Yorkshire MedTech

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Awarded Projects: Rounds 1-4

Proof of Concept	
Project title	**Public Overview**
HipSense Precision: verification of sensor-based human motion detection	The HipSense Precision Proof of Concept project leverages research at the University of Leeds to provide precision assessment and targets for the HipSense project, at Eventum Orthopaedics. HipSense aims to enhance hip replacement surgeries, through sensors monitoring hip joint movement to customise implant placement, improving surgical precision and patient outcomes. The integration of advanced sensors and software, for tracking of human motion, poses a technical verification challenge; to demonstrate sufficient device precision for the patient-specific clinical requirements. University of Leeds modelling capacity and data from anatomical databases will be combined to create a test bed for verification of sensor-based human motion tracking. That test bed will be applied to the HipSense project accelerating product development and forming a case study for the verification tool.
Haemodynamic Estimation in Arteries with Transthoracic 4-Dimensional Imaging	Coronary Artery Disease (CAD), characterised by a gradual accumulation of plaque in the arteries supplying blood to the heart, is the leading cause of death globally. Current guidelines state that non[1]invasive estimation of Fractional Flow Reserve, a measure of blood flow restriction, obtained from Computed Tomography Coronary Angiography (CTCA), should be considered to avoid unnecessary invasive investigation. This depends on CTCA eligibility and dataset quality, resulting in inadequacy in many cases. This proposal will develop the proof-of-concept of an alternative assessment of blood flow restriction using ultrasound. It will be used as a diagnostic test for patients with suspected CAD.
BONUS Injectable	"The Covid-19 pandemic will 'look minor' compared to drug-resistant infections, which already kill 1.2 Million people every year" (Dame Sally Davies, Guardian 13th May 2024). A concern that is reiterated a UK Government Report1 BONUS granules are a new biomaterial that promotes bone healing, while fighting local infection without antibiotics. It has been shown that the biomaterial kills key bacteria, such as drug-resistant E. coli, whilst also triggering human cells to make new bone. Currently, the biomaterial is in granular form, which is ideal for treating many fractures, but is not

	injectable, beneficial for spinal and trauma surgery. Together the University of Sheffield and VitriTec will develop BONUS injectable more than doubling the number of patients that can be treated.
Peptide GAG hydrogels for spinal disc augmentation	Over seven million people in the UK live with severe back pain. Spinal disc degeneration is one of the most common causes, but current surgical treatments are highly invasive, expensive and have poorer outcomes than other orthopaedic procedures. Nucleus augmentation is an emerging minimally invasive treatment where a biomaterial is injected into the degenerated disc to restore its bio mechanical function. We have designed and patented a hydrogel that uniquely meets the mechanical, biological and surgical requirements for nucleus augmentation. We have shown safety in vivo and efficacy in vitro using animal models. Here we will perform in vitro tests on human cadaveric tissue to derisk the technology by demonstrating biomechanical efficacy in human discs and to identify which patients the treatment would be suitable for. The evidence from this study, plus the market pull for new spinal therapies, will place us in a stronger position to secure next-stage investment or licencing.
Penicillin Therapeutic Drug Monitoring to increase patient safety and combat AMR	Antimicrobial resistance (AMR) results in infections that are difficult to treat with antibiotics, and more likely to be fatal. Improving the way we dose antibiotics can improve outcomes, reduce side effects and reduce the risk of AMR. Antibiotic therapeutic drug monitoring (TDM) is the practice of measuring the amount of antibiotic in the body and personalising treatment dosing. Penicillin TDM is not used at the moment because there isn't an easy way to measure it. We have developed a new way of measuring medicines which would allow TDM to be used for many more patients. In this project we will use our approach to develop a test for penicillin that would allow penicillin TDM, providing significant benefits to patients by ensuring penicillin levels are both safe and effective, wider society will also benefit through combatting AMR.
A Platform for Progress: Evaluating a Clinically Approved Graft for Broader Ligament Repair	The medial collateral (MCL) and anterolateral (ALL) ligaments are frequently injured knee stabilisers. This project unites the University of Leeds with Yorkshire-based Tissue Regenix to assess OrthoPure® XT, a biologically engineered graft, for replacing these ligaments. Using a joint simulation model that replicates real knee motion, the team will evaluate its ability to restore stability and protect joint health. The project has two goals: (1) support Tissue Regenix in expanding clinical markets for OrthoPure® XT, and (2) establish a novel platform of internationally recognised preclinical

	testing methods at University of Leeds. Outcomes will benefit both partners and reinforce Yorkshire's leadership in MedTech, while enabling wider collaboration and regulatory use.
AI-enabled structured CT reporting for early pulmonary hypertension detection (PH-STRUCT)	Every year, hundreds of patients in the UK experience delayed or missed diagnoses due to staff shortages and system inefficiencies. Raida is developing an AI-enabled reporting tool to support earlier and more accurate detection of pulmonary hypertension (PH) from routine CT scans. Although CT is widely performed, PH is often under-recognised. Our technology automatically measures key cardiopulmonary features and generates a clear, radiologist-style report for clinicians. The algorithms are already trained; this 12-month Proof of Concept will focus on transforming their outputs into clinically useful reports, integrating the system into NHS workflows, and preparing for commercialisation through a University of Sheffield spin-out.
Non-wearable fall prevention system for elderly with cognitive disorders	Falls pose a significant healthcare challenge, particularly among elderly individuals with neurological conditions like dementia and mild cognitive impairments. Existing wearable fall prevention solutions often face limitations such as discomfort, privacy concerns, and high rates of false alarms. Our innovative non-wearable wireless fall prevention technology addresses these challenges by continuously monitoring movement patterns and alerting caregivers during high-risk situations, such as bed transitions. Specifically designed for vulnerable populations, this technology fills a critical clinical gap in fall management. By enabling timely caregiver interventions, it supports the independence and safety of individuals, promoting healthy ageing and an improved quality of life.
The Microfluidic French Press: Safe Delivery of Gene Therapies	Current gene therapies for diseases like sickle cell anaemia are highly expensive (>£1M per patient) and risky due to unsafe delivery methods. We developed ForCell, a non-viral cargo delivery platform which acts as a 'French press' for editing genomes. Instead of toxic chemicals or electricity, ForCell applies compressive forces to safely open the cell membrane. This platform has demonstrated an ~3~fold boost in non-viral delivery efficiency in cell lines and preserves complete cell function in primary human CD34+ blood stem cells, significantly outperforming current delivery methods. These advances now position us to make life-changing gene therapies safer and more affordable worldwide.

