

Growing MedTech Translation **2019**

Dr Danielle Miles, Programme Lead and Technology Innovation
Manager (left) and Dr Josephine Dixon-Hardy, Programme Director



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Connecting capability to support competitive growth

The development of new medical technologies is vital to provide more efficient and effective healthcare, capable of addressing 21st century global health challenges.

Social, economic, technological and political factors, including an increasing and ageing population, mean that the global market for medical technologies is forecast to grow to \$675 billion by 2022. This growth is fuelled by technology convergence, including transformative digitally-enabled solutions, creating huge opportunities and tough challenges for companies faced with rapidly evolving technologies, changing regulatory requirements and associated new skills needs.

It is essential that the assets and capabilities of universities across the Leeds and Sheffield City Regions can be leveraged to respond effectively to these changing industry needs.

Capability connected

Grow MedTech provides a route into the medtech strengths and assets of six Yorkshire universities – Leeds, Leeds Beckett, Bradford, Huddersfield, Sheffield Hallam and York – through a single collaborative team of specialist medtech technology innovation managers.

The team works closely with regional medtech stakeholders to identify promising technology opportunities and to de-risk these to build the confidence of companies and other funders and investors to support their further development.

Each of the technology innovation managers is based in one of the six partner universities, connected into all the relevant capability of their host university but also networked with a wider multi-disciplinary community of potential technology development partners and collaborators, including companies, healthcare specialists and innovation enablers.

Although they are geographically distributed, the technology innovation managers work together as a single team, with each having distinct and complementary technology and business experience. Their collaborative approach to innovation support ensures that the most appropriate knowledge and expertise are brought to bear on each challenge and opportunity presented to Grow MedTech, with support from the whole team.

In this way, the complementary medtech capabilities and resources of not one but six universities are accessible through a single interface, enabling these universities to connect to make a broader offer to meet R&D needs, far exceeding what any individual institution could provide.

User-focused innovation

The six partner universities have co-developed and implemented robust processes to ensure that our approach to medtech development is effective. Our governance brings together national and regional stakeholders who ensure that Grow MedTech is guided and scrutinised by industry, academia, healthcare providers, patient groups, regional government, funders and regulators. Our funds, which support Proof of Market, Proof of Feasibility and Proof of Concept projects, are overseen by an Opportunity Management Panel, involving independent medtech and digital industry and innovation specialists in decision-making and project guidance.

The following pages provide a flavour of some of the exciting technologies, productive partnerships and inspiring individuals that, with our support, are driving technologies forward towards clinical application and commercial products.

Dr Josephine Dixon-Hardy
Programme Director

Dr Danielle Miles
Programme Lead and Technology Innovation Manager

160

technology development projects supported



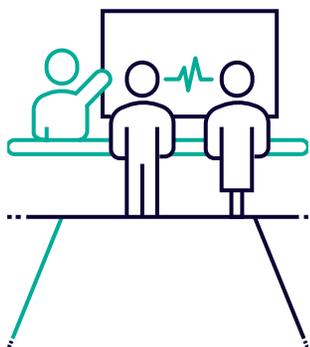
Partners involved in projects:

234 academics
124 clinicians or healthcare professionals

51 companies
29 universities

£5.9m

additional funding has been leveraged into the consortium by Grow MedTech



269

individuals supported by Translate MedTech interventions



55

applications for Proof of Market received

15

Grow MedTech funded projects generated by early-stage support



34

Proof of Market projects funded



Translate MedTech



→ Technology development towards clinical application and commercial product

Of the Grow MedTech funded projects:

35% are convergent technologies

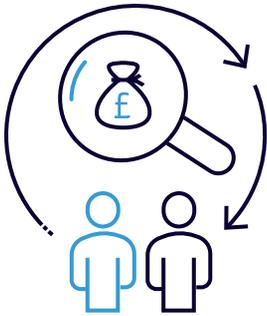
71% have direct clinical engagement

41% involve a development partner

76% include patient and public involvement activities



488 people are actively involved in Grow MedTech

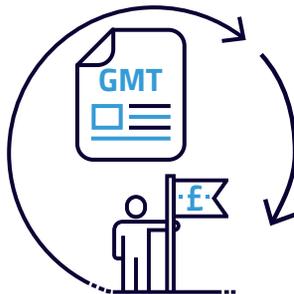


37 applications for Proof of Feasibility received

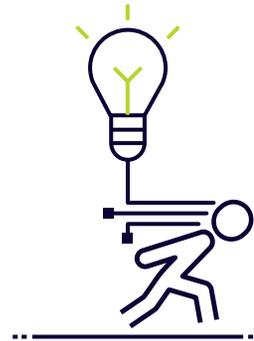


19 expressions of interest for Proof of Concept received

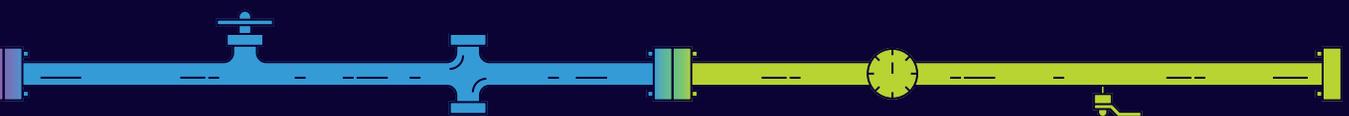
19 Proof of Feasibility projects funded



13 Proof of Concept projects funded



G R O W MedTech



→ Technology development towards clinical application and commercial product →

Proof of Market



FUNDING:

Up to £5k



DURATION:

6 months

SINCE LAUNCH:



55 applications



34 projects awarded funding

OF THE 34 FUNDED PROJECTS:

62%

have direct clinical engagement

44%

involve a development partner

35%

are convergent technologies

53%

include patient and public involvement activities

Our Proof of Market awards may be our smallest grants in value, but they are among the most important.

They help researchers determine whether the clinical need they are seeking to address is real and widespread and whether their proposed solution presents a viable commercial opportunity.

