobs for those who find it difficult to access mainstream employment, helping to create employment opportunities for people who would otherwise be NEET (Not in Education, Employment, or Training). Other organisations such as The Old Fire Station bridge cultural, social care and business sectors by using innovative business models to promote artistic programmes and social inclusion (see Case Study in Appendix 2). In an area of high employment, such as Oxfordshire, tackling residual unemployment can have significant social and economic impact.

A number of initiatives are underway to support social enterprise in Oxford. The University of Oxford, Student Hubs and Oxford Brookes University have contributed to setting up OSEP (Oxfordshire Social Enterprise Partnership), supporting an active community of 250+ social enterprises and prospective Social Entrepreneurs (see Case Study in Appendix 2). We have two part-time Network Navigators for Social Enterprise who have helped 300+ people interested in setting up social enterprises, to access the support provided by regional and national business support services. ROBIN (Responsible Oxfordshire Business Involvement Network) is a volunteer-led network of like-minded businesses that was set up in 2009 to support charities and community groups across Oxfordshire. The University of Oxford has recently supported a highly successful project to explore how social enterprises can more successfully contribute to supply chains in the commercial and public sector.

There is a severe shortage of practical and affordable space for early stage social enterprises, who often require more flexible space than a standard office environment (this need is particularly great within Oxford city).

However, there are still gaps with regards to funding, facilities, and networks that target the unique challenges and opportunities faced by social innovators. There is a severe shortage of practical and affordable space for early stage social enterprises, who often require more flexible space than a standard office environment (this need is particularly great within Oxford city). There are small groups of active social enterprises across the whole of Oxfordshire, but more could be achieved if there was a stronger network covering the whole county. Furthermore, OSEP is currently an informal partnership which will require funding and a formal legal structure led by social enterprises, to become fully sustainable.

We are keen to continue to develop the enabling mechanisms that will improve the capacity and capabilities of Oxfordshire's growing community of social innovators. We have opportunities to build on the knowledge and best practice already established in Oxfordshire by facilitating connections, embedding entrepreneurial practices within social enterprise, and expanding on successful initiatives. We will continue to identify

¹⁸ <http://www.yellowsubmarine.org.uk/>

¹⁹ <http://www.turlstreetkitchen.co.uk/about/values>

and develop opportunities for social enterprises to participate in commercial and public sector supply chains, and create sustainable social enterprises for the public good.

3.7 Nurturing Talent and Developing Skills

Making sure innovative businesses can access the right skills for growth

A supply of skilled people is a foundational requirement for innovation – we need not only ideas and capital, but also the people. Skilled people with deep technical knowledge, those with management expertise, and also entrepreneurs are important ingredients for businesses at every level.

Despite having one of the most highly skilled workforces in the UK, skills are potentially the scarcest resource in Oxfordshire relative to the opportunity. With one of the lowest unemployment rates nationally, and an environment where start-ups and scale-ups are flourishing, the availability of key personnel may end up being the limiting factor for growth in Oxfordshire. We need to find ways to attract and retain more talent in the region.

There are a number of constraints as well as drivers for this demand; with the increasing availability of capital in Oxfordshire (especially at the University and Research Facilities) there are an increasing number of technology start-ups and spinouts, putting pressure on the available pool of talent. Scale ups seeking to attract the best talent may have to attract them from outside Oxfordshire; however, cost of living in Oxfordshire can then become a limiting factor. If innovative growth businesses are not able to attract talent into Oxfordshire, we may risk losing them to other localities.

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Availability of skills will also be an important factor for inward investment. We need to understand and articulate our offering to companies who are thinking of moving here, as well as helping them to recruit in a competitive market for potential employees. A high tech knowledge based economy not only requires a highly skilled labour supply to service its own demands but equally requires an advanced service infrastructure that helps attract and retain talent. In the world where the local coffee shop increasingly acts as the local touch down space we will continue to require an increased supply of labour to manage and maintain our services – such as high quality retail and leisure offers, public transport infrastructure and the health and social care sectors. A world class innovation offer requires highly advanced services.

We need to develop the skills base from within our universities, further education colleges and schools. There is a need in our own skills programme to maximise the development of students at all levels to meet the needs of the economy, but it is likely that we will also need to attract skilled people from outside Oxfordshire. The University of Oxford's Graduate Entrepreneur Visa (GEV) scheme for example endorses non-EEA Oxford graduates with innovative business ideas to remain in the UK and Oxford to develop their business (see Case Study in Appendix 2). There are numerous other initiatives in place to bring forward positive change through developing STEM skills, growth of apprenticeships, entrepreneurship training, peer learning, and on-the-job training.

Our local further education sector has responded positively to the identified need for additional STEM skills with both City of Oxford and Abingdon and Witney Colleges successfully attracting Local Growth Funds (c£8.5m combined) to develop state of the art STEM centres that will increase our capacity to train both students and in the workforce.

Engaging young people at an early stage and ensuring they are fully sighted on the opportunities available locally – both current and projected – is key to future success. 'O2i – Opportunities to Inspire' (see Case Study in Appendix 2) creates and supports links between employers and education across Oxfordshire to inspire our future workforce.

Engaging young people at an early stage and ensuring they are fully sighted on the opportunities available locally – both current and projected – is key to future success. 'O2i – Opportunities to Inspire' (see Case Study in Appendix 2) creates and supports links between employers and education across Oxfordshire to inspire our future workforce. Activate Learning and its spin-out Activate Enterprise Limited work with learners, experts in learning and businesses to co-create study programmes and build industry-relevant career pathways (see Case Study in Appendix 2). The World of Work Schools Initiative has launched a training programme to introduce young people to STEM careers via work experience and apprenticeships (see Case Study in Appendix 2), and the STEM Ambassador programme at STFC connects members of staff who spend time working with young people and the public, talking about the science and engineering that happens at the labs and elsewhere in STFC. Raising awareness and aspiration within young people will help address our ongoing skills challenges. However, the next challenge for local colleges and the further education sector will be to identify gaps in current business needs and provide the correct level of training for each industry that will fill these gaps. This will require engagement with local businesses to establish what skills gap need to be filled with the appropriate training.

Regarding the development of entrepreneurial skills, the University of Oxford has introduced entrepreneurship training for graduate students and post-doctoral researchers across both the Humanities Division, and the Maths, Physical and Life Sciences Division²⁰;



MobOx is offering entrepreneurial mentoring, management and sector expertise to support start-ups in mobility and related sectors; and there are number of networks organised 'for entrepreneurs, by entrepreneurs' which facilitate peer learning and networking across sectors: the Entrepreneurs Forum, Oxford Start-ups meetup, Oxford Digital Entrepreneurs meetup, Oxford From PhD to Start-up meetup, and Tech Pixies. For managers, programmes such as Leadershape and MD2MD offer peer-networking and coaching that encourages MDs to learn from each other the practicalities of running a business (see Case Study, Appendix 2). In the private sector, Williams Advanced Engineering Ltd for example is actively winning new advanced engineering programmes, which require the recruitment of skilled engineers and management, growing the skills base and developing others through on-the-job training.

If we are to support these businesses to achieve their full potential in Oxfordshire we need to create opportunities for our existing talent base to enhance their entrepreneurial and managerial skills.

The biggest barrier to growth faced by ambitious businesses is access to skilled employees²¹. If we are to support these businesses to achieve their full potential in Oxfordshire we need to create opportunities for our existing talent base to enhance their entrepreneurial and managerial skills. We need to address the impediments for attracting new talent to the County, and foster a range of skills sets, from start-up management teams to highly skilled leaders of scale businesses.

Growth presents significant opportunity, but also significant challenge, to an economy struggling to service existing demand. Oxfordshire needs a skills infrastructure that is aware of and responsive to sectors of labour and skills shortages and planned growth and development well in advance of its arrival. The Oxfordshire Skills Board (see Case Study in Appendix 2) brings together a wide range of public and private employers, secondary, further and higher education skills providers and stakeholder groups. It is driven to achieve improvements in the skills infrastructure available to Oxfordshire's employers and the learning opportunities available to students, residents and workforce.

²¹ Analysis of barriers to growth faced by high growth firms in Oxfordshire supported by GrowthAccelerator/Business Growth Service, 2012 – 2016.

The Skills Board has recently refreshed its Skills Strategy – with the following five strategic priorities identified:



Strategic Priorities:

SP1: To meet the needs of local employers through a more integrated and responsive approach to education and training: developed in partnership with our provider network, to encourage more training provision in identified priority sectors - both current and projected.

SP2: To ensure that young people are prepared for the world of work through delivery of high quality CEIAG, by well-informed Careers leaders in schools supported by qualified careers advisers. This will include multiple encounters with employers and use of up to date local labour market information.

SP3: To address Oxfordshire's tight labour market and skills shortage areas by

- i) ensuring those marginalised or disadvantaged from work, are moved closer to the labour market
- ii) supporting and encouraging older workers to consider vacancies in areas of skills shortage

SP4: To support the government's agenda to increase the number of apprenticeships offered, and apprenticeship uptake, particularly within small to medium sized businesses.

SP5: To investigate how Oxfordshire as a place of employment is promoted to graduates in our HE organisations and how more graduates can be retained to meet the demand our businesses have for higher level skills.

3.8 Attracting High-Value Business

Making Oxfordshire attractive to innovative companies and institutions

Attracting global companies and their supply chains is a key component of growing our economy. Not only does the local and national economy benefit, but our capacity for further research and innovation will grow too. Economic and community benefits include increased job growth, and revenues from tax and business rates which can be used to enhance our infrastructure. Research organisations and facilities will benefit from close proximity and enhanced strategic relationships with such global corporations, and their innovation activities if located here will enrich the local innovation environment.

Our ability to attract these companies, however, is impeded by gaps in our ecosystem. There is a need for enhanced collaboration, and more availability of space for large business close to the Research and Innovation hubs.

Our ability to attract these companies, however, is impeded by gaps in our ecosystem. There is a need for enhanced collaboration, and more availability of space for large business close to the Research and Innovation hubs. We also need to make more efforts to tackle connectivity and housing issues to enhance attractiveness of the region. Even the quality of our infrastructure and schools will be a factor in the location decisions of global businesses. We have not yet clearly articulated the case for large companies moving headquarters and R&D facilities to the region, and we need to make sure we have an offering for the companies we hope to attract.

To tackle these challenges, Invest in Oxfordshire have already developed sector propositions and are working with the Department for International Trade (formerly UKTI) to enhance the regional offering.

Sector focused groups are also taking the lead, spearheading localised collaborations to improve the inward investment offering. The Harwell Space Cluster team, for example, brings together national and local stakeholders to guide and implement a joint-strategy for attracting businesses to Oxfordshire. Large-scale construction is ongoing at the Harwell Campus, providing specialised laboratory and office facilities that anticipate emerging and established companies near and long-term needs.



Initiatives are also underway to develop our emerging power and mobility sector, and create a coherent approach that will help us attract significant business investment. Five partners from across the ecosystem (including public, private, and academic) have

In late 2016 we participated in MIPIM UK, the national commercial property showcase at which we were able to articulate, probably for the first time, the strength and breadth of the Oxfordshire investment offer.

joined together to develop the business case for a new Mobility and Power Centre. The aim is to create a world-class cluster, to foster innovation, and translate early stage research into novel products (see Case Study in Appendix 2).

We are also seeing more interactions and closer working relationships between research facilities and bodies focused on inward investment, which is improving our ability to present a united offering and share business development leads. One such collaboration is the Disruptive Innovation for Space Centre (DISC) which is being developed by the Satellite Applications Catapult working with RAL Space and the University of Oxford and local, national and international businesses (see Case Study in Appendix 2). DISC will enable high-impact businesses to quickly harness and exploit breakthrough technologies as they emerge.

Going forward, we will seek to develop a strong business voice both to advocate to government and explain (with credibility) to the business community the advantages of relocation here. We will continue to support Invest in Oxfordshire as our inward investment agency and maximise the use of networks and credibility of universities and facilities which play strongly on an international stage. In late 2016 we participated in MIPIM UK, the national commercial property showcase at which we were able to articulate, probably for the first time, the strength and breadth of the Oxfordshire investment offer. We will build on this activity as we look to develop an integrated investment strategy across the region which takes into account space constraints, areas that can be expanded, and the types of companies that should be attracted into the region.

3.9 Attracting Capital

Making sure capital is available for innovative businesses

Access to capital and a vibrant capital market is essential for any business looking to start and scale. There are a variety of funding sources available locally, from crowdfunding to major patient capital investment funds, and we need all of these functioning well together to drive rapid growth.

