

**ORTHOPAEDIC AND  
REHABILITATION  
RESEARCH AND  
INNOVATION  
CENTRE**

# THE SUMMARY

The Orthopaedic and Rehabilitation Research and Innovation Centre will be one of the world's leading research and innovation centres for musculoskeletal injuries, treatment and technology. Located on Sheffield Olympic Legacy Park, it will bring together world-class expertise in the clinical, health and wellbeing, advanced manufacturing and academic arenas with private sector knowledge to:

- Deliver improved patient outcomes;
- Improve UK productivity by reducing sickness absence ;
- Rapidly design and develop advanced technologies that support the Industrial Strategy, Life Sciences Industrial Strategy and Northern Powerhouse 2050; and The North's Route Map for Productivity issued by the Northern Powerhouse Partnership.



# THE STRATEGIC CASE

## THE NEED

Orthopaedic medicine focuses on some of the most common yet debilitating musculoskeletal injuries and conditions that people experience at work, during exercise, or crucially, as they enter older age. All skeletal structures and key joints – including the spine, hips, knees, ankles, shoulders and elbows – all succumb to injury and damage during our lives:

- Musculoskeletal conditions are the largest contributor to the cost of disability in the UK;
- Nearly three-quarters of people with osteoarthritis report constant pain, with one in eight describing the pain they experience as 'often unbearable';
- Musculoskeletal conditions account for the third largest area of NHS spending, with a programme budget of £4.7 billion in 2013/4;
- Each year, around one fifth of the population consult their GP about a musculoskeletal issue such as arthritis;
- By 2036, hip fractures could account for up to 140,000 hospital admissions in the UK each year, with care and treatment costs rising to £6 billion;
- Only 59.4% of people of working age with a musculoskeletal condition are in work;
- 34.6% of people in receipt of the Personal Independence Payment (PIP) in October 2016 were recorded as having a musculoskeletal disease as their main disability condition;
- The presentation of these afflictions in the working age population is a major contributor to sickness absence and sickness benefit payments, and reduced UK productivity. Whatever the circumstances of the patient, the impact on quality of life can be dramatic and lead to poor mental health.

## THE BENEFITS

### Improving the Patient Pathway

The ORRIC delivers the opportunity to dramatically improve the development and implementation of care pathways for the management of musculoskeletal patients in a way that can directly address the impact and associated costs of musculoskeletal conditions. The benefits would be realised across the NHS:

#### For the patient:

- Improve understanding of the quality and outcomes of their care by building patient choice and involvement in the development of care pathways;
- Increased tailoring of services around the needs of the patient to improve outcomes;
- Focusing efforts on self-management and prevention to reduce NHS intervention in clinical settings;
- Access to online information to keep the patient fully informed at all stages of the pathway.

#### For front-line staff:

- Refocusing care around the patient;
- Evidence-based practice;
- Effective clinical governance and supporting multidisciplinary clinical audit;
- Patients' support needs are considered in a holistic way through interdisciplinary team care and the Single Assessment Process (SAP);
- Ensuring a fully joined up approach and line of communication between staff across the patient pathway;
- Providing a consistent decision-support system.

#### Organisational efficiency:

- Increasing the number of interventions undertaken on a day case basis, reducing Length of Stay (LoS) and reducing outpatient hospital attendances;
- Delivering consistent care records that are quicker and easier to update;
- Enabling the identification of organisational barriers to the delivery of patient-centred care and the solutions to overcome them.

## INNOVATIONS IN TECHNOLOGY AND TREATMENT TO DRIVE ECONOMIC GROWTH

Focused on generating and exploiting intellectual property to improve the patient pathway in Prehabilitation, Orthopaedic Surgery and Rehabilitation, the ORRIC will be located on Sheffield Olympic Legacy Park, within Sheffield's world-leading Advanced Manufacturing Innovation District (AMID) – which has attracted companies including Boeing, McLaren and Rolls-Royce to perform their cutting-edge materials research and development that is redefining engineering.

Exploiting its key location within AMID and Sheffield Olympic Legacy Park, the ORRIC will uniquely combine Sheffield's world-class expertise in healthcare and advanced manufacturing and engineering to develop and fast-track new treatments and technologies that can:

- Stimulate technical innovation and fast-track routes to market;
- Attract inward investment, create jobs and grow new companies to grow the Northern Powerhouse economy after Brexit;
- Reduce the costs to the NHS through the co-ordinated dissemination of best practice, early prevention and improved intervention to improve patient outcomes.

# THE COMMERCIAL CASE

Sheffield Teaching Hospitals NHS Foundation Trust will be responsible for designing, procuring and the operations management of the ORRIC.

