Local Industrial Strategy | Evidence base report

Grand Challenges
February 2019

The West of England Local Industrial Strategy will consider how the region can respond to the Grand Challenges identified in the UK Industrial Strategy. Work on these Challenges aims "to put the UK at the forefront of the industries of the future, ensuring that the UK takes advantage of major global changes, improving people's lives and the country's productivity".

The four national Grand Challenges are:
- Artificial intelligence and data: to "put the UK at the forefront of the artificial intelligence and data revolution"
- Clean growth: to "maximise the advantages for UK industry from the global shift to clean growth"
- Future of mobility: to "become a world leader in the way people, goods and services move"
- Ageing society: to "harness the power of innovation to help meet the needs of an ageing society".

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Approach

As part of our Industrial Strategy research programme we have undertaken analysis and engaged with stakeholders to better understand our regional strengths and opportunities in relation to the national Grand Challenges. To contribute to developing our evidence base, we carried out stakeholder workshops with businesses and community organisations on each of the four topics. This analysis is supplemented by research into the factors that contribute to innovation in the region. We carried out 'deep dive' research on a number of industrial sectors in the region operating at the intersections between new technologies and sectors. More detail of that research is discussed in the Innovation report of the evidence base.

This report sets out initial views on the strengths and opportunities across the West of England in relation to the Grand Challenges contained in the national Industrial Strategy. In relation to AI and Data, the conclusion of analysis and engagement to dates suggests the region should approach this as a cross-cutting theme that will underpin a broad range of activity across the region. We will continue to explore the remaining Grand Challenges in the next phase of our work.

Artificial Intelligence and Data

Artificial Intelligence (AI) and Data are transforming the global economy. Innovations in the way we use information are reshaping the way we trade, how businesses grow, advances in healthcare and the way we work, travel, and learn. The opportunity is huge. Embedding AI across the UK will create thousands of jobs and drive economic growth – potentially contributing an estimated £232bn to the UK economy by 2030.[1]

AI and innovations in the use of data are touching every industry in the West of England. They are key enablers of growth for the region and will reshape many of the skills and employment opportunities available to our residents over the coming years.

AI and Data are also reshaping our public services, enabling improved targeting of healthcare to those most at risk, supporting potential advancements in social care, and enabling greater collaboration and efficiency across public services as routes to sharing data develop.

In the same way that mass transportation models changed the world in the first Industrial Revolution, the way we use information is now reshaping our world.

Given the pervasiveness of the data revolution, AI and Data will be key enablers of our regional Local Industrial Strategy.

West of England strengths and opportunities
The stakeholder workshops for AI and data identified:

- **Academic strength in AI and data.** Regional academic excellence in AI and data spans a wide range of fields. From the UWE Bristol Robotics Lab to the Avon Longitudinal Study of Parents and Children (**ALSPAC**), (also known as **Children of the 90s)**, the region has a broad and rich history of data led academic advancements.

- **Strong collaboration between academia and industry in exploring the challenges and opportunities of applying academic advances in the use of data to real world problems.** For example, the Centre for Modelling and Simulation (CFMS) was identified as providing a valuable regional resource in bridging the gap between academia and industry. More broadly, the strength of collaboration in the region is enabling cross-sector collaboration in exploring innovative ways of applying data and AI to significant challenges, such as the future of mobility and medical assisted living.

- **The West of England has a diverse and fast growing business base. Growth in digital start-ups has been particularly strong.** There are currently around 7,400 businesses and 58,000 jobs in the region's High Tech sector. This represents 14% of the area's total business base and 10% of jobs. It is estimated that the sector currently contributes around 20% of the regional economy's total output.

- **The region has a strong skills base in relation to AI and big data.** Across our academic institutions, the region has excellent skills that are contributing to advancements in AI and use of data. However, stakeholders also identified a regional opportunity in developing a broader and more diverse skills pipeline though the development of a more comprehensive regional digital skills strategy. Reform of apprenticeships to contribute to this was

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[1] Government projection

suggested, as was a focus on developing digital skills in schools and using new Talent Institutes to build regional skills.

