

## Results of competition: Smart - Round 6 - Development of prototype

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
<b>3 Boys Limited</b>	PEEL-IT - DOP Project for an innovative environmentally-friendly paint packaging solution	£548,687	£246,909
<b>Project description - provided by applicants</b>			
<p>Following excellent results from proof of concept trials this project will translate the initial concept into a high speed, pilot paint packaging solution capable of manufacturing 2.5l oblong paint containers at 900 units/hr (&gt;8m/annum). The project builds upon work &amp; lessons learnt during the SMART POC Project 710233/6916. The manually produced sample pots of the POC project have been favourably evaluated by B&amp;Q (reference letter in Appendix A) &amp; they are now seeking much higher volumes of pots (&gt;5000) to complete comprehensive supply chain &amp; consumer testing trials.</p> <p>This project is a key step to securing large scale customers for this novel sustainable packaging system. There is currently a major problem with the disposal of paint containers due to waste paint &amp; contamination of the packaging. Waste paint tins cannot be treated through the normal waste streams due to the cost of cleaning &amp; over 95% of all paint tins are not recycled &amp; go to landfill. A recent pilot UK paint pot recycling centre has been found to be energy intensive &amp; not an effective solution.</p> <p>The PEEL-IT comprises of an outer pot made from recycled cardboard which incorporates a thin plastic film pouch. After use, the consumer separates the film pouch from the outer pot. By using packaging with a separate barrier film the major issues with conventional packaging are eliminated. The main innovations relate to</p> <ul style="list-style-type: none"> <li>i) insertion &amp; bonding of the film pouch with the outer container;</li> <li>ii) the easy removal of the film pouch by the consumer;</li> <li>iii) incorporation of a resealable lid into the paint pot.</li> </ul>			

# Technology Strategy Board

Driving Innovation

The main objective is R&D of the production process steps & automated assembly machinery to enable the production of large quantities of Peel-it paint pots. The project benefits include environmental (reduced waste), social (consumer behaviour) & commercial (lower cost paint pots). This project will focus on the development of paint pots, subsequently it will be broadened into packaging of other products.

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Accutronics Limited	Chameleon	£893,913	£250,000
<b>Project description - provided by applicants</b>			
<p>Critical medical support devices including ventilators and patient monitors require a battery, serving either as a primary source of power or as back up in the event of mains electricity failure. Medical devices are generally characterised as having long development cycles with manufacturers slow to adopt new technologies.</p> <p>Product life cycles tend to be long so manufacturers can recoup high development costs and health authorities cannot afford to renew equipment regularly. Against this backdrop, a large number of medical devices use outdated environmentally unacceptable battery chemistries and technologies which lack the battery features (such as rapid charging, high discharge capacity, fuel gauging and lightweight) consumers enjoy with mobile phones, cordless power-tools and laptop computers.</p> <p>There are sound economic and social benefits for removing patients from hospital and treating them in their own homes or in community care. The portability of medical equipment is often limited due to the size, weight and output of their battery technology. Medical OEMs are reluctant to make the considerable investment required to design, tool and qualify a customised battery due to their modest production volumes – they therefore use what is available on the open market with the compromises this entails.</p> <p>Following the successful completion (March 2014) of the ‘Proof of Concept’ project, Accutronics propose to develop a novel prototype battery system utilising the latest high capacity, high rate, rechargeable cell technology, coupled with state of the art electronic systems allowing safe and efficient charge management along and accurate fuel gauging technology. The system will be configurable in both electrical output and mechanical arrangement to satisfy the needs of multiple medical OEMs who are looking to develop the next generation of medical equipment. The system will be qualified to the latest international standards required for batteries in medical devices.</p>			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Aeristech Limited	Aeristech 48V electric supercharger - Prototype development to TRL 6/7 and MRL 4	£497,332	£223,799
<b>Project description - provided by applicants</b>			
<p>The aim of this project is to bring Aeristech’s novel electric supercharger to TRL 6/7 maturity level (“A-Sample” in the terminology of the automotive industry). This will build upon Aeristech’s successful proof of concept grant project completed in Q1 2014, and make the technology commercially attractive. Once at TRL 6/7, the automotive industry is well equipped to move the technology through its development process into mass production.</p> <p>With the requirements for lower fuel consumption and low emissions targets, engine downsizing and therefore engine boosting is becoming an increasingly popular solution. In line with the general drive towards vehicle electrification, electric superchargers are expected to become a key enabler to extreme engine downsizing. Aeristech’s proprietary technology is based on a novel control architecture and associated permanent magnet motor design that is the most power-dense, efficient and cost effective solution for variable, high-speed applications.</p> <p>In February 2014, Aeristech successfully completed a TSB Smart funded project at “Proof of Concept” level for the design and development of a 48V electric supercharger (eSupercharger) for 2.0L or less ICE engine boosting applications. Within this project, Aeristech will develop product-relevant designs that enable the electric supercharger to function in a realistic environment such as a car engine bay, with temperature and other environmental factors.</p> <p>Moving forward, Aeristech aims to work on a commercial basis with automotive OEMs and Tier-1s to tailor the electric supercharger to their specific performance requirements and cost targets, working towards a licensing arrangement whereby Aeristech would partner with experienced automotive component manufacturers to develop the electric supercharger for mass production. Demonstrating Aeristech’s technology at TRL 6/7 level with TSB grant support will be critical in capitalising on this near term market opportunity for eSuperchargers.</p>			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Akacode Technologies Limited	Augmented Intelligence Help Systems (Akacode Tech)	£278,034	£125,115
<b>Project description - provided by applicants</b>			
<p>Software is the disruptive force driving innovation, providing the competitive edge to business, reshaping the world economies and transforming all sectors of our society. Software has become an indispensable commodity without which our modern world cannot function and has turned software development into a global economy that provides employment to millions of programmers and is worth billions of US dollars per annum. Meanwhile, the demand for software is rapidly growing, but the number of developers available to produce this commodity is not. Increasing the pool of available skilled developers will help, but that alone is not enough. It is their effectiveness that will become the limiting factor in keeping up with the growing demand.</p> <p>Software is also becoming more complex with programs now routinely comprising tens of thousands or even millions of lines of code. Understanding how modern software works is cognitively challenging, but essential in order for developers to modify software and to find and correct errors in the code. The industry continues to ship software riddled with defects that compromise functionality, security and privacy, costing firms billions of US dollars annually. There is clearly an urgent need and an economic imperative to address this state of affairs. Programming is a hard cognitive task for humans to perform, so developers rely on a range of programming tools to ease that cognitive burden. The aim of this research project is to shift that cognitive burden from the programmer to the machine.</p>			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
<b>Cipher Surgical Limited</b>	Novel robust cleaning system to remove stubborn human adipose tissue (HAT) from keyhole surgery laparoscopes	£400,540	£180,243
<b>Project description - provided by applicants</b>			
<p>Laparoscopy is abdominal “keyhole” surgery used in General Surgery (e.g. Appendectomy, Hernia Repair, Gall Bladder Surgery and Obesity Surgery), Urology, Colorectal Surgery and Gynaecology. The laparoscope acts as the surgeon’s eyes by projecting an image of the operative site on an external screen. The scope lens is regularly contaminated by fluids, blood, tissue, fat or fogging any of which will impair the screen image. Until recently the only way of cleaning the scope was to remove it from the patient during a procedure. This results in the surgeon’s work flow and concentration being broken, the operation stopped and restarted, and there is a risk to patient safety since the surgeon can no longer see the operating field – and often at a critical moment (for example when there is bleeding).</p> <p>A 2013 Kings College Hospital study showed that the scope is removed on average 13 times per procedure and even then a surgeon will work 37% of the time with sub-optimal vision. The applicant, behind this application, developed and markets the OpClear, a device to clear the lens of all contamination whilst the scope remains within the patient. The OpClear is a disposable sheath that clips onto a laparoscope and delivers a bolus of CO<sub>2</sub> across the lens surface to instantly clear the lens.</p> <p>In Clinical Evaluations the OpClear successfully clears all contaminants except one – Human Adipose Tissue (HAT). Essentially HAT is vaporised fat caused by using energy assisted techniques to cut or ligate tissue. This creates a fatty smear that clings to the lens. Market feedback is that if the HAT problem can be solved we can immediately sell the OpClear to the broad community of laparoscopic surgeons both in the UK and Europe. Without a solution sales will be very difficult. We present the enclosed to develop a solution to integrate into OpClear to remove stubborn HAT contamination from the lens. The key objective is the validation of a prototype HAT system in a clinical setting.</p>			