Proof of Market grants are very flexible and can be used in multiple ways, such as establishing the clinical need or identifying the most promising application for a technology, understanding its unique selling points, market size or potential competitors and the regulatory barriers it might face. The work involved might require focus groups with clinicians or patients or bringing in external medical technology experts to carry out a professional analysis, but the desired outcome is always the same: to demonstrate whether the technology is one worth pursuing.

Case study: Assessing international markets for a new test for Alzheimer's

A new test that uses an existing clinical drawing task will enable clinicians to provide an early and objective assessment of Alzheimer's and related conditions. The technology uses machine learning to identify subtle differences in the patients' pen movements that can indicate cognitive decline.

"It's really important to involve different stakeholders early on," explains Professor Stephen Smith, leading the research at the University of York. "All our work is clinically led – we're working with consultants who understand the condition; a nurse specialist, who has expertise in managing patients; and, importantly, the patients and their carers.

"We're confident there's a need for this technology and with Grow MedTech's support we're able to test the market both in the UK and overseas. Our team has led workshops in the UK and China with experts from Leeds and Shanghai hospitals and held discussions with medical device companies worldwide. The next step is to use Grow MedTech funding to arrange a similar event in America."

Technology Innovation Manager



Dr Clare Green
University of York

Case study: Support breathes life into MS project

A breath test to help diagnose multiple sclerosis (MS) is being developed at the University of Huddersfield's Centre for Biomarker Research (CeBioR), and Grow MedTech funding enabled the team to work with patients to inform the design of the project.

Progression of MS can be slowed and its symptoms eased if treatment is given at an early

stage, but patients can currently wait years for a definite diagnosis.

Project lead, Dr Patrick McHugh ran workshops with MS patients, nurses and clinicians and presented the technology at an event for people newly diagnosed with the condition. He found patients responded positively to the concept of a diagnostic tool that could differentiate MS from

other conditions with similar symptoms. The funding has also paid for a report on the market opportunity for the test and the most promising pathway to commercialisation.

Technology Innovation Manager



Luke Watson
University of
Huddersfield

Case study: Plant biologists join war on fungal infections

Plant biologists at the University of Leeds are applying their expertise in a clinical setting with support from Grow MedTech.

Working in partnership with researchers at Sheffield Teaching Hospitals Trust, the team is developing a new generation of tests to detect fungal infections such as candida or aspergillosis.

These can be extremely dangerous – particularly to patients with weakened immune systems.

Current tests are inadequate, costly, and frequently lead to false diagnoses, meaning effective treatment can be delayed.

The new test is based on new, highly sensitive monoclonal antibodies that can detect a specific glucan present in most fungal cells.

Grow MedTech is currently helping the team fully investigate the use of current tests and meet with clinicians to see if a convincing commercialisation case can be built.

"A new test for fungal infections could prevent up to 1.5 million deaths globally each year," says Dr Yoselin Benitez-Alfonso, of the University of Leeds.

Programme Lead and Technology Innovation Manager



Dr Danielle Miles
University of Leeds

"Our novel assay has the potential to be transformative in terms of both patient care and healthcare finances. The support from Grow MedTech in supporting the academic and clinical team in commercial aspects of the work is invaluable."

*Dr David Partridge, Consultant Microbiologist,
Sheffield Teaching Hospitals Foundation Trust*

Case study: 'Virtual physiotherapist' improves stroke rehab

Stroke patients rely on physical rehabilitation to improve quality of life – but attending clinics is often onerous and finding the motivation to exercise at home can be difficult. This stalemate is what inspired Professor of Computer Science, Dorothy Monekosso, from Leeds Beckett University to develop the 'virtual physiotherapist'.

"Our system uses cameras to automatically assess movement as patients undertake rehabilitation

tasks, and can link patients directly to their health professional. We also use gamification technology to deliver progress updates and maintain motivation.

"Translate MedTech helped us to work directly with clinicians and a stroke survivor group, to get invaluable end-user feedback. Now Grow MedTech funding is helping to confirm the clinical opportunity. We'll be working further with the same group of survivors to find out

what incentives they might need to keep making progress. Those insights will enable us to apply for further funding to develop the Virtual Physiotherapist in line with patients' needs."

Technology Innovation Officer



Cat Colquhoun
Leeds Beckett
University



Dr John Buckley,
University of Bradford

"Through Grow MedTech we've been able to find the right partners to develop and test this technology, and prove that it will work for patients."

*Guy Parkin, Director, AMAT
Performance*

Case study: Athletic movement analysis technology can spot early frailty

A partnership between an expert in movement biomechanics at the University of Bradford and a company specialising in athletic technique analysis has led to the concept of a new system for predicting fall risk among older people.

Dr John Buckley at the University of Bradford is proposing developing the system which would augment existing technology owned by AMAT

Performance, a company introduced to him by Grow MedTech.

A Proof of Market grant is determining the clinical need for such a system and brings together patient groups and the NIHR Devices4Dignity MedTech Co-operative.

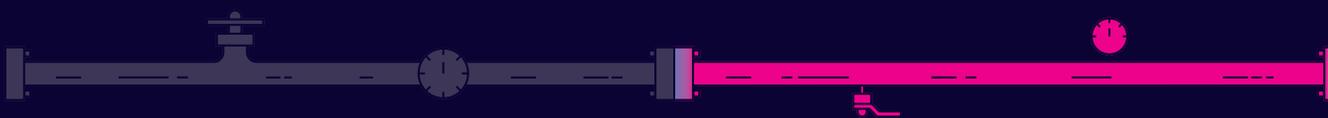
"Our aim is to devise an early detection system that can 'catch you before you fall,'" says Dr Buckley.

"By spotting early on weaknesses in how a person performs simple everyday gait tasks, we can suggest interventions which could be key to delaying frailty."

Technology Innovation Manager



Kieran Perkins
University of
Bradford





“Translate MedTech helped us to work directly with clinicians and a stroke survivor group, to get invaluable end-user feedback. Now Grow MedTech funding is helping to confirm the clinical opportunity.”

Prof Dorothy Monekosso

Prof Dorothy Monekosso,
Leeds Beckett University



Proof of Feasibility



FUNDING:

Up to £20k



DURATION:

6 months

Once the clinical need and market opportunity has been established, the next question is clear: can your technology provide a solution?