Commercialising holographic imaging for pathogen analysis	We are commercialising a novel method of rapidly identifying the bacteria pathogens that cause common urinary tract infections (UTIs). These constitute a serious risk to vulnerable groups, especially the elderly; rapid pathogen identification is essential to improving patient outcomes. Our novel imaging technique speeds up identification of pathogens from 48-72 hours to less than 1 hour, at concentrations over 1000-fold lower than previous methods. The current project gathers clinical evidence and tackles critical regulatory hurdles that will enable us to build a company in the region, bringing our device towards clinical use.

Proof of Feasibility

Project title	**Public overview**
TeleRegain: Hardware Feasibility Study	This project aims to advance the pre-commercial hardware development of TeleRegain, a novel technology for at-home upper limb rehabilitation in stroke patients. By utilising brain waves to control devices like electrical stimulators or exoskeletons, TeleRegain helps rebuild the brain-muscle connection, improving motor control more effectively than standard rehabilitation devices that passively move the impaired hand. This project will assess the feasibility of integrating TeleRegain into a small, portable, low-power, low-latency, low-cost device that wirelessly connects to brain encoding systems (i.e. EEG) and various third-party rehabilitation devices for delivering brain-guided rehabilitation.
Co-designing a dynamic music system for sleep with young users and testing its feasibility	Falling asleep can be challenging for children, especially when they are unwell or hospitalised. It is popular to use music at bedtime, providing a sense of safety and distraction from negative thoughts and discomfort. To function as a reliable intervention, the use of music needs to be further advanced and optimised. AdMuS employs music as a mood-state inducer and guidance for sleep. In combination with SleepCogni, a handheld device that measures the sleep-readiness of the user, it will also function as active feedback. This project co-designs the music and its application with young users in Sheffield Children's hospital, and advances and tests the technology in a feasibility trial. It unlocks a powerful tool to support children when they are vulnerable and in need.

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Pathogen identification through holographic imaging analysis	Common urinary tract infections (UTIs) constitute a serious risk to vulnerable groups, especially the elderly. Rapid identification of the bacteria causing a UTI is essential to improving patient outcomes, but this step can be time consuming because cells must be grown in a lab until they reach high enough cell densities for conventional identification methods. This costs precious time: 48-72 hours, or longer. Our novel imaging technique has the potential to rapidly identify bacterial pathogens in clinical samples at concentrations over 1000-fold lower than previous methods, accelerating treatment.
Development of a Variable-Stiffness Catheter for Cardiovascular Interventions	Each year, over 100,000 percutaneous coronary interventions are performed in the UK to treat heart attacks and angina. These procedures rely on catheters (flexible tubes) to navigate intricate vascular anatomies. However, existing catheters struggle to meet the conflicting demands of flexibility, critical for manoeuvring through bends, and stiffness, essential for providing a stable platform for complex procedures . Building on our prior research, this project aims to miniaturize and validate an innovative variable-stiffness catheter that can adjust its stiffness to fulfil both requirements. By integrating engineering innovation, clinical expertise, and the Commercialization Journey programme, this project will enhance procedural success, broaden treatment possibilities, and improve patient care.
Holistic 3D vision of the gastrointestinal tract to support clinical decisions	Colorectal polyps are a known precursor to bowel cancer, and timely removal through endoscopic polypectomy significantly reduces cancer risk. Current practice in the UK requires large polyps (>2 cm) to be discussed at a Multidisciplinary Team (MDT) meeting. However, patient referrals often include only a few still images, leading to subjective and inconsistent practice resulting in treatment delays and often few additional patients visit. We have developed an objective standardised assessment tool for polyps and other colonic areas, improving decision-making at both the point of care and within MDT discussions. This will ensure that patients are allocated to appropriately skilled endoscopists, optimising resource utilisation and reducing procedural inefficiencies.
Demonstrating the feasibility of employing a novel cervical polarisation sensitive OCT device for assessing and predicting preterm birth	Globally, over 15 million babies are born preterm annually, and over 1 million die before the age of 5 years. In England and Wales, about 60,000 babies are born prematurely annually, with care costs exceeding £2 billion. We need to improve the prediction and prevention of preterm birth (PTB). With funding from the EPSRC, we have developed a technique called polarisation-sensitive optical coherence tomography (PS-OCT) to make a device to assess the cervix to predict of PTB. This innovation may better signpost women to treatments for better health outcomes. We will determine how to employ PS-OCT to improve PTB prediction, care and birth outcomes.