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<b>Cortexica Vision Systems Limited</b>	"street style" visual recognition prototype	£482,725	£217,226
<b>Project description - provided by applicants</b>			
<p>“Visual search is finally here,” so said New York-based Liz Bacelar during a panel discussion about the future of shopping at the annual SXSWi festival recently in Austin, TX. Bacelar is founder of Decoded Fashion, a group that aims to foster creative partnerships between startups, fashion designers and retailers. Cortexica are a retail fashion image-recognition company, and we presented on the same panel, and were hailed last week in an article by the Financial Times as being a “visual search pioneer”.</p> <p>The simple idea is that anyone can snap an image of a jacket on a mobile phone and Cortexica’s software can isolate the pattern on that jacket and then search for other kinds of garments with an exact or similar pattern. It’s an intuitive enhancement of an already existing shopping behaviour (product search). Instead of hunting out your dream item, the most suitable products can find you – based on a single image. The technology originated in Imperial College London, and uses software developed during a seven year long research project by bioengineers exploring how the human brain processes images. Since 2009, Cortexica have developed the technology into a number of products whilst continuing to improve the core aspects of the technology.</p> <p>As we are gaining more traction, it is becoming evident that our end-users are trying to push the capability of the present technology that is centred around product images. As users try to take a picture in a normal setting with a shop window or city background or worn by their friends and acquaintances, the current system cannot distinguish the product in the image amongst all the other complex visual elements. We therefore need to enhance the system to work on “street style” fashion images. This will allow our product to cross-over into a new area of need which is now being demanded by the end-users and retailers alike. As far as we are aware, there is no product or technology out there that is addressing this need.</p>			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
<b>DPTS Limited</b>	EXARCHIVE: DPTS Development of Exabyte Scale Data Archiving	£693,636	£242,773
<b>Project description - provided by applicants</b>			
<p>EXARCHIVE is a 24 month project to develop a scalable platform and software system for the long-term preservation, archiving and management of Oil &amp; Gas survey data in repositories that may range from the hundred Petabyte to Exabyte scale. Survey and well data are extremely valuable and long-lived: data sets may be required years or decades after capture. Oil and Gas Exploration and Production (EP) is beginning to move from physically archiving data tapes offline toward a data chain built on file-based preservation with access to any dataset on-line, on demand.</p> <p>EXARCHIVE will develop technology and workflows to keep digital data objects secure, in multiple copies at different geographic locations, over periods that may be longer than the lifetime of any particular file format or storage system. It will enable the preservation of not only the data but also the metadata that defines the archive structure, file formats and processing, to allow indefinite replication of data sets and their analyses as formats and platforms change over decades.</p> <p>The approach will conform to the OAIS ISO standard for archival data preservation. The platform is expected to support highly automated processes for cataloguing, migration, replication and disaster recovery via remote locations using private Cloud storage connected by dark fibre networks. DPTS will offer services, using the resulting system, for data ingest, classification and cataloguing; data access management; long-term data archiving, storage and recall, with disaster recovery and duplicated on-line data sets held at remote facilities. There will be spill over applications to other sectors, including scientific, medical and media archiving. DPTS, is a well-established specialist provider of data processing, transcription and archiving for the Oil and Gas EP industry. Experts in distributed computing systems from Imperial College, London, will provide consultancy and support on advanced research aspects of the project.</p>			