Availability of capital fuels the start-up economy and prompts entrepreneurs to start businesses here. For companies at the scale-up stage, they too need access to sufficiently large sums to ensure they don't leave Oxfordshire (and possibly the UK) to seek capital elsewhere, just when they are becoming successful. If we aspire to have rapid innovation-led growth, then access to all levels of capital is important.

The entrepreneurial finance community in Oxfordshire is vibrant, with new entrants such as Woodford Patient Capital Fund and Oxford Sciences Innovation PLC (OSI) joining existing investors such as OION, IP group, Isis Innovation and Oxford Capital. These funds not only bring a substantial amount of risk capital to the high tech cluster, but they are also committed to a different model of investment. They are attempting to provide much longer term ('patient') capital for small firms with high growth potential. This long term approach to value generation is key to supporting early stage businesses. Oxitec is an example of a university developed technology

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being supported by local investors and delivering huge healthcare and financial value (see Case Study in Appendix 2).

The decision of Woodford Capital to base itself in Oxfordshire, and the raising of £500m+ by Oxford Sciences Innovation PLC (OSI) (see Case Study in Appendix 2) for Oxfordshire spinouts from the University of Oxford, Harwell and Culham, has seen a step change in the availability of large scale and later stage capital that has, in a short time, crowded in other capital into Oxford. In parallel, events such as Venturefest offer other channels for entrepreneurs and investors to connect, and it is continuing to expand its programmes in response to market demand (see Case Study in Appendix 2).

Oxfordshire needs a new generation of business angels to replace some previously prolific but now retired funders of innovative new businesses.

However, there are still gaps in our funding landscape, particularly with regards to funds for start-ups and scale-ups that do not emerge from university research. One concern is the decline in business angel funding in Oxfordshire in recent years, identified in research undertaken by Nesta. Oxfordshire needs a new generation of business angels to replace some previously prolific but now retired funders of innovative new businesses. This is particularly important for firms not directly connected to the research infrastructure, which will not have access to funds such as those offered by OSI. There is also a need for more commercial led business acceleration, where projects and new ventures pull technology through from research and SME's and develop this into scalable commercially deployable applications. New incentives or grants may also be required to tackle financing issues and make Oxfordshire a more welcoming place to do business.

It is not always the case that Oxfordshire is as welcoming a place to do businesses as we would like, and the culture could be more closely networked and mutually reinforcing. We need to focus on developing the elements that will make Oxfordshire an attractive place for investors and high tech businesses, e.g., a welcoming community; easy to do business; and a place where skilled people can thrive and

gain relevant skills. We also need to attract other funds and sources of capital, while also better communicating the Oxfordshire offer to mobile entrepreneurs – so money brings businesses brings money – a virtuous cycle underpinning the whole ecosystem.

3.10 Embedding Innovations in the Ecosystem

Developing the region as a testbed for innovation and encouraging the adoption of innovations

Innovation can occur at all stages within the pathway from concept to market. Often the pathway to the market is driven by the ‘push’ of a strong R&D platform, and in cases where the barriers to entry are relatively low, this can be sufficient in itself to ensure commercial success. In some sectors, however, the success of a product in a complex market requires a clearer understanding of market needs, integration, and converging technologies that can help to ‘pull’ an innovation through into the market.

Developing Oxfordshire as a living laboratory and a test bed for innovation will accelerate adoption and accessibility of innovations across the ecosystem.

Developing Oxfordshire as a living laboratory and a test bed for innovation will accelerate adoption and accessibility of innovations across the ecosystem. By taking ideas out of the lab and into the community or workplace – opening up access to data, users, and customers – innovators can ensure their products works in ways that benefit and add value for the users. In addition, the testbed concept creates opportunities for synergistic benefits that can emerge when innovations are implemented in in real world environments rather than in isolation from each other. The aim is to build a stronger, safer, economically and environmentally sustainable economy, to help its people to identify and be part of solutions, to provide a testbed for world class researchers and innovators, to generate growth and jobs, to advance economic and social prosperity, and to help improve the quality, effectiveness and efficiency of services. Projects should aspire to engage the community, applying innovating thinking and solutions to address the challenges of urban living in Oxford and beyond.

The concept of a test bed is one that we are developing through a number of different routes and provides the opportunity to develop a more joined up innovation pathway that supports innovators at different stages in the development and commercialisation process. The test bed concept could also provide opportunities to evaluate innovations, which are a product of convergent technology opportunities. Healthcare, Smart City, and Low Carbon are three disciplines that have been leading the charge to engage the community, support innovators, and accelerate the adoption of innovation by using Oxfordshire as a living laboratory:

- **Healthcare.** The role of medical innovation in delivering service transformation will be critical, and there is an opportunity to develop the region as a test bed for innovation, where new products and services can be assessed in a clinical test environment to determine the impact and benefits. Such test beds would support the pathway to product adoption in a more dynamic and effective way.

Typically, new innovations require real world data and health economic data to support the transition from pilot into adoption within the NHS. Oxford Academic Health Science Network’s (AHSN) work in clinical innovation adoption aims to



We need to further develop the market pull concept across the region and provide a coherent and clear offer for Oxfordshire as a test bed for healthcare innovation.

address this, where new innovations are taken up at pace and scale across the region. In addition, Oxford has been designated a Centre of Excellence under the Precision Medicine Catapult (see Case Study in Appendix 2), and will act as a conduit for new innovations developed either within the region, or those that have been tested elsewhere and which could be of benefit to the region. Precision medicine focuses on stratifying patient populations so that new diagnostics or therapies can deliver more effective treatments in the most cost effective way.

We need to further develop the market pull concept across the region and provide a coherent and clear offer for Oxfordshire as a test bed for healthcare innovation. This needs to be aligned with the transformation of healthcare pathways across secondary, primary and social care, as well as linking up with place-based opportunities across the region.

- **Smart City.** The Smart Cities concept has been adopted by multiple cities worldwide. Smart Cities initiatives aim to improve the management of urban environments through the use of information technology and the collection, processing, and integration of data across services (for example, transport, healthcare, and energy services). Smart Cities are about making places more 'liveable', and enabling every citizen to engage with all the services on offer, public as well as private, in a way best suited to his or her needs.

The characteristics of our natural and built environment combined with the strength of our research and innovation base make Oxfordshire an ideal location and testbed for Smart City initiatives. Oxford is a relatively small city, enclosed by rivers and a greenbelt, but within this compact landscape can be found many of the same challenges of a larger city such as environmental, transportation, social and housing problem. But we also have the capacity and capability to develop, test and deploy the technologies that can help address them. In the context of Smart Cities, these challenges become

opportunities to use the city as a testbed for new innovations to improve the quality of life for Oxford and the region.

Significant progress has already been made through initiatives such as the Smart Oxford²² project, a partnership which brings together representatives from the City and County Councils, Oxford Brookes University, University of Oxford, OxLEP, Nominet and other sectors. The brand 'SMART Oxford' recognises Oxford as a centre for developing products and services that use Big Data, Internet of Things, and Robotics. Specific strength lies in autonomous vehicles, digital health and mobile energy. More than 20 projects have been launched across a range of topics including transport (see Oxbotica and UK Autodrive Case Study in Appendix 2), environment (see Oxford Flood Network Case Study in Appendix 2), energy, urban planning, broadband and digital.²³

Culham Smart Community is another initiative which recognises the local strengths in the rapidly developing digital economy sector. Adjacent to the Culham Science Centre Campus, it will be a living test bed for emerging digital and green technology, with new houses designed around integrated transport (see Case Study in Appendix 2). Other initiatives such as Mobility Oxford (MobOx) aim to improve the experience of transportation in and around the city of Oxford (see Case Study in Appendix 2). MobOx is also working in partnership with the University of Oxford to carry out a feasibility study on Demand Responsive Transport (DRT), regarding the potential of shuttle routes between various innovation sites across Oxford (see Case Study in Appendix 2).

Developing and adopting 'smart' innovations will make Oxfordshire a better place to live, work, and visit.

By capitalising on our research base and engaging innovators and the community, we have the potential to become a leading example for Smart City worldwide. Furthermore, through Smart City projects, we have the potential to realise significant benefits for our local authorities, businesses, and citizens. Developing and adopting 'smart' innovations will make Oxfordshire a better place to live, work, and visit.

- **Low Carbon.** The next 20 years will see a huge expansion in the world market for low-carbon goods and services. This global phenomenon should spur enterprise, innovation and growth, giving impetus to our local economy. It also gives us the chance to make Oxfordshire a better place to live and work. This is important as we deliver the innovation-led SEP and also meet legislative commitments to reduce the region's carbon emissions by 80% by 2050²⁴. Our innovation and growth must be socially, economically and environmentally sustainable.

Our low carbon economy is sufficiently broad – across technology clusters, STEM-based and apprentice-level jobs, businesses, public sector and civil society – to be a significant cross cutting and underpinning theme of our innovation strategy²⁵.

There are opportunities for convergence and the development of a Low Carbon test bed across all sectors, but particularly in the automotive sector, building technologies, and renewable energy. Oxford has just been awarded government funding for a connected electric vehicle and infrastructure project, which will consist of research,

22 <http://oxfordsmartcity.uk/>

23 <http://oxfordsmartcity.uk/blog>, <http://oxfordsmartcity.uk/>

24 <https://www.theccc.org.uk/publication/the-fifth-carbon-budget-the-next-step-towards-a-low-carbon-economy/>

25 <http://www.eci.ox.ac.uk/research/energy/archive-low-carbon-energy-report.html>



development and testing of street electric vehicle charging stations using robotic infrastructure and become part of the connected grid. The trial, run in partnership between Oxfordshire County Council and Oxford City Council, will be the first on-street charging pilot on this scale in the world.²⁶ Another ‘first’ is North West Bicester Eco-town, the only site in the UK being developed to PPS1 Eco Town standards, including design for healthy lifestyles (see Case Study in Appendix 2). Energy Resources for Integrated Communities (ERIC)²⁷ is a research project part funded by the UK government (Innovate UK) to assess how innovative energy storage technology could help a group of homes in Rose Hill in East Oxford to save energy and money (see Case Study in Appendix 2). The Low Carbon Oxford²⁸ partnership boasts over 40 pathfinder organisations based in or around Oxford that have committed to collaborate to reduce their carbon emissions and share best practice, serving as a living laboratory for innovative local impact (see Case Study in Appendix 2).

The low-carbon market already accounts for a significant part (7%) of our local economy, supporting over 8,800 jobs, 570 businesses, and generating £1.15 billion per year in sales.²⁹ Revitalising local infrastructure can drive a range of markets for low-carbon business growth, and potentially create an additional 11,000 local jobs. The process will also provide living laboratories for new technology and foster synergy between research, business, local government and social enterprise.

The success of these projects stems from our ability to engage with citizens, the research base and entrepreneurs who bring the insights and innovations to tackle our challenges across disciplines such as healthcare, Smart City, or Low Carbon. We also require the ability to access and engage with partners and funding bodies within and outside the UK. We need to invest in marketing to raise awareness among and attract potential innovators alongside the need to promote the range of initiatives locally, marketing Oxfordshire as a test bed for innovation, and attracting resource, funding and inward investment.

26 <https://www.oxfordshire.gov.uk/cms/news/2016/jan/electric-avenues-oxford-set-install-100-electric-vehicle-charging-stations-residential> http://oxfordsmartcity.uk/cgi-bin/blog/Creating_a_Smart_Parking_system_using_Nominets_IoT_Tools

27 <https://localisedenergyeric.wordpress.com/home/about/what-is-project-eric/>

28 www.lowcarbonoxford.org

29 <http://www.energy.ox.ac.uk/olce/>



4. Strategic Objectives

A 'live' initial list of potential investment priorities has been proposed by the Working Group following input from the broader community. These projects represent ways in which we can begin to deliver the innovation strategy. The list currently represents the ideas and opinions of the contributors – it has not been qualified or filtered, and items on the list will need to be developed in order to become fundable proposals. Furthermore, the proposals only represent the beginning of a journey, as partners and stakeholders from across the community are invited to propose additional items. The list will be refined and expanded, as discussed in the Governance and Leadership section. In developing this pipeline we envisage close alignment between projects and ideas generated by the working group and potential funding opportunities such as any future Local Growth Fund or other bidding opportunities.

In developing this pipeline we envisage close alignment between projects and ideas generated by the working group and potential funding opportunities such as any future Local Growth Fund or other bidding opportunities.