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Tasty Spoon: Supporting malnutrition in dementia patients	The Tasty Spoon™ is a smart eating utensil that gently stimulates taste-buds to make food flavours stronger for people with dementia, a group in which up to 60 % suffer malnutrition due to unhealthy habits linked to the lack of taste. This project will assess the feasibility of the Tasty Spoon with a wider audience presenting diminished and/or lack of taste. It will address the question: Is the Tasty Spoon™ specific to people with dementia or can be widened to a range of conditions? This may include people undergoing chemotherapy or other ageing conditions. If successful, the Tasty Spoon™ will offer an accessible and experiential device to improve nutrition, enjoyment of meals and overall wellbeing to millions of people, while supporting caring roles and creating new jobs in South Yorkshire.
Injectable microspheres for adipose tissue regeneration	Our team has developed a novel biomaterial which can be injected to restore soft tissue volume for patients who need tissue reconstruction (e.g. post mastectomy or following tissue trauma). Laboratory results have shown this material has the properties needed to restore adipose tissue (fat) volume but we have identified three steps in our manufacturing process which need to be optimised to translate this technology to clinical use. In this project we will ensure our supply chain, sterilisation and manufacturing methods can be performed to clinical standards at sufficient scale to progress this towards future commercialisation and spinout.
GrindCue: Designing a User-Centred Wearable Bruxism Detection & Feedback Device	Bruxism, the unconscious habit of grinding or clenching teeth, affects millions, causing dental damage, jaw pain, and disrupted sleep. This project will translate our scientific findings into a lightweight, comfortable headband prototype that detects bruxism through non-invasive biomarkers. When teeth grinding is detected, gentle biofeedback cues prompt the wearer to relax. The feasibility question we address is whether our concept can successfully become a functional benchtop prototype. Through patient-focused co-design workshops, electronics design, comfort testing in short home sleep trials, and sensor-placement mapping, this study will validate technical feasibility and readiness for progression to a full proof-of-concept device.
MobiBlood	MobiBlood is a mobile-phone-based device for non-invasive, contact-fee optical monitoring of neutrophils and other blood parameters. It is designed to replace painful, invasive blood tests with an affordable, user-friendly alternative suitable for both home and hospital use. By combining advanced hyperspectral imaging with machine learning, the device captures images from the lip to assess immune cell levels. This technology has the potential to transform care

	for patients with cancer, anaemia, or immune disorders by providing rapid, infection-free results and improving quality of life.
Smart materials for infectious diseases - market opportunities sampling blood, urine and other biofluids	We have invented a prototype technology (handheld colour changing swab) that specifies the presence of infectious microbes. It is easy to use, requires no laboratory equipment and provides results in under an hour - a significant improvement over the current technologies that require external laboratories, trained users and can take days to provide results. In the meantime patients may have been prescribed wrong antibiotic which needs correcting. This project will validate the device in human biofluids to ensure technology meet user needs for sample testing.
Novel Chromatic Focus Variation Microscopy for Non-Contact Wound Topography and Healing Assessment	Chronic wounds pose a significant burden on the NHS (over £8 billion annually), with delayed healing causing increased costs and patient suffering. This project will explore our novel, patent-filed Chromatic Focus Variation Microscopy for non-invasive, high-resolution wound topography measurement. Its mechanical scanning-free design enables miniaturisation, allowing for a portable sensor to support diagnosis of healing stages and guide treatment decisions across diverse care settings. Combining strengths of the academic, clinical, and commercial partners involved, we will demonstrate clinical feasibility and identify the commercial opportunities of this transformative wound care solution, helping reduce long-term healthcare burdens.
Spectral-thermal perfusion mapping: feasibility for endovascular revascularisation guidance.	Peripheral Arterial Disease (PAD) causes narrowing of arteries supplying the lower limbs/feet. PAD leads to severe pain, gangrene and amputation if untreated. Clearing the artery to improve blood flow to the leg and foot is needed to resolve symptoms and prevent limb loss. However, 28-50% of treatments fail in the most severe cases, making repeat procedures necessary. Our MedTech prototype system allows clinicians to 'see' the distribution of blood returning to the foot during treatment, giving clinicians real-time feedback to inform procedural decisions for sustained benefits. This project aims to show feasibility to measure tissue oxygenation and to demonstrate whether improved perfusion of foot tissue translates into better tissue oxygen delivery.
PDPatch: Smart Phototherapeutic dressing for the management of chronic leg ulcers	Chronic leg wounds (CLW), specifically diabetic foot ulcers, costs the NHS ~£8B per year. Current treatments include absorbent wounds, requiring frequent changing and antibiotics Dressings offer no antimicrobial or healing properties and the overuse of antibiotics has led to rampant antimicrobial resistance. I have developed the PDPatch, a cutting-edge plaster that delivers Photodynamic Therapy (PDT) to chronic leg wounds, which will eliminate infections and stimulate healthy wound healing. In this project, I will be evaluating the PDPatch in a clinically relevant wound model,

	work with Prof Russell to support clinical translation and work with partner CROs to strategise commercial and regulatory readiness.
Development of an application-specific hand-held oral probe for the Electrical Impedance Spectroscopy -based detection of early oral cancers	Electrical Impedance Spectroscopy (EIS) passes a small harmless alternating current through tissue using a handheld device and the measured electrical properties have been used to detect precancer of the cervix. Our research indicates that EIS could also help clinicians identify and manage potential oral cancers that progress to kill ~3,000 people annually in the UK. A recent PBIAA-funded PoM report concluded that there is market demand for this oral application. This project will support the production of a certified patient-ready oral-specific prototype EIS probe with embedded software linked to desktop analysis to expedite its use in clinical studies.
Tailored Risk Assessment and Forecasting of Adverse Events in Intermittent Claudication: Building a Safe Sandbox and Electronic Medical Record Integration Toolkit (TRAFIC-SET)	The aim of this project is to explore whether an award-winning, machine-learning–based decision support system for people with peripheral arterial disease(PAD) can safely integrate with the NHS electronic patient record and operate automatically. Possibly as one of the first efforts to do so in a secure test environment, we will examine whether this AI tool can automate existing information (such as medical history, scans, and test results) and generate real-time, automatically updated risk estimates for each treatment option: including key hole interventions, or surgery. We will also assess whether the tool maintains its current accuracy, how well it fits into routine care, and any technical, safety, or privacy issues to inform a larger evaluation.
Soft Implant for the Treatment of Short Bowel Syndrome: Feasibility Study of Non-Invasive Endoscopic Implantation	Short bowel syndrome (SBS) is a severe condition in which up to 90% of the intestine may be absent, leaving the bowel unable to absorb nutrients to sustain life. It affects 24.5 per 100,000 live births and can also be acquired, meaning both children and adults may require treatment. We have developed a soft implant that is anchored within the bowel laparoscopically and applies gentle tension to stimulate natural tissue regeneration, enabling new bowel growth and potentially curing SBS. While the implant is now in preclinical testing, this project focuses on assessing the feasibility of delivering it inside the bowel non-invasively.
Development of limb cooling medical technologies for the prevention of chronic and debilitating chemotherapy-	Chemotherapy often causes peripheral neuropathy – nerve damage in the hands and feet – which can lead to pain, numbness and disability for cancer patients. There is currently no effective way to prevent this debilitating and chronic side-effect. In partnership with the Yorkshire-based company Paxman, who previously pioneered the world's first scalp-cooling system to prevent chemotherapy-induced hair loss, this project will explore how controlled limb-