Our Proof of Feasibility awards enable prototypes to be developed or initial testing to be carried out, to gather the evidence needed for the technology to progress to the next stage and attract further funding. Proving feasibility can cover a wide range of activity depending on the type of technology involved, from laboratory work to validation of algorithms.

During this stage of development, project teams are often still building the business case for their technology as well as developing the product, so the grant can also cover areas like market positioning or early health economics analysis and identifying the most appropriate commercialisation strategy. We also expect teams to have a robust patient and public involvement (PPI) strategy in place, to ensure they co-develop their technology with end-users.

SINCE LAUNCH:



37 applications



19 projects awarded funding

OF THE 19 FUNDED PROJECTS:



84% have direct clinical engagement



42% involve a development partner



37% are convergent technologies



100% include patient and public involvement activities



“PPI is most effective when researchers build relationships with patients and see them as assets to be nurtured.”

Sue Watson, Opportunity Management Panel patient representative

Case study: Best foot forward for technology

Collaboration with clinicians and NHS Blood and Transplant is enabling the evaluation of an existing technology to help prevent foot ulcers in diabetic patients.

Nerve damage caused by diabetes can cause the foot to change shape, losing fatty areas that provide protection to the bones. The increased pressure on the skin can lead to ulcers which are slow to heal. Management of diabetic foot ulcers – which at their worst can result in amputation – is estimated to cost the NHS £1 billion a year.

Collagen or silicone gels can be injected into the fat pad to treat the problem, but they fail to provide long-term protection and are not in routine clinical use. Grow MedTech support and funding is helping a team of academics and clinicians see if decellularised adipose (fat) tissue could provide a better alternative.

Dr Jennifer Edwards from the University of Leeds is leading the project with Consultant Vascular Surgeon David Russell at Leeds Teaching Hospitals NHS Trust, who regularly sees patients with diabetic foot ulcers in his clinic.

Because decellularised tissue includes proteins and growth factors that influence cell behaviour, they hope that, unlike other gels, it will not simply pad out the foot, but might encourage tissue regeneration.



Dr Jennifer Edwards,
University of Leeds

Dr Edwards has already proven she can create decellularised porcine adipose tissue that has the necessary properties. The Grow MedTech funding will allow her to work with NHS Blood and Transplant (NHSBT) to see if the process is also effective with human tissue, to provide a quicker route to clinic.

“NHSBT will also help us turn the tissue into a soluble gel,” says Dr Edwards. “An injectable form of the product is vital, to avoid cutting the skin. NHSBT are also advising on the evidence we need to gather to enable them to translate the product into the clinic.”

Mr Russell will run focus groups with healthcare professionals and patients to help shape the technology, looking at issues such as how often an injection would be needed, what size of needle to use and whether special shoes are worn to reduce pressure after treatment.

Mr Russell says: “We need the input of both professionals and patients to determine what protocols will be effective and acceptable by those using the technology.”

Senior Technology Innovation Manager



Dr Graeme Howling
EPSRC Medical
Technologies
Innovation and
Knowledge Centre (IKC)

Case study:

Self-tightening screws for small bone repair

Grow MedTech is bringing together advanced materials expertise in chemistry and engineering to develop a new medical device for fracture repair.

Small bone fractures, such as fingers and hands, are often extremely hard to repair and these injuries can lead to lifelong impairments.

One approach to treating fractures is to use metal orthopaedic compression screws, but these can loosen after they have been implanted, so surgeons are looking for alternatives.

University of Bradford chemist, Dr Tom Swift, has been collaborating with Dr Brian Thomson in Bradford's Centre for Advanced Materials Engineering on a multidisciplinary project to develop new polymer-based substitute materials with exactly the right properties.

Using Proof of Feasibility funding from Grow MedTech, they have been able to hire a research technician to work through different chemical formulations to close in on a promising functionalised material – an important step in de-risking the technology for future commercial partners. The aim is to develop a shape memory polymer screw that, once implanted, will shrink slightly at body temperature to draw the fractured bone together and hold it securely, allowing new cells to grow across the fracture.



Biodegradable implants have given surgeons cause for concern about the potential for harmful by-products to be released as they break down. The material being developed at Bradford is bio-inert but retains the useful properties of their existing prototypes, reducing risk by minimising physiochemical interactions with the patient.

"We know, from previous work, that there's a demand for this product among surgeons and patients. But now we need to get back to the fundamental chemistry, to find a material that fulfils all the requirements and that can be made at a reasonable cost," explains Dr Swift. "There's excellent synergy between the work I do and the work

in our engineering laboratories, but it can be tricky to get the funding needed to launch projects like this – that's where the Grow MedTech funding has been invaluable."

After refining the chemical formulation of the polymer, small batches of the material will be sent to Dr Thomson's lab where he will use an extrusion moulding technique to create sample screws for testing.

Technology Innovation Manager



Kieran Perkins
University of
Bradford

Case study: Improving stroke rehabilitation

Dr Christine Smith from Sheffield Hallam University has brought together a team of physiotherapists, stroke physicians, physical activity and exercise specialists and computer scientists with a local company to improve rehabilitation for people with stroke.

“Regular exercise following a stroke can bring major benefits, helping people regain fitness and strength and reducing the risk of another stroke. But being able to carry out exercise, particularly if the stroke has left you with any disability, is not always easy.

“My colleagues, Rachel Young, Dr David Broom, Professor Karen Sage, Professor Nasser Sherkat, and I have been working with a company called ‘Shapemaster’ who make power-assisted exercise (PAE) equipment. Although their machines are used to help people with reduced mobility to exercise, they currently have limitations in a clinical setting, so we applied to Grow MedTech to help fill that gap.

“Our Technology Innovation Manager from Sheffield Hallam, Simon Butler, has a real understanding of what we wanted to achieve and how to make that happen and worked with us on the grant application. The funding has helped us get things moving and bring together a strong team to take the project forward.

“The grant will enable us to work with people with stroke and clinicians, including Dr Ali Ali,

Consultant Geriatrician and Stroke Physician at Sheffield Teaching Hospitals NHS Foundation Trust, to develop an exercise programme using the machines based on clinical principles, that will help people with stroke to increase their endurance and strength.