- **Regional expertise related to the ethics associated with the use of data and industrial partners ready to collaborate in testing approaches to data sharing.** Research is being undertaken at the University of Bath on Artificial Intelligence and the ethics of AI development and its socio-economic impact. There is academic and industry interest in exploring the opportunities of data sharing that builds public confidence.

Deep dives analysis into collaborative innovation has identified that AI and data should be seen as a key enabler of innovation across the region. As such, it is a strategically important focus for the West of England but should not be viewed as tied to a specific sector or mission.

Our deep dive work identified there are several companies working on AI in the West of England, and two start-ups in particular have acted as anchor businesses for the region. Graphcore develops accelerators for machine learning and AI, and has recently become Bristol's 1st Unicorn company. FiveAI, a Cambridge based company, have set up an office in Bristol to develop autonomous vehicle technology. Both companies have had significant investment from external organisations.

AI is an enabler to other industry sectors and companies in the region are providing applications to these sectors. For example:
- AutonoMe provide a service to the health care industry, by helping people with learning disabilities to develop and evidence their independent living skills in cooking, cleaning, safety and personal hygiene.
- Kudan and Rovco are developing AI technologies for robotics applications.
- Urban Hawk are developing surveys, data analytics and visualisations in urban landscaping.

It is the work of smaller start-up companies, led by FiveAI and Graphcore, that sets the West of England apart from other locations. In particular, the application of AI technologies across other sectors builds upon the region's strengths in technology, clean growth and ethical use of AI and public policy. This unique combination offers an opportunity for AI to addresses local needs and become a key regional export.

The Deep Dives identified AI development in the West of England is being well supported by the local universities:
- The University of Bristol is one of several universities that are part of the National Centre for Nuclear Robotics, a collaborative research project that develops state-of-the-art robotics, sensing and AI technologies to address the major societal challenges posed by nuclear environments and materials.
- The Bristol Robotics Lab (located at UWE) is the most comprehensive academic centre for multi-disciplinary robotics research in the UK. This collaborative partnership between UWE and the University of Bristol brings together academics, researchers and industry practitioners. Together they are making world leading advances in service robotics, intelligent autonomous systems and bio-engineering.

The recent announcement of 30 University of Bristol fellowships at the national Turing Institute demonstrates the breadth and depth of academic excellence in this field.

Deep dives research also highlighted the importance of the Centre for Modelling and Simulation (CFMS) as a significant regional asset in the fields of AI and big data. CFMS, established in 2010, was born out of a collaboration between major regional industries. It offers access to a leading edge High

Performance Computer cluster, delivering modelling and simulation consultancy and support to organisations of all sizes. It is a key part of the regional ability to bridge the gap between academia and industry.

The deep dive analysis also concluded that demand for AI skills, such as machine learning, is increasing rapidly and there is an immediate risk that the needs of industry cannot be met by current skill levels. However, with the right investment and focus, this provides a potential opportunity for the region to build a skills pipeline that meets that demand and offers opportunities to residents.

AI and Big Data National Mission
Our stakeholder engagement explored **potential contributions to the national mission** identified for the AI and Data Grand Challenge and considered whether a **potential local mission** might be a more appropriate focus, given our specific regional strengths. The national mission is to use data, AI and innovation to transform the prevention, early diagnosis and treatment of chronic diseases by 2030. Stakeholders highlighted regional strengths that could contribute to this mission. For example, the Children of the 90s study, a world-leading birth cohort study, charting the health of 14,500 families in the Bristol area was highlighted by a wide range of stakeholders. The study is the most detailed of its kind in the world, providing the international research community with a rich resource for the study of the environmental and genetic factors that affect a person's health and development. The research, and the rich data it has generated has informed policy and practices that will provide a better life for future generations.