induced peripheral neuropathy in cancer patients	cooling may protect human nerves from the toxicity of chemotherapy. Using laboratory research to guide device design, this study will identify effective (protective) and comfortable cooling conditions that can be built into new limb-cooling medical technologies to improve quality-of-life for patients receiving chemotherapy.
Superselective glycan targeting probes as a medical technology - Proof of Feasibility towards spinal cord injury treatment monitoring	Restoring nerve function after spinal cord injury has traditionally proven challenging because the spinal cord does not readily repair itself, but regenerative treatments are now emerging that modulate the extracellular matrix of the lesion area to stimulate nerve re-growth. Their safe and optimal use will rely on monitoring the level of matrix modulation during treatment, yet suitable companion diagnostics are currently unavailable. This project seeks to prove the feasibility of a novel technology for sensitive monitoring of the level of the target extracellular matrix component above a non-zero background and to develop a prototype molecular probe for in vivo imaging. We will work with external stakeholders to ensure our technology is designed to meet user demands from the outset.
FlexiSense: Feasibility of a 3D-Printed Sensorised Glove for Objective Evaluation of Hand Function	Many neurological conditions are reflected in how people use their hands. At present, clinicians rely on simple clinic tests and observation, which can miss subtle changes. In this project we will manufacture and test a soft, sensorised glove that can measure grip strength, movement, touch and muscle health while patients perform simple tasks. Working closely with patients and neurologists, we aim to create a practical and comfortable tool that improves assessment in routine care. This technology has the potential to enable reliable, home-based monitoring, helping clinicians detect changes earlier and make more informed decisions about treatment over time.
A Sustainable and Tunable Amniotic Membrane Substitute for Corneal Healing: OptiPHA	Corneal blindness affects millions of individuals worldwide and current therapeutic approaches often employ human amniotic membrane (AM) as a cell carrier to facilitate the repair of damaged corneal tissue. However, AM is limited in supply, shows variability and requires costly processing. Existing synthetic alternatives are promising but many depend on non-renewable polymers that can break down into acidic byproducts. With 15 years of expertise in corneal research and direct input from surgeons confirming the clinical need to develop synthetic alternatives to AM, we are working to demonstrate that it is possible to create a sustainable AM substitute. Our approach uses resource-efficient materials and low-impact manufacturing to create a degradable polymer that breaks down into byproducts safe for human tissue. This project will pave the way for a safe, affordable and environmentally responsible alternative that will improve global access to corneal treatment.

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Preclinical assessment of surgical interventions in the shoulder to improve patient outcomes	Rotator cuff tendons surround the shoulder joint to enable movement. Approximately one in three people over 60 years old have symptomatic rotator cuff tears. Tears can be surgically repaired; however failures can be high depending on the tear size and location. Options for laboratory based biomechanical evaluation of repair techniques, including augments used to reinforce surgical repair, are limited. If these were more widely available, they could drive innovation and ultimately better outcomes for patients. We have recently developed a testing platform to provide quantitative biomechanical comparisons of different repairs. This project will demonstrate the feasibility of this enabling technology as a unique platform for generating evidence about augment efficacy to improve the outcomes of shoulder surgery.
Improving Early Acne Diagnosis and Scarring Risk Prediction Through Advanced Non-Invasive OCT Imaging	Acne affects around five million people in the UK and often leads to permanent scarring, causing psychological distress and growing pressure on NHS dermatology services. This project will develop an advanced, non-invasive Optical Coherence Tomography (OCT) software platform to support early diagnosis of acne severity and prediction of scarring risk. Working with dermatologists at Harrogate and District NHS Foundation Trust, we will collect new functional OCT data from participants and refine our AI-enabled analysis tools to produce reliable imaging biomarkers. The project will deliver a prototype suitable for future clinical evaluation, improving patient outcomes and supporting more efficient dermatology care.
AnklePress: Non-Invasive Ankle Pressure Monitoring for Early Gestational Diabetes Risk Prediction: A Feasibility Study with Co-Designed Implementation	AnklePress is a non-invasive device with integrated software to estimate ankle blood pressures, supporting early pregnancy risk assessment for gestational diabetes mellitus (GDM)-a condition typically diagnosed with blood tests later in pregnancy. Unlike unreliable BMI-based screening, AnklePress utilizes evidence that ankle blood pressure correlates with blood glucose in pregnancy. This project will investigate most effective methods for measuring ankle blood pressure by in-depth review of existing literature, consultation with clinical experts for future prototyping and clinical testing. AnklePress unlocks a powerful tool for early GDM detection, enabling timely intervention and improving short term and lifelong outcomes for mothers and babies.
BrainDetect - Using Behavioural AI for the Early Detection of Neurological Diseases	BrAInDetect is an innovative tool that uses artificial intelligence (AI) to detect early signs of brain tumours and other neurological conditions through speech analysis. This smartphone-based test analyses changes in a person's speech, language, and thinking ability to identify symptoms that are too subtle for doctors to notice. BrAInDetect can provide early, accurate and cheap results. This will mean faster diagnosis and more effective treatments. Our project as

	already shown promising results with brain tumour patients. We want to now extend that work to include those with dementia and Parkinson's Disease. This will make BrAInDetect even more useful.