For each of the ten themes, the strategic objectives that proposed projects should seek to deliver are presented below:

- **Understanding the Ecosystem.** We need to develop a deeper understanding of the innovation ecosystem in order to make sensible evidence-based interventions, in particular across the range of innovation activities and sectors. Proposed projects will need to identify areas that are underdeveloped or where there may be opportunities for collaboration between sectors and disciplines. For example, developing a matrix or diagram showing research, translation/innovation and commercial application activities across the ecosystem.
- **Strengthening our Networks.** The challenge here is to understand how our innovation networks interact, but also develop and maintain connections between sectors. Proposed projects will need to encourage clusters to interact with each other, coordinate engagement between innovators, and encourage networks and groups to work together rather than in isolation. For example, projects that link and strengthen networks for social entrepreneurs, provide incentives for large companies to work with social enterprises, and support connections between research institutions and businesses.
- **Building Innovation Space.** Due to increasing demand for additional space, we will need a regional strategic and tactical approach to better understand where new innovation spaces can be developed. Proposed projects should address this need, for example by targeting under-utilised spaces and sectors.
- **Reinforcing the Science and Research Base.** While the science and research base are fundamental drivers behind our innovation-based economy, the main challenge for the future will be to transfer this innovation to the business base in order to maximise value. Proposed projects should focus on engaging with local businesses to encourage this adoption. For example, supporting connections between research institutions and businesses across the region as well as engaging businesses to support the development of new research facilities that will generate innovation.
- **Innovation for All.** The challenge highlighted by this theme is the need for innovation to be adopted across sectors, in particular to drive growth in

the environmental, cultural and heritage sectors. Proposed projects include programmes that embed innovation within businesses and sectors not obviously derived from the research base, or sponsored challenges where start-ups and entrepreneurs are invited to generate new ideas to solve a particular social issue.

- **Innovation for Social Good.** The challenge here relates to the need for better funding, facilities and networks to ensure these programmes that support and deliver social value initiatives are sustainable. Proposed projects to address this need include new facilities and innovation spaces specifically for social enterprises, networks between social entrepreneurs, incentives for large companies to work with social enterprises, and opportunities for social/entrepreneurs to work in schools and colleges.
- **Nurturing Talent and Developing Skills.** Oxfordshire will need to continue to attract, develop and retain its skilled workforce in order to ensure innovative businesses can access the right skills for growth. Proposed projects should focus on engaging local businesses to identify the skills needed, for example by involving businesses in the design and delivery of curriculums in local colleges. Proposed projects should also look to attract and retain the skilled workforce, for example ensuring there is affordable housing and enhancing quality of life across the county.
- **Attracting Significant Business.** Despite initiatives to address the issue of space and networks for businesses locally large scale investments will be needed to attract companies to the region. For example, proposed projects might include initiatives that help attract early stage commercial ventures as well as a strategy to expand spaces for the types of businesses that should be attracted to the region.
- **Attracting Capital.** Whilst there are a number of funding sources available they are not necessarily evenly distributed across sectors. Proposed projects will need to encourage networks and collaboration across the funding landscape, for example attracting investors to hubs of innovative activity, initiatives to attract early stage commercial ventures, and incentives for larger companies to work with social enterprises.
- **Embedding Innovations in the Ecosystem.** The challenge regarding developing Oxfordshire as a testbed for innovation will be engaging with groups from across the county and beyond, including for example our citizens, the research base, entrepreneurs, external partners and funding bodies. Proposed projects include marketing and promoting existing projects like Smart City to identify new partners as well as open data projects to make information available to citizens.



5. Economic Benefits

Oxfordshire is an economy built on innovation, but to continue to thrive we will need to work hard to further improve the conditions for innovation-led growth. If taken forward, the ideas and initiatives set out in the ten innovation themes of this strategy as well as the case studies and proposed project list will play a role in the delivery of our four strategic priorities: people, place, enterprise and connectivity.

- **People** – delivering and attracting specialist and flexible skills at all levels, across all sectors, as required by our businesses, with full, inclusive, employment and fulfilling jobs. This strategic priority is developed in the themes *Innovation for All and Nurturing Talent and Developing Skills*.
- **Place** – ensuring a strong link between jobs and housing growth, and providing a quality environment that supports and sustains growth; and offering the choice of business premises and homes needed to support sustainable growth whilst capitalising on and valuing our exceptional quality of life, vibrant economy and urban and rural communities. This strategic priority is developed in the themes *Building Innovation Spaces and Innovation for Social Good*.
- **Enterprise** – emphasising innovation-led growth, underpinned by the strength of our research, business collaboration and supply chain potential; recognising and reinforcing the significant contribution made by all sectors, all parts of Oxfordshire and all types of business. This strategic priority is developed in the themes *Reinforcing the Science and Research Base for Innovation, Innovation for All, Attracting Significant Business and Attracting Capital*.
- **Connectivity** – enabling people, goods and services to move more freely, connect more easily; improving broadband and mobile coverage and capacity; and providing the services, environment and facilities needed by a dynamic, growing and dispersed economy. This strategic priority is developed in the themes *Understanding the Ecosystem and Strengthening our Networks*.

Some of the proposed projects and case studies in this document will also create new business opportunities across all sectors, in particular where there is spill-over between sectors.

Some of the proposed projects and case studies included in this document would directly generate expenditure and jobs. For example, new facilities at the Oxford Centre for Applied Superconductivity will create new jobs and training opportunities and Low Carbon Oxford could potentially create 11,000 new local jobs (see Case Studies in Appendix 2). Some of the proposed projects and case studies in this document will also create new business opportunities across all sectors, in particular where there is spill-over between sectors. This spill-over will occur with projects that foster synergy and collaboration between research institutes, businesses, local government and social enterprise – in particular, where local businesses are engaged and encouraged to adopt and extract value from innovation coming from the research base.

There is strong research evidence that shows the interdependence between innovation, high growth and exporting in businesses. A successful and growing Oxfordshire will bring benefits far beyond our boundaries and enhance our already significant contribution to the national economy.



6. Delivery Strategy

As mentioned previously, this document has informed the recent SEP refresh process, and will be adopted into the overarching strategy by our board. The innovation strategy will also inform the implementation of other documents such as The Oxfordshire Innovation Engine Report.³⁰ It is our hope that this document will inspire further initiatives to build upon this evidence base and deliver against the strategic themes. To do so will require a management framework that is opportunistic in nature, responding to the evolving needs of the innovation ecosystem, and seizing opportunities as they arise.

The next step will be to take this innovation strategy to the implementation stage. Successful delivery of the strategy will require a clear system of governance, a financial plan, tactics to deliver the proposed projects and further develop the case studies, as well as a system in place to monitor progression.

6.1 Leadership and governance

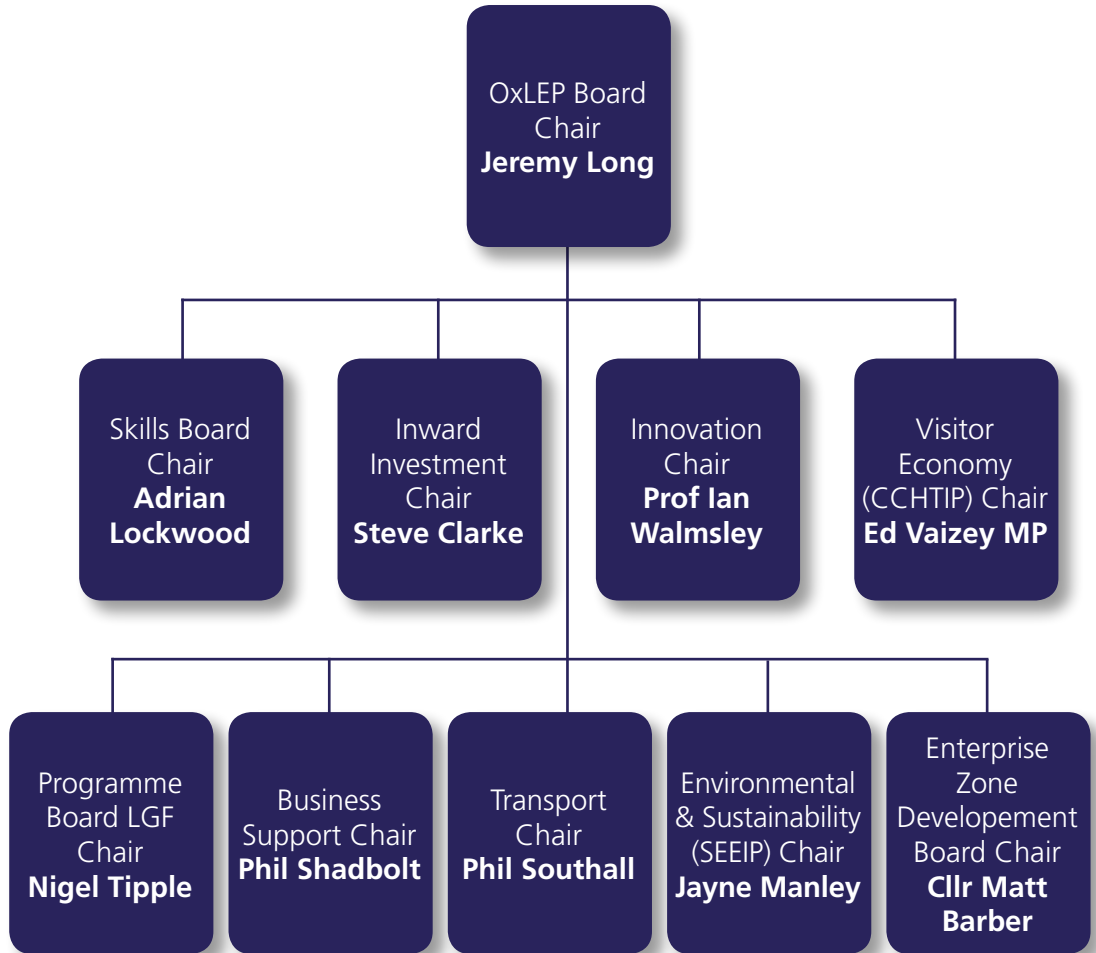
OxLEP will oversee the ownership and implementation of this innovation strategy. A sub-group of the LEP board has already been established, and this group will take responsibility for steering the delivery of the strategy, reviewing progress, and making strategic decisions regarding its direction. Detailed terms of reference for the sub-group are to be agreed by its members; however our initial proposal is that it will:

- Meet on a regular basis, for example quarterly.
- Have a membership made up of representatives from across all sectors of the Oxfordshire innovation ecosystem, as well as from public and private sector organisations, education, research and local government. Initial appointment of members will be overseen by OxLEP and will:
 - » Be led by OxLEP Board lead for innovation. The Vice-Chair will be elected by the members of the group.
 - » Report to our Board on the strategy's development and performance.
 - » Review the proposed projects outlined in this document and any further proposed initiatives, as well as how to resource them.
 - » Help to create links across organisations and activities to ensure successful delivery of the innovation strategy.

Successful delivery of the strategy will require a clear system of governance, a financial plan, tactics to deliver the proposed projects and further develop the case studies, as well as a system in place to monitor progression.

30 http://www.sqw.co.uk/files/2613/8690/7243/Oxford_engine.pdf

The sub-group will fit into the current OxLEP organisational structure as outlined in Figure 3.



6.2 Cross-sector engagement, coordination and capacity building

The success of delivering this innovation strategy lies in the actions of organisations and stakeholders across Oxfordshire as well as their future interactions. Stakeholders include any organisation operating locally with an interest in and ability to deliver against one or more of the strategic priorities. Their continued involvement and willingness to work together to achieve shared goals will be essential if we are to extract value from our innovation ecosystem and realise our vision of an innovation-led economy.

To facilitate this interaction we will work with partners to better link all our networks and centres and encourage clusters to engage with each other. In particular we will work on how to encourage this interaction and coordinate engagement between innovators so they work together rather than in isolation. Higher level actions that ensure all sectors are included in this engagement will need to be outlined, since successful delivery of the innovation strategy will rely on interactions across disciplines and groups. Furthermore, a difficult but important task will be to address how

innovation and expertise from the research base will be transferred to our commercial business base. The focus here will be on how to engage businesses in the delivery of the strategy, thus encouraging them to adopt and extract value from local innovation. Our current ERDF innovation bid will start to address this once it's confirmed by government.

