Technology Strategy Board
Driving Innovation

Results of competition: Smart - Round 4 - Proof of concept

Total available funding for this competition was £9.4m from the Technology Strategy Board.

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
Apperception Limited	DataCube Live - Latent semantic indexing for live data streams	£160,420	£96,252

Project description - provided by applicants

Increasingly high volumes of data are being generated and received by major organisations all the time creating pressures to understand how to interpret it and respond appropriately as well as the need to categorise and store the data. This process is accelerating with the increase in data from unified communications, social media and other new sources but the ability of service delivery organisations to analyse and respond to the data appropriately is becoming costly or impossible to manage manually.

The DataCube system has been developed to address this problem and has seen significant success when used for legacy data management within local authorities for auto-categorisation, retention policy and security labelling. This project builds on this platform by applying the technology onto live data streams as well as static data, including the potential to analyse email, digital voice and social media feeds, enabling organisations to react quickly to evolving issues, service requests and events, enabling them to respond appropriately. Using advanced content analytics, the system will have the capability to understand the content and priority of real-time unstructured data to direct it to the appropriate departments for response. This capability has a broad range of applications including security, law enforcement, emergency services, public services and marketing where rapid reaction can be critical. The project thus addresses a major unmet need, that of accurately analysing large volumes of real-time unstructured data, assigning appropriate categories, security labels and priorities, and enabling the organisation to provide an effective response with all of the available information. The ability to demonstrate that the system can accurately and consistently interpret the real-time data without any significant delay so that it can be responded to with the appropriate priority is key to confidence in the solution and the business case.

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Results of competition: Smart - Round 4 - Proof of concept

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
Applio Limited	High engagement learning methods (HELM) proof of concept	£209,828	£100,000

Project description - provided by applicants

Applio's HELM (high engagement learning methods) project seeks to develop a new type of learning technology that allows organisations in both the private and public sector to engage their personnel in new, more effective, ways. Business needs have changed:

• Structural in-balances in the workforce have increased skill gaps and disconnects between generations
• Emergence of a 'fully digital' generation in the workplace
• Employment relationships and engagement models have changed significantly
• Complex global environments mean strategy and process are insufficient without an effective culture
• Ease of 'hard' knowledge acquisition but greater need for complex soft skills
• Stakeholder affinity is increasingly critical but they are often less engaged.

The objective of HELM is to integrate collaborative game mechanics and associated techniques in ways not utilised before to provide a very different learning experience from those typically experienced by individuals in the workplace. HELM learning technology will support training in both knowledge and skill-based training but its unique capabilities will be in training areas that require connections to the emotions, attitudes and behaviours of teams and individuals. The 'proof of concept' project will identify and integrate the most cost-effective techniques to achieve this, thereby allowing HELM to be developed as a platform offered at a mainstream price point.

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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
BG Research Limited	Novel DNA fingerprinting apparatus: Portable, ultra-rapid and single base pair resolution	£166,665	£99,999
Project description - provided by applicants			
This project will produce and evaluate protype consumables suitable for the diagnostic separation and detection of DNA targets differing by only a single base pair in length. A large number of genetic tests rely on polymorphisms between DNA molecules, including DNA fingerprinting. The standard kits available on the marketplace involve the use of expert operators and expensive laboratory equipment. BioGene has previously demonstrated and applied for patent protection in the field of massive multiplexed detection, via novel chemistries and apparatus. The proposed research will investigate means of improving the resolution of this approach to the point where a lower cost, simplified consumable could be used in both the laboratory but also the field in markets such as forensics, human genomics and bacterial pathogen typing. BioGene (BG), BG Research (BGR).			

Results of competition: Smart - Round 4 - Proof of concept

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
Capito Systems Limited	Capito Systems Ltd - Rail travel	£163,568	£98,100

Project description - provided by applicants

Capito Systems is a B2B start-up company (established 2012) which has developed award-winning intelligent Speech Assistant technology for mobile commerce (mCommerce) applications. Our most recent award was for a free stand place at Mobile World Congress 2014 in a competition sponsored by UKTI and ICT KTN [34]. Pre-revenue but close to securing our first customer (as of writing), our technology offers a unique and novel opportunity to revolutionise mobile commerce globally.

This project will help us prove concepts that will enable us to drive demand for our speech assistant technology across a wide range of mobile commerce domains (i.e. industry sectors), and extend its accessibility to the sight-impaired and blind. Voice interfaces - particularly for smartphones - are emerging as “the new touch” and our language understanding technology is at the forefront of this revolution. Contextual understanding is the “engine” that powers voice and makes it truly useful to consumers. Capito Systems is pioneering this technology and bringing it into the mainstream by focusing its innovations on simplifying the process of finding information and purchasing goods or services on mobile devices. The biggest growth in online shopping now comes from mobile devices yet a vast opportunity is being missed as the percentage of purchase completions across mobile devices remains below 10% [1]. By proving the concepts described in this proposal we will put ourselves at the heart of the smartphone and tablet commerce revolution as a key enabler to mCommerce providers. It will help us to achieve our vision to become the world leader in our field and a vital cog in the mobile commerce value chain.