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Proof of Market

Project title	Public overview
Tissue Engineering Solutions for Severe Pelvic Floor Dysfunction	Pelvic floor dysfunction is a highly prevalent condition affecting hundreds of millions of women throughout the world, causing problems like urinary difficulties, pelvic discomfort and urinary incontinence. Existing surgical treatments are often invasive and not very effective. Our research seeks to improve pelvic floor dysfunction treatment by developing a durable and biocompatible tissue engineering material that mimics natural pelvic tissues, providing support for prolapsed vaginal organs. This proof of market study will assess global market demand and current surgical options, especially after the recent ban in various countries on the widely used surgical option of polypropylene mesh. We will investigate current pelvic floor dysfunction treatment costs, patient experiences, and the urgent need for better, less invasive options, aiming to significantly improve women's quality of life. Additionally, it will explore how pelvic floor dysfunction affects women from various ethnicities, ages, lifestyles, and activity levels, ensuring that our solution can incorporate this information into its design and development to support inclusive healthcare outcomes worldwide.
BrainDetect - Using Behavioural AI for the Early Detection of Neurological Diseases	The project aims to develop and refine BrainDetect, an innovative tool that uses artificial intelligence (AI) to detect early signs of brain tumours and other neurological conditions through speech analysis. This non-invasive technology analyses changes in a person's speech, language, and cognitive functions to identify symptoms that may be too subtle for doctors to notice during routine examinations. BrainDetect can provide early, accurate, and continuous monitoring, which is crucial for timely diagnosis and effective treatment. This technology will be useful for healthcare providers such as doctors and neurologists, hospitals, research institutions, and pharmaceutical companies, offering a promising solution to improve patient outcomes by enabling earlier intervention and personalised care.
Preclinical assessment of surgical interventions in the	Rotator cuff tendons surround the shoulder joint to allow arm movement. Approximately one in three people over 60 years old have rotator cuff tears with symptoms. Tears can be surgically repaired; however, failure rates can be high depending on the size and location of the initial tear. Biomechanical evaluation of repair techniques,

shoulder to improve patient outcomes	including patches (or augments) used to reinforce surgical repair, are limited. We recently developed a cadaveric shoulder simulator to provide a quantitative comparison of the biomechanical characteristics of different repair strategies. This proof market study will identify and understand the clinical need in the shoulder for surgical interventions and the unmet need for preclinical assessment tools for the development and testing of those interventions. The study will also assess the size of the market for such models and conduct a survey of current treatments on the market and in development, and identify potential partners and customers for the model.
Cold atmospheric plasma enhances topical uptake of anti-cancer therapies	The national incidence of oral squamous cell carcinoma (OSCC) has risen by 58% in the last 10 years, where Yorkshire and Humberside have the third highest rates of diagnosis in England. Despite treatment by ablative surgery, radiotherapy and/or chemotherapy, 10-year survival rates remain poor at 20-57%. Thus, there is an urgent need for new treatment modalities for OSCC. We have developed a novel anti-cancer treatment using cold atmospheric plasma (CAP) coupled with a chemotherapeutic containing gel. This can be used as the primary means of killing, where CAP kills cancer cells directly and delivers anticancer agents deep into the tumour, or as adjuvant with an immunotherapy, creating a "hot tumour".
Superselective glycan probes as a medical technology – Defining priorities and IP strategy for future co-development of applications	This project aims to define medical technology application priorities for a new generation of macromolecular probes. The probes are able to sharply discriminate cells and tissues by the comparative density of marker molecules present. This is distinct from current technologies which discriminate by the mere presence vs. absence of the marker molecule, and offers potential benefits in a wide range of medical applications. Translation of such probes into a medical technology will require co-development with industrial partners. The project seeks to establish a lead application area and an IP strategy that will inform and support future focused interactions with these stakeholders.
Proof of Market study into a novel diagnostic test for anti-nuclear antibodies for screening of systemic sclerosis and related connective tissue disorders	Systemic sclerosis (SSc) is a chronic, multi-organ, autoimmune connective tissue disease affecting the skin, blood vessels, joints and internal organs, including the heart, kidneys, digestive system and/or lungs. Approximately 20,000 people in the UK are affected by SSc each year, with many patients suffering serious complications and poor outcomes. Most patients with SSc report Raynaud's Phenomenon (RP) as their first symptom. Research has demonstrated that, together with a diagnostic antibody test and presence of puffy fingers, we could identify which patients are at a higher risk of developing SSc in primary care. Here, we undertake a Proof of

	Market study, to understand the value of developing a new and efficient diagnostic antibody test for SSc and other connective tissue diseases (CTD).
Ankle systolic blood pressure device for the prediction of Gestational Diabetes Mellitus in the first trimester: AnklePress	AnklePress will be an innovative, non-invasive medical device with software to measure ankle blood pressures, enabling early pregnancy risk assessment for gestational diabetes-mellitus, which is diagnosed with blood tests later in pregnancy. Body mass index, currently used is unreliable. A study has shown that blood glucose is associated with ankle, but not arm blood pressures in pregnancy. By identifying gestational diabetes-mellitus risk early, AnklePress will ensure timely lifestyle and medication interventions to transform pregnancy care by preventing gestational diabetes-mellitus; improving outcomes for both mothers and babies for life. AnklePress will be applicable across healthcare settings, research institutions and pharmaceutical companies.
IAPA: Intelligent Assessment of Placenta Abnormality	The translation of AI research in medical specialties has resulted in health-preserving and life-saving technologies but the application of AI in obstetrics and gynaecology such as early diagnosis of placenta abnormalities has not advanced much beyond basic research. Placenta dysfunction includes placenta accreta spectrum (resulted from previous surgery), maternal conditions including diabetes, abnormal implantation and function resulting in growth issues, stillbirth and preterm birth, which can have a profound and life-long impact on the child and mother. Research that would benefit these two under-represented groups has been disproportionally less compared to the rest of the population. This project aims to tip this imbalance by pushing the boundaries of AI to explore complex problems of placenta dysfunctions and their early and accurate diagnoses, to eventually integrate this into the clinical pathway.
Electrical Impedance Spectroscopy (EIS) for Oral Cancer diagnosis – Proof of Market and Competitor Analysis	Mouth cancer kills ~3,000 people in the UK per year. Patients initially attend clinics with a suspicious oral lesion and some will progress to cancer. Current diagnosis involves taking a tissue biopsy for laboratory examination, which is painful, expensive and time-consuming. At the University of Sheffield, we are currently working on Electrical Impedance Spectroscopy (EIS), whereby a small harmless alternating current is passed through tissue using a handheld device and its measured electrical properties are analysed. EIS has already been clinically used to detect cervical pre-cancer and our study on whether this technique might also work on mouth pre-cancer has achieved promising preliminary results. Here, we aim to determine if there is a market for using an EIS device for the early diagnosis of mouth cancer.