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Eduvee	Hawk	£554,001	£249,300
<b>Project description - provided by applicants</b>			
<p>Anyone who has ever been in a classroom, whether as a student or teacher, knows that not all students proceed at the same pace. Yet, for centuries, our model for education has remained to attempt to teach large numbers of students the same materials at the same pace, not accounting for their differing abilities and learning styles.</p> <p>The aim of this project is to develop an industrial scale, commercially viable adaptive learning engine that will deliver a truly personalised learning experience to all students, regardless of ability, means or circumstance. 28% of UK children have received private tuition at an average cost of £53/week, leading to an increasing divide between those that can afford expensive private tuition and those that cannot.</p> <p>This project redresses the balance, raising educational attainment, engagement and social mobility. The platform will be targeted initially at the UK STEM market, with plans to expand into other subject areas and geographies. Using a revolutionary approach to adaptive learning directly addressing the issues preventing its adoption to date, the project will provide real time personalisation of courses to students across multiple subjects giving them instant feedback on how they are performing and where they need to focus. It is one-to-one learning, provided one to-many. The potential beneficiaries from the project are not only students but also educational publishers. They have struggled to maximise the new opportunities available for the distribution of their content in the digital era.</p> <p>Eduvee will provide content producers with a simple platform in which their resources can be digitised and used for differentiated instruction, opening up another revenue stream for them in the same way Netflix &amp; Spotify have for the movie and music industries. The combination of this project's revolutionary technology and eduvee's creative business model will deliver a world beating technology company in one of the largest global industries.</p>			

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<b>EG Solutions PLC</b>	Demand and Resource Modelling to Predict SLA Performance for Complex Back Office Processes	£499,063	£224,578
<b>Project description - provided by applicants</b>			
<p>Software to support 'Back-office Workforce Optimisation' is a new market. Current solutions provide very limited forecasting, planning and scheduling capabilities. Furthermore, they do not enable an organisation to anticipate, in real-time, how the Service Level Agreements (SLAs) that must be supported by the organisation are threatened, over a wide range of timescales, by variation in the workforce's performance and fluctuating demand.</p> <p>Enterprise-scale workforce systems are complex and so a new generation of forecasting, planning and scheduling analysis tools is required. The 'Demand and Resource Modelling to Predict SLA Performance for Complex Back-Office Processes' project will develop and evaluate a prototype demonstrator of this new generation of analysis tools. The innovation of this project is through the development of new and novel business processing modelling techniques to:</p> <ul style="list-style-type: none"> <li>a) Provide the real-time SLA Monitoring &amp; Compliance violation detection capability through the comparison of the monitored and the predicted performance;</li> <li>b) Enable an appropriate 'What If' scenario prediction capability. This will help managers to design the appropriate forecasts, plans and schedules constrained by the organisation's SLAs;</li> <li>c) Publish the forecast plans to local operational managers to support the optimal business execution in-line with the forecast.</li> </ul>			

# Technology Strategy Board

## Driving Innovation

The key benefits that will accrue to the users of the new system are:

- a) The SLA Compliance monitoring capability will be able to improve quality of service while optimising the workforce activities and associated costs. This is particularly important when remedial planning and scheduling must be established and deployed in real-time;
- b) The forecasting and scheduling capability will recommend/suggest changes to the planning activity due to the availability of a 'what if...' analysis. This will enable an organisation to minimise its vulnerability to unexpected events thereby improving the quality of service delivery.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
ETS Design Limited	Roller Coater for applying release agent to the side flights of conveyor belt based systems	£70,723	£31,825
<b>Project description - provided by applicants</b>			
This project relates to a new method to apply release agent to the side flights of conveyor belts used in the production of Expanded Foam Polyurethane Insulation (EFPI) sheets. Existing methods use a spray system which is unreliable wasteful of release agent and can cause safety issues. The new method based on applying release agent via rollers directly to the side flights is safer, uses 50% less release agent and is more user and environmentally friendly.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
<b>Firstkind Limited</b>	Development of a new Neuro-Muscular Electro-Stimulation medical device for treating hard to heal leg wounds	£560,178	£250,000
<b>Project description - provided by applicants</b>			
<p>This project will develop a new medical device using Neuro-Muscular Electro-Stimulation to improve/provide treatment for 18 million people worldwide who suffer from hard to treat vascular, arterial and mixed leg wounds. Treating these wounds is a major challenge costing £3bn p.a. in the UK and \$20bn in the USA [1, see Scope] and causing a large amount of physical and mental suffering.</p> <p>This device will reduce cost of treatment and provide therapy for patients who cannot currently be treated. The geko™ is an unobtrusive, self-adhesive device that stimulates the common peroneal nerve near the knee, activating the calf and foot muscles and pumping blood around the body to promote healing. Clinical case studies show the technology heals wounds but currently, is only able to stimulate 2-3% of people suffering with leg wounds due to frequent high levels of oedema in these patients. This project will create and prototype a new device designed to overcome this barrier.</p>			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Inspiration Healthcare Limited	Development of a ResusPAP Generator and Portable Driver for Neonatal Resuscitation	£589,159	£250,000
<b>Project description - provided by applicants</b>			
<p>Approximately 10% of babies need help to start breathing, and 1% of all babies born need extensive resuscitation to try and save their lives. Currently, attending medical staff have a choice of methods to help newborns begin breathing – they can use a mask with either a self inflating or a mechanically-inflating bag fitted to it, or they can use a T-piece resuscitator (TPR) to mechanically pump air into the baby’s lungs. The bag methods provide Positive Pressure Ventilation (PPV), to force the lungs open; the TPR can provide PPV, but also has the ability to provide Continuous Positive Air Pressure (CPAP), which means residual air is left in the lungs to prevent them collapsing between breaths. However, the TPR can only provide PPV or CPAP one at a time, not both simultaneously.</p> <p>A small trial has demonstrated the therapeutic potential of a new device, composed of a generator and a driver, which is able to provide both PPV and CPAP simultaneously. No other device is available on the market that is able to provide this PPV/CPAP functionality concurrently. This innovative technology contains other novel features, such as a dual pressure gauge, and the ability for a mask or prong to deliver the airflow to the baby.</p> <p>This project will develop and test these prototype models (components of which are already patented) into fully-functioning, CE-marked, production-ready units. These will then be sold into the global neonatal healthcare market. The device works in a very similar way to existing resuscitation devices, so minimal training will be needed for medical staff, allowing a rapid marketplace uptake. This device could well become the gold standard of treatment for newborn resuscitation. It will save more lives, prevent the physical injuries caused by other methods of neonatal resuscitation, and lowering the incidence of permanent damage caused by lack of oxygen at birth.</p>			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Kimal Plc	ImmediateSense: Development of a Novel Multisense Catheter	£251,756	£88,115
<b>Project description - provided by applicants</b>			
<p>This project will develop a multi sensor catheter initially aimed at the detection of sepsis, with further applications where the management of vital signs provides accurate diagnosis of a condition. Severe sepsis (where the body's response to infection interferes with the function of vital organs) is a major cause of morbidity &amp; mortality, claiming 36,000 - 64,000 lives annually in the UK. Globally, a US study estimated 3 cases to occur per 1000 population, or 20m cases per year.</p> <p>Because of problems with vital organs, people with severe sepsis are likely to be very ill, and approximately 30-50% die. There is no reliable way to prevent sepsis, and no vaccine. Timely identification and appropriate treatment of severe sepsis is critical. Lactate levels in blood provide an indication of the level of sepsis in critically ill patients. Antibiotics are used to lower lactate levels. Research found that over 40% of patients die if lactate clearance takes more than 24 hours.</p> <p>Current treatment methodologies are time consuming involving the taking and analysing of blood samples. Measurement of vital signs is mandatory for all intensive care and emergency department patients. Vital signs not only indicate the severity of illness but also dictate the urgency of intervention. The greatest utility of vital signs is their observation over time. Deteriorating vital signs are indicative of declining physiologic condition, while improving values provide reassurance.</p> <p>This project aims to develop a critical care catheter incorporating sensor technology to enable real time monitoring of patient vital signs without the need to draw blood samples whilst enabling the delivery of HF and other critical IV infusions. It will be specifically focused on central venous pressure (CVP), temperature and mixed venous oxygen saturation (SvO2). This project is highly innovative as currently there is no catheter on the market with a combination of sensors to measure SvO2, CVP and temperature.</p>			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Loowatt Ltd	Loowatt: An Energy-Generating Toilet System for Off-Grid sites	£555,450	£249,952
<b>Project description - provided by applicants</b>			
<p>The UK portable toilet hire industry is worth £540 million/yr, and serves millions of customers every year, but relies on technology that dates from the 1970s. Portable chemical toilets, which use biocides e.g. formaldehyde to suppress odour, incur great costs and carbon emissions to transport thousands of tons of chemically-dosed sewage to treatment works. Having successfully completed a Smart Proof of Concept and generated interest from the Festival/Events Industry, Loowatt needs to develop prototypes for their innovative way of serving the demand for off-grid portable toilets.</p> <p>Loowatt toilets seal waste into biodegradable liner film material for safe and hygienic transport to a local anaerobic digester, where the film and waste are converted into off-grid energy. This project's key aim is to develop prototypes incl. proprietary biopolymer film, modular toilet unit, semi-automated manufacturing rig, hydraulic lifting-and-tipping system and service logistics model. The prototypes will undergo performance testing and generate data to articulate fully the system's financial, environmental and social viability as an innovative solution for the portable toilet hire industry.</p> <p>The Loowatt Development of Prototype will create opportunities for new value systems in the industry, with closed-loop waste treatment that generates energy. In addition, treatment of dewatered sludge will create opportunities to reduce or eliminate the costs and carbon emissions generated by transport and disposal of chemically-dosed sewage.</p> <p>Project partners include Qube Renewables, who brings 30yrs experience in waste and energy; Woo Woo Toilets, a producer and servicing provider of environmentally-friendly portable toilets; Wessex Water, who offers valuable insights to options for onsite waste treatment; and South Wales University, whose expertise in Anaerobic Digestion (AD) and biodegradable polymers will be key to the effective development of Loowatt components.</p>			



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<b>Meteor Power Limited</b>	Prototype High Performance Electric Motorcycle Featuring An Innovative Lightweight Chassis And Advanced Electronic Strategies To Maximise Handling And Performance - Meteor Power Limited	£444,181	£199,881
<b>Project description - provided by applicants</b>			
<p>This project is intended to deliver an innovative lightweight carbon fibre electric motorcycle chassis along with a number of other innovations to allow the building of a class leading sports motorcycle. The design specifications include a 240 hp motor, a new battery pack design along with sophisticated electronic rider aids, such as traction and wheelie control, ensuring it can be a direct contender with the leading petrol SuperBikes.</p> <p>Our goal is to become a leading manufacturer of high performance electric motorcycles. We believe that pound for pound a high performance electric motorcycle will have better handling and overall performance than the petrol equivalent. Rather than simply replace a heavy petrol engine with an even heavier battery pack our unique design will be the first electric motorcycle to put the chassis design first. The packaging challenges are significant and we are confident that our design will be a major step forward in making a desirable high performance motorcycle that happens to be electric rather than just a leading electric motorcycle.</p> <p>This project is to create the first prototype encompassing a totally new chassis design, utilising lightweight materials, and the latest F1 technology and design principles, to overcome many design and packaging constraints found in petrol motorcycles, coupled with our own electronics, will bring MotoGP levels of traction control and anti-wheelie control to electric motorcycles for the first time.</p>			