Despite some specific regional strengths that relate to the national mission, stakeholders concluded that the overarching strength of the region is the diversity of expertise and sectors that are ready and able to capitalise on the opportunities of AI and Data. There was a concern that focusing our attention on the national mission has the potential of narrowing our opportunity.

A wide range of potential local missions were identified in relation to how the West of England could apply its regional strengths. The diversity of suggestions[2] could be viewed to strengthen the overarching conclusion that AI and Big Data should be identified in our Local Industrial Strategy as a key enabler to innovation rather than as a specific area of focus in and of itself.

The concept of the West of England as a regional living lab, raised in relation to other Grand Challenges was again raised by stakeholders. Consideration needs to be given to the infrastructure and technical challenges that must be addressed to capitalise on AI and data enabled innovation. By promoting the region as a place where these challenges can be tackled in collaboration, the West of England has the potential to position itself as a place where innovators want to locate.

Proposed approach
AI and Big Data will shape innovation across the West of England. There are significant regional strengths in these fields that we should reflect in our Local Industrial Strategy, ensuring a clear case is made for continued regional and national investments that will support data led advances across a wide range of sectors.

Given the breadth of opportunity AI and Data presents, the region should not seek to promote advancements in one sector over another. The West of England should focus on:

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[2] Areas of focus highlighted for potential local missions included enabling advances in: tackling traffic movement; air travel; robotics to develop advances in assisted living; creative industries, in particular the future of gaming and advances in virtual reality was highlighted; and agritech.

- Ensuring the skills, infrastructure and support for businesses and residents are in place to continue promoting and advancing the data enabled innovation that will drive economic growth and opportunities across the region. For example:
  - Digital infrastructure plans across the region should consider the requirements of AI and Big Data, ensuring infrastructure plans are future proofed.
  - Promotion of digital skills across all levels of skills provision is needed. Ensuring digital skills are developed from school age and throughout all levels of skills provision should be a priority for the region. The region should use opportunities such as the development of Talent Institutes to deliver this.

- Ensuring AI and Big Data enable advancements in the Grand Challenge areas the region is placing emphasis on addressing, highlighting that without these key enablers, innovation in the region will be weaker.

- Consider how AI and Big Data can be used to help address regional challenges, such as: improving the movement of people and transport across the region; and contributing to tackling the costs of ageing through innovations in social and healthcare.

A range of enablers of innovation will be identified in the Local Industrial Strategy, AI and Big Data should form part of this landscape. The Local Industrial Strategy should emphasise the role AI and data is already playing in shaping regional innovations. It should also emphasise the impact further developments in these fields could have for regional innovation, growth, and opportunities for residents.

Clean Growth

Achieving Clean Growth[3], while ensuring an affordable energy supply for businesses and consumers, is at the heart of our emerging Local Industrial Strategy. It will increase our productivity, create good jobs, boost earning power for people, and help protect the climate and environment upon which we and future generations depend.

We are starting from a position of strength; we have already grown our local economy, whilst reducing our carbon emissions. Demonstrating that economic growth can go hand in hand with action to reduce emissions and increase energy efficiency.

We have a proud record in this field. Bristol was the first European Green Capital in 2015 and is one of the only local authorities in the UK to own large scale renewable energy company. On the global stage, Airbus, based in the region, is designing the next generation of aeroplane wings, making them more fuel efficient. And our innovators are creating new clean technology; Robial, a spin out company from the Bristol Robotics Lab, is commercialising technology that converts urine into electricity.

Government estimates that the low carbon economy could grow 11 per cent per year between 2015 and 2030, four times faster than the projected growth of the economy as a whole. We need to build on our position of strength and make the most of the global move to cleaner economic growth. Success in this ambition will increase our economic prosperity and improve our quality of life. It will mean cleaner air, lower energy bills, greater economic security and a protected natural environment.

