

# Innovate UK

## Directory of projects

Technology-inspired innovation 2015

**Collaboration  
Nation**

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## Company Categories

**Advanced materials**

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**Electronics, sensors and photonics**

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**Biosciences**

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**Information and communication technology**

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# Introduction

**Collaboration Nation 2015** showcases the small and micro companies Innovate UK have supported this year through our technology inspired feasibility studies competition. The innovative businesses listed in this directory and participating at Collaboration Nation have successfully won a share of the £2 million Innovate UK invested to stimulate innovation across the four enabling technologies areas:

- **Advanced materials**
- **Biosciences**
- **Electronics, sensors and photonics**
- **Information and communications technology**

Technological developments in these four areas can inspire innovation across a range of market sectors, generating wealth for the UK and meeting societal challenges. The technology inspired competition funded technical feasibility studies projects of up to four months long and up to £33,000 in value. These pre-industrial research projects allowed the companies showcased here de-risk early-stage technology and prepare them to exploit those innovations to grow their businesses.

We recognise that it is difficult to take a new idea to market, and Collaboration Nation is one way we help connect innovators with the right partners they need to succeed.

# Advanced Hall Sensors Ltd

Miniaturised magnetic sensor with monolithically integrated electronics

Advanced Hall Sensors is a SME which has developed a novel magnetic sensor based on compound semiconductors with distinct specification advantages, including very high sensitivity and high temperature operation. AHS can design, test and prototype sensors, and partner with UK semiconductor manufacturers for volume supply.

## What is the market opportunity that you have identified?

AHS currently supplies >2 Million Gallium Arsenide (GaAs) based Hall sensors per annum into metrology, automotive and industrial sensing markets. The majority of the market is serviced by Silicon Hall sensors, given the ease of monolithic integration with ancillary electronics to render a functional sensor. However, Silicon Hall sensors are limited in terms of sensitivity and temperature operating range as a result of the fundamental material properties. AHS see a tremendous opportunity to produce a higher value, so called 'Magnetic Integrated Circuit' (MIC) which has Hall sensor and electronics monolithically integrated on a single chip GaAs platform. This would allow the true potential of the superior dynamic range of the GaAs Hall sensor to be realised and drive more of the component value into the core sensor technology.

## How will you deliver value from this opportunity?

The market for magnetic sensors will be 9.6 billion units by 2020 (\$2.9 billion). From discussions with existing customers, we conclude the MIC platform could command 5-10x ASP of our discrete sensor, delivering improved performance and yield. This has the potential to drive AHS from a ~ £0.5 million to a £2-5 million turnover company considering further penetration in the current customer base.

## What are your next steps?

Our feasibility study has delivered a working prototype of the MIC. We are now engaging with the existing AHS customer base to evaluate the viability of its performance against target specifications. Our need for the next stage of execution is additional new customer sponsorship for evaluation in a wide range of initially 'high-end' applications.

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# Afterthought Software

Feasibility of developing novel high-efficiency power management to enable indoor autonomous wireless devices powered by innovative flexible organic photovoltaics

## Partner companies

Solar Press

Afterthought Software provides a range of consultancy services including embedded systems and software. Solar Press is focussed on the development of micro energy harvesting technology. This project allowed Afterthought Software to produce low-power wireless Internet-of-Things (IoT) sensors using Solar Press organic photovoltaic (OPV) technology.

### What is the market opportunity that you have identified?

A limiting factor in the mass deployment of AWD (Autonomous Wireless Devices) inside buildings is their dependence on battery operation. This represents an opportunity for micro energy harvesting solutions. This project addresses the emerging challenge of developing autonomous wireless devices that are self-sustaining (both battery and power cable free), so called 'fit and forget' solutions.

### How will you deliver value from this opportunity?

This feasibility study has allowed Afterthought Software to produce wifi and bluetooth low energy sensors powered by advanced micro energy harvesting electronics. The flexible OPV modules from Solar Press performed well in low-level indoor lighting conditions allowing evaluation of the energy harvesting electronics. The results of this study will be used to create proof-of-concept IoT sensors and further OPV technology.

### What are your next steps?

Afterthought Software and Solar Press will take the opportunity to meet with a wide range of stakeholders from the ecosystem of companies and organisations interested in IoT and micro energy harvesting.

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# Alterix Ltd

iBoard - multi touch solution for large displays

Alterix specialises in developing complex and elegant sensing algorithms using hardware capabilities of modern inexpensive microcontrollers. We have developed technology for converting large scale TV into interactive multi-touch display with an accurate support for stylus input.

