

Innovate UK

Results of Competition: Smart Round 4 2015-16 - Proof of Concept
Competition Code: 1509_SmartRnd4_POC

Total available funding for this competition was £7.29M from Innovate UK

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
GyroGear Ltd	GyroGlove - Tremor-reducing device for Parkinson's Disease	£166,569	£99,941
Project description - provided by applicants			
<p>Parkinson's Disease (PD) affects 10 million people globally and produces hand tremors which impede or prevent essential activities such as drinking and eating. Current therapies for PD are unsatisfactory with significant side-effects and eventual loss of efficacy. Our novel concept is for a wearable device for stabilising hand tremors. (Working name "GyroGlove"). The device is based on a miniature gyroscope attached to the back of the hand. Gyroscopes are routinely used to stabilise objects (in navigation, cameras etc) but have never been applied to people. Significant progress has already been made. Our initial experiments in test rigs and with PD patients have demonstrated that the amplitude of hand tremors can be reduced by 70%. This is enough to make the difference as to whether someone is able to look after themselves without assistance. The concept won the F Factor competition (largest tech challenge in the EU), and was a finalist in OneStart (largest biotech business challenge globally). We were featured as one of 15 millennial trailblazers by Telefónica's Digital Futures. The concept was invented in 2014 by a medical student at Imperial College. Since this time a team from Imperial College has been working on the idea and putting in place a network of advisors and mentors. These include the National Clinical Director for Innovation at NHS England, professors of engineering and musculoskeletal biodynamics at Imperial College and leading biotech entrepreneurs. Additionally, major charities such as The Cure Parkinson's Trust and Parkinson's UK have been involved. We have funded the work to date via awards and competitions but we now need to commence a more intensive phase of work. The engineering design of GyroGlove is the subject of a patent we have filed in the UK and internationally. The Smart funding will take the concept forward via design activities, a series of prototypes and patient trials at Charing Cross Hospital.</p>			

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IBEX Innovations Ltd	IBEX Dynamic X-ray imaging of reduced iodine contrast agents in angiography procedures	£164,081	£98,448
Project description - provided by applicants			
<p>IBEX Innovations has successfully demonstrated, in a previous Development of Prototype project, the materials classification capability of its Multi-Absorption Plate (MAP) X-ray detector technology. The ability to identify materials in a medical image using the MAP technology integrated to a standard medical flat panel detector (FPD) offers significant benefits, including the ability to measure bone mineral density (BMD) on standard Digital Radiography (DR) equipment. Angiography systems use X-ray absorption contrast of a radio-opaque contrast agent, usually an iodine solution, to visualise blood vessels and organs in the body and are used to assist in diagnosis and treatment of heart conditions (Coronary Angiography) or brain conditions (Neuro-vascular Angiography). Iodine-based contrast agents are known to impair renal function through Contrast Induced Nephropathy (CIN) in around 2% of angiography procedures, increasing to 20-30% in high risk patients. This project seeks to demonstrate that the IBEX materials classification methods can identify contrast agents by their material type rather than their X-ray blocking characteristics. This offers the potential to image much lower concentrations of iodine with no loss in contrast, or to use new types of non-harmful contrast media that can be distinguished by virtue of their material differences from the structures of the body. The project will also demonstrate that the IBEX materials classification technology can generate images of moving contrast agent in real time. Finally, the project will seek to demonstrate suppression of bone and tissue in the dynamic image as an alternative approach to digital subtraction angiography (DSA) methods.</p>			

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W. Ball & Son Ltd T/A Baltex	Low Friction Mattress Topper for the prevention of pressure ulcers.	£191,704	£100,000
Project description - provided by applicants			
<p>When the skin is subject to pressure (usually over a bony protuberance e.g. heel, back of head, elbow, etc for more than 2 to 3 hours, blood and oxygen flow is restricted causing body tissue to die starting at the epidermis or outer layer. The dead skin breaks down and forms an open sore or ulcer that is susceptible to bacterial infection and difficult to treat. Anyone having restricted movement such as the physically disabled, elderly and bed bound are susceptible to pressure sores, (also known as decubitus ulcers or bedsores) and are a widespread problem. Although pressure sores can be caused by simple pressure, they often occur by the action of pressure in combination with shear where layers of skin are forced to slide over one another, or over deeper layers of tissue such as where a patient on a raised mattress slides down the bed. Baltex has developed a range of 3-D warp knitted spacer fabrics that offer considerable benefits in terms of pressure distribution when used as seat cushions by those confined to sitting or in wheelchairs. This product has good breathability (enabling heat and moisture to be carried away from the skin unlike foam mattresses), compression strength, recyclability, redistributes pressure, and can be washed. It is our proposal not only to prove the concept of a spacer fabric mattress topper for superior pressure distribution and microclimate control but also for it to have low friction surfaces to minimise skin shear and friction when the patient moves or is moved.</p>			