# Technology Strategy Board

Driving Innovation

The project will benefit from bringing tried and tested suspension, recognised wheelbase and geometry measurements and other proven components together with precision modelled chassis design and a proven electric drive train mounted in a unique way to allow maximum flexibility of the bespoke battery and battery pack cooling technology. Once the prototype has proven our wide range of innovations we intend to put it in to production for both road and track use.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
<b>Mood International Software Limited</b>	Giving Meaning to Big Data for Business Transformation: Automating Discovery of Causality	£673,450	£235,708
<b>Project description - provided by applicants</b>			
<p>This project will facilitate improved business performance by enabling senior decision makers to explore and interact with a visual, connected model of their business that is populated jointly from domain knowledge and insights derived from sources of 'big data'. The model will support continuing analysis and validation of the projected performance of future scenarios and will enable investigation of points of difference between the domain expert and the results of best available analysis techniques. The model will use visualisations and expressions that reflect the natural way in which collaborating decision makers think about and understand how their business works and will enable the assessment of changes in terms of predictive 'what if...' scenario analysis.</p> <p>The project will establish the use of big data techniques to inform; with much quicker feedback, the consequences of business transformation activities, delivering benefits in terms of greatly increased confidence in decision making and speed of value from business change. The innovation focus is on the:</p> <ul style="list-style-type: none"> <li>a) Adaptation of 'big data' analysis algorithms to identify and validate the critical concepts in a business landscape model, together with a contextual cause-and-effect discovery engine to map the results of statistical analysis against domain expert views of how a business, or proposed scenario, works;</li> <li>b) Provision of new visualisation and validation techniques to replace traditional business process representations with paradigms more natural and intuitive to the decision maker i.e. a native business perspective and not a tool/technology constrained perspective.</li> </ul> <p>This new technology will both speed and scale transformational decision making within organisations, informed by both top-down and bottom-up analysis of the options and projected outcomes available, helping avoid the well-documented and catastrophic failures in business change that act as a drag on economic development and progress.</p>			

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<b>Moortec Semiconductor Limited</b>	Development of an Embedded Process Detector Circuit Targeting Advanced CMOS Semiconductor Technologies	£152,812	£68,765
<b>Project description - provided by applicants</b>			
<p>Moortec Semiconductor Ltd develop on-chip monitoring circuits and intellectual property (IP) for silicon chip devices manufactured on advanced technologies used in today's electronics products. Moortec plan to develop a prototype embedded process detector circuit, otherwise known as a process monitor that will measure the variability of circuits manufactured on advanced CMOS technology nodes such as 28 nano-meter (nm), 16nm and 14nm. With advances in silicon CMOS technology and the scaling of transistor channel lengths to nanometer dimensions, process induced variations in circuit delays have begun to significantly impact chip performance and power consumption.</p> <p>Moortec's Process Detector (PD) will possess features and address applications that go beyond what is currently commercially available to the designers and developers of semiconductor devices. The PD will allow a silicon chip to self-determine its own manufactured process characteristics, providing information to the rest of the system as to how its performance can be optimised. The System on Chip (SoC) can then be optimised for either its power consumption or its speed for computations or data transfer. The PD will also allow for the ageing effects, which all silicon devices are subjected to, to be measured and monitored by the system, potentially throughout the lifetime of the device.</p>			

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<b>Participant organisation names</b>	<b>Project title</b>	<b>Proposed project costs</b>	<b>Proposed project grant</b>
<b>Photocentric Limited</b>	Development of a Prototype of a New Type of 3D Printer	£198,671	£89,401
<b>Project description - provided by applicants</b>			
<p>This project aims to make a 3D printer prototype that operates using novel technology to create the image. The object will be formed in photopolymer, but polymerised using an innovative system. It will generate an extremely high resolution physical copy of any digital 3D file. The anticipated cost of the machine, and consumable, would be considerably lower than existing 3D printers of this kind. This will enable a wider uptake of this exciting technology and will in turn widen the scope of applications for it, from prototype building to small scale manufacturing.</p>			

## Results of competition: Smart - Round 6 - Development of prototype

**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
<b>Pragmatic Printing Limited</b>	Ultra-thiN Integrated Thin-Film Electronics Devices (UNITED)	£557,706	£250,000
<b>Project description - provided by applicants</b>			
<p>Printed electronics (PE) built on plastic and other cheap substrates (paper/card) can enable new products in high volume markets such as consumer packaging and anti-counterfeit labels. The printed electronics market is estimated to be £1.5B today, growing to £30B by 2021 and £200B by 2027 (IDTechEx), addressing areas such as electronic smart packaging devices which is projected to grow from £0.02B (2012) to £1B (2022, 35B units). PPL has developed printed logic (circuits built from active devices such as transistors and diodes) corresponding to the printed equivalent of a silicon chip for broad applicability in consumer packaging, security (identification and brand protection) and novelty applications.</p> <p>Conventional electronics on PCBs is rigid, difficult to distribute within products and over-engineered, resulting in high cost for these applications. Replacing the PCB with flexible (printed) electronics could overcome these constraints and enable many new ultrathin form-factor products. However, novel highly-automated manufacturing processes are required to meet the extremely high-volumes of these applications and integrate the components.</p> <p>To date existing integration solutions such as pick-and-place, already widely used in PCB electronics, have been adapted to printed electronics. However these processes do not currently cost-effectively scale to the very-high volumes required by consumer packaging and security products (ultimately &gt;1trn units pa).</p> <p>This development-of-prototype project builds on a previous proof of- concept project which investigated transfer of printed logic from its original substrate onto a target surface. This transfer approach substantially broadens the range of applications which can be addressed by PPL's printed logic and other printed electronics components, in addition to providing lower-cost and improved form-factor for already addressable applications.</p>			