## What is the market opportunity that you have identified?

There is currently an established worldwide market worth more than \$2 billion per annum for interactive whiteboards. These whiteboards are mainly used in schools and other educational establishments. Makers of interactive whiteboards face major disruption as the cost of flat-panel TVs continues to fall. Disruptive changes in the market for large scale interactive displays have created an unanswered need for novel technical approaches capable of positioning large interactive TV panels as a replacement for interactive whiteboards. Yet current touch sensing solutions while adding thousands of pounds to the cost of a display above 55" diagonal sizes are striving to meet the technical specification required for Windows 10 certification. The search is now on for a new sensing technology capable of working effectively with TV panels bigger than 65".

## How will you deliver value from this opportunity?

Alterix has developed a novel, highly efficient and inherently low-cost multi-touch sensor system for large-scale touch-screen interactive displays. The method scales easily to large sensors and is compatible with flat-panel TVs with which the future of interactive displays lies. Our approach allows the use of inexpensive off-the-shelf electronics and achieves a substantial improvement in the signal-to-noise ratio over existing systems.

## What are your next steps?

We are in the process of developing the supply chain for our electronics for multi-touch displays with a large diagonal size. We have already carried out top level discussions via face-to-face meetings with numerous ODMs in Taiwan and China. We are finalising opportunities for the trial of our electronics with major touch panel manufacturers in Japan, Korea, and China.

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# Amalyst Ltd

REPLACE

Amalyst is an established spin-out of UCL operating since 2012. We are a catalyst development company selling our patented, low-cost and high-performance catalysts worldwide to customers engaged in electrochemical industries such as fuel cells and water electrolyzers.

## What is the market opportunity that you have identified?

Amalyst's AMCAT catalyst can be used as a 'drop-in' replacement for platinum on fuel cell anodes and water electrolyser cathodes. AMCAT has the same high performance as platinum in these applications but offers significant savings over platinum. Amalyst is already into commercial sales of AMCAT and we are focused on realising potential sales of £25 million in the fuel cell sector by 2023 with revenues as high as £5 million possible as early as 2020. Early market opportunities in water electrolyzers with ~£150,000 in sales in 2017 will see Amalyst to self-sustaining revenues. Success with the REPLACE project would enable Amalyst to offer a 'drop-in' replacement catalyst for platinum on the fuel cell cathode as well. This would effectively double all Amalyst revenue forecasts.

## How will you deliver value from this opportunity?

Amalyst has formal relationships in place with major OEMs and will look to increase sales through 2015 - 16. Amalyst has engaged a preferred UK toll manufacturing partner for kilogram production of AMCAT and has identified three additional candidates. Amalyst will continue to foster our current commercial relationships providing commercial quantities to customers while building sales and entering new markets.

## What are your next steps?

Amalyst is looking for new investors to fund the business through 2016 where we will reach self-sustaining revenues in 2017. We are looking for another £150,000 investment in Q4 2015 / Q1 2016. These funds will see the completion of the AMCAT commercial production line at our preferred toll manufacturer and continued growth of our sales and customer portfolio.

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# Applied Nanodetectors Ltd

An investigation into the feasibility of fabrication of inkjet SERS sensors to detect bacteria in sputum samples for the early detection of exacerbations in chronic obstructive pulmonary disease (COPD)

Applied Nanodetectors is a leading developer of nanosensors-based solutions for healthcare and medical markets. We are commercialising point-of-care medical diagnostic solutions to identify diseases, to give fast, accurate and reliable results and to help healthcare experts make the right decisions.

## What is the market opportunity that you have identified?

Chronic obstructive pulmonary disease (COPD) is a prevalent lung disease (3 million in UK) that accounts for a major burden in the UK in terms of morbidity (25,000 deaths a year) and health care costs (£4 billion). COPD is punctuated by exacerbations, which are episodes of increased respiratory symptoms associated with systemic and airway inflammation. Exacerbations impose considerable burden on the healthcare systems globally (70% of total healthcare costs). Most exacerbations however are either triggered by viral or bacterial infection. A diagnostic test which could confirm the presence of pathogenic airway bacteria would be useful in helping guide physicians in prescribing appropriate medication. In this project we will investigate the viability of using a nanomaterial based sensor array to detect bacteria in sputum samples to predict the onset of exacerbations.