Our efforts to understand Clean Growth in the West of England
As part of our Industrial Strategy programme we are undertaking analysis to better understand Clean Growth in the West of England; our strengths, our weaknesses and our growth opportunities. The following paragraphs provide a summary of this analysis, stakeholder engagement and a deeper look at Clean Growth within the region.

Initial desk top SWOT analysis
The West of England has many strengths, from an active social enterprise sector supporting the growth of community energy projects, to the UK headquarters of Triodos Bank, a world leader in sustainable banking. We have a reputation for high value design; the National Composite Centre, based in the region, is accelerating the development of light weight and low carbon materials. Our universities are pioneering clean research; the Institute of Advanced Automotive Propulsion Systems (IAAPS) is creating a space where the world's best engineers can work hand in hand on clean vehicle research. This progress means that we can successfully grow our economy while reducing emissions. We have an opportunity to lead by example. Our local authorities have delivered a wide range of energy efficient measures and investment initiatives. Keynsham Civic Centre, opened in 2015, is one of the lowest energy consuming public buildings in the country. We have an opportunity to build on what we have achieved and to lead the reduction of carbon emissions in the region.

Action to deliver Clean Growth can also have wider benefits. For example, the co-benefit of cutting transport emissions is cleaner air, which has an important effect on public health, the economy, and the environment.

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[3] Clean growth means growing our local income while cutting greenhouse gas emissions.

Stakeholder engagement

Generally, it was agreed that the region has a strong track record in the fields of energy, sustainability, digital and low carbon. One of the tables advocated the region's continued work on smart energy, which is bringing together different experts to develop new approaches to smart energy tech. Higher Education and Further Education also featured in multiple discussions, specifically about the importance of harnessing low carbon innovation. There was a strong sense of maintaining our region's lead on environmental sustainability.

The second session looked at the Government's Clean Growth mission to 'at least halve the energy use of new buildings by 2030'. It was identified that the region already has a strong supply of skills, including: green retro-fitting skills, architects, engineers, universities and technological innovation. Our Joint Spatial Plan and Local Plans give us the opportunity to go beyond this national mission. Some delegates emphasised the need for greater collaboration across low carbon and high growth sectors and the importance of harnessing the regions skills and knowledge specialisms such as digital.

Energy strategy

Delivering an affordable energy supply for businesses is at the heart of national Industrial Strategy. Alongside our Local Industrial Strategy, we are also developing an Energy Strategy that will accelerate the development of a diverse energy system that supplies our homes and businesses with secure, affordable and clean power. This will mean developing low carbon sources of electricity that are both cheap and clean. It also means upgrading our electricity system so it is smarter (using data to provide greater control), more flexible (providing energy when it is needed) and takes advantage of rapidly developing technologies such as energy storage. We are expecting to publish the Energy Strategy for the West of England early in 2019.

Deep dive

Clean growth spans across multiple industry sectors. It includes any innovation and business improvement that contributes to improving productivity, whilst also reducing greenhouse gas emissions. As a large proportion of our greenhouse gas emissions come from our need for energy, this deep dive focused on the clean energy sector, consisting of; energy efficiency, low carbon energy generation and smart energy solutions.

The West of England has a strong clean energy offering in consultancy, technical and financial capability and has helped support the UK as a leader in the international clean energy market. There are several key businesses working in Clean Energy in the West of England. DNV GL is the world's leading renewable energy consultancy and employs more than 370 staff in Bristol.

West of England based companies are also developing and installing solar energy solutions. Aura Power specialises in renewable energy solutions, particularly in Solar Energy and have based their UK headquarters in Bristol. Other companies such as Ecocetera and Solarsense provide solar panels. Key electricity suppliers are working to improve their sustainable, clean energy provision. Western Power Distribution, who are the West of England's main electricity Distribution Network Operator, is one of the leading operators for innovation, support for vulnerable customers and community engagement.

Thrive Renewables provide sustainable energy equipment and solutions for individuals and businesses and are based in Bristol. OVO Energy also have their HQ in Bristol and are a national company that has been awarded Energy Supplier of the Year, for three consecutive years by the uSwitch Energy Awards.