6.3 Reinforcing the strategic framework and evidence base

In order to facilitate an efficient, joined up approach to our innovation strategy, it will be important to have an effective strategic framework that guides action across the county and access to a shared evidence base to inform the work of different stakeholders. As part of the delivery of this innovation strategy we will work with the local authorities to reinforce the strategic framework and evidence base for future innovation investment, and share this information effectively with relevant organisations. The framework should incorporate the following mechanisms and processes:

- **Identification – Continually identifying and evaluating a new list of proposed projects.** Each innovation theme will be realised through the implementation of projects and initiatives, and will require an agile and adaptable process for discovering, soliciting, and selecting new projects.
- **Communication – Raising our self-awareness and promoting our successes.** By championing successful initiatives we will stimulate innovation, showcasing our strengths, and attracting new investment and ideas. In the first instance, this may require mechanisms for identifying our successes and gathering stories and feedback from the community. We will then need to explore how to create a harmonious set of messages, communications and PR from the different organisations in the ecosystem.
- **Evaluation – Assessing our progress and growth over time.** A mechanism will be required for looking at the baseline measures of our activity today, benchmarking against comparators and developing a plan for evaluating these indicators in the future. We will need to gather quantitative supporting evidence to justify our decisions and enable us to measure our successes.
- **Evolution – Adapting our strategy to respond to new economic and technology strengths as they develop.** Recognising that innovation is constantly evolving, we need a more sophisticated way of thinking about our clusters and our sector-specific strengths. Over time, new clusters will emerge from the convergence of old clusters and we will require an agile and responsive approach to evolve and adapt our innovation strategies.

We will also need to consider – and possibly coordinate with – other parallel initiatives that could impact or accelerate the innovation strategy in both the short- and long-term. This may include:

- **'Devolution' Initiatives** – There is an ongoing conversation in government around devolving responsibilities and giving more powers to local agencies. Regions and local government may have an even greater role to play with regards to the innovation strategy.

- **Local Growth, Industrial Strategy Challenge Funds & European Structural Investment Funds** There are potentially a number of funding opportunities in the next few years which could provide the resources to accelerate projects resulting from the innovation strategy.
- **Scenario Planning Green paper** – This paper presents a 20-year outlook and vision to increase prosperity and quality of life locally. It takes a holistic look at a possible future vision, which sets a context for how we expect innovation to drive the economy and what other factors will also need to be considered in order to achieve our aims of an innovative, liveable county.

6.4 Financing

Although pressure on public sector spending persists, there are a variety of options for financing innovation projects. These include:

- Government support across relevant departments and their agencies. Given the broad nature of the strategic objectives set out in the strategy, delivery could feasibly be supported across a wide range of departments, including the Departments for:
 - » Business, Energy and Industrial Strategy
 - » Innovate UK
 - » Communities and Local Government
 - » Health
 - » Education
 - » DEFRA
 - » Transport, and
 - » Culture, Media and Sport.
- Further submissions to Local Growth Fund (or any successor funds) could provide much needed capital funding to develop the ecosystem and supporting infrastructure that will enable innovation.
- Major infrastructure and development projects could have an impact on attracting new businesses, and could also impact how we develop our innovation spaces. Engaging with development projects to raise awareness of the innovation priorities could identify opportunities to complement existing schemes and create added value through innovation.
- Local authority budgets cover a range of activities that are enablers for innovation, including for example, social enterprise, skills, transport, and network development. In some cases, upfront investment may lead to long term savings in local authority budgets or additional revenue streams. MobOx, for example, is a partnership between entrepreneurial SME's, both of Oxford's Universities and the County and City Councils – it is an important part of Smart Oxford leading on Mobility theme.
- EU funding is available for projects which meet given criteria. Some funds are awarded by direct application to the EU; others are 'distributed' on a regional and

local basis by relevant agencies including OxLEP. For example the European Structural Investment Fund (ESIF) supports investment in innovation, enterprise and skills. The three funds in the programme reflect many of the innovation themes, including employment, social inclusion, skills, research and innovation, and support for small to medium sized enterprises and creation of a low carbon economy. Post referendum government has now confirmed that ESIF funding will be available in the short term and beyond the UK negotiating our exit from the European Union.

- Charities and other bodies continue to support innovation across a variety of sectors through direct investment or grants. For example, the Oxford Trust has developed the Oxford Centre for Innovation, it has co-funded The Oxford Innovation Engine Report, and it has supported the development of a new £10 million innovation centre in Oxford close to the data and health sciences area.
- Equity or debt finance, either from the private sector, public sector or individuals, may be available for innovation projects which are able to deliver a direct financial return. The ability to secure such finance and the conditions and costs attached, will depend on the level of risk, the expected scale of the return and the duration over which that return would be realised.
- Crowd funding or other community investment models, whereby a large number of individuals from the local community contribute financially to projects, either by donation, lending money or buying shares. Oxfordshire is already home to the Low Carbon Hub which is a pioneering organisation that promotes community investment in renewable energy and serves as a test bed for innovation.

In addition to financing for innovation programmes and capital investments, financing is needed to support innovative researchers, entrepreneurs, and businesses to develop and grow. While we have noted there are still gaps in the funding landscape, banks, government grants, European grants, angel investors and venture capitalists (VCs) are providing essential support. Potential sources of finance include:

- **British Business Bank's Investment Programme.** The Investment Programme, which builds on the Business Finance Partnership, was launched in April 2013 and is aimed at supporting and developing access to finance for smaller businesses. £400m of state funding has been committed to the Investment Programme as of 2014.
- **Better Business Finance.** Better Business Finance was set up by a number of UK banks to provide impartial information and support to businesses and entrepreneurs looking to develop and grow; whether the business is seeking finance, or starting out or exporting abroad, BBF is there to help.
- **UK Crowdfunding Association.** The UK Crowdfunding Association website has some useful background information on the different types of crowdfunding in the UK.
- **Oxford Sciences Innovation (OSI).** OSI's investment of £500+ million will act as a catalyst for supporting spin-out companies created from the intellectual property of the University, as well as that of the Oxford innovation cluster (Harwell and Culham laboratories).

- **Oxford Investment Opportunity Network.** Oxford Investment Opportunity Network (OION) is a business angel network operated by Oxford Investment Opportunity Network Limited (OION Ltd), which is authorised and regulated by the Financial Services Authority. OION was launched in 1995 as one of the UK's first business angel networks, and is one of Europe's most successful technology business angel networks linking investors to companies with high growth potential seeking business development funds from £100k to £2.0m.
- **Oxfordshire Business Support.** Oxfordshire Business Support (OBS) is developing a growing range of integrated services for local businesses which help companies to grow and create new private sector jobs. For business support in Oxfordshire they: Signpost to local and national support via the OBS web portal and helpline; Provide specialist advice and guidance through their Network Navigators; and encourage start-ups, growth and innovation with a range of local products, grants and services.
- **Innovate UK.** Innovate UK provides funding for business led innovation projects. The principal objective of the support is to stimulate R&D and innovation activity, encouraging businesses to develop innovative products, processes and services with future commercial potential.
- **Horizon 2020.** Horizon 2020 is the EU Research & Innovation funding programme with €79bn available over 7 years (2014-2020). Many of the projects are 100% funded with the focus on EU wide innovation, application and benefits, targeting industrial technologies and themes aimed at EU society and the challenges it is facing.
- **SME Instrument.** A new addition to the Horizon 2020 programme is a dedicated SME Instrument with up to €2.5m single company funding available. Small and Medium-sized Enterprises (SME) that are EU-based or established in a country associated to Horizon 2020 can now get EU funding and support for innovation projects that will help them grow and expand their activities into other countries – in Europe and beyond.
- **Eurostars.** Eurostars is a programme that supports research-performing small and medium enterprises, which develop innovative products, processes and services, to gain competitive advantage. Eurostars does this by providing funding for transnational innovation projects; the products of which are then rapidly commercialised.
- **Enterprise Europe Network (EEN).** Enterprise Europe Network (EEN) is a free service matching businesses in 54 countries for commercial, technical and research collaboration. Their 3000 representatives on the ground have direct contact with companies and make introductions on your behalf.

Currently limited funding is directly available to OxLEP for innovation projects. It is therefore important that we bring together the stakeholders and partners behind this innovation strategy to develop a strategic and aligned approach to investment.

Currently limited funding is directly available to OxLEP for innovation projects. It is therefore important that we bring together the stakeholders and partners behind this innovation strategy to develop a strategic and aligned approach to investment. By identifying areas where our focus is aligned, we may be able to more effectively apply for and secure funding for the greater benefit of the innovation ecosystem.

6.5 Monitoring and review

Monitoring and reviewing progress will be an essential role of the Innovation sub-group in ensuring the long-term success of the innovation strategy and its implementation. Progress will be reviewed over a 12 month period. Some potential data sources that the sub-group could use to assess and track innovation performance include HEFCE data, the yearly UK innovation surveys, and the ERC analysis of LEPs across the country. It is recommended that a number of key performance indicators are measured to facilitate this, including both output and outcome measures. For example:

- Output measures could include amount of funding secured, number of proposed projects funded, progress with implementing specific interventions such as amount of new innovation spaces created, number of new businesses, or number of new businesses adopting innovation.
- Outcomes could include economic, social and environmental outcomes such as number of jobs created or number of people with improved or new skills.

What indicators are measured and how frequently they are reviewed will depend on the availability and reporting cycles agreed for relevant data. Whereas output measures are relatively straightforward to collect information on from the relevant parties, measurement of some of the outcomes and establishing a causal link can be challenging, particularly for indirect outcomes. However, monitoring and assessment methods are improving continually particularly with the development of advanced datasets and digital technologies. The sub-group will work with innovation stakeholders from across the area, including the local authorities, environmental organisations, the Universities and other research centres to agree on an approach to monitoring which makes best use of the available data and expertise and supports innovation where appropriate.

The proposed project list will be reviewed as items on the list are developed and evaluated in terms of their feasibility and funding required. In addition, the list will be revisited and refreshed as stakeholders bring forward new opportunities. It will be the responsibility of the sub-group to clearly outline the process by which proposed items become firm projects, how projects will be prioritised, as well as how new items can be added to the list. Whilst there is no current funding 'pot' available, by developing our project pipeline we will be in a position to respond promptly as future funding opportunities emerge and can be 'strategically opportunistic' across the breadth of our programme.



Appendix 1: Proposed Project List

The following ideas have been suggested by stakeholders involved in the development of the innovation strategy to date. However, we are aware there is a requirement to engage the wider innovation community and stakeholders, so they may suggest additional ideas that will deliver against our strategic objectives and drive growth – that is one of the immediate next steps for the innovation sub-group. Once all ideas have been received, they will be assessed for their strategic fit and contribution to our priorities, with the revised listing being the investment prospectus that will harness our collective ambition moving forward.

Each proposed project is loosely mapped to the innovation themes in the table below. Note there is no correlation between priority and number of proposals per theme; rather, this is an unfiltered list of ideas that will be prioritised and refined by the innovation sub-group, as mentioned above.

Key: ●- Primary theme; ○ - Secondary theme

Proposed Project List	Understanding the Ecosystem	Strengthening our Networks	Building Innovation Spaces	Reinforcing the Science and Research Base	Innovation for All	Innovation for Social Good	Nurturing Talent and Developing Skills	Attracting Significant Business	Attracting Capital	Embedding Innovations in the Ecosystem
Develop a matrix /diagram showing research, translation/innovation and commercial application activities across the ecosystem. This would work with the space sector, for example, where there are two research organisations (University of Oxford and RAL Space), translational activity (in Harwell, through the Catapult, ESA BIC and RAL support activities), and there is a burgeoning industry sector.	●	○						○		
Promote knowledge-focused businesses, fostering an entrepreneurial spirit and providing spaces to accommodate the stages of earlier growth and opportunities for entrepreneurs to gain skills and knowledge			●				○	○	○	○
Found a high profile Google Campus/ Digital Entrepreneurship centre equivalent in the heart of Oxfordshire and use this as a focal point for Oxfordshire’s entrepreneurial/start-up culture			●		○			○	○	○

Proposed Project List	Understanding the Ecosystem	Strengthening our Networks	Building Innovation Spaces	Reinforcing the Science and Research Base	Innovation for All	Innovation for Social Good	Nurturing Talent and Developing Skills	Attracting Significant Business	Attracting Capital	Embedding Innovations in the Ecosystem
Develop more informal, accessible start-up spaces that will underpin the grass-roots entrepreneurial activities.			●							
Build a digital hub / start-up incubator, co-located with Oxfordshire Business Support (OBS) to provide hot-desking/co-working space for “digital” start-ups, host meet-up events and “accelerator” programmes, and also for service providers to run digital enablement workshops/seminars for SMEs across all sectors		○	●						○	
Build the Wood Centre for Innovation in the Headington data and medical sciences quarter to support start-up and grow-on companies. The site will also be home to a new Science Education Centre for schools			●				○			
Continue to support the growth and increasing connectivity of the research institutions and facilities that form the bedrock of innovation in Oxfordshire.		○	○	●						
Invest in developing new research and development facilities and upgrading existing ones, with the support of business, to improve the capacity for generating innovation			○	●			○	○		
Incubating the Innovators - develop skills for the next generation of digital innovators, creating innovation-enablers for all (for example proposals that have been discussed by Smart Oxford for a citizen-oriented “Internet of Things Toolkit“.)					●		○			○
Inculcate ‘innovation’ within businesses and sectors that are not obviously derived from the research base, to innovative processes and thinking to enhance their work				●		○				