## How will you deliver value from this opportunity?

Following the successful development of this new diagnostic test we would partner with a large medical device company to enter the home monitoring market for COPD patients. It would be used for the early detection of the onset of exacerbations and assessment of severity. This will slow disease progression, reduce healthcare costs and improve the patient's quality of life.

## What are your next steps?

Successfully completing this project will enable us to work with other UK academic and industry partners to build up the manufacturing supply chain and develop new business opportunities in many different sectors. That would include chemical and biosensors, medical diagnostics and other markets.

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# APS Biocontrol Ltd

Interpreting culicoides biting midge data for real-time reporting and risk assessment

APS Biocontrol Limited is an innovative biocontrol company specialising in the development of natural, safe and sustainable technologies as an alternative to synthetic chemicals, in line with EU and UK policy. Established in 2004, APS employs 9 staff, giving a diverse scientific skill base.

## What is the market opportunity that you have identified?

The opportunity being addressed is to develop a real-time reporting and alert system for *Culicoides* spp. biting midges, initially in Scotland with the potential to roll out across Europe. As well as causing significant disruption through their biting behaviour, impacting on tourism and outdoor working, biting midges are the most important vectors of economically-significant arboviruses of livestock (including cattle, sheep and horses). Insect surveillance is key as the basis of disease mitigation but existing methods (e.g. based on light-suction traps) are labour-intensive, expensive and associated with a considerable time-lag between trapping and reporting, reducing the impact of legislative measures and impacting on trade and animal welfare. There is a significant opportunity for insect surveillance through real-time reporting, allowing more informed decisions relating to pest avoidance and disease-mitigation measures.

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## How will you deliver value from this opportunity?

Innovation of a real-time biting midge surveillance system has the potential to add value to the 'visitor experience' in Scotland, for which tourism is an important sector. Regarding risk assessment for arboviruses, unmonitored disease incursions can result in reduced livestock value, export restrictions and employment impacts; the proposed surveillance system would be well-placed to contribute to the mitigation of this.

## What are your next steps?

The next steps will involve validation of the pilot data and a widening of the sampling associated potential targets for midge-transmitted diseases. Partners from key market sectors (particularly the livestock and equine industries, together with representatives from outdoor tourism industries) will be sought, together with software professionals for full commercialisation and testing. Potential funding routes include Innovate's Agri-Tech Catalyst Programme.

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# Archer Technicoat Ltd

Zirconium Diboride coatings for ultra-high temperature composites and solar power generators

ATL is a high tech UK SME with over 30 years' experience specialising in coatings and materials technology. The business speciality is chemical vapour deposition, covering process R&D, supply of coated components and custom built equipment.

## What is the market opportunity that you have identified?

Zirconium Diboride falls into the family of ultra-high temperature ceramics which can survive in extreme high temperature environments with a melting point greater than 3000°C. This, along with other advantageous material properties makes it an ideal candidate for use in numerous potential market applications ranging from renewable and sustainable solar power applications to thermal protection systems for spaceplanes, re-entry vehicles, hypersonic vehicles and missiles. The coating process developed is not currently available in the EU. This offers potential access to a global space market expected estimated to be worth £19 billion by 2020, an emerging space tourism market, military applications and the developing concentrated solar power market which could potentially provide 25% of global energy needs by 2050.

## How will you deliver value from this opportunity?

Commercialisation of the coating process offers entry into a global, unfulfilled market and enquiries have already been received from overseas customers about the capability for zirconium diboride coatings. There also exists the opportunity for the development and supply of coating systems for both industrial, academic and research parties interested in ultra-high temperature ceramics and their applications.

## What are your next steps?

Collaborative partners and funding to further develop the process towards industrial applications and commercialisation. Partners may be interested in ZrB<sub>2</sub> coatings or the application of the process to alternate UHTC coatings such as ZrN, HfB<sub>2</sub> and HfN.

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# Aseptika Ltd

Feasibility study for the automation of sputum biomarker analysis for respiratory disease in self-management (diagnostics)

Aseptika Ltd (under the brand Activ8rlives) develops and manufactures medical devices designed for the consumer to self-monitor and self-manage long-term health conditions, focused on respiratory care. The company has developed a patent test for biomarkers of the pathogen *Pseudomonas aeruginosa* in sputum.