Results of competition: Smart - Round 4 - Proof of concept

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
Destiny Enterprise Solutions C.I.C.	Aid for birthing cattle in dystocia (ABC)	£135,245	£81,147

Project description - provided by applicants

Dairy farming is the largest UK agricultural sector at £3.5bn and represents 17% of agricultural production (Defra, 2013). Dairy cows must give birth in order to produce milk, but difficulty in birthing (dystocia) costs UK dairy farmers £83m a year. Significant improvements to birthing process are needed to improve welfare and protect dairy farmers' incomes (Dairyco, 2013). Vets and farmers need a safe method of assisting birth (Holstein, 2013). Destiny's experienced developers have designed a birthing aid based on an idea patented (No. 1016373.1) by Destiny's partner Bruce Sutherland (large animal veterinary surgeon), who has given Destiny exclusive development and exploitation rights. The Aid would be used by vet or stockman at the first sign of dystocia to gently expand a cows' birthing canal, increasing pelvic flexibility and stimulating a safe natural birth, thereby increasing welfare and protecting farmers' incomes. Initial responses from Holstein, DairyCo, vets and British Veterinary Association are extremely favourable but to add support they need evidence from live and comparative trials.

This 12-month project will develop using a bench prototype with durable Microkinetic materials, an inflation/release mechanism, and infection control tool to maximise performance. We will run trials with respected vets, breeders and schools to establish benefits. Based on discussions with vets, we estimate the Aid would help in 60% of dystocia. By 2020, with 2/3 adoption, the Aid could prevent 165,000 cow and calf birthing deaths in UK alone. This will save UK dairy farmers £28.8m a year and vets will earn £830k a year from sales and demonstration. At the end of this project we will then set up a new Ltd company (Destiny Developments Ltd) to develop the Aid and raise private funding for commercial development and exploitation in UK and globally.

Technology Strategy Board
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Results of competition: Smart - Round 4 - Proof of concept

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
Diamond Photofoil Limited	Photofoil direct printing system	£132,326	£79,395
Project description - provided by applicants			
System for the direct image printing of three dimensional objects.			

Technology Strategy Board
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Results of competition: Smart - Round 4 - Proof of concept

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
Exhalation Technology Limited	Home monitoring device for self-monitoring and control of COPD exacerbations	£83,636	£50,182

Project description - provided by applicants

We propose to develop a small, fully automatic, user-friendly device to detect lung inflammation to be used at home by COPD (Chronic Obstructive Pulmonary Disease) patients themselves. The device will use exhaled breath with H2O2 as the marker. It will allow COPD patients to share the results with healthcare staff remotely and make it easier for people from COPD risk groups to be screened. Current diagnosis and monitoring of COPD are typically based on clinical examination, spirometery, forced expiratory volumes and lung capacity measurements. A few commercial devices for detection of NO (Nitric Oxide) in exhaled breath exist, but NO detection generally requires a controlled exhalation, making it unsuitable for most COPD patients and for self monitoring. In the UK, there are estimated to be six million COPD sufferers, but the European COPD Coalition states that only an estimated 900,000 (1.5% of the population of the UK) are correctly diagnosed. The cost to the NHS of COPD prescriptions and hospital admissions in 2010 was £578m (NICE Costing Report 2011). We estimate that cost savings of 10% of this would be achievable after 18 months if our device was adopted. As exhaled H2O2 does not require a controlled exhalation, H202 is an ideal marker for home monitoring of COPD.

We have successfully demonstrated real-time assessment of lung inflammation using exhaled H202 in clinical settings in a pilot study at the UEA Medical School. The study demonstrated that exhaled breath H202 measurement can be applied to provide exact real-time analysis, and confirmed that exacerbating COPD patients display significantly higher H2O2 values. Patients found H202 sampling easy and preferable to alternative solutions, especially during exacerbations, where breathlessness made spirometry and NO measurements difficult. By developing the concept into an "all in one" fully automatic smaller device we will enable patients and physicians to detect lung inflammation far earlier.

Results of competition: Smart - Round 4 - Proof of concept

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
iProov	VISEDGE - Visual Identity aSsurance for EDGE Cases	£164,702	£98,821

Project description - provided by applicants

iProov is a pioneer in the field of identity verification, with an approach we refer to as “012” – zero effort, one-step, two-factor authentication. The company has innovated a set of identification algorithms combining specialist face detection and mobile device technologies. The VISEDGE project extends these capabilities to ‘edge cases’, extending the iProov service to previously unidentifiable prospective users. This is critical for mainstream usage of the service. The iProov service is provided as a cloud-based identity verification service to security-conscious service providers, such as financial institutions, exam providers, subscription service providers and web services requiring precise identification of users. Password-related login mechanisms have long been problematic in these systems, and a biometric login service has distinct advantages.

The VISEDGE project will research and combine candidate algorithms to provide robust and evidence-based coverage of difficult identity capture situations. This satisfies the requirements of advanced prospective licensees, who demand commercial validation of solutions. Today, although substantial academic research has been conducted in highly specific situations, no commercial data exists for identity capture ‘in the wild’. VISEDGE is a ‘proof of concept’ project, which will enable the extension of iProov coverage to ‘edge’ cases, and provide an evidence base to satisfy the demands of security-savvy prospective customers in advance of commercial implementation.