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Microneedle Equipped Engineered Device (MicroNEED) for precision drug delivery in brain tumour treatment	Over 5400 people die annually in the UK from brain tumours, with significant economic and social impact on patients, families, and society. Despite limited treatment options, no major scientific breakthroughs have occurred in the field of brain tumour therapy for decades, leaving patients with treatments that only prolong life without addressing the disease's effects. This project aims to develop µNEED, an innovative post-surgical brain tumour implant that delivers targeted therapies directly to the tumour site. By integrating advanced bioengineering, nanotechnology, and real-time imaging capabilities, µNEED ensures precise drug delivery, minimises systemic side effects and enhances therapeutic outcomes through combination therapies. This interdisciplinary approach addresses critical challenges in brain tumour management offering a promising solution to prevent recurrence and improve patient survival. Additionally, µNEED's adaptable design has the potential for future application across a diverse array of diseases, making it as a ground-breaking advancement in therapeutic delivery systems.
Sensorised glove to evaluate hand function: Defining intended uses and market priorities	We use our hands in nearly everything we do, and when they don't work correctly, the impact on our lives is immense. Current methods to assess hand function often rely on subjective evaluations and simple examinations. We have developed a customisable glove embedded with sensors designed to precisely monitor hand movements and functionality. While initially tailored for neurological disorders, the potential applications of this technology are far-reaching. This project will engage Medilink to identify a variety of intended uses and patient populations, forming the basis for a preliminary market and competitor assessment to prioritise the most promising applications and markets.
Non-wearable fall prevention system for elderly with cognitive disorders	Falls pose a significant healthcare challenge, particularly among elderly individuals with neurological conditions like dementia and mild cognitive impairments. Existing wearable fall prevention solutions often face limitations such as discomfort, privacy concerns, and high rates of false alarms. Our innovative non-wearable wireless fall prevention technology addresses these challenges by continuously monitoring movement patterns and alerting caregivers during high-risk situations, such as bed transitions. Specifically designed for vulnerable populations, this technology fills a critical clinical gap in fall management. By enabling timely caregiver interventions, it supports the independence and safety of individuals, promoting healthy ageing and an improved quality of life.
Evaluation of the Commercial and Clinical Potential for	Bone infection is a major challenge following trauma and in certain elective procedures such as joint replacement. While antibiotics are used successfully, there are concerns around growing resistance of certain bacterial strains,

Innovative Injectable Antimicrobial Bone Graft Substitute	and a desire to reduce antibiotic use that can promote the development of resistance (AMR). Researchers at Sheffield University have developed a zinc-containing biomaterial that has potential for use as a synthetic bone graft substitute with antimicrobial properties. While it clearly has commercial and clinical potential, there are a number of critical questions to address that determine the next best steps needed to take this forward for patient and societal benefit. The aim of this due diligence project is therefore to address these, including assessment of cover under a new Sheffield University-Ceramisys Ltd. joint patent for a related material, and selection of the specific formulations with the best clinical and commercial potential.
Comfort Membrane: Novel Auxetic based pediatric bone fracture cast membrane to minimize skin sores, infections and pressure	The aim is to develop an innovative paediatric membrane that minimises the risk of adverse events at the skin-cast interface, is safe, comfortable, waterproof and cost-effective. A unique auxetic material-based membrane capable of absorbing pressure from the cast-skin interface will be devised to improve blood flow and air circulation at the interface. This is a collaborative, multidisciplinary, translational project focusing on a significant medical need through research and innovation and builds on the team's extensive prior expertise. It will seek feedback from stakeholders by adapting a patient and public involvement engagement. The product has potential to be manufactured in the Yorkshire region thus promoting employment and regional innovative healthcare technologies. It has significant associated material engineering, infrared thermal imaging and artificial intelligence innovations. The work will facilitate a follow-on proof-of-feasibility where we will build, and laboratory test the prototype membrane. The work has potential for IP, publications and much broader applications (veterinary, sport, military).
Biosensor for early diagnosis of stroke	Annually, worldwide, over 17 million people experience a stroke, with 5.9 million stroke-related deaths. Many patients diagnosed with stroke by the currently used physical tests and brain scans are subsequently confirmed to have alternative pathologies, delaying the transfer of patients to the stroke unit for early interventions. To address this, we are developing a complementary point-of-care (POC) biomarker sensing method to differentiate between stroke patients and non-stroke patients. This project focuses on market research for this technology to identify and quantify its potential market opportunity through competitor technology analysis, IP reviews, regulatory strategy, and to highlight the commercial risks and considerations.
Self-powered Piezoelectric Immunomodulatory Nanofiber	Diabetic foot ulcers (DFUs) are chronic, hard-to-heal wounds that affect millions in UK and place a significant burden on healthcare systems. They persist due to poor blood flow, chronic inflammation, and impaired immune