## What is the market opportunity that you have identified?

1 in 5 of us will die from respiratory disease. The EU spends euro 380 billion on care and lost working days and it is the third largest cause of death in the UK. Hospitalisation must be transformed into care at home, for the benefit of the patient and to conserve beds for acute and emergency care. A home-use test is needed which can accurately assess the level of bacterial virulence (activity) before, during and after an exacerbation to better inform the patient and their clinical carers about the patient's health status. Sputum is the ideal body fluid in which to detect the pathogen's biomarkers as part of a test, but is challenging to automate.

## How will you deliver value from this opportunity?

We seek to undertake a feasibility study to automate the process of testing for not only *Pseudomonas aeruginosa* but also for a range of other pathogens implicated in respiratory infections.

## What are your next steps?

We are seeking funding and partnerships to develop the EyKos HealthHub concept to incorporate a small footprint unit suitable for home use for a variety of diagnostic assays.

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# Astrimmune

Concept evaluation of a cellular-digital phenotypic diagnostic PCR platform

Astrimmune is biotechnology company developing and commercialising non-invasive technologies to enable monitoring and treatment of existing cancer patients and earlier diagnosis of cancer patients, particularly in high-risk groups, through the isolation and examination of cancer and other rare circulating cells from blood and urine.

## What is the market opportunity that you have identified?

We propose to enhance and simplify the sensitivity of the PCR method we are using, by developing a totally new technique, based on the principles of digital PCR, where amplification is done in a smaller volume, separate from potentially interfering nucleic acid sequences. Sensitivity for a single molecule of target can be readily and reliably detected. Our new technique will use a novel filter geometry that we have created for the isolation of rare (one in a billion) circulating tumour cells (CTC) from blood. Retrieved cells will be recovered in a 'honeycomb basket filter' wherein there are 10,000 baskets per square centimetre of filter. RTqPCR will be conducted on cells in situ on/in the filter.

## How will you deliver value from this opportunity?

We simultaneously simplify and enhance the sensitivity of detection of CTC exploiting mRNA markers that signify tissue of origin (e.g. pancreatic as opposed to colon cancer) using the objective readout of a quantitative polymerase chain reaction (qPCR), and producing actionable results (e.g. send patient for a scan, start second course of chemotherapy, treat with drug X and not drug Y).

## What are your next steps?

We seek, using this new approach, to take a world lead in the field by having optimal convenience in execution of the test combined with high sensitivity and information content in the results of the test. Therefore, we are looking for global leader in medical device development that would collaborate with us and validate our test results.

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# Autonomous Devices Ltd

Glidr: a Graphical Language for Imperative Dynamic Reactive Programming

Our vision is to make the development of robotic devices as agile as software development. Founded in 2015, Autonomous Devices develops modular robotic systems for defence, based on 10 years' experience developing some of the world's most advanced robots by principal and founder Ken Wahren.

## What is the market opportunity that you have identified?

The potential of graphical programming languages and tools is immense. The Mathworks and National Instruments were both early to identify the latent need for graphical tools that would enable non-specialist mathematical programmers to work at a higher level of abstraction than that offered by the languages of the day, and The Mathworks now enjoys revenue of \$750 million as a result. Today, with the advent of parallelism and cloud computing, software developers themselves are in urgent need of better abstractions for programming concurrent systems. A graphical language for dynamic reactive programs will be well positioned to capitalise on the increasing uptake of the reactive paradigm across many languages and application domains, and there is potentially an even larger market than that for domain-specific graphical dataflow programming languages.

## How will you deliver value from this opportunity?

We will deliver value from this opportunity by licensing IP in language tools to larger partners with established channels, or by making basic language tools freely available to developers, and then offering premium products and services to supplement those tools.

## What are your next steps?

To take the next steps we need to validate the demand for our tool chain, which we have developed to proof-of-concept stage within an Innovate UK feasibility study. We are looking to work with companies currently developing concurrent systems (in fields as diverse as robotics and cloud computing) to assess how our tools can reduce their development and maintenance costs.

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# AvantiCell Science Ltd

Sonobiology: acoustic cell control in human cell-based analysis

AvantiCell Science Ltd (ACS) is a SME specialising in cell-based analysis using human primary and stem cells. ACS was launched in 2006 and will, in September 2015, employ 18 staff in premises located in Ayr, Scotland. ACS has been profitable for several years.