“Earlier work with people with stroke showed us that they would like the machine to tell them how much effort they are putting in and how much assistance is being provided by the machine. So we’re going to make this part of the bespoke software that will be designed by our computer science colleagues, led by Professor Sherkat. The software will integrate the exercise programme we develop for people with stroke.



Dr Christine Smith,
Sheffield Hallam University

“Our aim is to then install the software into Shapemaster’s equipment as standard practice. We’ll trial the system with up to 15 of Dr Ali’s patients, looking not only at whether the software makes it easier for people with stroke to carry out their exercises, but also the physical improvements that result over an eight-week period.”

Technology Innovation Manager



Simon Butler
Sheffield Hallam
University

“The funding has helped us get things moving and bring together a strong team to take the project forward.”

Dr Christine Smith

Case study: Biomarker technology points to clinical test for kidney disease

Grow MedTech is providing continuity of support to take projects supported through Translate MedTech's pioneering partnership approach forward to the next stage of development.

Building on earlier work carried out with the Translate MedTech team, Grow MedTech support is helping University of York researchers demonstrate the effectiveness of a test that could diagnose kidney disease rapidly, reliably and cheaply in the clinic.

The technology developed by the team enables biomarkers to be measured in urine using light. A photonic sensor, used together with a smartphone camera can detect both the presence and the quantity of biomarkers to give an accurate diagnosis of a disease and its severity.

A market research study helped the researchers identify kidney disease as the most promising diagnostic area for the technology.

Kidney disease is surprisingly common, affecting around six per cent of all adults, but current tests are expensive and require samples to be sent to a laboratory for analysis, causing delays in diagnosis and treatment.

Proof of Market funding allowed the team to identify the different biomarkers available and select the most promising ones for kidney

disease. Grow MedTech introduced the researchers to the NIHR Leeds In Vitro Diagnostics Co-operative, to help with this phase of the development. The test can measure three different biomarkers in parallel, significantly increasing its accuracy. A key advantage is its low cost; researchers predict that the equipment can eventually be made for as little as £10-£20 and that each test will cost only around £1.

The evidence gathered through the new Grow MedTech Proof of Feasibility project will help the team to bring on board a commercial partner. Further funding has also been leveraged through an Impact Acceleration Award from the Engineering and Physical Sciences

Research Council, to adapt the technology to read biomarkers in blood.

"Working with Translate MedTech, and later Grow MedTech, has been invaluable because the Technology Innovation Managers have really engaged with our research, asking questions that are critical but also constructive," says project lead Professor Thomas Krauss. "Their input challenges my research and pushes my team to do better."

Technology Innovation Manager



Dr Clare Green
University of York



"Input from the Technology Innovation Managers challenges my research and pushes my team to do better."

Prof Thomas Krauss

Prof Thomas Krauss,
University of York

Case study: Getting the measure of a problem

The introduction by Grow MedTech of an industry partner into an academic-clinical collaboration is helping to move a digital urine measuring device closer to clinical use.

Information on the volume and frequency of urination can help clinicians enormously in diagnosing kidney and bladder conditions, but they are not simple things for patients to measure and record.

A digital scale to make the process easier was the idea of urologist Nicolas Bryan, from Calderdale and Huddersfield NHS Foundation Trust. He teamed up with Dr James Williamson from the University of Huddersfield's Centre for Precision Metrology to create an initial prototype, called UScale. Using UScale, patients urinate into a bag and the volume is measured and stored by the device along with the time of day.

Luke Watson, Grow MedTech's Huddersfield-based Technology Innovation Manager, introduced the pair to Elaros, a company developing a digital bladder diary that would allow patients to record urination data on their mobile phone.

"The feedback from Elaros on our device was positive, but they spotted a problem," recalls Dr Williamson. "To access the data, clinicians would have to plug the device into their computer and download software. Elaros saw that NHS security procedures would make this very difficult."



Dr James Williamson,
University of Huddersfield

The project team – now with Elaros on board – have been awarded Proof of Feasibility funding to develop a wireless version of UScale, that will automatically save data to the cloud, allowing clinicians to access it without additional software.

The UScale prototype will also be tested with patients in Nicolas Bryan's clinic, to get feedback on the device and to compare compliance with traditional methods: measuring volume in a jug and recording onto a paper form.

Dr Williamson says: "Having Elaros on board has meant we can draw on their earlier work with patients

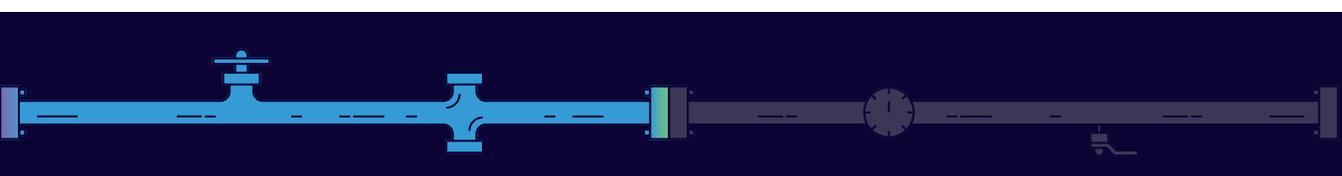
around the challenges of the existing system to evidence the clinical need."

After many years thinking about how to meet that need, Nicolas Bryan is pleased his idea is now taking shape. "Having this partnership in place has been transformational," he says. "It's like pouring water on a desert – things are really starting to grow faster

Technology Innovation Manager



Luke Watson
University of
Huddersfield



Proof of Concept



FUNDING:

Up to £80k



DURATION:

12 months

Our Proof of Concept (PoC) funding supports technologies for which the clinical and market need has been established and the basic research completed to demonstrate feasibility.

Longer project timescales enable technical de-risking of the concept in order to show functionality, verification and validation in a relevant environment. The funding is used to advance technologies towards commercialisation or clinical adoption leading to investment and either product development by industry or through spin-out formation.