Results of competition: Smart - Round 4 - Proof of concept

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
M Innovations Limited	LabMonkey – robot for test, measurement and desktop automation	£35,610	£21,366

Project description - provided by applicants

Recent developments in computer hardware, sensors and mechanical actuators have meant that high performance, human-safe, integrated robots can be built at a price point never feasible before. This has opened up the possibility of using robots in applications previously deemed unsuitable or unsafe. We have identified an opportunity to create a general purpose, robotic arm for use in R&D (research & development) and NPD (new product development) setting for automating time consuming and repetitive processes such as testing, verification and pre-production validation.

We propose to develop a low cost, fully integrated, plug-and-play, human safe, desktop robot called the 'LabMonkey'. It consists of a single robotic arm with operating range and capacity similar to that of a human arm, 600mm reach and 5kg payload. It will incorporate a 3D camera (Microsoft Kinect) to perceive its surroundings and enable visual tracking of the task performed. The integrated single board computer (Raspberry Pi) will enable standalone operation or seamless integration with a PC or smartphone. It can be easily programmed by a simple teach and play method that does not involve any computer coding. It will be intuitive to use, easy to setup and will eliminate the need for users to be technically trained or skilled in order to operate the robot.

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Results of competition: Smart - Round 4 - Proof of concept

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Meniscus Systems Limited	Meniscus - Creation of a real-time analytics platform to enable smart management of big data	£83,658	£50,195

Project description - provided by applicants

Technology advances have increased the number of sensors available, the sources of information monitored, the frequency of data transmission and the bandwidth of transmission across inter-connected networks. This has caused an exponential growth in the amount of data both generated and stored. Meniscus provides data collection and analysis for utilities companies including water and energy. The analysis forms business intelligence that can inform decisions, improve operational management and increase efficiency. A major application of our existing analytics platform is the forecasting of hydraulic capacity levels in the sewerage networks for water companies. There is an opportunity to use all this new data with smart water solutions; the potential global savings for water utility companies is estimated between $7.1bn and $12.5bn each year.

Meniscus wants to take advantage of this opportunity by developing a real-time analytics platform, which will inform operational decisions of the sewerage network, prevent flooding incidents and reduce overall energy costs.

Results of competition: Smart - Round 4 - Proof of concept

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
Morgan Innovation & Technology Limited	Morgan-IAT: Haptic sensory system for the hand	£178,600	£100,000

Project description - provided by applicants

Haptic technology, or haptics, is a feedback technology, which mimics the sense of touch by applying stimuli, such as compression, friction and vibration forces to the user. In gaming and in ‘sensory rehabilitatio’ for individuals with disability, the ability for a user to 'feel' a virtual environment as well as ‘see’ it would be a significant advance on what is currently available and will open up numerous opportunities.

MIAT, in conjunction with Southampton University, is developing a haptics (multi sensory) system for the hand that will provide the user with a sense of touch, which when combined with position sensing technology, will allow the user to 'see' that motion or action. This technology has significant commercial potential as a gaming product, particularly as virtual reality gaming is becoming more popular, but will also be transferable to pioneering rehabilitation technology for sensory re-education in medicine, e.g. stroke recovery.

Results of competition: Smart - Round 4 - Proof of concept

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
Nanoclave Technologies LLP	Medical equipment disinfection with Mini UV Cabinet by Nanoclave Technologies	£69,081	£40,000

Project description - provided by applicants

The decontamination of near patient electronic equipment on hospital wards is currently expensive, time consuming, environmentally unacceptable and lacks efficacy. Decontamination is usually manual, by conventional cleaning and disinfecting with chemicals and wipes and cleaning staff struggle to effectively decontaminate these complex shaped sensitive electronic devices. As complex electronic equipment becomes ever more prevalent on hospital wards, there is an urgent need for an effective automated decontamination method. Without this, these high touch point surfaces will continue to aid the spread of infection.

Nanoclave is an SME established to commercialise the use of short wavelength high-energy ultraviolet light for pathogen decontamination. We have developed the concept of a UVc decontamination cabinet for processing portable medical equipment which promises to reduce the time it takes to decontaminate such objects and improve patient safety. The key advantages of the technology are:

• Up to five times quicker than existing best methods such as manual cleaning
• Repeatable and validated process with feedback and cycle logging
• Reduction in hospital acquired infections and death.

Results of competition: Smart - Round 4 - Proof of concept

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
Owned it Limited	Enhancing retail experience with hyper personalised predictive targeting	£214,557	£100,000

Project description - provided by applicants

The retail industry across the developed world continues to develop at a staggering pace as consumers adopt to new technology and shopping channels - both traditional and online offerings. Traditional retailers, such as Boots and John Lewis have a wealth of information for some key consumers driven by Store Card activity which is used to promote general buying opportunities on a broad based basis. Many of these traditional retailers have developed an online presence but turnover is threatened by smaller leaner online retailers. Major retailers are interested in utilising their consumer data to better effect but are unable to do so. Owned it Limited is a fast growing, equity backed technology business which has developed and licensed a sophisticated social marketing automation platform for online retailers with over 1000 organisations currently using the system, processing 100,000's of weekly transactions, generating significant extra sales through social campaigns.