## What is the market opportunity that you have identified?

Industry has adopted cell-based analysis as the preferred tool to measure the biological activity and biosafety of a wide range of materials, from candidate drugs to nutraceuticals and medical devices. Cell-based testing is also finding use in nanosafety testing, as a means to assess industrial or environmental contamination. All these applications require analytical sensitivity and predictive value, which cannot be delivered by aged cell lines and conventional cell culture, and instead need human primary cells with tissue-reflective functionality, which require careful handling and placement into analytical situations. AvantiCell Science Ltd (ACS) is developing technologies to this commercial purpose, and has identified acoustic manipulation of cell populations in culture as a potential tool to improve their delivery into and performance in cell-based analysis.

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## How will you deliver value from this opportunity?

The project shall test the potential of acoustic cell guiding to increase efficiency in handling of living cells under commercial or clinical conditions. Reproducible and rapid selection of cell populations by a non-invasive, acoustic process prior to cell-based analysis promises enhanced performance of all analyses based upon those cells, with prospect of a step-change in the lucrative cell-based market.

## What are your next steps?

The immediate routes to market for the technology, following extensive post-project validation, shall arise through its incorporation 1) into an enhanced cell-based service offering by ACS directly to its customers and 2) its delivery of higher-specification primary cell products. Incorporation of acoustic guiding into commercial processes will be developed in collaboration with University of Glasgow, where the technology originated.

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# Baker Ruskinn

IDAP - Integrated Decontamination Accessory Project

Baker Ruskinn's core business is the development and manufacture of sealed Hypoxic (low oxygen) and Anoxic (zero oxygen) 'glove port' workstations for cell biology, stem cell research and microbiology applications.

## What is the market opportunity that you have identified?

All decontamination of workstations uses a manual 'wipe-down' which is labor intensive and highly variable. This study looks to identify automated methods for decontaminating the glove port workstation to provide a controlled and repeatable process for the end user.

## How will you deliver value from this opportunity?

This feasibility study allows us to explore methods of decontamination and the development of protocols to achieve repeatable and consistent results.

## What are your next steps?

With the success of this study we would look at the formal design-in of the decontamination system along with certifying it to the relevant safety and performance standards

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# Base Materials Ltd

Artificial neural network prediction of coefficient thermal expansion of tooling board

Base Materials, with 45 employees, was established in 2002 and manufactures epoxy resin based tooling board widely used for the moulding of carbon fibre reinforced composite materials used in F1. Our team is led by Ahlame Taha who is the base projects manager.

## What is the market opportunity that you have identified?

Our concept is for an epoxy resin based composite tooling board capable of high curing temperatures but with a low CTE such that production components can be taken directly from the first tool providing significant cost reductions for the industry. The development of such a tooling board is not trivial and the board properties can vary depending on process conditions and formulation. We propose to take our complex data sets that we are generating and analyse them using an artificial neural network in order that we have a numerical model to predict the properties of variants of this new class of tooling board based on formulation and process conditions thereby minimising the amount of experimental work to be conducted.

## How will you deliver value from this opportunity?

We will generate value by shortening the time for our technical team to develop these new and innovative materials and furthermore have a technique to capture our formulation knowledge base and predict the physical and mechanical properties of new formulations. Many of our clients demand bespoke tooling board properties and this project should enable us to serve them better.

## What are your next steps?

We're seeking end users who are seeking tooling board with bespoke properties and that we can engage with.

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# Biopta

Fresh native human tissue slices in 96-well plate format compatible with phenotypic high content biology for drug screening and advanced target validation

Biopta is a contract research organisation focussed on the ethical use of fresh functional human tissues in drug development. Drugs provided by clients are tested to provide information that contributes to the understanding of clinical safety and effectiveness.

## What is the market opportunity that you have identified?

A major aspiration of the pharmaceutical industry is the use of relevant human tissue models for better understanding of disease processes and how potential drugs modulate these processes. The appetite for this in the market place is supported by the recent push towards artificial 2D and 3D tissue models. These models fall short in biological relevance to native human tissue systems but currently have an advantage in experimental throughput and ease of use.

## How will you deliver value from this opportunity?

Biopta aims to improve the throughput of fresh human tissue experiments via miniaturisation and automation of precision cut tissue slice technology. Compatibility with automated, high content biology screening platforms would provide maximum value to clients as this technology can provide information on multiple parameters from the same tissue sample.

## What are your next steps?

Tissue should be viable at the time of miniaturisation and after transport to allow experiments to occur in high content biology screening platforms. The next stage of the project will assess and optimise the shipment parameters required. We are looking for optimal transport systems to facilitate this.