The application process for PoC funding is thorough. Initial expressions of interest undergo panel review and each project receives extensive feedback to help it progress. The most promising projects submit a full application, which includes a detailed business case for the technology. Applications are reviewed by an external panel comprising patient representatives and medtech, innovation and IP experts, who question the applicant following their presentation of the project. Public and patient involvement (PPI) at this stage is key, as patient representatives ask questions and spot weaknesses that might otherwise be missed, due to their unique perspective.

SINCE LAUNCH



19 expressions of interest



15 full stage applications



13 projects awarded funding

OF THE 13 FUNDED PROJECTS:

77%

have direct clinical engagement

31%

involve a development partner

31%

are convergent technologies

100%

include patient and public involvement activities

Case study: A technology on the rise

A polymer-free liquid that turns into a sticky gel on contact with biological fluids has been developed by Professor Anant Paradkar from the University of Bradford. This platform technology has multiple medical applications and has been awarded our PoC funding to progress its use in colorectal surgery to remove pre-cancerous polyps. Surgeons currently use various liquids mixed with dyes to try and raise and delineate a polyp so it can be completely removed without perforating the bowel, but existing methods don't work well, or for very long. Professor Paradkar's technology, co-developed with University of Bradford colleagues Dr Sudhir Pagire and Dr Sachin Korde, raises the polyp much higher and for

longer and prevents the dye bleeding into surrounding tissue.

The team will use our funding to work with NHS Huddersfield Pharmacy Specials Unit to optimise the product and scale up manufacture to clinical standards. They will also develop a strategy for clinical testing and validation in collaboration with the NIHR Surgical MIC and its clinical director, colorectal surgeon Professor David Jayne.

Technology Innovation Manager



Kieran Perkins
University of
Bradford

Case study: Fertile ground for development

The conditions in which embryos are grown in the laboratory is one of the factors affecting the success of fertility treatments, yet the methods used haven't changed in 40 years. Fertility clinics still grow embryos in standard open plastic dishes, overlaid with a potentially toxic mineral oil. Our PoC funding will enable a team involving engineers, fertility experts, clinicians and industry to progress a device that creates a safe, closed and precisely regulated microenvironment, more

closely resembling an embryo's natural growing conditions.

Led by Dr Virginia Pensabene from the University of Leeds, the team will test the safety and toxicity of three different plastics from which the device could be manufactured, then validate the best of these using bovine embryos which are close in size and development to human embryos. The funding will also help the team develop a manufacturing plan and market analysis to shape the business case for the product.

A key part of the project is user engagement: with embryologists and IVF clinics to finalise the device design; but also with patients and the public, through patient groups and information events and through patient-oriented fertility organisations.

Programme Lead and Technology Innovation Manager



Dr Danielle Miles
University of Leeds

Case study: Making therapy into a game

Doing physiotherapy exercises for rehabilitation following injury or disease can be tedious and repetitive and patients – particularly children – often lapse, slowing their recovery.

Researchers at Sheffield Hallam University have found a way to make such exercises more fun and encourage repetition – by incorporating them into a virtual reality (VR) game. With our PoC grant, the team, led by Ivan Phelan, will work with patients and health professionals to create a suite of games to support upper limb rehabilitation in children and adults.

Patients will use them in different clinical settings and at home, and the team will assess how well the



Jordan Best,
Sheffield Hallam University

games are accepted and how well they help patients adhere to their exercise programme. In collaboration with the hand transplant clinic at Leeds Teaching Hospitals NHS Trust, they will develop and test a prototype VR system for hand and finger rehabilitation with transplant patients. During the 12-month project, the team will also work with Grow MedTech and Medipex to

develop a business plan and market assessment, to identify potential industry collaborators to take the technology forward.

Technology Innovation Manager



Simon Butler
Sheffield Hallam
University



SINCE 2015:

£14.9m

public sector income generated
(£2.7m in 2019)

60

secondments funded
(10 in 2019)

73

applications received for Summer Student Projects
(44 in 2019)

39

Summer Student Projects funded
(13 in 2019)

195

academics trained
(51 in 2019)

139

potential technology development opportunities identified

15

Grow MedTech funded projects generated by early-stage support

Our activities are designed to plug gaps in the innovation pipeline, offering researchers valuable training, funding or collaborative opportunities to move their project forward at a point where it might otherwise stall.

Frequently, these will be early-stage projects that require support to better understand a clinical need, to generate additional scientific evidence, or to find the right partner to move a project forward. Because we work alongside Grow MedTech, our researchers are often in a great position to apply for further funding from Grow MedTech once these gaps have been addressed.

We're opening doors for students and early career researchers interested in finding out about research translation, too. By delivering training opportunities not typically offered by universities, we are helping to shape a new generation of innovators focused on research translation.

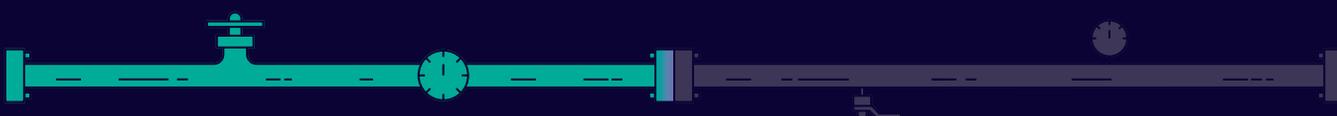
Opening up secondment opportunities

Secondments offer academics the opportunity to spend time in a different institution or within a company, working on projects that fit our core aims of progressing technologies towards translation, or building innovation capability.

We offer grants of up to £2,500 for researchers to arrange their own secondment programmes, or apply for an opportunity offered by one of our partner organisations. This year, for example, we've worked with Versus Arthritis to offer an opportunity to a PhD student or post-doctoral researcher to work with the charity on a variety of communication, public and patient involvement and research-based

projects. Other secondments have been arranged through organisations such as Devices for Dignity.

We've also funded academics to take up secondments in the National Physical Laboratory, and universities such as the Centre for Complex Systems and Brain Sciences. Ten placements have already been funded this year, with a further ten expected.