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Qi Instruments Ltd	MultiTran - Measurement of the permeability of ultra-high performance barrier layers	£146,301	£87,780
Project description - provided by applicants			
<p>High performance barrier layers prevent the passage of atmospheric oxygen and moisture, along with other species such as carbon dioxide and ethylene, to/from the materials and devices they protect. The analytical instrumentation used to qualify such barrier layers is a growth market with a compound annual growth rate (CAGR) of >20% and projected to be >£140 million by 2021. The market divides between the established speciality packaging market for foods and pharmaceuticals etc. growing at GDP rates +5% and the emerging plastic electronics markets with a CAGR of >50%. To achieve the required device lifetimes of >10 years requires ultra-high performance barrier layers with water vapour transmission rates (WVTR) of 1.0×10^{-6} g/m²/day. Such transmission rates are 100x below that measurable with commercially available instrumentation today. We plan to demonstrate an instrument that can measure WVTR to the levels required and ultimately tap into this unmet need of the emerging plastic electronics market. The technique is based on an innovative new type of mass spectrometer ionisation source using plasma to ionise the species of interest and is protected by a pending patent application. We will demonstrate the performance of the instrument using both calibrated samples obtained through the National Physical Laboratory (NPL) and samples from prospective customers. The unique ability of a mass spectrometer to measure multiple species simultaneously will also allow a single unit of our instrument to replace multiple single species measurement instruments currently being used throughout the speciality packaging market.</p>			

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Smart Component Technologies Ltd	Smart Component Technologies: Smart Washer Augmentation	£166,054	£99,632
Project description - provided by applicants			
<p>A switch moves trains between tracks; components include switch rails, stretcher bars (SBs) & a switch motor. SBs keep the rails a set distance apart & ensure both rails move together. Switch integrity is vital; on the UK's busiest lines >100 trains will pass over a switch each day (Ref A). Switch failure is the 3rd biggest cause of UK derailments (Ref B). Missing/faulty bolts were the cause of both Potters Bar & Grayrigg incidents. In conjunction with Network Rail, Smart Component Technologies Ltd developed a 'SmartWasher' (SW) to measure the clamp-force of switch fasteners during real-time installation & routine maintenance. Trials at London Underground confirm the SW's ability to detect loose/missing bolts by reporting changes in clamp-force. The SW is also capable of providing remote periodic data & alerts should the clamp-force deteriorate. It also safeguards against human error during manual inspection. During London Underground trials it was requested that capacity to measure the dynamics of moving components by the SW was added. Thus, SCT propose a £166,054 Proof of Concept project to evaluate the potential to extend the use of a dynamic SW to address a range of issues including the remote condition monitoring of the entire switch asset but also track bed stability including voids & track geometry/inclination. With the upgraded SW ('SW3') attached to switch components, it will sample the dynamic response of the movement of the switch, in three dimensions, enabling a trace of 'normal' switch movement to be gained. Via the remote condition monitoring & cloud data storage facility, SW3 informs users of the integrity of the switch. As SW3 permits trend analysis, it improves predictive maintenance capability & safety of rail networks, leading to cost savings, & meeting Network Rail's goal for innovation in cost-effective monitoring. As a platform technology, SW3 has use in other wider applications such as escalator maintenance, & on pipework valves.</p>			

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MediSieve Ltd	Development and testing of magnetic blood filter to treat severe malaria	£166,667	£100,000
Project description - provided by applicants			
<p>With 200 million cases a year, and the death of a child every minute, malaria remains one of the world's biggest problems. One issue is that patients get to hospital too late for drug treatments to be effective, with mortality rates of up to 20% due to high parasite burdens. The drugs are toxic, and can cause serious side-effects. The chances of survival and time to recovery are both dependent on a patient's parasitaemia when starting treatment. Furthermore, resistance to front-line drugs, which has been catastrophic in the past, is again spreading in SE Asia. There are no treatment options available to drug-resistant patients. MediSieve is developing a novel medical device to treat malaria which could turn back the clock for these patients by rapidly and safely reducing their parasitaemia. It is a 'dialysis-like' technique, continuously pumping a patient's blood through a magnetic filter via an external blood loop. In a single treatment, the filter captures and removes malaria infected red blood cells from the bloodstream, using their distinct, naturally occurring magnetic properties; the rest of the blood returns to the patient unharmed. Primarily intended as a complement to drugs, the device can be used to treat any malaria patient (including infants and pregnant women). Easy to use and cheap to manufacture, it could have a significant impact on severe malaria mortality, and be a very valuable tool in the fight against drug-resistance, as it can be used as a standalone treatment. Removing (rather than killing) infected cells provides substantial clinical benefits over drug treatments, improving outcomes. This project will enable MediSieve to perform proof of concept safety testing of basic prototypes appropriate for clinical use, to ensure that no harm is caused to healthy blood components. These studies will enable the company to seek the necessary approvals to perform the first-in-man clinical trials in 2016.</p>			