Owned it wishes to undertake a 'proof of concept' project to research and prove key technology to enable us to build a sophisticated predictive retail marketing campaign platform. Areas for research and prototyping include the use of psychometrics to understand buying behaviours, data mining publically available social data on individual consumers to develop buying profiles and the use and extraction of retailer held data to generate an overall current and future buying profile of individual consumers. This is all extremely innovative and if the technology blocks can be proved to be effective to undertake a subsequent development of prototype project to create a full-fledged platform for release in 2015. The 'proof of concept' project will cost some £214k to undertake and a grant of £100k is sought from the Technology Strategy Board to enable this highly innovative and disruptive project to be undertaken.

Results of competition: Smart - Round 4 - Proof of concept

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
Oxford Expression Technologies Ltd	A novel production system for virus-like particle vaccines	£94,647	£56,750

Project description - provided by applicants

One of the greatest challenges to human and animal health, particularly to young adults, is the threat of emerging infectious diseases, which can spread rapidly across countries and through unprotected populations. Many of these threats come from virus diseases, in which mutations enables a virus to spread into new animal or human populations. It is therefore important that we can respond by the production of new vaccines in a timely manner. Effective vaccines to many virus diseases can be made by immunising people or animals with a non-infectious particle that mimics the infectious agent; such particles are usually referred to as virus-like particles (VLPs). In recent years it has been shown that an insect-specific virus, a baculovirus (BV), can be used as a tool to deliver the blueprint for the target vaccine VLP into an insect host cell, which then acts as a factory to produce large quantities of the required VLP vaccine. This so called 'BV system' is safe, because only insect viruses are used; is rapid, new VLP vaccines can be produced in a just a few weeks; and is easily scalable to produce 1000's of vaccine doses. BV-derived vaccines have already been approved for use in animals and humans and so have a successful track record. However, as more VLPs have been produced in insect cells, a significant hurdle has been discovered; in many cases it is difficult to separate the desired VLP from the baculovirus particle and this has lead to time consuming and laborious purification techniques that have often led to poor yields or even no useful VLP product at all.

Our project aims to address this technical challenge by testing a novel BV system in which we can control production of the baculovirus particle, by using what is essentially a molecular on/off switch. If our control system works, we will be able to switch off BV particle synthesis at the time of target VLP production and thus avoid the need for any further purification steps.

Results of competition: Smart - Round 4 - Proof of concept

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
RAFT Solutions Ltd	Precision dairy management system	£159,534	£95,720

Project description - provided by applicants

Profitable UK dairy farmers achieve competitiveness through efficiency gains thus meeting the challenge of producing quality food, meeting the needs of the market while minimising their impact on resources and the environment. The best measure of economic efficiency at the farm level is net margin per litre of milk produced. This measure captures the effect of both technical, cost and scale efficiency and is therefore an attractive high level benchmark to use across production systems. The latest information from DairyCo's MilkBench+ data base is that the variation in this measure of efficiency is large, with a difference of 12 ppl between the 25% highest net margin producers and the 25% lowest margin producers. This constitutes a significant opportunity for a large number of farmers to increase profits, production and sustainability.

This project will develop an internet-based service for dairy farmers and their approved advisors to manage dairy farm performance. The service will consist of three elements: 1) a sophisticated farm management tool on which users will record a structured set of data to be stored online. This unique system will allow point of use data capture of all physical and financial inputs to the business; 2) the programme will provide analysis for weekly, monthly and annual performance reviews in real time; and 3) the web service will also provide an analytical tool for users to carry out their own analysis. This part of the service is aimed at advisers.

The project requires significant development and will provide a step change in the way farmers and advisors are able to use data on farm. The management tool that this project will develop aims to equip 21st century farmers to meet the challenges of the next decade, satisfying an increasing world demand for food while minimising the impact of production on natural resources.

Results of competition: Smart - Round 4 - Proof of concept

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
RINICARE Limited	PRIME (PRe-hospital Information and Monitoring E-system)	£179,795	£100,000

Project description - provided by applicants

Rinicare's Pre-hospital Information and Monitoring E-system (PRIME) proposes to develop a mobile health information and monitoring platform aimed to optimise patient pathways in pre-hospital healthcare and ambulance services' efficient performance. PRIME's proof-of-concept (PoC) will assess the technical feasibility of creating an intuitive and rich patient electronic form (eForm) that considers NHS requirements and the paramedics' mobile environment, procedures and workflow, integrating real-time continuous recordings of patients' vital signs and multimedia data (written and audio notes, images and high-definition video). The PRIME eForm can be seamlessly shared with remote specialists (telehealth) to assist early and accurate assessment of patients' conditions and the provision of treatment advice to paramedics on site and in the ambulance.

PRIME innovation will impact pre-hospital healthcare on the ability to sustainably develop ambulance services and their increasingly active role in healthcare, improve patient satisfaction as well as the NHS new competitive nature, cost savings effort, paperless approach and integrated care vision, in the name of quality and excellence in healthcare delivery.