Summer Student Projects

Many research projects don't manage to fulfil their commercial potential because they run out of money before they've progressed sufficiently to qualify for new grant funding. By funding students to work on tailored projects during the summer we can provide a low-cost way of bridging this gap. This means researchers have an additional resource to help them gather evidence, or enable them to take risks and test out their technology in new areas. At the same time, students gain valuable experience of working in a research translation environment.

The scheme also gives us the opportunity to connect with talented students in our partner institutions and is a great way to encourage more students to consider working in the medtech innovation field. With 13 projects funded from a pool of more than 40 high quality applications in 2019, it's clear that there's plenty of skill and enthusiasm to be harnessed.

Courses

We understand that researchers might need translation support at any stage of their careers, so the courses we offer are open to all levels of researcher, from PhD students to professors. Our training addresses topics not typically offered by university CPD programmes and are run by external providers who are experts in their field. We cover topics from

patient and public involvement, the role of health economics in innovation, to NHS strategy and adoption. A 'pick and mix' approach ensures participants can attend sessions according to their own particular training needs.

Creating new partnerships

Our 'unmet needs' workshops are a great way to create new partnerships and develop projects around challenges identified by our clinical collaborators. We join forces with organisations such as the NIHR Medtech and In Vitro Diagnostics Co-operatives (MICS) to design full-day events where researchers, industry partners and clinicians can come together to discuss potential solutions.

By the end of each workshop, we aim to have identified approaches for the challenges identified. Typically, the technologies that emerge from this approach are a few steps ahead when it comes for applying for funding, because the clinical need is already established.

Fostering the innovation pipeline

Academics who engage with us are passionate about medtech translation – and that passion goes beyond applying for grants or even successfully commercialising a product. We're delighted to continue to work with these researchers to spread the word about Translate MedTech and to encourage new innovations with clinical and market potential. Our Innovation Champions offer mentorship to researchers within the Translate MedTech partnership and act as an invaluable source of ideas, advice and great networking. With their help, we're encouraging new generations of market-savvy researchers, as well as finding new ways for our organisation to grow and improve.

Translate MedTech Innovation
Development Officer



Mohua Siddique

"It totally changed my thinking and I think it is necessary for many researchers like me."

*Patient and Public Involvement
course delegate*

Case study: Gaining insight into medical device development

Dr Ruth Evans is a Postdoctoral researcher at Sheffield Hallam University, where she's working with Reza Saatchi, Professor of Electronics (Medical Engineering), to develop a non-contact thermal imaging device to help diagnose sleep disorders in children. Ruth has been awarded £1800 by Translate MedTech for a 3-month part-time secondment with S-Med, the UK's leading supplier of specialised sleep diagnostic systems and services.

What clinical need does this new technology address?

Investigating sleep-disordered breathing such as sleep apnoea in young children is particularly difficult because they naturally want to pull off the sensors placed on them which measure things like blood oxygen levels, respiration and heart rates. We're developing a non-contact sensor using a thermal camera which can measure respiration by looking at temperature changes around the nose and mouth. When you breathe in the colder room

temperature air, it minutely affects the skin temperature around this area, and when you breathe out the air around this area is warmer. It's a really clever solution.

Is your background in medical devices?

No, my PhD was in Physics and Astronomy and I was working with infrared data using a thermal camera to look at galaxies! I wanted to apply my skills to something that was more immediately useful and my skill set matched with those Professor Saatchi needed to analyse and interpret his data. It sounds bizarre, but the technical side - the signal processing and data analysis - is the same; it's just the subject matter that's different.

How did the secondment opportunity arise?

Coming from a Physics and Astronomy background to medical devices, I've been on a steep learning curve. I attended several Translate MedTech training courses earlier this year and

learned about the secondment scheme via their newsletter. I realised that this would be a valuable opportunity to gain insight into industrial processes and the regulatory side of medical device development.

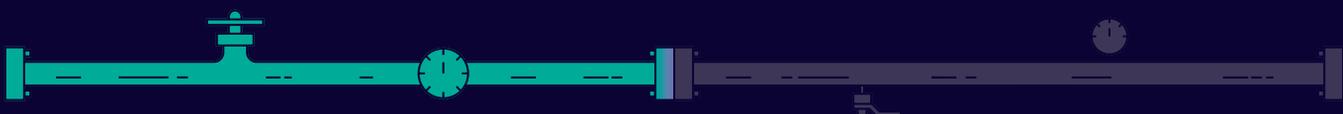
Professor Saatchi has a long-standing relationship with S-Med, which helps develop and distribute the devices that are currently used to measure heart rate and respiration rate in hospitals. They've already supported several of my grant applications and immediately saw the benefit of a fully-funded secondment. The Translate MedTech team helped with feedback to strengthen my application and I heard back really quickly that I'd been successful.

What do you hope to gain from the secondment?

It's an incredible opportunity to gain a much deeper understanding and experience of what industrial partners need from us to be able to bring a new device to market.

"We've worked with plenty of universities and hospitals where they've used our equipment and technology for their research projects, but this is the first time we've worked this way round – using university expertise to help us design and develop a new product."

Selwyn Sher, Managing Director, S-Med



The secondment will enable me to visit S-Med's partner company, SOMNOmedics, whose production plant is in Germany. I'll learn about the software that they're currently using and work with the team there to find a way to incorporate the imaging software that I'm developing into the devices that they produce. I'll also learn more about medical device regulations that govern new product development.

I hadn't considered doing a secondment before I saw the Translate MedTech opportunity and I haven't even seen any other organisations offering grants for secondments. Without Translate MedTech, I don't think I'd have had the opportunity or found funding to do something like this. I can't wait to start.



Dr Ruth Evans,
Sheffield Hallam University



Case study: Learning the benefits of PPI

Patrick Statham is two years into his PhD research at the University of Leeds, looking at using decellularized tissue from pigs to regenerate a patient's own cartilage following damage caused by osteoarthritis. Through Translate MedTech, he secured a 12-week secondment to Versus Arthritis, a national charity committed to improving the lives of people living with arthritis.

"I heard about the secondment opportunity in the Research Liaison and Evaluation team at Versus Arthritis during a staff meeting and thought it sounded really interesting.