Many of the region's law firms, planning consultancies and engineering consultancies have strong renewable energy capability, serving national markets as much as local ones. Examples include law firms Renew Legal, TLT and Ashfords, and energy consultancy firm ESOS Energy. The presence of Triodos Bank's UK headquarters in Bristol is also a key asset for the region.

The West of England has two of the country's most successful community energy enterprises, Bristol Energy Co-op and Bath and West Community Energy. Together with locally-based businesses like Thrive Renewables, they are working to enable wider community ownership of renewable energy generating assets.

The region has invested in waste re-processing and energy recovery and companies like GENeco, based in Avonmouth, are leading global developments.

The Science and Innovation Audit highlights several clusters of industrial and R&D activity in the West of England that have enabled growth of the Clean Energy sector. The report highlights:
- A corridor of technical expertise in hydrogen fuel cells along the M4 corridor
- The Nuclear Research Hub at University of Bristol
- An emerging cluster of excellence and good practice in underpinning technologies related to distributed energy systems and smart grids.

Future of Mobility

The West of England has a proud history at the forefront of innovations in mobility that have changed the world. Brunel's Industrial Revolution innovations addressed long-standing engineering challenges that unlocked mass transport systems across the world. The impact of this innovation went far beyond transport systems; it shaped the development of global trade, drove sustained growth in the global economy, and ultimately drove sustained improvements in standards of living.

The transport and engineering challenges we face today are on a par with the challenges and innovations of the Victorian Industrial Revolution. New technologies are shaping the way vehicles move, how they are powered, the materials used to construct them, and how people can interact with them (both as individual users and in developing mass transit models). The way we move in future can be cleaner, more accessible, and more affordable to more people. It can again reshape the world.

The West of England remains at the forefront of tackling this challenge.

The West of England has academic and industry strengths in fields that can contribute to addressing the future of mobility. The region has a dense concentration of industrial strength in aerospace and has academic excellence in lightweight materials, propulsion, AI and robotics. Strong links between academia and industry are already in place, enabling innovation to develop swiftly in ways that have practical, real world application.

Contributing to this challenge is therefore emerging as an area of strength for the West of England Local Industrial Strategy, particularly in relation to air transportation (and associated technologies), and system design.

As well as contributing to global innovation, our expertise in relation to the Future of Mobility will enable us to address regional challenges we are committed to tackling. Our Local Industrial Strategy will emphasise the importance of developing our regional infrastructure to ensure new models of transport:
- contribute to increased regional productivity;
- deliver against our inclusive growth ambitions, enabling our residents to access opportunities by ensuring individuals and communities have access to high quality transport options that link them to employment opportunities; and
- deliver against our clean growth ambitions, addressing the environmental impact of current transport models and improving quality of life for all our residents.

West of England strengths and opportunities
The stakeholder workshops for the Future of Mobility have identified:
- **We have a strong regional R&D base** in sectors such as aerospace, alternative energy, robotics and AI, new materials, digital and creative industries, and mobility as a service.

- **We have world class academic institutions** focused on robotics, AI, propulsion, and drone technology. We also have strengths in cyber security that will be crucial to many of the potential innovations in this area.

- **We have very strong links between academia and industry and a strong track record in bringing together our skills in high value design**, which are required to tackle this challenge and which contributes to innovation within the region. For example, expertise has been brought together to establish BAATS (Bristol & Area Autonomous Technologies & Systems)

bringing together expertise in autonomous air, land and sea transportation. This capability is focused on ensuring effective cross-fertilisation across our regional expertise in relation to mobility.

- **The region has a strong pipeline of the digital skills that will be required to address the challenges of the Future of Mobility.** Across our region's universities, postgraduate digital skills required to address this challenge are in a good position. There is an opportunity to strengthen other elements of the regional skills landscape, ensuring that pipeline remains strong and is increasingly diverse.