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Safeguard Nautica Ltd	Subsea Pile Decommissioning System - Deployment & Recovery Device	£87,745	£52,647
Project description - provided by applicants			
<p>Within the offshore Oil & Gas and Offshore Renewable Energy sectors, decommissioning is set to become a major sub-sector in its own right. The logistical and environmental challenges related to working in an offshore, subsea situation present technically complex, high-risk environments where technologies often under-perform, placing additional pressures on the budgets of inventory owners and the decommissioning securities of government. This challenge presents a market opportunity for the development of improved technologies and processes which offer reliable, repeatable and low-risk capability, whilst also realising cost reduction compared to today's practices. Marine consultancy firm, Safeguard Nautica conceived a unique concept to decommission piled foundations where the pile is cut below seabed level. A highly-innovative Deployment & Recovery System to place a tool on the seabed, and recover a pile to the surface without need for high-cost surface assets is to undergo development in a Proof of Concept study, co-funded by InnovateUK to demonstrate technical feasibility of the system.</p>			

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Acedag Ltd	Manufacture blown PVOH water soluble film suitable to package liquid	£166,138	£99,682
Project description - provided by applicants			
<p>Acedag Ltd is a successful manufacturer and distributor of plastic and polythene products since 1982, we have recognised the growth potential in the water soluble film for liquid detergent market. Using decades of experience we have developed a concept to produce the film at a price and rate which is more competitive than existing methods. More than 800 million laundry detergent capsules are sold each year in the UK alone, each made from water soluble PVOH manufactured using casting methods by a small number of companies worldwide. Due to a number of accidents with young children, who are attracted to the bright sweet like capsules the EU has introduced new rules which aim to prevent children being poisoned or burned by the laundry capsules. Our project is to prove our concept which uses a unique plasticising process as well as an innovative blown extrusion method to manufacture the blown water soluble PVOH that is suitable for packaging liquid detergent. The film produced will be a third cheaper and has a much higher production rate than current methods, as well as meeting with new regulations regarding child safety, enabling users to have a competitive edge.</p>			

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Micropropagation Services (EM) Ltd	Sphagnum Seed Stock	£204,917	£100,000
Project description - provided by applicants			
<p>Harvesting and subsequent degradation of peat bogs is a growing and controversial problem, with this limited resource having a finite lifespan, meaning natural peat sources are running out. DEFRA are currently working to completely phase out the use of peat based products in UK Horticulture by 2030. Existing natural peat bogs are harvested for use in horticulture as a growing medium, bio-fuels and other niche markets. Peat is widely recognised as providing key ecosystem services that are important for human well-being. It underpins habitats and landscapes important for biodiversity, moderation of groundwater flow and quality, climate regulation, provision of food, cultural heritage and recreation (Bonn et al., 2010). Not only does this cause problems of supply in horticulture, but degradation of peat bogs is having a severe environmental impact with release of carbon contributing significantly to global warming. It has been shown that fresh sphagnum moss, which creates peat bogs, is a viable alternative to peat as it has similar properties and could be developed to offer a sustainable growing medium reproducible on a significant scale. Micropropagation Services Ltd (MPS) have researched a unique technique for the micro-propagation of sphagnum which has the potential to grow sphagnum on a commercial scale, giving a renewable resource to enable the repatriation of peat bogs, and the growth of a profitable cash crop on land which is currently of limited commercial use.</p>			

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Python Performance Ltd	Python Compression - Working closely with PHD student's we've designed a new peice of compression clothing, using specialised weaving of nylon and elastine, we are able to increase compression around the joint for increased performance in sport, increased	£159,192	£95,515
Project description - provided by applicants			
<p>The Python Performance project is a game changer in the sports apparel markets. The sportsapparel industry is now worth around \$150bn and set to reach \$178bn by 2019. Python will bepioneering research into compression clothing for sports. Using our methodology for acompletely new way of weaving materials we're able to pinpoint compression around joints.This gives the user a comfortable set of undergarments, which are streamlined, but provide thesupport, and heat around a joint required for increased performance in sport. This newtechnology will reduce recovery time of athletes, reduce joint deterioration over time andincrease performance in selected discipline (whether sprinting, running, cycling, weightlifting,powerlifting, or general sports). The outcomes from the project will be a basic prototype,tested and proved, of an innovative game changing pair of compression tights, and acompression shirt, which will provide the results stated above.</p>			