About Rinicare: Rinicare Ltd. is a Lancaster-based (UK) SME that offers state-of-the-art technology solutions for healthcare applications. Products and solutions provided by Rinicare utilise the latest information and communications technologies and provide solid foundation for enhancing its users' quality of life. Rinicare's state-of-the-art technology-based healthcare portfolio present ACUSCEN (electro-stimulator for pain relief), CARDIOLEAF (ECG wireless heart monitor system), WiFIT (mHealth app) and KHIMS (kids health indicators monitoring system).

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Driving Innovation

Results of competition: Smart - Round 4 - Proof of concept

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
RNF Digital Innovation Limited	iMAP	£170,166	£100,000
Project description - provided by applicants			
The management of health and safety (H&S) at work requires firms to have access to competent advice so they can meet their H&S obligations, using in-house support where it is available, and according to the Health & Safety Executive (HSE) most small firms should be able to deal with their workplace H&S issues easily themselves. As can be appreciated, many firms (particularly small ones) struggle with the process of risk assessment. Our proposal is to create a cloud-based service based on real time intelligent forms fully compliant with H&S legislation and completed by the person responsible for H&S via a handheld device. This will enable businesses to quickly manage their H&S obligations and wherever possible continue to do this in house.			

Results of competition: Smart - Round 4 - Proof of concept

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
Roli Ltd	Sensei-POC	£163,000	£97,800

Project description - provided by applicants

There are nascent problems that face the future of “located” HCI (peripherals devices that enable people to interact with non-mobile computing devices, like desktops and laptops). We will always want to benefit from the larger screens and greater computing power that located computers enable. But located HCI has seen far less innovation than mobile HCI, and the innovation we have seen has serious limitations. Sensei is a new concept in physical interface design, a new kind of physical input device for personal computers which integrates tactile and spatial data to create a new set of user interaction possibilities. The product will be a fusion of the interaction concept behind our music hardware Seaboard product and the motion-control paradigm of Leap Motion - or Kinectstyle controllers.

ROLI is a technology start-up whose initial focus has been music hardware. We are undertaking the Sensei project because it directly aligns with our primary mission, which is to empower people through intuitive technology. What this means in more practical terms is that we invent, design and build products and technologies – both hardware and software – whose stated aim is to increase the bandwidth of interaction between human ingenuity and the digital frontier. Our proprietary SEA Interface technology is a disruptive platform hardware innovation that enables high resolution pressure sensors to be embedded in any form factor and enables groundbreaking interactive device applications in a wide range of industries. Sensei is a novel application of the SEA Interface that is intended as an improvement over existing desktop peripherals. Development of Sensei not only plays to ROLI’s strengths, utilising our design and engineering expertise, it also helps us fulfil our primary company mission. The purpose of this project is to create a proof-of-concept prototype demonstrating the core functionality of the Sensei concept over the course of nine months.

Results of competition: Smart - Round 4 - Proof of concept

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
Rotary Engineering UK Limited	The production of high value decorative laminate metal products by Friction Stir Welding	£99,925	£59,955

Project description - provided by applicants

Rotary Engineering UK Ltd will carry out a 'proof of concept' study on the production of a high value, patterned metal laminate material (mokume gane) for use in the jewellery and decorative metals industry. Mokume gane (meaning wood grain metal in Japanese) is a premium jewellery product manufactured by bonding and patterning layers of different coloured metals such as gold and silver. Traditional production of mokume gane using diffusion bonding is difficult and expensive, involves multiple manufacturing stages, and is limited in the maximum size of sheet production. It also has a high failure rate and remains at the craft level, relying on the expertise of individuals with many years' experience rather than a modern manufacturing technique.

We have developed a novel method of producing a mokume gane type material using friction stir welding (FSW). By adapting FSW it has been possible to demonstrate bonding of many layers of dissimilar metals while simultaneously producing unique patterns in the metal, removing the need for a separate patterning stage. This approach minimizes processing, reduces waste and potentially lowers costs. The FSW technique avoids many of the problems experienced in traditional production, e.g. melting or lack of bonding, while allowing production of much larger sheet size and thickness. With this proof of concept funding we aim to develop our capabilities to produce a laminate sheet with commercially marketable patterns by FSW.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Scannerfutures Limited	IMPACT (Imaging by microwave phase and amplitude contrast)	£100,000	£60,000

Project description - provided by applicants

The feasibility of computed tomography (CT) scanning that uses radio frequency (RF) waves rather than X-rays has been demonstrated in a feasibility study undertaken by Disect Systems Ltd and subsequently by a preliminary 'proof of concept' study by Scannerfutures. The market opportunity for RF CT has been investigated and shown to be compelling in a study also undertaken by Scannerfutures. This project will build upon the success of the previous studies by further developing the technology required to bring this new breed of scanner to fruition. X-ray CT scanners are widely used across the public and private sectors, particularly in health. They can be large expensive installations and the use of X-rays carries a certain risk. In contrast, RF CT scanning is intrinsically safe, lends itself to a simple compact construction and can be widely deployed where X-ray CT is impractical. Furthermore, RF CT has the potential to be significantly less costly than X-ray CT in manufacture, installation infrastructure and maintenance.