"The end result will be a valuable resource for many researchers around the UK, and make the research we fund more relevant to the ultimate beneficiary – people with arthritis."

*Dr Katherine Free,
Research Engagement
Manager, Versus
Arthritis*

I discussed it with my supervisor and Mohua Siddique, Translate MedTech's Innovation Development Officer, helped me put a strong application together. After an interview at Versus Arthritis, Mohua let me know I'd been successful. It was a very easy, smooth process. The secondment plus travel expenses allowed me to spend two days per week at the charity's Chesterfield offices, visit the London office and travel up and down the UK a fair bit too.

"The Research Liaison and Evaluation team has a variety of functions, including liaising with Versus Arthritis-funded researchers across the UK and providing research information to other teams across the charity, such as communications and fundraising. Day to day, my role covered collecting, collating, translating and sharing information and data about funded research to whoever needed it, both internally and externally.

"I was also tasked with producing a booklet to encourage and guide researchers through the basics of incorporating Patient and Public Involvement (PPI) into their research. PPI is a key requirement of all research funded by the charity.

"This was a really interesting and valuable project. I gained experience and managed activities that I'd never done before – interviewing patients, writing case studies, organising photography, liaising

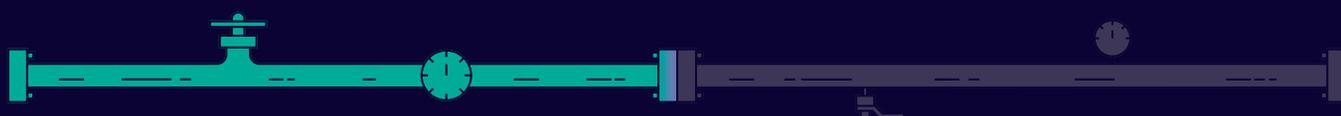
with graphic designers to structure the content and layout. I've really enjoyed seeing how the booklet developed.

"Learning about the benefits of PPI, I realised that my own research lacked a PPI element, so I've already taken steps to address that by speaking to a colleague and getting the ball rolling on involving a patient in my research. It's definitely something that I'll carry forward in my research career.

"The secondment has given me a wider perspective of research and an appreciation how the skills I have can be applied in my future career. I've translated research into lay language, run focus groups, worked with patients and delivered presentations, so it's helped me communicate my research to non-scientific audiences much better.

"I also learned a great deal about the grant application, evaluation and approval process at Versus Arthritis. Gaining insight from a funder's perspective, together with my greater understanding of the importance of PPI, will definitely help me to strengthen future grant applications.

"Overall, it's been a fantastic and highly beneficial experience. I'm extremely grateful to Translate MedTech for enabling this opportunity to develop both personally and professionally. If another secondment opportunity arose, I'd jump at the chance."





“Projects like these provide a valuable – and cost effective – way of moving our research on to the next stage.”

Dr Nat Milton, Leeds Beckett University

Case study: *In silico* modelling could advance Alzheimer’s saliva test

Translate MedTech’s Summer Student Projects offer valuable opportunities for students to contribute to the commercial translation of technologies, exchange new skills with project teams, and invigorate projects with fresh perspectives.

Researchers at Leeds Beckett University are developing a reliable, easy-to-use saliva test for Alzheimer’s disease that could transform the treatment and care of millions of sufferers. There are around 44 million people worldwide estimated to be living with Alzheimer’s disease, but only about a quarter of these are accurately diagnosed.

A team led by Dr Nat Milton has identified a family of hormones, called kisspeptins, that could act as a biomarker for the disease.

The team were able to confirm the clinical need for an effective test through a Grow MedTech Proof of Market project.

The key to successful development is now to find the right aptamers – molecules that are essentially short sequences of DNA – that can bind to the hormones and enable them to show up in tests.

In the laboratory, this could be slow and painstaking work but, thanks to Translate MedTech’s Summer Student Project fund, the team have been able to secure the expertise of Marcus Rock, a graduate student from the University of Derby, who is using high throughput computer screening techniques to speed up the process. This will enable randomly selected DNA sequences to be rapidly characterised with the

aim of finding the best sequence to bind to the protein.

By modelling the sequences ‘*in silico*’, it’s possible to test large numbers of aptamers before selecting the most promising for optimising and then testing further in the laboratory.

“Projects like these provide a valuable – and cost effective – way of moving our research on to the next stage,” explains Dr Milton.

“Most university degrees don’t teach commercial processes so these projects are essential for catching students at an early stage in their careers and shaping their thinking – whether or not they decide to pursue a career in research.”

Case study: Electrospinning offers implant solutions

Two separate Translate MedTech Summer Student Projects at the University of Bradford have enabled one manufacturing technique to spin out in two very different directions, explains Dr Farshid Sefat, Lecturer in Medical Engineering.

"We're using electrospinning techniques to produce scaffolds that have potential in two different clinical areas. In the first, we've used the scaffold to create a multi-layer artificial cornea – the first of its kind in the world. In the second we've engineered a mesh that can be impregnated with anti-cancer drugs for use in mastectomy surgery.

"Using Translate MedTech Summer Student Project funding, we've been able to make significant progress with both projects that would otherwise have stalled due to lack of money and materials.

"Our MSc student, Safiyya Yousaf, spent three months in the laboratory, optimising the solutions for fabricating the corneal scaffolds and then testing the mechanics of the material, such as how it degrades and its porosity. This is an exciting period of research – we're using different polymers to construct the three layers of the cornea – epithelium, stroma and endothelium – and fitting them together to make the first ever full thickness artificial cornea.

"In our second Summer Student Project, our recent BSc graduate Zoe Hancox worked on a surgical mesh designed for mastectomy patients, testing its effects on cancer cells in the laboratory. The aim is to create an implant that will continue to release the drug for several weeks following surgery, killing any remaining cancer cells.