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Things3D Ltd	THINGS3D LIMITED - Digital Rights Management and Brokerage Platform for Personalised Smart 3D Printed Licensed Products	£165,092	£99,055
Project description - provided by applicants			
<p>3D printed miniatures of one's self (or 3D Selfies) are made by 3D Printing the holy grail of data (a human form), and are slowly making it into mainstream retail (e.g. Walmart/ASDA). However, widespread adoption by MegaBrands (e.g. Aardman, Universal, Paramount, Warner Bros.), who want to allow 'realtime' compositing of scanned customers with favorite licensed 'digital' character(s) (e.g. movie stars, characters, sport personalities, etc), is inhibited by: (a) Megabrand fear over data control /counterfeiting, (b) control of follow-on incremental revenue, and (c) process speed. 3D Data Counterfeiting is a major challenge. Unlike traditional manufacturing, where counterfeiting needs tooling, counterfeiting a 3D print, or using a megabrand asset in a game or app, simply requires access to data. Counterfeiting cost economies US\$1.7 Trillion (OECD, 2014). License owners lose \$250bn/yr. (Gartner, 2015; Global License, 2014). The project develops Ownerchip® - the World's first Digital Rights Management & Brokerage (DRMB) platform that links Megabrand IP owners, Licensees, Venue Operators, and Mass Consumers to a network of 3d scanners, 3d printers, and content/game developers via a secure cloud architecture and unique visceral user experiences. Megabrand IP Licensing generates US\$250bn annually. Ownerchip® DRMB 'could' enable a controlled proliferation of brands in consumer 3D Selfies, generating a new \$multi-billion segment. The platform, and membership-style network 'could' link every 3D scanner, 3D printer and user to the 'Internet of Things', creating an unparalleled 3D MegaBrand licensed content usage dataset.</p>			

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TISICS Ltd	Fibre Reinforced Metal Composite Pressure Vessel (FEA Validation)	£149,992	£89,995
Project description - provided by applicants			
<p>Pressurised systems are used extensively in many industries from breathing air tanks for rescue services, deep water oil and gas instrument housings to chemical and gas tanks used to move satellites in orbit, with the space sector having the greatest need for lightweight tanks. However the main requirements for space materials are light weight, multi-functional capabilities, smart features and outstanding thermal stability, which cannot be achieved with these conventional materials. TISICS has developed reinforced metal matrix composites (MMC) with titanium and aluminium alloy matrices. This produces metallic composite parts with very high specific strength and stiffness, and the potential to be used for in structural or complex shape tanks.</p>			

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Ethersec Industries Ltd	Ethersec Industries Limited: World's first 3D Video Analytics System	£150,322	£90,193
Project description - provided by applicants			
<p>This project intends to develop the world's first commercially available 3D Video Analytics system. The 3D nature of the Video Analytics shall enable dramatically increased accuracy when identifying an alarm condition. The breakthrough in precision will allow currently active markets such as border security and utilities to be effectively monitored by far fewer human observers who can, for the first time, rely on the autonomy of the system. Further, we can explore novel markets that take place in environments that are too problematic to monitor with current 2D technology. The R&D performed during this project will lay the base for a suite of new products in security and related industries. As a demonstration of this step change in product functionality, the project will also include a further extension to the Video Analytics product described above. This new product will provide an entirely new modality of interaction between the user and the system, namely a synthesised multi-camera augmented reality environment. This technical leap is only possible due to the novel characteristics inherent in 3D data sets and the transition to 3D Video Analytics.</p>			

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GeoRoc Ltd	Development of Process Envelope for Hot-Isostatic Pressing of Radioactive Sludges	£64,082	£38,449
Project description - provided by applicants			
<p>Large stockpiles of untreated radioactive sludge materials exist globally. The UK's Sellafield site houses over 5,000 m³ of ILW sludges and slurries. GeoRoc is developing technology to treat these wastes with considerable benefits over the baseline methodology. Advantages include the passivation of the waste, direct immobilisation of radioisotopes, substantial reductions in waste volume and the potential to reduce lifecycle waste management costs. GeoRoc's Hot-Isostatic Pressing (HIPing) technology is a leading alternative treatment option and has recently been demonstrated at ~1/2 commercial scale, proving the processing of these materials is commercially feasible. GeoRoc Limited have also recently delivered a conceptual plant design to Sellafield Ltd outlining how a HIP plant would be used to treat ILW sludges and slurries. In order to move the technology to the pilot plant stage, a programme of work should first be performed to evaluate the flexibility of the HIP process. This specifically relates to its capacity to a) accommodate the waste-streams' physical and chemical variations and b) to investigate the properties of uranium doped, radioactive samples. The proposed project will be split into three work packages. The first will systematically investigate the science and materials properties of the waste form using alterations in the additive formulation. The second will determine the waste processing envelope by investigating the extremes of Sellafield Ltd.'s waste inventory. This will include particle size, carbonate content, organic content, reactive metal content and total waste loading. The final stage of the project will produce and analyse a uranium doped sample to characterise the behaviour of active material during processing. This package of work will provide the proof of concept for the HIP process by bounding the waste treatment envelope, prior to investigation using an operational pilot plant used to prove process fidelity</p>			