- **The West of England is a global leader in drone technology.** By working in collaboration with the aerospace sector and drawing on regional expertise in service/system design, there is the potential to lead the way in exploring the future of air transport.

- **System development/design is an area where there are currently gaps in global innovation**. To ensure innovation makes the leap into real world application and impact, ensuring the user experience is shaped must be at the heart of how we apply our knowledge. System expertise within each of our regional universities could be brought together to support integrated transport planning at scale.

- **We have diverse regional transport challenges, which present an opportunity in testing new systems at scale.** As a region, we have dense urban centres, dispersed rural populations, international air and port transport hubs, and transport infrastructure challenges. Testing new transport models in the West of England provides the opportunity to test innovation in a complex live environment. For example, developing understanding of the potential impact of new modes of transport on energy provision/requirements. As a region, we also have a population of early adopters, willing to trial new technologies and systems.

- **Data security, in which we have regional strengths, will be a central component to innovation in relation to the Future of Mobility.** Innovation is increasingly data-enabled. This brings real opportunities as our world becomes increasingly data rich, but it also raises challenges in ensuring data is stored and used securely. The West of England's leadership in the fintech sector has led to a regional concentration of excellence in this space that can be harnessed to apply to the future mobility challenge.

- **The region has good business incubator space that is enabling innovation relevant to this sector, but grow-on space is needed.** In common with broader stakeholder engagement to shape the West of England LIS, stakeholders looking at the Future of Mobility challenge highlighted the need for appropriate space to enable business growth and innovation.

The **deep dive** analysis has identified regional strengths and opportunities in:
- **Advanced materials technologies.** Part of the challenge of the Future of Mobility is in developing new, strong but light materials that, coupled with advancements in new power sources, can revolutionise vehicle design and manufacturing. The West of England has world leading strengths in this sector through assets such as:
    - The National Composite Centre, which works across a wide range of sectors to develop new materials, tackling the engineering challenges of today and tomorrow. The West of England is also home to significant industrial materials capacity.
    - Airbus develops all its technology and product solutions for the wings of its civil airliners in Bristol. Key to Airbus assets in the region is AWIC (Airbus Wing

Integration Centre); a £70m investment in an advanced wing systems integration and test centre which houses around 500 airbus engineers working on wing solutions, incorporating composites and other advanced materials.

- o Rolls-Royce has its University Technology Centre at the UoBristol and Dresden and has established its global Composites Technology Hub in Bristol. Rolls-Royce has also consolidated its composite fan and fan casing development activities in Bristol.

Broadening the application of new materials to the way we travel will help drive advances in clean growth. Composites products are typically lighter than corresponding metallic ones. In products that move, such as transportation products, this directly reduces the energy required to deliver the same acceleration/deceleration, and hence reduces CO_2 and other emissions.

- **Connected Autonomous Vehicles (CAV).** New modes of transport (especially for first/last mile) will increasingly utilise CAV technologies, creating more efficient, safer and economical ways for businesses, visitors and commuters to travel. The West of England CAV cluster has experience in R&D projects including trials on public roads. This has been enabled by working in close collaboration with the region's local authorities, who recognise the importance of supporting innovations in CAV. The broader innovation ecosystem in the West of England provides a range of connections that can help stimulate developments in CAV, for example, we have assets and strengths in:
  - o AI and robotics, providing specialism in relation to the testing of CAV related control systems.
  - o The creative digital sector, providing opportunities to develop vehicle simulation software.
  - o Fin-tech, reg-tech, and law-tech, sectors that will be vital in developing the system requirements for new forms of transport (i.e. payment platforms, new insurance products; and legal/regulatory advice)
  - o Composite materials, providing insight in relation to potential new lightweight but strong materials for vehicles.
  - o Propulsion systems that will provide innovations in how vehicles of the future are powered including battery technology and synthetic fuel.