Patches (INPs) for Diabetic Wound Healing	responses. Current treatments often fail to address the underlying immune dysfunction, leading to poor healing and high recurrence. This project aims to develop Piezoelectric Immunomodulatory Nanofiber Patches (INPs) which are smart, flexible dressings that harness the body's own movement to generate electrical signals, stimulating immune modulation and tissue repair. These self-powered, low-cost patches offer a practical and scalable solution to improve healing outcomes for people with chronic diabetic wounds.
Investigation of the Due Diligence/Proof of Market and IP landscape review for the prospective commercialisation of a new non-invasive breast cancer detection test	A groundbreaking proof-of-concept screening has been developed to detect breast cancer from fingertip smears. The test is non-invasive, modesty-preserving and radiation- and pain-free. These features would increase accessibility and compliance, thus increasing survival rates. However, the ability to commercialise the kit without infringing on existing intellectual property rights, as well as gathering evidence demonstrating demand and customer interest, need to be investigated/gathered. Therefore, this project seeks to conduct research into the patent landscape and proof of market in order to inform subsequent research developments and successfully engage commercialisation partners, for the integration of the testing kit within the health system(s) screening programmes.
Proof of Market Study of Versatile Arm Trainer (VersAT) in people with stroke	Promoting self-managed arm rehabilitation is important, but exercise technologies must be enjoyable and easy to use. Regular gym equipment (e.g. dumbbells, resistance bands) is affordable, but cannot be used by people with moderate to severe stroke. Modern arm rehabilitation technologies such as robotic systems are expensive and require specialised staff for safe use. The applicants have co□designed a versatile arm trainer which has the potential to help arm recovery with minimum supervision. The aim of this study is to explore the market opportunity in stroke arm rehabilitation, to help us to decide where the opportunities for product development exist.
Defining the market for antimicrobial 3D Printed bone implants	Antimicrobial resistance, whereby bacteria and other microorganisms become resistant to antibiotics and other medicines, is a major global concern. While the development of medicinal treatments remains an important priority, other methods of fighting infections are also vitally important. Ongoing research at the University of Sheffield has focused on reducing the spread of bacteria through physical contact. 3D Printing processes, which produce parts in a layer-by-layer manner, can produce highly complex geometries which have huge potential for medical applications, and in particular for use as patient-specific bone implants following injury, illness or surgery. Implants can be prone to post-surgical infection, meaning the inclusion

	of antimicrobial functionality could provide a significant further benefit. We have previously demonstrated that we can create 3D Printed objects with in-built antibacterial properties; we now intend to focus on refining and optimising our approach to suit the development of personalised, antimicrobial, bone implants. This project will develop a detailed understanding of the types of implants which may most benefit from our approach, and identify the most impactful areas for immediate development. To ensure we have spoken to a broadest range of potential beneficiaries, we will carry out this market research through a combination of targeted approaches to relevant companies, in particular within the Yorkshire region, and visits to relevant exhibitions and trade shows.
Computational hip tool for improved diagnostics and treatment of cam-type femoroacetabular impingement.	Variations in hip joint shape can cause high pressure impingement, leading to pain and damage of the tissues. Surgical techniques to remove the impinging bone and repair tissues are typically planned using two-dimensional patient imaging, which does not capture the dynamic motion-dependent impingement patterns of daily living, limiting treatment success. We have developed a computational tool (HipMoSh), capable of combining patient hip shape and orientation with motion data to predict impingement; with potential to inform personalised treatment pathways. This project will quantify the clinical need and assess the market opportunity for the development of the HipMoSh tool into a medical device.
Tissue Engineered Vascular Graft	Millions of patients annually need blood vessel replacements for conditions like Coronary Artery Bypass Grafting or kidney dialysis access. Currently, doctors use the patient's own vessels which are often scarce or low-quality, or synthetic grafts, which frequently fail in small vessels. Our technology creates decellularised tissue engineered vascular grafts (dTEVGs) in the laboratory which are durable, off-the-shelf devices that are immediately available for surgery. By perfectly mimicking natural blood vessels, our dTEVGs aim to stop complications like clotting, limit infections and improve long-term success. This project will conduct a market analysis to define the commercial opportunity for our superior small□diameter dTEVG technology and plan its successful translation to the clinic.
PlasmonosticsDx: Development of a point-of-	We are developing a rapid, portable diagnostic platform (PlasmonosticsDx) using advanced laser-based sensors to detect diabetes-related health markers from a single drop of blood. This technology is intended to facilitate early

care platform for decentralized screening of diabetes in young population using Raman-based diagnostics	screening and monitoring in local health centres and mobile units, particularly within underserved and high-prevalent communities. Detecting pre-diabetes state enables the start of preventive measures that will reduce the burden on the NHS of treating diabetes and its associated complications. The platform will deliver results in under one minute and offers potential for checking for several health markers at once, making it easier to avoid delays in diagnosis.
Tissue Engineered Solutions for Congenital Heart Valve Dysfunction	Congenital heart disease (CHD) affects around 1 in every 100 babies born in the UK. Life-saving surgery received in infancy can ensure short-term survival, but the child will still require multiple operations throughout their lifetime. Our research seeks to prevent the need for reoperation through delivery of tissue engineered heart valve devices that will have the ability to grow with the child and provide lifetime durability. We wish to conduct a market analysis to better understand current standard of care, critical unmet needs, and the routes into clinical practice. This will enable us to refine our research proposals and deliver the most impactful solutions.
ADAPT: Adaptable Insoles For Diabetic At-risk foot Pressure Treatment	ADAPT is a novel innovation providing same day personalised insoles that will provide immediate reduction of foot ulcer risk in people with diabetes and prevent long wait times. By providing personalised fit on the day of appointment this leads to a reduction in required appointments, reduces delivery cost, reduces waste compared to traditional manufacture and allows immediate intervention. This provides relief to both healthcare settings and the patient by improving quality of life, reducing the treatment timeline and reducing the cost/time burden compared to the conventional and currently available solution.
A digital tool (application) to support patients and personalise their MRI-experience to improve scan outcomes	Magnetic-Resonance-Imaging (MRI) is a safe imaging method used for clinical diagnoses and monitoring as well as to support research in many branches of healthcare. However, MRI is sensitive to patient behaviour/compliance. A study conducted in Leeds indicated patient anxiety and unsettled patients in the scanner are leading reasons for poor outcomes. Using previous funding, a mobile□friendly digital-application was developed to help patients to manage their anxiety, prepare better, and personalise their MRI-experience. A pilot study with patients resulted in very positive feedback and improvements in scanning outcomes. This proposal is to assess the market opportunity for this digital-application, so that it could be developed further towards the clinic and bring-in a commercial partner.