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Subsea Asset Location Technologies Ltd	SonarDock - SonarBell aided AUV Docking	£138,514	£83,108
Project description - provided by applicants			
<p>The potential for Autonomous Underwater Vehicles (AUVs) to perform tasks underwater has been recognised by industry across several market sectors, including, military, commercial and scientific. Their importance has also been recognised to the future of the UK economy and its global technological standing by the UK Government within the Defence Growth Partnership and Robotics and Autonomous Systems Special Interest Group (RAS-SIG). To benefit from the use of AUVs, several technological challenges must be overcome. One of the challenges faced is the recovery of the AUV and more specifically, the autonomous docking of an AUV into a docking station positioned on the seabed. Our proposal provides a novel AUV docking solution. It is based around the use of passive acoustic reflectors (SonarBell devices developed by Subsea Asset Location Technologies (SALT) Ltd.), a commercial sonar typical of that fitted to an AUV, and sonar processing algorithms. Within this programme of work, this concept will be proven. The work will be conducted during 2016 and successful completion will increase the visibility and credibility of our concept, helping us to raise further investment for development of a preproduction prototype. We expect this further development to take place in 2017 with early products available during 2018. To achieve this we will need to partner with an AUV specialist during the follow-on development programme. We are predicting a significant increase in revenue during the five year period after the completion of the pre-production prototype. This is based on a conservative penetration into the AUV market. This project will generate jobs and revenues for us and in doing so will aid the UK economy as well as cement the country's reputation as a world-leader in AUV technologies.</p>			

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Impact Laboratories Ltd	Non Destructive Testing of plastic pipes to reduce failures in the water and gas networks	£170,793	£99,500
Project description - provided by applicants			
<p>Impact has developed and identified an opportunity to further develop an ultrasound testing method for PE plastic pipe joints. Electrofusion joints are commonly used to connect PE pipes for water and gas delivery across the UK, but studies have found that 20% fail before the end of their service lifetime. There is currently no cost effective method of testing these joints and as a result testing is rarely carried out, and failures, which lead to safety concerns and water leakages are common place. In 2014, UK water authorities lost 3.3 billion litres of water daily to leakages in pipes, with the majority due to faulty joints. Current testing methods are limited to destructive testing of dummy joints, which test the welders ability, but this method is time consuming and costly as the testing is required to be performed at external laboratories. As a result, most contractors will ignore this testing. Impact NDT will be developed in this project to be a compact, handheld device, which can be operated by a minimally trained operator. The technology will be able to analyse and interpret the results in real time and deliver a red, or green light to the operator and certify the pipe joint meets the relevant standard. It will be a low cost solution, in line with the industry wants, as confirmed during an Innovate UK proof of market. During this project, an MD of a large UK water authority commented 'Can I have one tomorrow?'. Additionally, Impact have identified a large market within the USA, where PE pipes are commonly used for gas transport. A 2014 fatal gas explosion in Harlem, NY, led to a NTSB investigation, where a faulty pipe weld was found to be responsible. As a result, the NTSB has issued a safety warning against electrofusion pipe welds, until a suitable quality solution can be found. Therefore, there is a large possibility of having Impact NDT regulatory approved and mandated within the USA for all PE pipe welds.</p>			

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Results of Competition: Smart Round 4 2015-16 - Proof of Concept

Competition Code: 1509_SmartRnd4_POC

Total available funding for this competition was £7.29M from Innovate UK

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Diagnostig Ltd	A new approach to point of assessment diagnosis of tuberculosis	£100,000	£60,000
Project description - provided by applicants			
<p>Tuberculosis remains one of the most significant causes of death, particularly in individuals co-infected with HIV-AIDS; co-infection can lead to a life expectancy of a few weeks and has, for example, reduced life expectancy in South Africa by around 10 years. Although there are many methods that are supposed to detect the disease, in practice none of these can give a diagnosis within a single visit and many do not distinguish latent from active TB - a major problem given that the World Health Organisation estimates that a third of the world population has latent disease. The normal protocol for diagnosis uses a combination of several biochemical assays as well as physical observation. The WHO has identified a clear need for a reliable point of care assay that will provide a result within minutes and which can be distributed in high-burden TB populations for less than \$ 10. This project seeks to validate just such a device, based on the recognition by antibodies in the serum of patients with active TB of novel synthetic lipid antigens identical to components of TB cells. The assay (patents applied for) has been shown to provide good levels of sensitivity (correct detection of TB positive serum compared to clinical diagnosis) and specificity (correct detection of TB negative serum) in a blind trial on 250 samples from high burden TB populations, and to do so within 30 minutes without the need for laboratory equipment. This project will seek to improve further the performance of the device and provide proof of concept that it works to the required standard with serum from a range of different types of co-infected patients, including those co-infected with HIV/AIDS and those with non-pulmonary TB. It will put in place all the necessary data and quality control systems to provide a design lock for the device and to take it to the next stage of external validation and then to commercial production.</p>			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
TTI Testing Ltd	ON-TRACS : Rapid rail tension measurement system	£179,616	£100,000
Project description - provided by applicants			
Most modern rail installations use a 'continuously welded rail' which, because of the lack of expansion joints, is laid with a pre-tension as determined by the temperature extremes to be experienced. In order to maintain safe operation during service it is necessary to have a method of measuring residual rail tension (or compression) in situ. Current methods are time consuming and invasive, limiting their application. The concept of a new method to produce a much faster, non-invasive and more convenient method of measurement will be demonstrated.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
The Native Antigen Company Ltd	Development of a novel, rapid and safe neutralising antibody diagnostic kit by The Native Antigen Company	£186,715	£100,000
Project description - provided by applicants			
<p>Diagnostic tests are a vital component of disease diagnosis and vaccine research. For any test, the important parameters are sensitivity (i.e. the ability of the test to correctly identify a positive sample) and specificity (i.e. its ability to discriminate correctly between different diseases). Most diagnostic tests are simple plate-based assays or pregnancy test-type assays 'cheap and easy to run in most labs or GP surgeries, but often suffer from poor sensitivity and specificity. For example, tests for Chlamydia pneumonia can be false positive if genital Chlamydia trachomatis is present, and dengue virus tests come up positive for West Nile virus and tick-borne encephalitis. Plaque reduction neutralisation tests (PRNTs) get around these cross-reactivity problems, and are currently the gold standard diagnostic test, but they use live pathogens that are often extremely hazardous to handle and can take up to 10 days to perform. This means they can only be done in rare specialised laboratories and have a high cost per test. PRNTs are also used in vaccine research, where the number of neutralising antibodies is used as a measure for how efficacious a vaccine is. Having to perform these tests in high biocontainment facilities raises the cost of vaccine research and the speed to develop a successful vaccine. Our novel test is designed to provide the specificity and sensitivity of a PRNT, but with 100% safe reagents and taking only 1 day to perform. We believe this would be of great help to improve diagnosis for many human and animal diseases and to enable and enhance vaccine research into hazardous pathogens.</p>			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Wyld Research Ltd	Development of the Wyld Research Mesh Network - an Off-Grid, near real-time, intelligent notification and messaging system for underground metro systems.	£189,907	£100,000