Proposed Project List	Understanding the Ecosystem	Strengthening our Networks	Building Innovation Spaces	Reinforcing the Science and Research Base	Innovation for All	Innovation for Social Good	Nurturing Talent and Developing Skills	Attracting Significant Business	Attracting Capital	Embedding Innovations in the Ecosystem
Programmes to support and disseminate business model and financial innovations in the field of cultural heritage into the wider ecosystem, by focussing on high-impact, low-cost connections, which can then develop into bigger (more fundable) projects. For example, the recent proposal for the Oxford Centre for Heritage Research and Engagement (OCHRE).					●	○				
More 'challenge' style initiatives where local authorities and universities invite start-ups and entrepreneurs to generate new ideas for solving pressing challenges and, in doing so offer all important seed funding and early validation. SmartCity Challenge was a great example of this.					●	●		○	○	○
The local authorities and universities should seek to procure and embed within their wider networks and supply chains innovative products and processes, acting as "early adopters", ensuring that the county become an exemplar of innovative practices. We should also more generally support initiatives to source from local suppliers, promoting growth by providing business to our local firms and entrepreneurs.					○	●				○
Explore funding to allow OSEP to be sustaining						●				
Facilities and innovation spaces suitable for social enterprises; linking and strengthening networks for social entrepreneurs		○	○			●				
Incentives for large companies to work with social enterprises to help them develop supply chain expertise		○				●	○		○	
Promoting opportunities for social entrepreneurs to work with schools and FE colleges to promote awareness						●	○			
Developing a hub and spoke structure for supporting social enterprise at a county-wide scale		○				●				
Building on the design challenge approach OSEP is piloting at Marmalade to address some of the county's social challenges					○	●				

Proposed Project List	Understanding the Ecosystem	Strengthening our Networks	Building Innovation Spaces	Reinforcing the Science and Research Base	Innovation for All	Innovation for Social Good	Nurturing Talent and Developing Skills	Attracting Significant Business	Attracting Capital	Embedding Innovations in the Ecosystem
Increasing long-term survival and economic impact by training and encouraging social innovators to create sustainable business models rather than charities dependant on grants or donations						●	○			
Supporting initiatives such as the Smart City Incubator where entrepreneurs are challenged to deliver solutions for local authorities that address areas affected by spending cuts						●				○
Involve businesses in the '3 D's': design (curriculum), delivery (curriculum) and destinations (employment). Encourage opportunities for businesses and business people to assist in the development of live briefs to link with programmes of student study to properly reinforce the importance of innovation and STEM						○	●			
Training and development programmes for innovation, entrepreneurship and business skills						○	●	○	○	
Consider the people who power the innovation ecosystem, ensure they can afford to live in proximity to their work in homes that meets their needs, recognising that different people need different things							●			
Embed the ecosystem in a liveable city and county, ensuring that growth goes hand in hand with preserving and enhancing the quality of life in the county						○	●			○
Build more networks and opportunities for Managing Directors to share learnings: Some networking organisations are oriented towards generating sales, whereas we need to create a private, confidential space to allow business leaders to share challenges and talk.		○			○		●			

Proposed Project List	Understanding the Ecosystem	Strengthening our Networks	Building Innovation Spaces	Reinforcing the Science and Research Base	Innovation for All	Innovation for Social Good	Nurturing Talent and Developing Skills	Attracting Significant Business	Attracting Capital	Embedding Innovations in the Ecosystem
Nurture existing knowledge-led industries and find ways to increase the uptake of new innovations from the research base. We need to ensure there are spaces and facilities to accommodate their growth within Oxfordshire, including use of under-utilised existing public sector buildings.			○						●	
Attract innovative, knowledge-led businesses of all scales to Oxfordshire, ensuring there is a strong offer of space and support, even for the largest			○					○	●	
Seek out and encourage business scale-ups, to maximise retention in Oxfordshire to drive growth and productivity								○	●	
Targeted initiative to attract investors to locate in Oxfordshire, in particular around hubs of innovative activity (OU, Harwell, Culham, etc.)		○			○		○	○	●	○
Develop an integrated strategy across the region which takes into account space constraints, areas that can be expanded and the types of companies that should be attracted into the region.			○					●		
Support the creation of a business-led technology accelerator which can encourage the inward transfer of skilled people, projects, new ventures and investment to Oxfordshire. Oxfordshire lacks a Cambridge Consultants type enterprise which provides an important role in helping bring early stage commercial ventures to the county.							○	●	●	
Marketing and promotion of Smart City projects: attracting new innovators to work with us, and marketing us as a smart city area and ensuring we get the resource and funding (and inward investment)					○	○				●
Funding to establish a full time and dedicated management/project coordination team for Smart City, and to facilitate the creation of a joined-up strategy and roadmap,					○	○				●

Proposed Project List	Understanding the Ecosystem	Strengthening our Networks	Building Innovation Spaces	Reinforcing the Science and Research Base	Innovation for All	Innovation for Social Good	Nurturing Talent and Developing Skills	Attracting Significant Business	Attracting Capital	Embedding Innovations in the Ecosystem
Support the development of the offer to industry and other innovators around a regional test bed										•
Digital strategy and action plan for local authority/ authorities						○				•
Open data projects, to make local authorities' data available for the benefit of citizens						•				•
Oxfordshire has been famous for its cars for over a century. The growing world market in alternative-fuel cars and buses is a great opportunity for the county to build on current success. And cutting exhaust emissions means cleaner air for everyone.						•				•
Plans to retrofit our existing housing stock and create up to 100,000 new homes over the next 15 years will benefit Oxfordshire's low-carbon building technology sector. More houses, clever planning and changing work patterns will reduce commuting pressure and improve quality of life.						•				•
Using less energy is one part of the low-carbon equation – especially with electricity prices set to rise over the next five years and concerns over certainty of supply in Oxfordshire. Another is to find alternatives to fossil fuels (which cost the county £1 billion to import every year) and invest in the local infrastructure for a resilient, low carbon electricity grid.						•				•



8. Appendix 2: Case Studies

The following section contains descriptions of activities that offer illustrative examples of the types of projects and initiatives that are required to develop and deliver the innovation strategy themes. This is a 'live' list that can be added to and expanded over time.

8.1 Understanding the Ecosystem

8.1.1 NESTA – Connecting the Dots Project³¹

The Connecting the Dots Project aims to advance both understanding and support of entrepreneurial ecosystems within the so-called 'golden triangle' of London, Cambridge and Oxford. Funded by NESTA and local partners in the three cities, the database created will allow users both to discover large-scale patterns characterizing entrepreneurship ecosystems across this global powerhouse of innovation, and to identify particular actors—entrepreneurs, investors, mentors and others—within specific sub sets of the ecosystem through an easy-to-use, open access visualisation tool.

The project is part of the wider global study of innovation ecosystems being carried out by GERN which ultimately will include 100 cities within the next 5 years. Cities currently being mapped include: Buenos Aires, Cairo, Cambridge, London, Medellin, Mexico City, New York, Oxford, Santiago, Sao Paulo, Singapore, and Toronto. Researchers and practitioners will then be able to query the database along multiple analytical dimensions.

8.2 Strengthening our Networks

8.2.1 Grass Roots Network

Oxford has a plethora of 'official' networks which operate often in splendid isolation of each other for various reasons. There is an area, however, that is often overlooked. This is the self-organised 'Meet Up' group. The recent Tech City 2016 report highlighted that Oxford had more of these than anywhere else in the country and this indicates that there is a vibrant grass roots community that cross sectors and technologies.

The Oxford Trust studied this ecosystem as part of its strategy to support innovation and entrepreneurship. The provisional results indicate that at least 25 separate meetup groups exist in the city ranging from business start-up advice to specific technology platforms all self-organised and based on shared passion for peer to peer learning. More than 1,000 individuals are active within this specific ecosystem.

As a result of this study, the Trust has opened up part of its Oxford Centre for Innovation to provide free meeting space for those groups that wish to use it, and many now chose to do so, whilst retaining their full independence and informal nature. The Trust is now studying how best to further encourage and support this important aspect of entrepreneurial life in Oxford.

31 <http://www.gern.co/research/>; <http://www.entrepreneurshipnetworkmapping.org/londonCities/>

8.2.2 Network Navigators³²

Network Navigators help entrepreneurs and companies 'navigate' the county's networks, and maximises the support businesses receive to start-up and grow. Oxfordshire's Network Navigators do this by: providing advice and guidance; signposting to sources of help; specialising in their sector; being well-connected locally; and linking clusters, experts and networks.

Network Navigators work to address specific challenges in their sector, while also collaborating on cross-sector initiatives. Examples include:

- Navigator for Space and Satellite Applications - Supported increased inward investment by focusing on the Harwell Space Cluster as an international hub of activity in the sector.
- Navigator for Digital, Media and Publishing - Supported the establishment of Digital Oxford to bring together members of the Digital and Creative community in Oxfordshire.

8.2.3 Enterprising Oxford³³

Enterprising Oxford is a web portal developed by the University of Oxford and launched in May 2015 with the aim of highlighting and promoting entrepreneurial opportunities across Oxfordshire. By mapping the local resources (including courses and conferences, funding opportunities, networks, workspaces, and events), showcasing entrepreneurs and start-ups, and sharing events and news, Enterprising Oxford is helping to connect the dots in the Oxfordshire ecosystem.

Enterprising Oxford was set up as a collaboration between Isis Innovation, The Oxford Launchpad and KEIT (Knowledge Exchange and Impact Team) in the University of Oxford. Originally designed to show to students, researchers and staff the possibilities of entrepreneurship, it is now open to the wider Oxfordshire environment. It is a practical source of information for the entire Oxfordshire region, with a focus on basic information and resources, events and training, real life stories, and profiles of start-ups, spinouts, sole traders, and SME's from the Oxfordshire area.

8.2.4 Oxford Technology & Media Network³⁴

Oxford Technology & Media Network aims to turn Oxford into the UK's most entrepreneurial Media and Technology centre.

The network runs a small but well planned events programme of four events per annum. Its objectives are to:

- Stimulate a debate and business thinking on key topics and markets.
- Help network members build a local network for support, personal development and mentoring on an individual basis.
- Help local start-ups and businesses find the people, connections and resources they need to flourish.

³² <http://www.oxfordshirebusinesssupport.co.uk/content/network-navigators>

³³ <http://eship.ox.ac.uk>

³⁴ <http://www.otmfn.co.uk/>

- Provide a catalyst for Oxfordshire expertise to become the UK's leading high technology and media cluster.

This is an example of a network that connects a number of technology strengths across several sectors, whilst making connections to providers of finance.

8.2.5 Cryogenics Cluster

The UK has a particularly strong cryogenic community, centred around Oxfordshire, emanating from the interaction of Oxford University and STFC's Rutherford Appleton Laboratory (RAL) and the cascade of surrounding enterprise over many years. Oxfordshire's position as the world's leading manufacturer of MRI scanner magnets today can be traced back to pioneering work at RAL in Superconducting Magnets and Oxford Instruments, the first spinout company from the University. Cryocooler technology developed by the University and RAL has made it far and away the most successful flown in space. A cryogenic infrastructure has built up around these centres, comprising everything from global corporations to sought-after, one-man specialists. Over 30 organisations are engaged directly in cryogenics, directly accounting for over 1000 employees and £1 billion in economic activity.

8.3 Building Innovation Spaces

8.3.1 The Oxford BioEscalator³⁵

The Oxford BioEscalator will be a hub for the commercialisation of medical science in Oxfordshire. The BioEscalator will bring together clinicians, researchers, patient cohorts, entrepreneurs and investors to tackle challenges in healthcare and medical sciences, and build scalable enterprises to take those solutions to the world.

Opening in late 2017, the BioEscalator will be a purpose-built facility based on the same site as a world leading medical campus and a leading UK hospital trust. The BioEscalator will provide facilities and services to support the set-up, proof of concept and initial scale-up of high-growth, high-impact products and companies. There will be communal space for networking, meetings, hot-desking, shared laboratory space, and individual offices and laboratory suites.