The ORRIC will replicate a proven business model, successfully implemented at the Advanced Manufacturing Research Centre in Sheffield. This will see:

- The ORRIC partnering with private sector commercial expertise;
- Private sector partners paying an annual fee to cluster around and work with the ORRIC;
- Revenue will come from private sector investors in collaborative research programmes, grants, educational programmes and conferences, access to in-house test-bed facilities, and NHS revenue for treatment transferred from Sheffield Teaching Hospitals NHS Foundation Trust.

Discussions have already commenced with interested private sector companies including B Braun, One Health and JRI.

# THE ECONOMIC CASE

The ORRIC has the potential to bring substantial economic benefits and to unlock and catalyse the wider Sheffield Olympic Legacy Park opportunity – which, together with the Centre for Child Health Technology (CCHT), will act as a catalyst for:

- 109,520 sqm of new employment floor space;
- 3,465 gross Full Time Equivalent (FTE) jobs by 2027;
- 348 higher value professional FTE jobs;
- 1,340 construction-related job years.

The focus on medical innovations at Sheffield OLP, delivered as part of a wider AMID Medical Innovation Campus, will support new high value professional job opportunities within the Sheffield City Region labour market and the delivery of modern fit-for-purpose business accommodation on the remainder of the Sheffield OLP will encourage modern business practices and support a wide range of new professional service job opportunities.

The ORRIC and CCHT proposals therefore have potential to bring an excellent return on the investment. It is estimated that for £1 of public investment this will generate around £14.50 towards the economy by 2042.

# DELIVERING THE GOVERNMENT'S POLICY AGENDA

The **Industrial Strategy** Green Paper published in February 2017 emphasised the need for NHS organisations to support local economies and working closely with local and combined authorities, Local Enterprise Partnerships and universities, to better inform local decision making. The ORRIC responds positively to these two challenges. It provides a focal point for innovation and collaboration. It addresses the fundamental objectives set by government and the NHS.

The ORRIC specifically addresses key areas of Government policy:

- Contributing to the delivery of the Industrial Strategy objectives;
- Supporting the Northern Powerhouse to rebalance the UK economy;
- Driving UK growth post Brexit by fostering new technological innovation;
- Further building on the UK's Olympic legacy;
- Supporting and enabling NHS efficiency and productivity improvement.

The **Life Science's Industrial Strategy** places an emphasis on putting the UK in a world-leading position to take advantage of the health technology trends of the next twenty years and to address a series of challenges under the following key themes:

**Reinforcing the UK Science Offer:** undertaking complementary innovations and development work with the Advanced Wellbeing Research Centre and National Centre for Sports Exercise and Medicine on the Sheffield Olympic Legacy Park ;

**Growth and Infrastructure:** business incubator space within the ORRIC and adjoining plots to support the growth of SMEs and create clusters and networks;

**Manufacturing:** building upon the work that is already being undertaken at the Medical Advanced Manufacturing Research Centre and develop cutting edge manufacturing technologies that will address scale up challenges and drive up productivity;

**NHS Collaboration:** Sheffield Teaching Hospitals is the Lead Partner supported by the Yorkshire and Humber Academic Health Service Network and the Care 2050 initiative - a world-leading collaborative innovation environment in which to identify, develop, test, champion & implement the technology and systems that will deliver game-changing affordable and sustainable future healthcare;

**Data:** establishing digital studies for the generation of real world data, streamline processes and methods of assessment for new products, value assessments with improved patients' outcome measures and affordability data;

**Skills:** working with University Technology Centre Sheffield Olympic Legacy Park to create an apprenticeship scheme that focuses on data sciences, life sciences and trains a new cadre of technologists, healthcare workers and scientists at the cutting edge of digital health.

## DRIVING THE NORTHERN POWERHOUSE AND POST-BREXIT GROWTH

The Northern Powerhouse Independent Economic Review (NPIER) 55 identified Health Innovation as a cross-cutting and underpinning Northern strength that links to the North's excellence in research, applied science, digital and its advanced manufacturing and materials base.

The North's health sector is one of the most dynamic and productive sectors in the country, with fast-growing private sector companies in life sciences, pharmaceuticals and meditech, all developing new products and services alongside the global expertise of the North's universities and hospitals. In 2015, Northern life sciences companies exported £7.3bn worth of products, accounting for 45% of UK exports in the sector.

In Sheffield there is a strong medical technology cluster with key medical equipment, prosthetics and tissue repair manufacturers. This cluster is linked closely with research and innovation hubs at the new Advanced Wellbeing Research Centre and Medical Advanced Manufacturing Research Centre, which bring together the research excellence of Sheffield Hallam University, the University of Sheffield and private sector partners.

These strengths are widely recognised. Health innovation is identified as one of four "prime" capabilities of pan-northern and international significance in the Powerhouse 2050: The North's Route Map for Productivity issued by the Northern Powerhouse Partnership.