Project description - provided by applicants

Utilising Mesh Networking technology, we intend to develop an Off-Grid, near real-time, intelligent notification & messaging system for underground metro systems. This will enable the secure, mass communication of information in environments where 2G/3G/4G/Wi-Fi are restricted. In practice, this means an Off-Grid communication channel that can transmit relevant, location-specific travel & service status information through an entire underground system within minutes to passenger smartphones, without the need for phone signal. Mesh Networking leverages smartphones' ability to communicate directly with other nearby devices via Bluetooth & Peer to Peer Wi-Fi, without the need for a grid connection. This is particularly useful to environments where there is a high footfall but restricted connectivity such as underground networks. The rise of 4G & Wi-Fi availability however has meant that Mesh Networking technology has largely been unexplored since it was made more accessible to developers for iPhone & Android devices in late 2013. Improving communication and user experience on the tube network is a key priority for underground metro operators as passenger numbers continue to increase. This is particularly true for network over 50 years old - Marseille, Athens, Rotterdam, Rio de Janeiro, Vancouver, New York City & London - where aging infrastructure makes the installation of 3G/4G connectivity impractical and disruptive, and extremely costly (£100m+ in London: TfL 2011). If technical feasibility of our system can be proved then our technology will enable the development of an innovative low-cost, high-impact communication channel for these underground networks and provide an alternative to costly, impractical communication infrastructure work. More widely, the technology will have applicability in Defence, the Mining industry and with the Emergency Services as an Off-Grid failover option for unplanned outages or emergencies (AppA:1).

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Seeper Ltd	Seeper INNERLIGHT	£191,370	£100,000
Project description - provided by applicants			
<p>Digital displays are ubiquitous in everyday applications including home entertainment, mobile devices, advertising displays & vehicle navigation systems. Their use is, however, almost entirely limited to flat, rectangular shapes. Current state of the art display technologies (LCD & LED) cannot be used on irregular shapes (e.g. shapes based on a Coca-Cola bottle, a plane, a human figure). As such, many potential commercial & creative applications in, for example advertising, theme parks and education are not currently achievable. 3D projection mapping can be used to overcome this to some degree. 3D projection mapping is the technique of projecting video or computer-generated visual content onto irregular surfaces such as building facades. Seeper were leading pioneers of 3D projection mapping and have completed many high-profile projects for clients such as Google, the BBC, MTV, Microsoft, & Nike. We also develop enabling technology (seeserver.com) to enable other companies to undertake similar projects. 3D projection mapping can be used to economically create extremely compelling experiences but it too has major drawbacks. It is very difficult to project content onto highly irregular or moving objects when light will often hit the target surface at angles which distort content beyond acceptable levels. There must be a clear projection field (e.g. no people getting in between the projector and the surface onto which it is projecting) so objects cannot move far from the fixed projector. Finally, projections are only visible when it is dark. This R&D project aims to investigate the technical feasibility and commercial potential for a proof of concept of a new technology that can overcome these challenges. This will require novel software capable of rendering video content on the fly combined with the use of miniaturised projection equipment and dynamically controlled optics to project onto internal surfaces from within semi-transparent objects.</p>			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Predictable Network Solutions Ltd	Overture testbed – a study into the provision of a service test & development platform for high performance web/network applications	£115,777	£69,466