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Gastric cancer clinical supportive diagnostic tool - Proof of Market analysis	Gastric cancer is the fourth deadliest cancer worldwide, with 70% of cases found at advanced stages where survival is below 10%. The core problem is the lack of a rapid, non-invasive triage tool for GPs. We are developing a breathalyzer that detects chemical patterns (Volatile Organic Compounds) linked to early-stage cancer. Using advanced dual-sensor technology and AI, our device provides an immediate risk score during the patient's visit. This will help doctors identify high-risk patients for urgent referral, aiming to shift detection to earlier, treatable stages while reducing unnecessary procedures for healthy patients.
Non-invasive, sensory neuromodulation for pain; Proof of market project	Chronic pain is a major unsolved health problem, affecting up to a third of working age adults. Neuromodulation is an approach to improve the disturbances in brain processing which generate the experience of chronic pain. We are developing a way of doing this non-invasively, with sensory (light and sound) stimulation. We are working towards a wearable device that people can use independently in their own homes, which uses sensors on the scalp to read the real time brain signals, and provide personalised stimulation. This would help people with chronic pain by offering a safe way to relieve symptoms and function better, and take pressure of the health service. This project will help by analysing the landscape of what is currently available in this area and what local companies we could work with.
Commercialisation of the GlucoSentinel Opportunity: Integrating RealTime Prediction of Extreme Glucose Levels with Next-Generation Wearable Devices	GlucoSentinel is a glucose level monitoring and early warning system designed to reliably predict extreme episodes of hypo- or hyper-glycaemia for patients with diabetes. The software technology invented at the University of Leeds will be integrated with the next-generation wearables capable of producing continuous measurements of glucose levels, along with other body metrics. This innovative medical device will empower clinicians and patients to take timely preventive action, promising to reduce emergency interventions and to improve long-term outcomes. By integrating predictive analytics into routine monitoring, GlucoSentinel will enhance patients' safety, support clinical workflows, and contribute to a sustainable healthcare delivery.
High-Integrity Alginate Fibres for the Management of Highly Exudative Chronic Wounds	Managing highly exudative chronic wounds is a major clinical and economic challenge. Current dressings often fail when saturated, fragmenting during removal and causing pain and delayed healing. We have developed a novel alginate fibre technology using an innovative crosslinking approach that delivers over twice the wet strength and 40% greater absorbency compared to standard alginate fibres. These properties enable intact removal and reduce patient discomfort. This project will validate the commercial potential by identifying priority clinical applications, assessing market size, and defining a clear business case for adoption in advanced wound care.

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AI-enabled Low-cost Imaging System (ALIS) for Early Oral Cancer Detection and Triage of Oral Lesions in Primary Care	The NHS is facing critical challenges in the early detection of oral cancer ranging from diagnostic delays, limited specialist access, and rapidly escalating treatment costs. Treating late-stage oral cancer costs the NHS £50,000-£100,000+ per patient versus £5,000-£15,000 for early-stage oral cancer, a 5-10 fold increase. Urgent suspected oral cancer referrals have quadrupled to 275,354 annually, yet only 2.6% of these referrals are cancers, overwhelming limited NHS capacities. The Leeds Teaching Hospitals NHS Trust (LTHT) has developed an imaging system which automates cancer classification from standard clinical photographs, enabling primary care triage. Pilot data shows 57% of referrals (≈157,000 annually) can be safely de-escalated, freeing specialist capacity while accelerating genuine cancer diagnoses. This reduces unnecessary appointments, lowers treatment costs through early intervention, and improves patient outcomes.
Assessing Market Potential for Novel Multi-biomarker Wound Biosensor	This project is to support and de-risk the development of an innovative smart wound monitoring system designed to advance remote wound assessment. Using advanced medical biosensors and smart technology, the device continuously monitors vital signs of healing and provides clear, real time insights for patients and care givers. By having multilayered holistic sensing system rather than relying on visual inspection alone, it offers faster, more accurate and reliable and consistent information about wound recovery. In collaboration with clinicians, industry partners and patients, the team will evaluate how this technology can improve care, reduce complications and bring smarter objective wound management system to everyday healthcare.
AnklePress: Non-Invasive Ankle Pressure Monitoring for Early Gestational Diabetes Risk Prediction: A Feasibility Study with Co-Designed Implementation	AnklePress will be an innovative, non-invasive medical device to estimate ankle blood pressures, enabling early pregnancy risk assessment for gestational diabetes-mellitus, which is diagnosed with blood tests later in pregnancy. Body mass index, currently used is unreliable. A Study has shown that blood glucose concentrations is associated with ankle, but not arm blood pressures in pregnancy. By identifying gestational diabetes-mellitus risk early, AnklePress will ensure timely lifestyle and medication interventions to transform pregnancy care by preventing gestational diabetes-mellitus; improving outcomes for both mothers and babies for life. AnklePress will be applicable across healthcare settings, research institutions and pharmaceutical companies.

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Market analysis for a portable and rapid antibiotic sensitivity testing device	Currently, a treatment against suspected bacterial infections relies on empirical method of prescribing broad-spectrum antibiotics. This could result in ineffective treatment and promote antimicrobial resistance. Most gold standard methods for antibiotic susceptibility testing (AST) are slow, often taking over 24 hours. We have developed a benchtop device for the rapid AST for the prosthetic joint and urinary tract infections to reduce the wait times and prescribe effective antibiotic treatment. The aim of the proposed project is to assess the clinical requirement of such a testing device and explore the marketing opportunities under the current medical device landscape.