It is therefore feasible for desktop sized RF CT scanners to be deployed in GP surgeries and community clinics for the frontline assessment of minor injuries. That would enable these centres to deliver a more comprehensive service to their local communities and help to reduce the burden on hospitals. In addition to health and medicine, compact portable RF CT scanners would find widespread use in veterinary practice, research, industry and security. RF CT is therefore well suited to deployment on a scale far exceeding that of X-ray CT and has the potential to create a new and expanded market place. RF CT is game changing. This subsequent proof of concept project aims to further develop the core technologies required for RF CT, to the point where third party external investment can be sought. This will enable the project to move RF CT into the 'regulated product development' phase in preparation for clinical trials and certification.

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Results of competition: Smart - Round 4 - Proof of concept

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
ShyDen Biotechnology Ltd	Safer activatable, anti-EGFR bispecific antibodies for metastatic colorectal cancer	£62,634	£37,580
Project description - provided by applicants			
ShyDen Biotechnology is a start-up antibody drug discovery company based in the Open Innovation incubator, The Stevenage Bioscience Catalyst. It is discovering and developing the next generation of bispecific antibodies that can be switched on or off, thus carrying a new level of molecular regulation and thus safety. This project is to take two clinically-approved and established monoclonal antibodies and combine them in such a way as to produce a bispecific antibody when binding of one arm controls the other. This will be aimed at metastatic colorectal cancer, but later other solid cancers could be targeted.			

Results of competition: Smart - Round 4 - Proof of concept

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
Sound Approach Limited	Sound Approach Ltd is developing dispensers for wet wipes for use in medical and commercial establishments.	£155,586	£93,352

Project description - provided by applicants

The project is predicated on the fact that there is pent-up demand for reliable wet wipe dispensers within the medical and commercial sectors. A previous Technology Strategy Board grant has resulted in the design of hermetically sealed soft packs (HSSPs) of wet wipes from which wipes dispense in single sheets and within which the wipes always remain fresh now makes deploying these soft packs of wipes from within dispensers feasible. Kimberly Clark (K-C) is officially evaluating them for their baby wipes and flushable wipes markets.

This project will therefore now address the technical challenges and design issues relating to how to deploy these HSSPs and tubs of wet wipes within dispensers. Particular emphasis will be paid to developing a fool-proof system to ensure that specific dispensers will only accept the correct wipe types. This 'differentiator system' will ensure that wipes with, say, a harsh chemical impregnate, cannot be erroneously placed into a dispenser located within a baby changing area or into dispensers reserved for wipes that are to be used to cleanse bed-bound patients. Such mistakes could result in harm to the skin of the baby or bed-bound patient - and even law suits.

The company has patented such a differentiator system which has the added benefit of protecting the shape of the consumable from imitators, thereby safeguarding the licensees' long-term consumable business. K-C are keenly interested in seeing samples of the dispensers to be developed which could lead to them possibly market testing the dispensers if the prototypes can be shown to elegantly deliver as per expectations.

Results of competition: Smart - Round 4 - Proof of concept

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
Stage One Creative Services Limited	Stage One Freeform Printing	£130,698	£78,400

Project description - provided by applicants

The aim of the Freeform Printing project is to commercially develop a unique, large-scale additive manufacturing (AM) technology for architectural and scenic applications within 10 months. AM is being used in a range of industries, such as automotive and aerospace, however, the capability to commercially produce large-scale structural elements for architectural and scenic applications using 3D printing currently does not exist.

Freeform Printing will bring the benefits of AM to the architecture and event sectors and, in doing so, will bring the UK to the forefront of this emerging and revolutionary technology by providing both the know-how and means to produce large-scale 3D printed structures. Freeform Printing will produce complex geometry elements more cost-effectively, faster and with less environmental impact – less waste, less embodied energy and less embodied CO2 – than traditional, subtractive manufacturing methods. One-off, complex geometry, elements, such as façade panels, currently cost approximately £1,500/m2 to produce. Equivalent panels produced by Freeform Printing will cost approximately 46% less to produce (£800/m2). This will act as a catalyst for the creative design industries to realise more designs. It will also increase UK export income, as the biggest commercial opportunities are with projects overseas. Stage One is at the forefront of both digital manufacturing for architectural and scenic applications, which was recently recognised with a Queen's Award for Innovation 2013. These factors place Stage One in the ideal position to realise the enormous market opportunity presented by large-scale AM. We project that Freeform Printing will turnover £1m in year 1, rising to £6m by the end of year 5. Please refer to Appendix A for further details about the market dynamics and the exploitation plan.

Results of competition: Smart - Round 4 - Proof of concept

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
Start-rite shoes Limited	Development of a cost effective novel and ergonomic mass customisable children's footwear (FIT-RITE)	£145,259	£87,155

Project description - provided by applicants

Shoes that restrict the natural motion of the foot also force the foot into specific motions that can be unhealthy. Children's feet are particularly vulnerable as they are still growing and are at a higher risk of foot and lower limb problems if the natural motion is restricted. Whilst a more flexible shoe does not affect this motion to the same degree not all feet require the same amount of flexibility, and ideally the shoe design characteristics should match the individual's foot function. For a shoe company to offer a range of shoes that enable the matching of footwear design characteristics to individual foot function would require a large range of shoe types per design. Presently, the capital investment for tooling associated with a large number of shoe variants would be cost probative. To compound this issue the large number of variants would require us and our retailers to carry large amounts of stock and reduce the amount of shoe styles as cash becomes tied up in shoe variations.