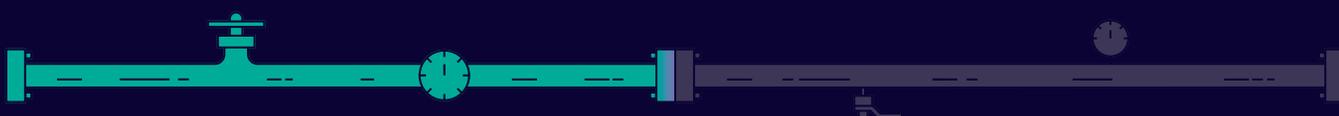
"We already have interest from industrial partners in both these technologies so it's really important that we keep them moving forward. The Translate MedTech funding enabled us to do this, and retain and enhance the skills of two of our most promising and dedicated students as well!"



Dr Farshid Sefat,
University of Bradford

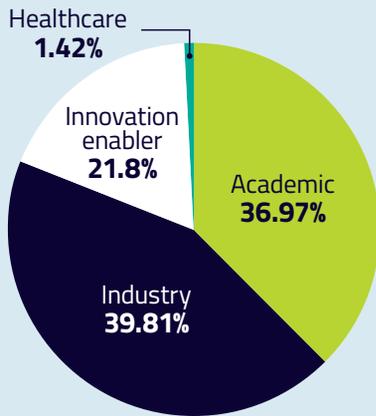
"Using Translate MedTech's Summer Student Project funding, we've been able to make significant progress with both projects that would otherwise have stalled."

Dr Farshid Sefat



Engaging the Grow MedTech Community

The Grow MedTech launch event in November 2018 brought together over 160 members of our medtech community:



SCR_Business_Helen
@SCR_Business_HL

In a very festive Leeds for launch of [@growmedtech](#) [#MedTech](#) sector of growing importance to [@SheffCityRegion](#). Delighted to support [@sheffhallamuni](#) & the other Yorkshire universities in this exciting new partnership [#celebratemedtech](#)

Using social media in our communications strategy, we've established a highly engaged community who are keen to respond to medtech funding and event announcements.

Twitter response to our funding calendar announcement

5525 views
93 engagements

Application statistics



29 universities involved in technology development projects



111 funding applications received



500+ registrations for our events

We support community leaders in keeping our network engaged by providing them with regular medtech news, events and funding opportunities to share.



52%

of our email readership comes from community shares



869

people have signed up to receive our emails

13,284 total web visits between Nov 2018 – Sep 2019

56% of our Twitter community are women

631 social media followers (Twitter & LinkedIn)

Our community is growing. Since our launch in November 2018, we've picked up:

497

new followers on our social media platforms

Communications and Engagement Co-ordinator



Kaeyo Kelly

Meet the Team

Our people, working with our partners, provide the foundations for our success.

Our technology innovation and programme support team bring specialist skills and know-how to progress technologies and develop innovation capability across our portfolio of programmes.

Programme Director



**Dr Josephine
Dixon-Hardy**

**Programme Lead and
Technology Innovation Manager**



Dr Danielle Miles
University of Leeds

Technology Innovation Manager



Simon Butler
*Sheffield Hallam
University*

Technology Innovation Officer



Cat Colquhoun
*Leeds Beckett
University*

Technology Innovation Manager



Dr Clare Green
University of York

Technology Innovation Manager



Kieran Perkins
*University of
Bradford*

Technology Innovation Manager



Dr Julian Sorrell
*Leeds Beckett
University*

Technology Innovation Manager



Dr Luke Watson
*University of
Huddersfield*

**Senior Technology Innovation
Manager**



Dr Graeme Howling
*EPSRC Medical
Technologies IKC*

**Communications and
Engagement Manager**



Rowan Grant

Reporting Officer



Nick Chester

**Communications and
Engagement Co-ordinator**



Kaeyo Kelly

Administrative Assistant



Victoria Turner

**Translate MedTech Innovation
Development Officer**



Mohua Siddique

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Our work would not be possible without our External Advisory Board, Opportunity Management Panel and Executive Group who provide Grow MedTech with end-user, academic, industrial, clinical, investment and regulatory perspectives. Their insights provide an invaluable steer to the strategic direction of our programme and we are very grateful for their support.

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- Helen Lazarus, *Sheffield City Region Local Enterprise Network*
- Kelly Broadbent, *EPSRC Medical Technologies Innovation and Knowledge Centre*
- Graeme Howling, *EPSRC Medical Technologies Innovation and Knowledge Centre*



Technology Innovation Managers,
Grow MedTech

External Advisory Board

- Jacqueline Andrews, *Leeds Teaching Hospitals NHS Trust*
- Cathy Barnes, *Leeds Beckett University*
- Victoria Betton, *mHabitat*
- John Bridgeman, *University of Bradford*
- Ruth Brown, *Reliance Precision Limited*
- John Fisher, *University of Leeds*
- Michael Kipping, *Biomedical Catalyst Innovate UK*
- David McBeth, *University of York*
- Alison Metcalfe, *Sheffield Hallam University*
- David Moore, *Leeds City Region Local Enterprise Partnership*
- Claire Paxman, *Paxman Coolers Ltd*
- Bill Pigg, *Holden-Consult Ltd*
- Abayomi Salawu, *Hull and East Yorkshire Hospitals NHS Trust*
- Ian Sharp, *Future-Health Innovations Ltd*
- Martin Stow, *Nexus Leeds Ltd*
- Liz Towns-Andrews, *University of Huddersfield*
- Neville Young, *Yorkshire and Humber Academic Health Science Network*

Opportunity Management Panel

- Sean Clarkson, *Yorkshire and Humber Academic Health Science Network*
- Lindsay Georgopoulos, *Medipex Ltd*
- Michael Kipping, *Biomedical Catalyst Innovate UK*
- Astrid Lorenz, *Symbiosis IP Ltd*
- Patrick Trotter, *Medilink North of England*
- Patient Representatives from Leeds Biomedical Research Centre Patient and Public Involvement and Engagement Group

Executive Group

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- Alex Prince, *Sheffield Hallam University*
- Julian Sorrell, *Leeds Beckett University*
- Barry Timmins, *University of Huddersfield*
- Geoff Whiteley, *University of York*

“The Grow MedTech review panel brought together a good range of experience, skills and knowledge to properly scrutinise proposals and provide an independent view, which is vital to choosing the best proposals.”

Michael Kipping, Innovation Lead for the Biomedical Catalyst, Innovate UK

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