The BioEscalator was initiated in response to needs expressed by academic researchers and bioscience companies wanting to engage with the University of Oxford. This is an example of a collaborative approach, with involvement from local government, the hospital trust, Academic Health Science Networks, universities, and the business and investor communities across Oxfordshire. Funding has been provided by central government via the City Deal and there will also be a contribution from the University of Oxford.

8.3.2 The Begbroke Innovation Accelerator³⁶

The Begbroke Innovation Accelerator (BIA) is a multi-use facility aiming to successfully integrate academic and business communities. It focuses on advanced engineering and automotive sectors as well as nuclear materials, advanced materials, robotics, nano-medicine, pharmaceuticals, energy storage and supercomputing. BIA helps small and

³⁵ <http://www.medsci.ox.ac.uk/newsletters/may-2015/innovation-initiatives-resources/innovation-initiatives-and-resources/the-oxford-bioescalator>

³⁶ <http://www.begbroke.ox.ac.uk/home/space-and-facilities/available-property/begbroke-innovation-accelerator/>

medium-sized science businesses take their projects to market. It also provides facilities for researchers from the University developing new innovative products and technologies.

Funding for the BIA was provided by central government as part of the City Deal, with an additional contribution by the University of Oxford. The first phase of the project opened in late 2016 and comprises of a 2200m² mixed-use flexible space for offices and laboratories as well as an extension for the Centre for Innovation and Enterprise.

BIA builds on the Begbroke Science Park's cross-disciplinary approach to bring business and technology closer together, whilst providing training, networking and mentoring opportunities. It allows Begbroke Science Park to meet the needs of emerging businesses and their research counterparts in future as well as provide employment locally. The aim is to establish the region as a centre for high-tech production, attracting investment from both global and smaller companies into advanced manufacturing for jet and aerospace technology, medical research, nuclear engineering, superfast computers and robotics.

8.3.3 Oxford Innovation

Oxford Innovation aims to ensure companies achieve ambitious growth plans and overcome barriers to growth. They provide inspiring environments that are designed to be low risk, coupled with coaching services to facilitate faster, stronger growth and funding opportunities. The company was founded in 1987 by Sir Martin and Lady Audrey Wood, co-founders of Oxford Instruments Plc.

Oxford Innovation manages a UK network of 20 innovation centres across the UK supporting over 900 companies. Seven of these centres are in Oxfordshire - in Oxford, Witney, Bicester, Upper Heyford, Culham and Harwell – supporting 300 companies. The benefits of being part of this network include³⁷:

- Companies are 25% more likely to survive 5 years in an OI centre than the national average
- More companies achieved high growth in an OI centre compared to other incubators
- 10% of occupier growth can be directly attributed to the impact of the innovation centre
- 40% of occupiers recognised that the business would not have survived a critical period

The support from centre staff and peer networks within the innovation centres ensure that tenant companies are connected to appropriate support to overcome challenges faster.

8.3.4 The Satellite Applications Catapult³⁸

The Satellite Applications Catapult is one of a network of Research & Technology Organisations established to foster innovation and accelerate the take up of emerging technologies. Its objective is to promote, develop and facilitate the commercialisation and advancement of the UK's satellite applications industry.

³⁷ According to research commissioned in 2014 looking at 10 years of innovation centre management

³⁸ <https://sa.catapult.org.uk/about-us>

It acts as a neutral convener across government, academia and industry, bringing together highly-skilled and multi-disciplinary teams to generate ideas and solutions in an open, innovative and collaborative environment. Through its wide range of facilities, platforms and laboratories it enables the best businesses, researchers and end-users to work together to develop new satellite-based products, moving ideas from concept to market.

For example, by using satellites to monitor shipping activity there are new opportunities to identify illegal fishing and provide assurance for legal fishing. Similarly by working with local councils and understanding their requirements the Satellite Applications Catapult has been able to demonstrate the benefits of satellite data for planning departments.

8.3.5 The Oxford Trust³⁹

The Oxford Trust established the country's first innovation centre many decades ago starting the trend to develop cost effective incubator spaces for young companies and entrepreneurs in the then fledgling technology sector. The Trust has gone on to found or facilitate the creation of many other centres across the region.

More recently the Trust developed the Oxford Centre for Innovation in the city centre and following on from the success of this and its co-funded innovation ecosystem report (Oxford Innovation Engine Report) decided to expand its support via a new £10 million innovation centre in Headington close to the data and health sciences area.

The Wood Centre for Innovation is, subject to final approvals, expected to open in early 2018 and will provide substantive capacity, independent of academia or government, for organisations wishing to access grow on space within the City. It will also contain a science education centre aimed at enhancing the pipeline of future scientists and employees of this sector.

8.3.6 The ESA Business Incubation Centre Harwell

The European Space Agency's Business Incubation Centre Harwell (ESA BIC Harwell) provides entrepreneurs and start-ups with access to funding, technical expertise and business support to transform space technologies and systems into vibrant non-space businesses. Part of ESA's thriving Europe-wide network of Business Incubation Centres, ESA BIC Harwell is managed by the Science and Technology Facilities Council (STFC) and draws on both organisations' outstanding track record in business incubation – providing a unique environment perfectly engineered to accelerate innovation and unlock commercial potential.

Since 2010 over 50 new space start-ups have launched in the UK thanks to the support of the ESA BIC at Harwell. Oxford Space Structures is another example start-up – it uses technology developed for the European Space Agency's Alphasat mission to develop commercial baby-care products – its first product, SpaceCot, launched in January 2016 as the first UK premium travel cot on the market.

39 <http://www.theoxfordtrust.co.uk/>

8.3.7 The STFC's Innovation Technology Access Centre

STFC's Innovation Technology Access Centre (I-TAC) provides flexible, affordable access to state-of-the-art machining facilities. These facilities help SMEs produce a few parts for prototypes, therefore bypassing manufacturers who are reluctant to produce one-off parts or small batches.

STFC's Innovation Technology Access Centre has enabled spin-outs such as Oxsensis to reduce their R&D costs and further grow their businesses.

STFC's Innovation Technology Access Centre has enabled spin-outs such as Oxsensis to reduce their R&D costs and further grow their businesses. Oxsensis is an STFC spin-out that produces bespoke sensors for use in extremely high temperatures and pressures – this has an application in industries such as nuclear power, aerospace and oil and gas. Taking advantage of I-TAC's lab and office space alongside the high-tech equipment in the centre's machine shop has enabled the company to create their prototype products on a small-scale and with great precision; significantly reducing the manufacturing costs as well as the amount of wastage. Their location at the heart of STFC has also facilitated access to vibration tables and metallurgy equipment, which were used to intensively test and validate their products.

By reducing the time and costs spent on R&D through I-TAC's small scale manufacturing facilities, SMEs can put those resources back into the company and continue to grow. Oxsensis made £2m in revenue in 2013 and increased from a single employee in 2004 to a 20-strong workforce. In addition to the high-tech facilities, Oxsensis has enjoyed the vibrant campus at Harwell Oxford which has helped them receive EU funding from the Technology Strategy Board. Through I-TAC, Oxsensis has been able to focus time and energy on growing the business as efficiently as possible.

8.4 Reinforcing the Science and Research Base

8.4.1 Oxford Centre for Applied Superconductivity⁴⁰

The purpose of the Centre is to accelerate innovation in emerging materials and technology to support and expand the commercial exploitation of superconductivity and superconducting machines.

The Centre will seek to address real industry problems for project partners and Oxfordshire's cluster of applied superconductivity companies, through the following:

- Facilities - Two new laboratories will be made available for both the core research programmes and centre partners.
- Research - Core research will focus on scientific work to underpin technical issues of relevance to the industrial partners.
- People - The Centre will aim to create new jobs and training opportunities.

The £6.5m project launched in 2016, supported by a five year initial funding envelop under the Oxfordshire SEP, and contributions from partner institutions including OxLEP, University of Oxford, Oxford Instruments, Siemens Magnet Technology, Agilent, and STFC RAL.

40 <https://www.cfas.ox.ac.uk/>

The UK's space Innovation and Growth Strategy brings together industry, government and academia in partnership to drive growth in the UK space sector. In its first report in 2010 it promoted the Harwell campus as the space cluster for the UK.

8.4.2 Case Study: Clustering Really Works!

The UK's space Innovation and Growth Strategy brings together industry, government and academia in partnership to drive growth in the UK space sector. In its first report in 2010 it promoted the Harwell campus as the space cluster for the UK. At the time there was only a handful of space related organisations based there, now there are over 60, including the European Space Agency's Centre for Satellite Applications and Telecommunications, RAL Space, Satellite Applications Catapult, successful start-ups such as Oxford Space Systems and Rezatec and established UK players opening offices on site alongside international companies establishing a UK presence. The 600+ space employees on campus have many opportunities to interact and drive innovation in the region and beyond.

8.4.3 Remote Applications in Challenging Environments (RACE)⁴¹

A new centre of excellence for Remote Applications in Challenging Environments (RACE) has been opened at the Culham Science Centre campus. RACE will conduct research and development into remote applications and will offer access to state-of-the-art facilities, remote handling equipment and expertise to design, implement, train and operate complete solutions. Access is available to all (SMEs, multinationals, research laboratories or academia) and access models will be tailored to the specific requirements of the user. Users and their supply chains will be able to use the world's best robotics to develop technology for operations in hazardous environments that include nuclear, oil & gas, sub-sea, space and construction.

The RACE facility brings together a broad range of expertise from the UK Atomic Energy Authority and its partners the National Nuclear Laboratory, TWI, the National Physical Laboratory and the Nuclear Advanced Manufacturing Research Centre. RACE has already helped win £100 million contracts for AMECFW (Amec Foster Wheeler PLC) and AssystemUK, developing remote handling technology for the ITER international fusion experiment in Cadarache, France. RACE will support design, development, testing and operation of remote maintenance / robotic equipment for one of ITER's key components – the 'divertor' exhaust system that ejects waste from the reactor.

8.4.4 Material Research Facility⁴²

One example of the deep networks of Oxford's national and international research collaborations is the UK Atomic Energy Authority's new Materials Research Facility (MRF) which opened in 2016. With government funding from the Sir Henry Royce Institute and National Nuclear Users Facility initiatives, MRF conducts processing and testing on nuclear materials. It can take specimens far too radioactive for university premises, but not requiring the licensed facilities at Sellafield. This capability is required by universities and industry to accelerate materials research for nuclear energy.

8.5 Innovation for All

8.5.1 The Healthcare Values Partnership⁴³

The Healthcare Values Partnership looks at how to apply innovation in healthcare delivery, developing working relationships between patients, researchers, healthcare practitioners, managers and policy makers to explore questions of value in healthcare today.

41 <https://www.gov.uk/government/news/race-is-open-for-business>

42 <http://www.ccf.ac.uk/mrf.aspx>

43 <http://www.healthcarevalues.ox.ac.uk/>

In seeking the public good, the Healthcare Values Partnership:

- serves patients and those working in healthcare through high quality research and public engagement;
- unites research strengths across the University of Oxford and other academic institutions
- collaborates with non-academic healthcare organisations to enable mutual learning about values in healthcare;
- identifies points of engagement in which the partnership can make a practical contribution;
- organises seminars, conferences and other events to consult and gather expertise;
- publishes material in accessible and academic formats; and
- promotes the research and policy initiatives of other individuals and organisations.

8.5.2 Thames Valley Country House Partnership Project⁴⁴

The Thames Valley Country House Partnership is a Higher Education Innovation Fund (HEIF) supported initiative that creates sustainable relationships between country houses, heritage and tourism organisations and the University of Oxford.

The partnership links academic researchers in the University of Oxford with external partners from the heritage sector, especially those engaged with preserving, protecting and interpreting country houses in the Thames Valley, to develop and promote a varied programme of research projects and engaging events with a focus on increasing visitor numbers and spend-per-head.

Established in October 2013 and based at TORCH (The Oxford Research Centre in the Humanities), the partnership is a way of linking entrepreneurial ideas in the heritage sector with researchers in the University of Oxford. The partnership actively promotes innovative multi-disciplinary research into the history and future of the country house.

8.5.3 Solid State Logic

Founded in 1969 and based in Begbroke, Solid State Logic (SSL) has become a world leading manufacturer of analogue and digital audio consoles. It is also a provider of creative tools for film, audio, video and high class broadcast professionals such as the BBC, Fox, CBS and ABC. As a result of heavy investment in a new software platform, SSL produced a growth plan based on launching a series of new products to achieve a target of increasing sales to £30m by 2016.