The ORRIC will directly contribute to the success of the health innovation sector in the Northern Powerhouse. The Centre will further strengthen the flagship Advanced Manufacturing Innovation District in Sheffield that is home to some of the most advanced engineering on Earth bringing together the expertise of the Sheffield Teaching Hospitals, two Universities and private sector partners including B Braun, JRI, One Health, and Westfield Health.

## OLYMPIC LEGACY DRIVING INNOVATION

Sheffield Olympic Legacy Park is a unique collaboration between Sheffield City Council, Sheffield Teaching Hospitals NHS Foundation Trust, Sheffield Hallam University and the British Olympic Association delivering improvements in public health as a tangible legacy of the London 2012 Olympic Games. Sheffield is the first city in the world to be associated with an Olympic association delivering legacy for the Olympics for the benefit of the general public.

The ORRIC will form part of Sheffield Olympic Legacy Park – an emerging world-class cluster of institutions focused on improving health and wellbeing, including the **Advanced Wellbeing Research Centre (AWRC)** backed by Sheffield Hallam University. The AWRC, funded by Treasury and the Department of Health, will develop 'innovations that help people move more' mitigating the impacts of obesity and diabetes on the NHS.

Embedded in the AWRC will be the **National Centre for Sport and Exercise Medicine (NCSEM)**, one of the three Centres in Great Britain that are delivering improvements to the health and wellbeing of the nation as part of the legacy of the Olympic Games.

NCSEM Sheffield is focused on the design, implementation and evaluation of whole-system approaches to increasing physical activity across the population. This includes the development of physical activity pathways within the NHS. An innovative hub-and-spoke capital model co-locates patients, researchers, clinicians, sport and exercise medicine specialists and public health professionals, and adopts user-centered healthcare design principles to co-produce new models of care with patients and stakeholders.

### The Power of Colocation

The AWRC, NCSEM and ORRIC will improve MSK outcomes:

- Complex cases will be easily shared and co-managed. Quick opinions will be provided across clinical areas and not just within individual specialities;
- Physical activity rehabilitation will be embedded in chronic pain management programmes, providing a clear and easy transition to maintaining ongoing lifestyle changes;
- Therapists will demonstrate specific exercises in the actual setting where people will be performing their programme. Technology within the equipment will be used to provide objective feedback to patients and clinicians about progress;
- Streaming patients through research programmes, as part of their management plan, facilitates the generation of quality data, which could feed into the further re-design of care pathways and improve patient outcomes;
- There is an opportunity to develop existing pathways. For example, surgical prehab and rehab could particularly benefit with the potential to ensure that every patient undergoing major surgery (e.g. hip & knee arthroplasty) undergoes a prehab programme to optimise their operative fitness and speed recovery.

# THE FACILITY

The ORRIC will create a world class research and innovation environment that will design and develop efficiencies in the Orthopaedic Patient Pathway and develop composite material for implants and technological improvements in equipment.

The ORRIC will:

- Accommodate a 50-strong team of Academics and Researchers working collaboratively with up to 100 private sector businesses;
- Create sustainable partnerships between the public and private sector to generate investment, whilst also attracting new additional funds and investment;
- Provide an environment to allow cross disciplinary research between the Advanced Wellbeing Research Centre, the Medical Advanced Manufacturing Research Centre and the National Centre for Exercise and Sports Medicine, all based in the Sheffield City Region Advanced Manufacturing Innovation District;
- Quantify the impact of innovations using NHS style return-on-investment (ROI) models and standard health metrics such as IPAQ and cost per QALY;
- Create a Knowledge Transfer Centre to disseminate successes nationally and internationally through world leading research publications, Public Relations and conferences, whilst helping to build the UK's reputation for innovation and research excellence;
- Deliver training, seminars and conferences, embedding new skills, service models, clinical processes and increased productivity and efficiency.

# THE LOCATION

The ORRIC and Sheffield Olympic Legacy Park are located in close proximity to the UK Catapult Centre based around the Advanced Manufacturing Research Centre – which includes major materials research and development facilities for Boeing, Rolls-Royce and McLaren – and the Medical Advanced Manufacturing Research Centre. All of these leading facilities sit within the Advanced Manufacturing Innovation District between the centres of Sheffield and Rotherham and in close proximity to the M1. This concentration of leading facilities and innovation centres builds on the specialist expertise of the University of Sheffield and Sheffield Hallam University.

Over 1.8m people live in Sheffield City Region (SCR), making it one of the UK's major urban areas. Sheffield has one of the largest Teaching Hospital Trusts in the UK and one of only four dedicated Children's Hospitals across the country and is a major centre of excellence in medical, healthcare and sports and exercise medicine. The age and ethnic profiles of SCR is consistent with national profiles, providing a strong base to test out innovations which could be rolled out more widely.