Case Study: The AI enabled evolution of transport

AI is shaping our future including the future of our transport options. The West of England has created a place where innovators can flourish, where companies can find the skills they need to grow, and where change is being led. FiveAI is one of the companies benefiting from locating here. FiveAI is building its own autonomous driving system; and developing transportation services based on this technology with a fleet of self-driving taxis. FiveAI is working with Transport for London, the Transport Research Laboratory, Oxford University, insurer Direct Line and others to develop a self-driving car pilot for London to cut traffic congestion and free up parking spaces. StreetWise is slated for its first test runs at the end of 2019.

Future of Mobility: National Mission

Our stakeholder engagement explored **potential contributions to the national mission** identified for the future of mobility Grand Challenge and considered whether a **potential local mission** might be a more appropriate focus, given our specific regional strengths. The national mission is to put the UK at the forefront of the design and manufacturing of zero emission vehicles, with all new cars and vans effectively zero emissions by 2040.

Stakeholders concluded the region potentially has a specific contribution to make in relation to the electric charging infrastructure required to enable this mission. However, the view of stakeholders was that the national mission was too narrow in focus, particularly given regional challenges such as tackling congestion and addressing the transport links that will help drive inclusion.

Potential local missions were identified that might better draw on our regional strengths, these were:

- **Minimising use of industrial motorised vehicles.** Congestion is having environmental impact but it is also impacting on productivity and quality of life. Innovations that once connected us are now limiting our capacity to get around. To address this challenge, integrated public transport systems and shared mobility solutions are needed just as much as cleaner, greener modes of travel. In implementing the regional transport plan the West of England should test and prioritise developments that will encourage residents and visitors to move out of their cars.

- **Exploring the potential of new models of ownership.** New models of vehicle ownership and accessibility has the potential to link isolated individuals and communities, opening up new opportunities and addressing social isolation. However, these opportunities will only be realised if we seek to understand the view of individuals and communities on these options. Community led trials should be encouraged, supporting communities to identify opportunities to collaborate in addressing local mobility challenges.

- **Developing the West of England as a regional test-bed for innovations.** Stakeholders highlighted that one of the strengths of the region was the breadth of innovative capacity and willingness to explore new ideas. Developing the region as a place that will explore challenges in a real-world context was identified as a route to tackling the regulatory and system challenges that any innovation will face.

- **The future of air travel.** Given the strength of the aerospace sector in the region, stakeholder agreed there was an opportunity to explore the future of air travel. This would bring together skills and experience in aviation, drone technology, and new power sources. Coupled with the technical advances in the way air travel develops, this challenge could draw on regional strengths in system design and data security, expertise that would be required to translate technical innovation into new transport systems.

Ageing society

Our population is getting older. There are over 201,000 people (17.5% of the population) in the West of England who are over 65, and by 2038 this is predicted to have risen by almost 40%. We are living longer lives because of medical advances, better drugs, healthier lifestyles, and safer work places. A girl born in the UK today has a 1 in 3 chance of living to 100, and the chance of living to 100 will double in the next 50 years. In the UK and in developed countries around the world, an ageing population is the new reality. It is a reality that poses challenges to society, but also unique opportunities.

Ageing populations will create demands for services including new housing models, new models of health and social care, and new funding or finance. It also presents challenges to the economy, including a greater caring demand on those of working age and increased health and social care costs.

Ageing also presents opportunities in age-related products and services, and can make a significant difference to UK productivity, and people's wellbeing.

As the population ages, so will the workforce. An empowered, skilled and healthy ageing workforce creates a new opportunity, but employers will need to adapt. Learning and training will become of even greater importance to enabling people to work longer. The economic success of our economy will increasingly be tied to that of older workers.

We are starting from a position of strength; the number of medtech and Digital Health companies in the region has risen by 25% in the last 3 years. Bath and North East Somerset was one of the first areas nationally to integrate adult health and social care services, and Bristol's Health Integration Teams are tackling health priorities by working in new ways, harnessing the best of research, innovation and care.