With coaching support from Oxford Innovation Services, SSL reviewed the launch plan and proposition for a new live console product which created £2.5m of headroom for future developments in addition to ensuring a successful new product launch. The team also reviewed their R&D process and developed a robust strategy to use and exploit their IP effectively. The reinvigorated innovation process has generated around 60 product ideas for the team of which three are under development and will be launched shortly.

The Thames Valley Country House Partnership is a Higher Education Innovation Fund (HEIF) supported initiative that creates sustainable relationships between country houses, heritage and tourism organisations and the University of Oxford.

44 <http://www.tvchp.org/> <http://www.torch.ox.ac.uk/knowledge-exchange/tvchp>

8.5.4 Oxford Academic Health Science Network (ASHN)⁴⁵

The Oxford Academic Health Science Network (Oxford AHSN) brings together universities, industry and the NHS to improve health and prosperity in our region through rapid clinical innovation adoption. Clinical innovation adoption lies at the heart of the activities of the Oxford AHSN. The Clinical Innovation Adoption (CIA) programme focuses on the evaluation and spread of novel technologies across the region at scale and pace. It has demonstrated delivery with a number of products including the use of intermittent pneumatic compression (IPC) stockings for reducing deep vein thrombosis and mortality after stroke and the Gestational Diabetes Mellitus Health management system. In addition to the CIA Programme, the Oxford AHSN supports 10 clinical networks as part of its Best Care Programme, and has a Wealth Creation programme that links industry, academia and the NHS across the development pathway.

8.5.5 Oxford Cultural Leaders Programme⁴⁶

The Oxford Cultural Leaders is a programme developed by Oxford University Museums and Collections and the Saïd Business School which aims to encourage innovation and entrepreneurial thinking in the museum and cultural sectors. Oxford Cultural Leaders is unique in that it was designed to address the need for cultural organisations to reinvent themselves as businesses, albeit not-for-profit, with entrepreneurial ways of thinking and behaving.

First held in March 2015, programme participants include CEOs, directors, heads of department, and senior managers. It is delivered by cultural sector leaders and commentators, business school experts and industry authorities. The coaching environment combines theory and practice, peer mentoring and action-learning sessions. Evening sessions include talks from cultural leaders and discussions about the future of the cultural sector.

The programme aims to provide participants with a greater insight into their role as leaders and their vision, values, impact, behaviours and attitudes (including to risk). The aim is for participants to be more entrepreneurially minded. The desired impact is that their organisations will experiment with new business models and ways of working whilst supporting and creating a climate for new ideas. Organisations will also benefit from leaders who have the insight and ability to uncover the hidden talents and qualities of their people.

8.6 Innovation for Social Good

8.6.1 Oxfordshire Social Entrepreneurship Partnership (OSEP)⁴⁷

University of Oxford, Student Hubs and Oxford Brookes University have contributed to setting up OSEP (Oxfordshire Social Entrepreneurship Partnership), which supports an active community of 250+ social enterprises and prospective Social Entrepreneurs.

The support programme offered by OSEP consists of four elements: Development and Learning; 1 to 1 Support; Mentoring; Networking Events and Opportunities. OSEP has

⁴⁵ <http://www.oxfordahsn.org/>

⁴⁶ <http://www.oxfordaspiremuseums.org/oxford-cultural-leaders>

⁴⁷ <https://www.osep.org.uk/>

OSEP has used funding from UnLtd and from the wave 2 growth hub programme to provide nearly 100 grants totalling over £0.25M to local social entrepreneurs, and it has provided training and support to over 120 individuals since its formation in 2014.

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OSEP also works on collaborative projects to enhance and support social enterprise in the community:

- **“Start-up Success - Social”** – OSEP is working with OxLEP on this pilot programme to help 15+ early stage social enterprises, incorporating some of the Masterclasses from Oxford Brookes University’s highly successful OBSEA programme.
- **All-Party Parliamentary Group on Social Enterprise** – In 2015 OSEP was invited to speak about the successful collaborations between the Universities and OxLEP in supporting social enterprise.
- **Marmalade Social Innovation Festival** – In April each year, Arts at the Old Fire Station produces Marmalade which brings together innovators from across the UK and abroad to look for real world solutions to intractable social problems. In 2016 OSEP ran a design challenge at the festival to help provide solutions to Oxfordshire’s food waste and community transport challenges.
- **Social Enterprise in School Curriculum** – Social enterprise is now part of the Key Stage 4 curriculum, and OSEP has provided speakers, assistance and information to local schools.

8.6.2 Arts at the Old Fire Station⁴⁸

The Old Fire Station is an arts centre in central Oxford. It presents an eclectic programme of contemporary theatre, dance, music, comedy and visual art, inviting audiences to be open to new ideas and different people. It supports the professional development of early to mid-career artists, helping them become more successful, and it includes a shop and café.

The Old Fire Station is unique in that it helps to build the confidence and skills of homeless people through a collaboration with the charity, Crisis. Together, these two organisations enable homeless people to choose their own labels by including them as audience, participant, trainee, volunteer, contributor or artist. This helps develop networks and build resilience and leads to more stable lives.

The Old Fire Station is a public space shared by very different people which helps to break down barriers, promote solidarity, and provides bridges between the cultural, social care, charity and business sectors. The approach is recognised nationally as a model of good practice in terms of the artistic offer and social inclusion. The Old Fire Station has also developed an innovative business model which combines social investment, sales and fundraising. It has introduced well respected annual events to the City, including the social innovation festival Marmalade (in partnership with the Centre for Innovation in Voluntary Action), a new performing arts festival Off Beat (in partnership with Oxford Playhouse) and a performance created by homeless and professional artists called Hidden Spire (in partnership with Crisis).

48 <http://www.oldfirestation.org.uk/>

8.7 Nurturing Talent and Developing Skills

8.7.1 Oxfordshire Skills Board

Oxfordshire Skills Board brings together a range of public and private employers, secondary, further and higher education skills providers and stakeholder groups.

Working closely with OxLEP, the Skills Board is driven to developing a strategic & coordinated approach to skills development aligned to Oxfordshire's economic growth ambitions, as articulated in the Strategic Economic Plan.

With this in mind, the board has developed the Oxfordshire Skills Strategy to 2020, which currently focuses on five strategic priorities:



Refreshed Strategic Priorities:

SP1: To meet the needs of local employers through a more integrated and responsive approach to education and training: developed in partnership with our provider network, to encourage more training provision in identified priority sectors - both current and projected.

SP2: To ensure that young people are prepared for the world of work through delivery of high quality CEIAG, by well-informed Careers leaders in schools supported by qualified careers advisers. This will include multiple encounters with employers and use of up to date local labour market information.

SP3: To address Oxfordshire's tight labour market and skills shortage areas by

- i) ensuring those marginalised or disadvantaged from work, are moved closer to the labour market
- ii) supporting and encouraging older workers to consider vacancies in areas of skills shortage

SP4: To support the government's agenda to increase the number of apprenticeships offered, and apprenticeship uptake, particularly within small to medium sized businesses.

SP5: To investigate how Oxfordshire as a place of employment is promoted to graduates in our HE organisations and how more graduates can be retained to meet the demand our businesses have for higher level skills.

8.7.2 MD2MD Peer Learning & Leadership Development⁴⁹

The purpose of MD2MD is to help businesses become more successful by helping their managers become better leaders of their business, raising their confidence, competence and motivation.

MD2MD is a Leadership Development platform (becoming a better leader) not Business Development platform (finding customers). It encourages managing directors (MDs) to work in peer groups and learn from each other the practicalities of running a business.

The organisation currently supports fifty members from across Thames Valley and Oxfordshire who meet monthly for one-day sessions to share experiences, learn from specialists, and provide peer-to-peer coaching or mentoring. Topics are decided by the members, often focussing on the 'soft' leadership challenges of developing the mind-set and behaviours that get the best out of self and others.

8.7.3 O2i Opportunities to Inspire⁵⁰

O2i-Opportunities to Inspire creates and supports links between employers and education in order to inspire the future workforce. Founded in 2014, O2i offers an online platform which allows volunteers from any sector to find opportunities to inspire and inform young people by working with schools and colleges to promote awareness.

For businesses, O2i offers the opportunity to connect with education, highlight their sector to the next generation, and improve the employability skills of school-leavers. For schools and colleges, the platform can offer interactions such as work experience, mentoring, talks and engagement projects such as enterprise project challenges for their students.

8.7.4 Activate Learning⁵¹

Activate Learning is an education group based in Oxford that brings together secondary, further and higher education and schools along with workforce training and management consultancy. Activate Learning works with learners, experts in learning and businesses to co-create study programmes and build industry-relevant career pathways.

As a landlord with space for facilities, Activate Learning aims to contribute to an Oxford City Centre Innovation District. In order to balance the already high demand for Oxford City Centre space, Activate Learning is seeking to balance its revenue generating potential with opportunities for creating exciting positive outcomes for learners, faculties and the innovation community. This move will allow Activate Learning to engage more meaningfully with businesses around their skills needs now and into the future.

Activate Enterprise Limited is a spin-out of the Activate Learning group and the leading apprenticeship and training provider in the Thames Valley region. Their focus is on growing apprenticeship numbers, and they have a successful track record of supporting over 1000 organisations every year with their training and team development. Activate Enterprise Limited support businesses to source, recruit and develop young people in the workforce, to meet industry requirements. Their services range from board leadership programmes to government-approved apprenticeships, whilst combining high educational standards with extensive commercial expertise.

50 <http://www.o2i.org/>

51 <http://www.activatelearning.ac.uk/>

8.7.5 Graduate Entrepreneur Visa Scheme

The University of Oxford has endorsed 54 graduate entrepreneurs under the Tier 1 (Graduate Entrepreneur) visa scheme (“GEV”) since 2012, thus enabling non-EEA Oxford graduates with genuine, creative and innovative business ideas to remain in the UK to develop their business. Applications are considered on a quarterly basis by a panel of business experts from the Careers Service, Research Services, and Saïd Business School. Successful applicants may then apply to UK Visas and Immigration (UKVI) for a one-year visa to stay in the UK to develop their business; following a successful progress review, the vast majority secure a one-year visa extension. To date, endorsed businesses have ranged from Social Enterprises to Technology Start-Ups, and from Digital Education Tools to Energy Research.

The GEV scheme supports the wider Oxfordshire innovation environment by promoting a positive message that the university and the region encourage new business. The regular promotion of the scheme to all international undergraduates, postgraduates and post-doctoral researchers continues to confirm the positive intent of the University, and UKVI positive intent to be open and welcoming to those who wish to stay in the UK with a valid business idea.

8.8 Attracting Significant Business

8.8.1 Disruptive Innovation for Space Centre (DISC)

The Disruptive Innovation for Space Centre (DISC) is being developed by the Satellite Applications Catapult working with RAL Space and the University of Oxford and local, national and international businesses. DISC will enable high-impact businesses to quickly harness and exploit breakthrough technologies as they emerge. It will enable high-impact businesses to quickly harness and exploit breakthrough technologies as they emerge. DISC will comprise laboratories, materials, fabrication equipment and expertise, all of which will be available to support applied research at both industrial and experimental levels. Businesses will be able to use DISC to support ongoing development of existing product lines, for example experimenting with new materials and manufacturing techniques.

8.8.2 Mobility and Power Centre

Five partners from across the ecosystem (including public, private, and academic) have joined together in a new Mobility and Power Centre proposal. The aim is to create a world-class cluster, to foster innovation, and translate early stage research into novel products. The building will include research teams from the University of Oxford and Oxford Brookes University, and will also have companies hosted within it to help direct what research is done. The Centre aims to create spin-outs and have the companies based there take products to market.

With world-leading science facilities, universities, and automotive sports companies all within a 20-mile radius, Oxfordshire is ideally positioned to be a global leader in Energy and Mobility sector. This centre highlights the importance of having a coherent approach in an emerging sector, to attract business to the region.

8.9 Attracting Capital

8.9.1 Oxford Sciences Innovation (OSI)⁵²

Oxford Sciences Innovation PLC (OSI) is a new company with £500m+ of funds established in March 2015 to invest in new spin outs formed to commercialise technological innovations arising from the University of Oxford and the Harwell and Culham campuses. The company is corner-stoned by leading investors including Lansdowne Partners LLP, IP Group PLC, the Wellcome Trust, Invesco Asset Management Ltd, Woodford Investment Management LLP and the University of Oxford's own endowment fund.