The project will develop the knowhow to enable a shoe to be mass customised at point of sale to fit ergonomically to the individual foot characteristics based on two width fittings and up to six structural types. This would have the benefit of reducing the manufacturing cost, a better use of stock space and increasing the number of styles stocked by retailers. The first aim will be to determine the common feet characteristics and use this information to create a design configuration on which areas of the shoe to customise for best fit. The second aim will be to determine how to change the properties within the shoe to achieve the desired fit. An experimental shoe will then be designed and a basic prototype manufactured. The shoe will then be tested to validate against the design configuration.

Technology Strategy Board
Driving Innovation

Results of competition: Smart - Round 4 - Proof of concept

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
Super Enterprise Associates Limited	Interactive sensing surface	£166,527	£99,916
Project description - provided by applicants			
This project will prove the concept for an interactive battery-less sensing surface seamlessly able to sit on and interact via the back of smartphone/tablet devices. The concept is based on utilising a number of innovate technologies, each cutting-edge in their own way, and then combining them in a way that has not been done before. This concept proposes to expand user interface and bring new functionalities and new dimensions to the back of the mobile devices.			

Results of competition: Smart - Round 4 - Proof of concept

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
TecExec Ltd	ReXLPE – The Recycling of Crosslinked Polyethylene (XLPE) scrap	£158,450	£95,070

Project description - provided by applicants

Polyethylene is widely used across industry in both Low Density (LDPE) and High Density (HDPE) forms. Crosslinked PE (XLPE / XPE / PEX) is increasingly being used for applications where there is a need for improved long-term thermal or chemical stability, such as in heavy-duty electrical cables as insulation materials (XLPE), in plumbing as hot water and central heating piping (PEX – nearly 50% of the market) and in the automotive industry as seating foams. Whilst regular LDPE and HDPE plastics can be easily recycled using conventional technologies, crosslinked material cannot be easily returned to its non-crosslinked state for reuse. This means that currently, XLPE production scrap and off-cuts generated during product application are discarded. This scrap represents a valuable and costly resource and its recovery is highly desirable.

In order to recover this material a technology is required that can reverse the crosslinking process whilst retaining the technical properties of the polymer. Work carried out on crosslinked rubber polymers using Gradient Compounds' CDV (Continuous Devulcanisation) technology has demonstrated both the technical and commercial feasibility of recovering rubber materials at production scales for reuse in their original application with minimal or no loss of properties or alteration of the customer's production process. Previous work carried out using controlled stress fields to rupture XLPE networks has shown promise and research in Japan has led to the commercial application of XLPE materials processed using an extrusion technology, within the cable industry. CDV technology is likely to offer improved efficiency and economy over the Japanese process but this needs to be confirmed with trial work at both laboratory and industrial scales.

This project will look at the application of CDV technology to post-industrial XLPE materials through a proof-of-concept study using existing CDV laboratory and pilot production apparatus.

Results of competition: Smart - Round 4 - Proof of concept

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
Tecvac Limited	"AdCrManu": Advanced CrAlNO nanostructured PVD coatings enabling the mass-manufacturing of complex die-cast aluminium/steel hybrid components	£166,645	£99,987

Project description - provided by applicants

The objective of the “AdCrManu” project is to prove a concept which, when proven, will enable partners to take commercial advantage of an existing urgent global market demand for lighter-weight and more complex automotive components.

The main aim of the project is to prove a concept which will enable the mass-manufacturing of complex die-cast aluminium “hybrid” components. Hybrid die-cast components made of aluminium-steel and aluminium-plastic have the strength necessary to replace heavier steel parts and single-material parts thereby reducing weight , saving fuel and reducing CO2 emissions especially in automotive applications.

The concept to be proven is that the efficiency of aluminium die-casting manufacturing processes can be improved through the development of an innovative new generation of multifunctional nanostructured protective coatings. These innovative new coatings will provide the benefits of enabling the mass-manufacturing of hybrid components and other Al-die cast components with more complex shapes than can currently be Al-die cast. These innovative protective coatings will prolong Al-die cast tool life, enhancing production efficiency and reducing production cost, thereby making it cost effective for end-users (automotive manufacturers) to use more hybrid and complex shaped aluminium die-cast components, and so growing the market for hybrid, and more complex shaped Al-die-cast components.

Technology Strategy Board
Driving Innovation

Results of competition: Smart - Round 4 - Proof of concept

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
Touché NFC Limited	NFC Transactions bypassing the secure element	£59,004	£35,402
Project description - provided by applicants			
The proposed project targets investigation of possibilities and barriers in developing a feasible end-to-end NFC smartphone-based travel product while not utilising an embedded secure element.			