If we succeed, we will create an economy that works for everyone, regardless of age. West of England businesses will be thriving in the growing global market for age related products and services. Older people will be able to lead fuller, more independent lives, increasingly supported by smart home technologies, wearable devices and tech enabled health and care services. Business will have redesigned jobs and workplaces to better use their older worker's experience, enabling people to keep active and stay in work. Workers will have more flexibility to help balance their work with caring responsibilities.

Our efforts to understand Ageing Society in the West of England
As part of our Industrial Strategy programme we are undertaking analysis to better understand 'Ageing Society' in the West of England; our strengths, our weaknesses and our growth opportunities. The following paragraphs provide a summary of this analysis, stakeholder engagement and a deeper look at 'Ageing Society' within the region.

Initial desk-top SWOT analysis
The West of England has many strengths from innovative medtech and Digital Health companies to university lead R&D including SPHERE a health improvement programme using AI technology to track people's wellbeing. We have a reputation for health and social care innovation; the Health Tech Hub is accelerating the development of product design and development. Our universities have research excellence in biomedical sciences and engineering; a robotics company which began as a start-up at Bristol Robotics Laboratory (BRL) has launched the world's first medically certified 3D printed artificial arms for amputees.

Our universities also offer undergraduate and postgraduate courses in health and social care including Bristol Medical School and UWE School of Nursing and Midwifery; developing world leading clinicians and scientists for our hospitals and social care settings.

Action to support our ageing population can also have wider benefits. For example, reducing the care demand on our working age population.

Stakeholder engagement
Generally, it was agreed that the region has a strong and proactive community sector working to improve wellbeing, reduce social isolation and loneliness amongst older people and help them live fulfilling lives. One of the tables advocated the regions excellence in medical research and excellence as well as innovation assets creating a space for product development and commercialisation. New models of housing and residential care also featured in multiple discussions and St Monica's Trust in Keynsham was cited as an example of best practice.

The second session looked at the Government's Ageing Society mission to 'Ensure that people can enjoy at least 5 extra healthy, independent years of life by 2035, while narrowing the gap between the experience of the richest and poorest'. Generally, it was agreed that the focus of this mission should be narrowing the gap between the experience of the richest and poorest. Lifelong long learning was highlighted as an important tool to supporting older people within the workforce. Some delegates emphasised the need for new models of finance and funding, new models of transport, a whole system approach to ageing well and the importance of investing in our health and social care workforce.

Deep dive research into medtech and Digital Health
In the West of England it is estimated that the medtech and Digital Health sector supplies around 4000 – 5000 jobs to the local economy, with many companies focused on assisted living, diagnostics, medical electronics, clinical management and hospital infrastructure/services.

In 2015, there were 178 core medtech companies and 35 Digital Health companies identified in the West of England. Based on the 2018 estimates this has now risen to 221 medtech and 55 digital health companies which represents roughly a 25% increase in 3 years. The vast majority of companies in the West of England are early stage or scale-up stage SMEs, with very few large corporates. Where larger corporates do exist, they are divisions of associated sectors e.g. medical division of Renishaw and the UK headquarters for EPIC healthcare systems.

Despite the absence of major anchor companies, the growth of the companies in the West of England is considerable with 43 new businesses or sites formed since 2015, mirroring the level of the growth rate of the sector across the UK.

One key enabler to growth is the research excellence and support provided by the universities: University of Bristol, the University of Bath and University of the West of England. These universities have research excellence in biomedical sciences and engineering as well as mathematical modelling and data analysis. The University of Bristol is also home to a world-leading birth cohort study, charting the health of 14,500 families in the Bristol area, Avon Longitudinal Study of Parents and Children, which attracts considerable research activity and investment from life science companies. Science and technology focused incubators such as UnitDX and SETsquared and several business networks (Assisted Living Action Network and Medilink SW) have supported the growth of medtech and life science companies across the region.