OSI is already further catalysing the growing number of new spin out companies formed with the support of the University of Oxford's Technology Transfer Office, Isis Innovation Ltd. Ten seed investments have been made by OSI in its first year, spanning technologies with applications across the life and physical sciences. These represent the first steps towards OSI's aim of building billion dollar companies which can compete globally and build long term value for both OSI's investors and for Oxfordshire.

The establishment of OSI further enhances the innovation support and investment resources to compliment the world-class science for which the region is renowned.

8.9.2 Venturefest⁵³

Venturefest Oxford puts on the region's largest event to connect entrepreneurs with investors and support services, and has been doing this for 18 years. 60% of delegates each year (c. 1000 visitors) are entrepreneurs and innovators. The innovative programme offers workshops, plenaries, exhibitions and other opportunities that support and encourage the growth and sustainability of entrepreneurship. Venturefest Oxford embraces the key high tech sectors in Oxfordshire, including digital, life science, automotive, space and cryogenics. Its vision is to offer more events during the year offering continuous networking and support services. For the past year it has held three Pitchfest events where new businesses can pitch to a group of investors for funding. This is gaining its own momentum, attracting large investors from outside the County as well.

8.9.3 Oxitec - Investment Community and the University of Oxford Working Together⁵⁴

University of Oxford support spin outs in various manners, alongside local investors. As an example, the novel biotech company Oxitec span out of Department of Zoology in 2002 and was supported by the University of Oxford and Oxford Capital, who invested and through the strong network introduced other investors. Their novel technologies can suppress insect spread disease, such as malaria and dengue fever. The company was sold in 2015 to a large US biotech company who believe that this technology is transformational, and are better able to deliver the potential. The company is already valued in the multi-million dollars and is expected to add multi-billion dollar value. A key

52 <http://www.oxfordsciencesinnovation.com/>

53 <http://www.venturefestoxford.com/>

54 <http://www.oxitec.com/>

example of a university developed technology, being supported by local investors and delivering huge healthcare (and financial) value to the world.

8.10 Embedding Innovations in the Ecosystem

8.10.1 Culham Smart Community⁵⁵

Culham Smart Community will be a living test bed with new houses designed around integrated transport (road, rail) that adopts the latest green technology and community thinking and makes space for emerging digital technologies. By linking with other smart city projects around the country the intention is to attract global attention from companies, researchers, investors and even governments. Locating this community adjacent to the Culham Science Centre also means that we create a link between high tech jobs and 21st century living.

The brand 'SMART Oxford' recognises Oxford as a centre for developing products and services that use Big Data, Internet of Things, and Robotics. Specific strength lies in autonomous vehicles, digital health and mobile energy. One of the big unknowns is how this disruptive technology will improve the design of our towns and cities and enable us to live healthier, more productive lives. Culham Smart Community recognises the local strengths in the rapidly developing digital economy sector.

8.10.2 MobOx Foundation CIC⁵⁶

Mobility Oxford (MobOx) aims to improve the experience of transportation in and around the city of Oxford by creating open systems, processes, and technologies that will benefit residents, businesses, and visitors alike.

MobOx has already worked on developing new projects in mobility along with 20 partners ranging from multinational organisations to start-ups and recently formed a development and learning partnership with Team Aguri Formula E team. MobOx will develop solutions that integrate technological and social solutions, based on the premise that integrated transportation is a complex system of interactions between people and technology. MobOx will also act as an incubator support system for ideas and start-ups in the mobility sector. Projects delivered continue to add to the understanding of the city ecosystem building up the living laboratory, which will work across all the dimensions of the mobility challenge such as mobility devices, communication, infrastructure, services, and event retail.

8.10.3 Oxbotica & UK Autodrive⁵⁷

Oxbotica is a spin-out from the University of Oxford's internationally acclaimed Mobile Robotics Group specialising in mobile autonomy, navigation and perception.

UK Autodrive is one of three projects that will see trials of driverless cars taking place over the next few years in Milton Keynes, Coventry, Greenwich and Bristol. A key element of the £20m UK Autodrive project is the implementation of a Low-Speed Autonomous Transport System (L-SATS), which will see 40 self-driving pods carrying members of the public on routes around Milton Keynes city centre, linking in to

55 <https://www.youtube.com/watch?v=PO15V7EbwE8>

56 <http://mobilityoxford.com/>

57 <http://www.oxbotica.com/projects/>

key transportation hubs and car parks and travelling through pedestrianised areas. Trials will explore the opportunities and challenges of using L-SATS fleet to provide a working public transport system.

Oxbotica is a pivotal contributor to UK Autodrive and will develop the entire autonomous control systems and sensor sub-systems that enable real-world operation of driverless vehicles in urban and pedestrianised areas around Milton Keynes. In turn, this will support the introduction of intelligent urban architecture to support a wide variety of applications driven by the underlying technology that bring benefit to the citizen, especially in an urban environment.

8.10.4 Oxford Flood Network⁵⁸

The Oxford Flood Network is a citizen-based sensing project to collect detailed information on river levels around Oxford. Led by Oxford SME Love Hz, the initiative has engaged Oxford residents and organisations to deploy a set of sensors in positions around the city region from which real-time river level and flow data can be collected, and the information made available to the public.

Applying Internet of Things (IoT) and other emerging technologies, the project empowers citizens to build their own local flood sensor networks in the areas that affect them the most, and to develop low-cost sensors affordable by local communities. Since 2014 the Oxford Flood Network has also been working with Oxford-based not-for-profit company Nominet, which has developed a set of IoT tools for the collection, storage, analysis, interpretation and real-time visualisation of the network's data in an interactive map.⁵⁹ Nominet has also produced and managed the first Ofcom-approved database in support of TV white space applications nationwide. The data generated by these initiatives is used to assist in flood response and calibrating flood models for hydrologists.

The sensor-network and IoT-tools developers are now looking to extend and commercialise their work, with the creation by Love Hz of the nationally-focused Flood Network⁶⁰, as a vehicle to extend the development and consultancy opportunities to other regions of the UK, and with Nominet exploring new application areas for their IoT technology, such as a sensor-based car parking application.⁶¹

8.10.5 Demand Responsive Transport (DRT)

As part of a larger range of transport initiatives, the University of Oxford is carrying out a feasibility study on Demand Responsive Transport (DRT). It will be undertaken in partnership with Preston Motorsport and MobOx, through innovative application of technology.

The Demand Responsive Transport (DRT) model offers an innovative alternative to conventional people movement, matching supply to demand using mobile technology in a similar manner to the taxi service, Uber. By sharing a wider pool of vehicle types with taxi operators, it has the potential to correctly match vehicle size to observed demand in real-time with consequent potential savings on running costs and carbon emissions.

⁵⁸ <http://www.love-hz.com/oxford-flood-network/>

⁵⁹ <https://map.flood.network/>

⁶⁰ <http://flood.network/>

⁶¹ <http://www.nominet.uk/researchblog/creating-a-smart-parking-system-using-our-iot-tools>

The feasibility study will use passenger data from a pilot Science Transit Shuttle service operating between the City Centre, Harwell Campus and the Old Road Campus. It will assess the potential financial savings, carbon reduction and customer experience that DRT could deliver. It may also comprise a limited pilot if a flagship electric vehicle can be secured through sponsorship connections between MobOx and the automotive industry.

It is anticipated the study will answer several key questions about whether the Science Transit Shuttle service can transition to DRT in the medium-term.

8.10.6 Precision Medicine Catapult⁶²

The Precision Medicine Catapult (PMC), the UK's innovation centre for precision medicine under Innovate UK, announced in 2015 that Oxford would be one of six regional Centres of Excellence. The role of each centre is to act as a hub for regional precision medicine activities within the UK-wide network. Each centre is a government initiative that is established and part-funded through Innovate UK.

The PMC was established to grow the UK national and regional precision medicine industry across data, drugs and therapies, diagnostics and digital health. Precision medicine combines precise diagnosis with precise treatment and precise data analysis. An important aspect of the PMC's plan is to support early NHS test-bed capability and adoption. Oxford, through both the University of Oxford and the Oxford University Hospitals NHS Foundation Trust, has had nearly two decades of strategic R&D investment and clinical practice in this space, and is well placed to develop new diagnostic opportunities and embed them within the existing NHS ecosystem across the region. The focus is on developing the region as a supportive test-bed for precision medicine innovations, both for industry and for innovations that have been developed through funding within the academic and NHS environment.

The centre will work on locally driven programmes and use the PMC network to draw from expertise across the UK. It will be an example of collaborative work in Oxfordshire and beyond, working with local, national and global stakeholders, from academia to health systems to industry partners and SMEs. A number of projects have been identified in a range of disease areas for evaluation and adoption across the health system, focusing specifically on evaluation and adoption.

8.10.7 North West Bicester Healthy Town⁶³

North West Bicester is the UK's first eco-town. Its vision is to build a new community of around 6,000 homes, as well as new employment opportunities and attractive amenities all built to be environmentally, socially and economically sustainable. This is the only site in the UK being developed to PPS1 Eco Town standards, including design for healthy lifestyles.

Oxfordshire was successful in a bid for North West Bicester to participate in the NHS Healthy New Towns Programme. The initiative is aimed at putting health at the heart of new neighbourhoods and town by future-proofing new communities for the health

⁶² <https://pm.catapult.org.uk/>

⁶³ <http://nwbicester.co.uk/>

and care challenges of this new century – obesity, dementia, new models of digital health, by designing in health and modern care from the outset.

The built environment in North West Bicester will be a catalyst for Healthy Living through: its integrated energy efficient design; hard-wired digital, community and travel connectivity functions providing real-time data; and a community and physical infrastructure to promote and actively engage residents to live healthy lives as the norm.

The New Healthy Towns Initiative provides the opportunity to assess the innovations at NW Bicester and to identify the impacts they have on public health and be replicated across the later phases of large scale planned growth for the town, other areas of the town and elsewhere in the country.

8.10.8 Project ERIC⁶⁴

ERIC stands for Energy Resources for Integrated Communities. It is a research project part funded by the UK government (Innovate UK) to assess how innovative energy storage technology could help a group of homes in Rose Hill in East Oxford to save energy and money.

This cross sector project involves Oxford City Council, GreenSquare and private homeowners alongside technology lead Moixa Technology. It will involve installing a Maslow energy storage unit in up to 100 households and, of these, 60 will also have solar PV panels installed on roofs.

The energy generation from solar PV, energy demand from the household and the storage of energy within the Maslow battery will be monitored throughout the 27 month duration.

Project ERIC represents a £1.2m investment in Rose Hill over two years leading to a significant impact for local residents; bringing down energy bills and giving the local community greater control and power over the energy they use.

8.10.9 Low Carbon Oxford⁶⁵

The Low Carbon Oxford partnership boasts over 40 member organisations based in or around Oxford that have committed to collaborate to reduce their carbon emissions and share best practice intelligence in order to establish a low carbon, sustainable economy, creating green jobs and increased prosperity for all. The membership covers all sectors of the city's economy and approximately 50% of the city's carbon emissions.

Its participative approach enables an on-going programme of events and projects with a small amount of core resource from Oxford City Council. Notable successes have been:

- Food Printing Oxford report: quantifying the carbon impacts of the food consumed by the City and identifying resilience and security issues

⁶⁴ <https://localisedenergyeric.wordpress.com/home/about/what-is-project-eric/>

⁶⁵ <http://lowcarbonoxford.org/>

- Oxfordshire's Low Carbon Economy Report: delivered by the University of Oxford in partnership with Low Carbon Oxford and establishing the case for low carbon investment in Oxfordshire
- The Route Map to 2020 project: which is analysing the city's carbon emissions projections in order to capture best practice and identify gaps and priorities for further action
- Low Carbon Oxford Week: A city-wide annual festival which uses creativity, culture and community to show case the actions taken by pathfinders and to inspire local people to take action on climate change.

Our Priorities



people

Delivering and attracting specialist and flexible skills at all levels, across all sectors, as required by our businesses, filling skills gaps, and seeking to ensure full, inclusive, employment and fulfilling jobs;



place

Ensuring a strong link between jobs and housing growth, and providing a quality environment that supports and sustains growth; and offering the choice of business premises and homes (including more homes that are genuinely affordable) needed to support sustainable growth whilst capitalising on and valuing our exceptional quality of life, vibrant economy and urban and rural communities;



enterprise

Emphasising innovation-led growth, underpinned by the strength of Oxfordshire's research, business collaboration and supply chain potential; recognising and reinforcing the significant contribution made by all sectors, in all parts of Oxfordshire and all types of business;



connectivity

Enabling people, goods and services to move more freely, connect more easily; improving broadband and mobile coverage and capacity; and providing the services, environment and facilities needed by a dynamic, growing and dispersed economy.