## Results of competition: Smart - Round 6 - Development of prototype

**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
<b>Process Asset Integration and Management Ltd</b>	RAM software for the upstream oil and gas sector	£443,961	£199,782
<b>Project description - provided by applicants</b>			
<p>Process Asset Integration and Management Ltd (ProAIM) is in the process of developing innovative software to address the Reliability, Availability and Maintainability (RAM) aspects of the upstream oil &amp; gas industry to increase recovery efficiencies and improve asset utilisation.</p> <p>Upstream oil and gas production operations typically comprise production streams of 3 primary fluids: oil, gas &amp; water. Process plants have to achieve a high level of separation to provide maximum resource usage, maximum value to the operating company and minimum hydrocarbon emissions to the environment. The 3 fluids from the production wells have varying flow rates over time, and this requires careful control of the flow from each well to maximise production and recovery from the reservoir.</p> <p>Commercially available RAM modelling tools only represent a single fluid stream with proportional control of flows from a number of sources when there is a downstream processing capacity or constraining event (equipment failure). These tools can significantly underestimate the production availability of an upstream operation and often lead to inappropriate costly decisions being taken in respect of over-sizing capacities, architecture design and/or excess sparing of equipment.</p> <p>The proposed software will represent 3 fluid streams with full separation, permit the smart turndown of individual production and allocate lost production to the individual item of equipment causing a reduction in capacity. Automatic reports will also facilitate the interpretation of results; RAM analysis traditionally requires careful interpretation.</p>			

## Results of competition: Smart - Round 6 - Development of prototype

**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
PyroPure Limited	Development of a novel system for medical waste	£367,111	£165,200
<b>Project description - provided by applicants</b>			
<p>This project offers a new solution to reduce the cost, environmental impact and hazards associated with disposal of hypodermic syringes and other medical 'sharps'. The solution involves development of a novel variant of the PyroPure technology. PyroPure is a unique, innovative, micro-scale waste disposal and energy recovery system. The variant to be developed will have a suitable capacity and performance characteristics for installation at hospitals to process medical sharps waste.</p> <p>The developed PyroPure system will be coupled with developments to the containers used to hold waste sharps in order to reduce the overall costs involved substantially whilst enabling the recovery of metal and energy from the process. This global market for this solution in hospitals is estimated at £600 million and there are substantial export opportunities including countries that lack medical waste handling infrastructure. Hence this will contribute to reducing the high levels of infections in such countries caused by needles that have not been fully sterilised and destroyed.</p>			



## Results of competition: Smart - Round 6 - Development of prototype

**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
<b>Rebellion Developments Limited</b>	RAPID: Rebellion Adaptive Procedural technology for Intelligent game Development	£678,451	£237,458
<b>Project description - provided by applicants</b>			
<p>RAPID is a 24 month project to develop a prototype toolkit to assist, improve and accelerate the development of video games by the application of procedural methods for automatic and semi-automatic content generation and performance tailoring. The toolkit will contain components to assist the design and population of worlds for high-quality games; automatically to generate new levels and gameplay for mobile games; automatically to prevent the creation of impossible or unrealisable designs; and tools that automatically match the environment geometry complexity to platform capacity and bandwidth.</p> <p>The video games industry is at a crossroads. At the top end of the market, the cost of developing and marketing ‘AAA’ games can match movie blockbusters. At the other end, low-cost and ‘free-to-play’ mobile games have become hugely popular, but creating the new levels to retain player engagement is very difficult to do affordably and developers struggle to make money. UK studios are squeezed at both ends of the market.</p> <p>RAPID will result in new algorithms for procedural content development, new procedural approaches to game delivery and gameplay, a modular procedural software toolkit (to support the creation of AAA and mobile games by Rebellion, and services for the procedural development of games and gameplay by other companies, including micro studios.</p> <p>We plan to offer a free, basic automatic service, and a premium paid service, in which Rebellion will run a developer’s plan through the full procedural engine and toolkit to deliver a detailed mobile games level or high quality environment. Rebellion is one of Europe’s leading games developers and publishers. It is the studio behind numerous hit games (including Sniper Elite V2, Sniper Elite: Zombie Army, Aliens vs Predator, The Simpsons, and Star Wars Battlefront: Renegade Squadron), a successful publisher of comics and books, and a producer of cross-platform entertainment media.</p>			

## Results of competition: Smart Round 6\_13 Development of Prototype

**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
Rosehill Polymers Limited	Development of novel PU binder and processing plant technology for use in PU foam recycling	£625,135	£218,797
<b>Project description - provided by applicants</b>			
<p>Flexible polyurethane (PU) foam is used extensively in the manufacture of durable goods (e.g. vehicles &amp; furniture). Despite continuous improvements in production methods, up to 20% of all PU foam becomes scrap after cutting and shaping. Additionally, once products such as mattresses and chairs reach their end-of-life stage, the disposal of the PU foam content must be addressed.</p> <p>Rebonded PU foam carpet underlay is one highly successful product developed to deal with waste foam. Although the benefits of recycled foam are numerous, the recycling process itself is slow, lengthy and requires significant energy input due to the use of steam, a necessary component of the binding process.</p> <p>Currently the production of underlay from waste foam involves bonding the foam “chippings” into large blocks with PU binders, using a steam curing process. The use of steam in the processing of recycled PU foam has many disadvantages. Generating steam is extremely expensive and non-environmentally friendly. Furthermore, the foam blocks produced have a high moisture content meaning they must be dried for up to 3-4 days in large storage sheds before slitting. Pollutants trapped within the steam can also escape into the environment during evaporation.</p> <p>The Foam-Bind project proposes to transfer and develop technology used in the rubber recycling industry and apply it to PU foam recycling applications in order to eliminate the need for steam and thereby address the issues outlined above. Rosehill Polymers (RP) has already undertaken successful laboratory developmental work for the binding agent. We plan to further develop the specialist polyurethane (PU) binder and also the dosing/mixing plant required to apply the binder to the chip foam.</p>			