Project description - provided by applicants

The Overture Testbed project aims to clearly demonstrate both the problems and potential solutions involved in delivering high performance, web/network based services over current infrastructure. Ongoing studies have demonstrated problems with modern network infrastructure, globally and nationally, as demand rises. Whilst these problems have been largely masked by a continuous increase in network infrastructure capacity, the fundamental problems remain. These problems are exposed by an ever more rapid requirement for capacity/bandwidth upgrades (raising costs of delivery). The continuing demand for many types of services, in particular video and interactive services, exacerbates the need for capacity whilst adding to quality variability. At the same time, these are precisely the services that are sensitive to such variability. Interaction with content is becoming a greater part of proposed services, such as online gaming and personalised fashion retailing. Applications that aim to do this need to be tested in a realistic network environment to assess their ability to function in target networks, both nationally and globally. The number of personal network-connected devices (smartphones, tablets, etc.) is growing, as is consumer engagement with them. In order to continue serving consumers well, and to open up new ways of interacting with them, the need for better testing in real-world scenarios is becoming more pressing. The Overture Testbed aims to create a platform and/or service through which testing can be conducted reliably and repeatably by both large and small enterprises. The testbed will be a developer-controlled, end-to-end delivery environment which emulates web services and networks over diverse and realistic loading conditions. This will facilitate the construction of apps and services that deliver more consistent higher quality experiences, to end users. The testbed will therefore enable better user experiences and improved commercial viability.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Barfoots of Botley Ltd	An innovative new technique for improved separation of liquid digestate to concentrate & retain valuable nutrients and reduce costs of liquor processing through sustainable reed beds - Ultrafloc	£164,974	£98,984

Project description - provided by applicants

Anaerobic digestion (AD) of biowaste is becoming an increasingly popular means of recycling unwanted materials to generate both energy (in the form of biogas/electricity) & reusable materials (fertilisers). In the UK, the number of AD plants has increased dramatically since 2013, from 106 to 246 plants. However a major problem faced by entire sector is dealing with the large amounts of liquid digestate produced as a by-product of the process; 80% of the input feedstock is typically collected as liquor. Control & handling of the digestate liquor is regulated, so dealing with the large volumes (~40,000 tonnes per average size plant) can be extremely difficult and costly. Ideally, reed beds would be used, but are not viable due to the high solid content that tend to choke the reed beds, along with the loss of the valuable nutrients the liquor contains. Consequently, the most common disposal method is to transport the liquor to farms where it is spread directly as a fertiliser at considerable cost. Land application of fertiliser can also lead to run-off & leaching, creating a risk of eutrophication. The ideal solution would be to lower the suspended solid digestate content of the liquor (to 5wt% max.) to generate a digestate liquid which could subsequently be processed using reed beds; dramatically reducing transport costs & enabling recovery of valuable nutrients (eg. nitrogen & phosphorus) in a solids concentrate. Our innovative new concept will accelerate the flocculation of particles & encourage sedimentation. It is envisaged that the development of the new technology will: Reduce costs of dealing with digestate liquor; lower capital & operating costs vs SOA Reduce solid content of digestate liquor from 10% to less than 5% Facilitate release of liquor to reed beds ' less solid content in liquor will reduce risk of blockage Recover valuable nutrients (nitrogen & phosphorus) in a concentrated form