Results of competition: Smart - Round 4 - Proof of concept

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
Ultromex Limited	Proof of concept for a new process to recover metals from furnace slag and dross with a 90% energy saving	£136,410	£81,846

Project description - provided by applicants

Slag is a by-product of metal smelting, and several 100,000 tonnes of it are produced every year in the process of refining metals and making alloys. Slag usually takes the form of a loose aggregate with lumps of varying size. Slag contains impurities from the metals, which float to the top during the smelting process. Also, slag forms a protective crust of non-metallic and metallic oxides on the surface, protecting the liquid metal underneath from oxidation. When smelting is complete, the slag is skimmed off and deposited in a slag heap to 'age'. Slag actually has many uses, and rarely goes to waste, but it is used in low value applications such as ballast in concrete and in aggregate road materials. However, slag retains significant amounts of metals, and these are sometimes recovered by re-melting the slag, but this is extremely expensive with a very high energy burden.

Our idea is to use a novel technology to selectively break down the non-metallic components of slag from the metallic particles. This novel technology was originally developed to recycle waste glass and is relatively new, and has not been applied commercially to other materials. We have carried out some simple tests and the results indicate there is some degree of preferential reduction and separation of metal from non-metal particles. Further research will allow us to explore the novel process more closely, and we believe that with modifications the technology could be refined to treat a variety of different NFM slag materials very effectively and should significantly improve metal recovery from all slag. The metal recovery route will vary from material to material but almost any metal recovery from slag could be achieved using our concept process route. The benefits of the proposed process versus existing process are:

• 90% saving in energy cost
• Rapid local turnaround of material

- 90% cut in the carbon footprint
- Retain control of metal recovered
- Enable smelters to recover more metal.

Results of competition: Smart - Round 4 - Proof of concept

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
Undo Limited	The Undo Flight Recorder: a new approach to fixing software failures in the field	£131,753	£79,000

Project description - provided by applicants

This is a proposal for the development of a new technology to assist in the diagnosis and fixing of Linux software failures (i.e. bugs): the Undo Flight Recorder (UFR).

Software is written by developers working for a Software Vendor, and consumed by an end user. End users may also work for the software vendor (e.g. in-house developers, testing departments), although more usually for another organisation. When software contains bugs, the end user will suffer crashes and/or a decrease in their applications' performances. Buggy software creates significant costs to the vendor and represents even greater costs to the end user. It is the software vendor's responsibility to fix bugs reported by end users. To analyse an end user reported software failure, developers must (1) reproduce in-house, or (2) gain remote access to the end user's computer, or (3) travel to the end user's site, or (4) use an error-reporting scheme to gather sufficient information. Error-reporting schemes are desirable as 1-3 are usually expensive and time-consuming and often impossible. However, existing error-reporting schemes tend to contain at best a snapshot of the program state at the time of the failure, with very limited information about what led up to the failure. UFR is an error-reporting scheme significantly better than anything currently in use. It removes the need to reproduce software failures. Once embedded into the software vendor's program, UFR enables the program to record itself. The resulting recording contains everything the buggy program did and can be loaded into the developer's computer for analysis. Furthermore, the Linux debugging tools market is under-developed when compared to tools available for other operating systems such as Windows.

Results of competition: Smart - Round 4 - Proof of concept

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
Warwick Analytical Software Limited	Project "ARCA" - Automated real-time classification in aerospace maintenance, repair, overhaul and logistics market	£159,643	£95,785

Project description - provided by applicants

There are significant challenges and costs in Maintenance, Repair and Overhaul & Logistics (MRO&L) in terms of identifying and resolving issues quickly leading to significant cost, delays and ultimately safety. This is due to a number of factors: increasing complexity of systems, interrelatedness of distinct issues and nature of the data collected which is big, dirty and disparate.

Getting to the root cause of an issue can save time and money and can have significant impact for companies involved. Warwick Analytics (WA) has been approached by several companies to look at No Fault Found issues in the aerospace. WA has had some success but has encountered particular problems with data which, whilst applicable to other industries, are particularly problematic in the aerospace industry. MRO&L data is generally collected manually either written or through computer forms. However, the data are often semantically incorrect due to different interpretations of a problem. Whilst intentions are good, it can make it difficult to get to the root cause of issues. Commonly, the data has to be reinterpreted/classified by hand so that it can then be used further. This proof-of-concept project will create a new specialist concept tool to convert syntactically correct but semantically incorrect data to help resolve the root cause of the issue in real-time, ultimately leading to cost effective solutions in MRO&L to enable predictive and preventative maintenance. This will apply to NFFs which are generally the most challenging issues to root cause.

Results of competition: Smart - Round 4 - Proof of concept

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
XAD Communications Limited	XAD - Satellite communications on the move (SOTM)	£340,620	£100,000

Project description - provided by applicants

The subject of this proposal is the design and development of a mobile antenna system that will automatically connect to a VSAT satellite system to provide a two-way voice, data, video or internet connection in locations and/or situations where there is no other viable form of communications.

Two novel aspects of the proposed design are that the communications link will be maintained while the vehicle is moving and that the system is packaged in a low-profile housing suitable for roof-top mounting on most vehicles.