## Results of competition: Smart - Round 6 - Development of prototype

**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
Speakerbus Technology Limited	Virtual Turret ( vTurret )	£649,535	£227,337
<b>Project description - provided by applicants</b>			
<p>The Virtual Turret (vTurret) project will demonstrate that it is possible to replace the current proprietary Internet Protocol/Session Initiation Protocol (IP/SIP)-based hardware multi-way voice communications hardware products, used by the trader voice market, with a software only equivalent. Traders require high quality voice communications for many highly dynamic concurrent one-to-one, one-to-many and many-to-many scenarios using intercom, private line and open conference lines where configurations require rapid real-time changes. Traditionally, such systems require expensive, specialist telephony hardware. A less expensive, more flexible solution is required. The innovation in the vTurret project is based upon:</p> <ul style="list-style-type: none"> <li>a) A new software-only end-to-end solution that can be used to provide the full range of the equivalent trader voice functionality. This includes the multiplexing of many audio channels into a single IP/SIP stream;</li> <li>b) The adoption of a Software Defined Networking based technology to enable the server and network services virtualisation such that the end-to-end latency and jitter effects are tightly constrained across the wide range of network infrastructures typically encountered in trader voice deployments.</li> </ul> <p>The main benefits and likely outcomes with significant impacts that will accrue to users from this new approach are:</p> <ul style="list-style-type: none"> <li>a) A new set of business models will be enabled such that users will be able to move from the traditional significant upfront installation/deployment costs to 'pay-as-you-use';</li> <li>b) The all-software approach means that the typical, significant costs in both standard and specialist telephony hardware become unnecessary.</li> </ul>			

# Technology Strategy Board

## Driving Innovation

This will reduce environmental impact with fewer unused/unwanted fixed point telephones being required/manufactured/disposed. Prototype demonstrators will be produced and evaluated to confirm the approach and to ensure that the required functionality and performance is achieved.

## Results of competition: Smart - Round 6 - Development of prototype

**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
<b>Spirit Healthcare Limited</b>	Development of prototype management system for COPD and Diabetes	£444,865	£200,189
<b>Project description - provided by applicants</b>			
<p>The ageing UK population is putting an enormous strain on the NHS. As the population grows older, the number of people living with a long-term condition (LTC) that affects their health increases steadily. The proportional costs to the NHS in treating these conditions is staggering: 70% of the entire NHS budget is spent managing the LTC's of 30% of the population. Monetarily, this amount was calculated to be £77bn per year spent managing 15.4m patients. As 80% - 90% of all care for people with LTCs is undertaken by patients and their families, improvements in self-management methods will result in a reduced number of GP visits and admissions to hospital, and increased compliance with treatment regimens.</p> <p>This project will develop a prototype system to monitor biometric signs, such as blood pressure and oxygen saturation levels, and transmit the information back to the NHS, to aid management of long-term conditions (LTCs) and improve patient outcomes, whilst reducing costs of care. To achieve this, Spirit Healthcare (SH) will build upon a successful system, the 'Clinitouch', which they have already implemented in Leicester for the management of 50 patients with chronic obstructive pulmonary disorder (COPD).</p> <p>This trial proved that Clinitouch was able to reduce emergency hospital admissions by 65-95%, saving in excess of £353,000 in 26 weeks by averting 87 hospital admissions. It was so successful that SH have been commissioned to roll out the service to more patients across Leicester. SH will transform their Clinitouch patient interface platform from a bulky and cumbersome unit into an intuitive platform that will run on a tablet computer that interfaces (via Bluetooth) with various biometric-monitoring peripherals. For the purposes of this development of prototype project, SH will target patients with COPD or diabetes. If the 65% reduction in unplanned admissions was achievable on a national basis, the £407m bill for unplanned COPD admissions would reduce to £142m.</p>			

## Results of competition: Smart - Round 6 - Development of prototype

**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
User Replay Limited	UserReplay SaaS prototype	£556,141	£250,000
<b>Project description - provided by applicants</b>			
<p>Websites are never perfect. They are complex systems and are prone to technical errors. They are used by human beings, who do not always behave in expected ways. When human meets software, there will always be a certain amount of trouble. Up to 25% of users struggle when they attempt to make purchases online, and as a result many become frustrated with a website and leave without purchasing. Such struggle is believed to cost the UK economy over £1bn due to abandoned online transactions (source: Experian).</p> <p>Companies are increasingly trying to understand the struggles faced by the customer - once they are in the checkout process, what would deter them from completing the purchase? Digital Customer Experience Management (Digital CEM) solutions have been developed to address this huge business problem. Digital CEM is based on recording user journeys, storing them for analysis, and enabling journeys of interest to be visually replayed alongside technical diagnostics. The resulting insight allows the online retailer to make changes to their website leading to higher sales for example by a decrease in the number of abandoned transactions.</p> <p>UserReplay Limited was founded in 2009, and specialises in "session replay technology" designed to allow web developers to record, re-run and analyse a visitor's journey through a website. For eCommerce companies this service is intended to measure and optimise the digital experience. We are able to find and fix site bugs, resolve disputes, recover abandoned baskets and prevent fraudulent transactions online. This Technology Strategy Board project seeks to develop a prototype solution which melds the best analytical functionality of our existing on-premise solution with the flexibility and speedy deployment of a SaaS (Software as a Service) solution. In doing so, substantial R&amp;D will be necessary to resolve technical uncertainties. The resultant system will provide a step change in capability which will mark it out from existing alternatives.</p>			