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
ThinkInnovate Ltd	Live Crowd Insights	£165,947	£99,568
Project description - provided by applicants			
<p>Modern car navigation systems not only navigate you from A to B but can also take into account traffic congestion and redirect the motorist via the optimal route. We want to build on the appetite for location based tech and drive innovation to provide the same functionality for pedestrians in crowded environments. ThinkInnovate have evolved a number of technologies, establishing Bubbl (from a previous GeoVote Smart PoC), a suite of SDK tech, based on highly innovative internal positioning software and a sophisticated geo-location based app constellation for the events, business and retail sectors. The 'Live Crowd Insights' (LCI) project objective is to investigate technical feasibility and prove the concept for an innovative location crowd aware SDK software, to guide users with live crowd analytics data and tracking for multiple friends. To do this we will be fusing: Our device detector sensor integration algorithm that combines multiple discordant sources of information. Geolocation triggering and location based functionality (the technology developed to underpin our Bubbl suite). Distributed crowd capture hardware using off-the-shelf low cost components. Our PoC will solve the anticipated technical challenges allowing us to reach a basic prototype that maps realtime crowd movement, understands bottlenecks and navigates users with the optimal path through a crowd. Outside it's possible to obtain a position that's accurate to a few metres with GPS. However, indoors and in dense urban areas buildings disrupt or block satellite signals. With our novel sensor-fusion algorithm, geo triggering algorithms and low cost hardware we will be able to provide a seamless navigation through crowded environments both outside and inside as well as moving between the two. Associated analytics will allow insight into crowd movement, improve flow management and inform environmental and planning decision</p>			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Laboratory Markets Ltd	LabClick	£28,735	£17,241
Project description - provided by applicants			
A knowledge-sharing website and database of global life science and clinical laboratories and their activities			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Scannerfutures Ltd	STREAM (STRoke detection by Electromagnetic Analysis at Microwave frequencies)	£100,000	£60,000
Project description - provided by applicants			
<p>The feasibility of medical scanning in which the beam uses low intensity Radio Frequency(RF) waves rather than X-rays, has been demonstrated in an Innovate UK funded study undertaken by Scannerfutures Ltd, a UK based micro SME. Stroke detection and diagnosis emerged from that study as the most immediate and societally urgent medical application of this new method of scanning. This Proof of Concept project builds upon that finding to develop a lab-based concept demonstration of this new type of diagnostic system. Currently stroke detection and diagnosis requires patients to receive an X-ray CT scan in hospital before a diagnosis can be made and treatment administered. These scanners are large expensive installations and hence are few in number, which leads to lengthy waiting times, which is highly detrimental to the recovery prognosis for stroke patients. Furthermore, the use of X-rays carries a certain risk, particularly if repeated scans are required over a short period of time. In contrast, RF scanning is intrinsically safe and has the potential to be significantly less costly than X-ray CT in manufacture, installation infrastructure and maintenance. Consequently RF scanners can be more widely deployed in hospitals, thereby reducing waiting times. Furthermore, RF scanning technologies facilitate a simple compact construction. Consequently, RF scanners can also be installed in ambulances, enabling stroke patients to be scanned, a diagnosis made and treatment administered at their location. This will dramatically shorten the time between the stroke and treatment, which will greatly improve the outcome for patients. RF scanning is potentially game changing for stroke detection and diagnosis. This project aims to construct a lab-based demonstration system that proves the concept and determines the achievable performance. This will inform the design of a field deployable prototype RF scanner that will be developed beyond this project to support pre-clinical trials.</p>			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Playmob Ltd	Playmob Engagement Platform	£163,754	£98,250
Project description - provided by applicants			
<p>The millennial generation comprises of people born 1980-2000. It is the biggest generation the world has ever seen (2.5 billion) and will comprise 50% of the workforce by 2020 (75% by 2030). They are tech-savvy, socially-connected & socially conscious. Their spending power is on the rise & they control it themselves. They will switch brands and products for those that are 'giving back' to society. Brands increasingly realise that customers want to buy from and work with companies that are giving back. Finding ways to link businesses to good causes improves brand perception and consumer loyalty for their products and services. (Why Millennials Matter, Blackbaud, Charities Aid Foundation). Legislation is increasingly being passed to ensure business contributes to society. Indian companies over £80m in size are now required to give 2% of net profit to charity. This will generate over \$US2 billion of donations annually. (Economic Times). We have repeatedly proven that linking user actions within digital games (e.g. completing an in-app purchase) to social causes benefits all parties. We have enabled significant commercial and social impact (inc. \$881,508 in donations) across many projects with 166 game companies (inc. EA, Rovio, Jagex) & 146 charities (inc. Save the Children, Comic Relief & WWF). Scaling this is limited, however, by the time and effort it takes to manually undertake each integration of a game with our tracking platform (approx. 6-12 weeks). Brands need to be able to create campaigns quickly and to quantify impact with organisationally-specific reporting. Charities need an easy way to find appropriate brand partnerships. Application publishers need easy integration. This R&D project aims to investigate the technical feasibility and commercial potential for a proof of concept of a new technology that can automate the process of linking user actions in all forms of digital applications to social causes.</p>			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Biosceptre UK Ltd	Proof of concept for nf-P2X7 to treat and diagnose cancers	£165,987	£99,592
Project description - provided by applicants			
<p>This project will deliver proof of concept (POC) data to identify a new diagnostic and to establish Kidney and lung cancer as therapeutic targets for BIL03s, our lead fully human therapeutic antibody. The World Health Organization reported that 8.2 million died of cancer in 2012. While progress has been made, patient outcomes remain poor particularly for kidney and lung cancer, existing treatments and those in development are inadequate. Biosceptre is an established UK company developing cancer therapeutics, its goal is to commercialise therapeutics and diagnostics to target nf-P2X7, a unique variant of the P2X7 receptor present at the surface of cancerous but not normal cells. Biosceptre has established freedom to operate and has a strong global patent portfolio. Antibodies targeting nf-P2X7 have shown specificity and efficacy in pre-clinical studies. Toxicology studies have confirmed they are safe. Hence, nf-P2X7 can be targeted safely and effectively. Our aims are to define the potential for efficacy in kidney and lung cancer indications using 'gold standard' patient derived xenografts (PDXs) models and to establish the potential for developing a companion diagnostic to define responding patient populations. Biosceptre will establish breadth of utility for BIL03s by obtaining efficacy data against a range of cancers and by analysing the correlation between BIL03s efficacy in patient derived tumour xenograft models (PDX) and P2X7 expression status. This will define the market for BIL03s and establish POC for a companion diagnostic. This approach will have a critical impact on the commercial viability of BIL03s by increasing the number of cancer indications targeted and facilitating selection of patient cohorts based on their P2X7 expression status. This project will foster academic collaborations and lead to publications. Biosceptre will also undertake business development activities to establish the commercial and clinical pathways for BIL03s development.</p>			

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