## Results of competition: Smart - Round 6 - Development of prototype

**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
Ventive Limited	SHAP VHR Development of Prototype	£362,270	£162,500
<b>Project description - provided by applicants</b>			
<p>As new buildings are built to higher energy standards and become more airtight, natural means of ventilation disappear. To overcome this, Mechanical Ventilation is often used. This can lead to up to 5,000 kWh of heat loss from a typical home per year. In order to 'reclaim' this energy, Heat Recovery is often added, with some models achieving up to 90% efficiency. With two fans running, 24h a day, such systems typically use up to 700kWh of electricity per year (three times more than a new fridge). In cases where gas heating is used, Mechanical Heat Recovery Ventilation invariably provides either very little or no net CO<sub>2</sub> saving. Besides the energy use, mechanical systems have high installation costs.</p> <p>Due to their complexity, they require a number of trades to install and maintain, and suffer from component failures. This further adds to the running costs, which can average £100 per year. Mechanical systems also depend on a number of electronic and mechanical components contributing to lack of reliability, resource depletion and future electronic waste. Starting off with our innovative and retrofit specific Passive Ventilation with Heat Recovery (utilising passive stack effect and wind assistance), we have designed, prototyped and tested a reliable ventilation system for warmer climates. This incorporates a number of inventions around passive extraction boost, extraction period extension, moisture withdrawal and simplified installation.</p> <p>The proposed system (SHAP VHR) overcomes the main issues associated with Passive Stack Ventilation, such as summer operation, and makes the product applicable to warmer climates, greatly increasing its export potential. The development of this technology will also allow us to provide a full house system, a proposition preferred by both BRE and LABC.</p>			

## Results of competition: Smart - Round 6 - Development of prototype

**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
<b>Vexica Technology Limited</b>	A new LED lighting construct using remote phosphor technology	£250,984	£112,942
<b>Project description - provided by applicants</b>			
<p>LED lighting units require an individual AC power input and drive system encompassing electrolytic capacitors which overheat; their life expectancy is 2 to 3000 hrs. Secondly, installing current LED lighting solutions into elaborate architectural designs is limited by the necessity to incorporate individual drivers and power inputs into each lighting unit. Installations are time and labour intensive with the requirements of extensive and unattractive mains wiring and cable looms giving rise to limited design flexibility. Finally, reproducing colours of various objects faithfully (i.e. colour rendering Index - CRI) and the ability to eradicate unwanted 'stepping' when dimming are also attributes the lighting industry are keen to address.</p> <p>Vexica aims to conduct a period of R&amp;D to prove the technical and commercial potential of designing and developing a new LED lighting construct in order to address industry and customer concerns. Fundamental to the design is substituting the cumbersome external driver system for new on-board 'solid state' technology allowing up to 50 one metre LED lighting strips to be powered by a single AC mains input. Further, Vexica propose developing circuitry which will enable the ability to dim using TRIAC dimming modules. Fundamental also will be the design of a new type of plastic casing based on a unique proprietary mechanical 'linkable' system (like Lego) which will allow continuous unbroken shapes to be designed and installed quickly and at a cheaper cost. The internal profile of the mixing chamber will be re-designed using a new identified or formulated material which gives rise to superior light extraction through diffuse and homogenous reflection. The light-emission window is to be coated with new remote phosphor technology for low glare, high luminous efficacy and enhanced colour rendering. This also addresses colour consistency delivering reliable correlated colour temperatures that are consistent to 2-3 MacAdam Ellipses.</p>			



## Results of competition: Smart - Round 6 - Development of prototype

**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
Whispering Gibbon Limited	Whispering Gibbon: Automated Game Asset Merchandising	£346,778	£156,050
<b>Project description - provided by applicants</b>			
<p>This project will develop a technology demonstrator for a 'middleware' platform that enables game developers to automate preparation of in-game assets for 3D printing, sold directly from their app, generating merchandising revenue. In particular the project builds upon Whispering Gibbon's in-depth market research and technical feasibility studies (undertaken with the support of Microsoft and Nokia) to develop specific technologies that accurately and effectively automate the conversion of a user customised in-game 3D data (specifically posed and visually customised) into a data format that can be used in 3D printing.</p> <p>The technical challenges (and core technical innovation) lie in resolving the differences between 3D models that are created and optimised for in-game display purposes, and the requirements for 3D printing which need to take into account the specific printing process, structural integrity of the physical object and decorative factors (e.g. texture, colour, durability).</p> <p>The ability for game (and other digital application) developers to sell physical manifestations of virtual, customised, goods offers significant commercial opportunities - opportunities beyond generic 'off the shelf' goods (e.g. Angry Birds stuffed toys) or dedicated, vertically integrated, 3D printing offerings (e.g. MakieLab).</p> <p>Our platform can enable any gamer to turn the in-game virtual items that they have invested considerable time and effort personalising (pets they have nurtured, cars they have upgraded) into real objects they can own, display and cherish. This new approach, monetising the emotional attachment that users have for virtual items, can lead to significant new revenue streams for IP owners, developers and publishers. It can also yield benefits to wider digital application providers. We are setting out to open up a new model for in-game monetisation for digital games. In securing Technology Strategy Board support we will unlock circa £200,000 of private funding to match-fund this project.</p>			

## Results of competition: Smart - Round 6 - Development of prototype

**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
<b>ZOO Digital Group PLC</b>	Process Automation for Localisation of Dialogue in Entertainment Media (PALODIEM)	£715,098	£250,000
<b>Project description - provided by applicants</b>			
<p>This project concerns the exploitation of latest academic research in the field of natural language processing to develop innovative workflow automation solutions for the entertainment industry and other sectors in which localisation of audio/visual materials is important. The project will focus on localisation of soundtracks, captions and subtitles and will use cloud computing to improve process efficiency, enabling more effective localisation of cross platform digital media for feature film, TV, video games and other non-entertainment content such as news, education and corporate communications.</p> <p>The applicant is ZOO Digital, a company that develops and markets cloud-based workflow software for creative organizations. ZOO already provides subtitling services and, in the course of creating subtitles for entertainment industry clients, is building a large proprietary database of dialogue data with parallel translations into over 50 languages.</p> <p>For this project, this database will be used to ‘train’ machine translation software to enable a capability to suggest translations of new dialogue, resulting in faster turnaround and lower costs. Quality estimation methods will be used to develop optimum strategies of capitalising on the similarities between related languages (e.g. Romance languages - French, Spanish, Italian, etc.), where the approaches are expected to give superior results. Workflow management methods will be developed for increasing productivity of multi-lingual dubbing, from casting through to editing and mixing. Automation will be used extensively to enable high levels of reliability with low human intervention.</p>			