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# Britonwood Packaging

Environmentally friendly packaging

Our core business is manufacturing paper sacks for food, chemicals, police evidence ect. Turnover is approx £1.3 million, and we have 14 employees. The business is owned by Ron Jones and Alan Rea. We have two granted UK patents and have a EU patent pending.

## What is the market opportunity that you have identified?

There is a market for cost effective, environmentally friendly, protective packaging using an advanced paper to create a single ply protective envelope. The internet market is growing month on month and the current market leader is made from a mixture of plastic and paper that inevitably ends in landfill.

## How will you deliver value from this opportunity?

We already have a three ply, patented, protective envelope made entirely from 100% paper. This will be a follow up product and we already have interest.

## What are your next steps?

This study will prove that the product can be physically made. The next stage will be to investigate the manufacturing possibility and to create the envelopes at high speed.

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# Cadscan

A low-cost optical foot scanner

Cadscan was formed in 2011 and is a developer and manufacturer of low-cost 3D scanning systems. It launched its first product, Cubik, a desktop 3D scanner, in 2013 and is currently developing a number of new devices for the medical sector.

## What is the market opportunity that you have identified?

Leg braces, ankle supports and footwear can be effective in preventing and treating a number of medical conditions. Ankle fractures affect 700,000 people in Europe each year, with 70% suffering long-term symptoms; yet bespoke compression sleeves can address this. Bespoke footwear and inserts can be manufactured to offload the foot to prevent foot ulcers or help compensate for joint degeneration. Beyond the medical orthotics sector which is estimated to be worth \$4.7 billion in 2015, opportunities exist in the athletic footwear market (\$84.4 billion) and specialist running segment which is currently growing at 11% pa. To be effective these require an accurate 3D measurement of the lower leg, ankle or foot to ensure a perfect fit that maximises contact area and optimises loading and pressure distribution.

## How will you deliver value from this opportunity?

While this project has demonstrated technical feasibility the system requires further development prior to commercialisation. The current concept addresses a number of application areas from which several different products may emerge. We now plan to investigate the most promising configurations further to identify those that can be commercialised quickly.

## What are your next steps?

We are looking for partners who can manufacture bespoke splints, ankle supports and compression stockings that can be paired with our technology to produce a complete point-of-care solution to rapidly address a number of medical problems. We are also looking for partners with other complementary technology with the potential to add further value.

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# CHAIN Biotech

Redesigning metabolic circuits for speciality chemical production

The company's primary focus is on the development of advanced fermentation technology for the production of high value chemicals and in particular chiral chemical intermediates used in a variety of applications such as nutraceuticals, pharmaceuticals and fragrances.

## What is the market opportunity that you have identified?

Stereoselective chemical manufacture for the fine chemical industry is difficult, inefficient and costly. It requires expensive chiral catalysts, solvents, harsh physical conditions and results in unwanted by-products making purification difficult. Biological methods using fermentation or enzymes are highly stereospecific and can be performed under mild reaction conditions using more sustainable feedstocks. The global market for technologies that enable chiral chemical production is forecast to reach \$5.1 billion (US) by 2017 and is driven by the continued rising demand for enantiopure compounds. Regulatory pressures and extension of patent protection for drugs manufactured from pure enantiomers is driving growth. Amines, carboxylic acid derivatives, diols and ketones provide the fastest growth opportunities among chiral intermediates for high value-added pharmaceutical and nutraceutical ingredients.

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## How will you deliver value from this opportunity?

CHAIN aims to produce high value fine chemicals at costs lower than current chemical synthesis methods. Using microbial fermentation and renewable feedstocks we also address key environmental and sustainability concerns. Large opportunities exist within pharmaceutical, personal healthcare and bioplastics markets. CHAIN has specifically identified a new nutraceutical market opportunity which requires our target molecules.

## What are your next steps?

CHAIN seeks industry development partners that understand the benefits of industrial biotechnology and can benefit from the company's unique development platform for anaerobic bacteria targeting a pipeline of chemical products. This platform is supported by a large microbial culture collection, modular plasmid vectors, synthetic biology expertise and the use of robotics that increase throughput and accelerate the development cycle.

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# Chronos Therapeutics

Feasibility of creating a novel *C. elegans* model for identification of compounds useful in neurodegeneration

Chronos Therapeutics was founded in 2009 with the aim of identifying innovative therapeutics for the treatment of age-related diseases. The company is an SME specializing in the screening of compounds for enhancement of chronological lifespan as well as development of models of neurodegenerative disorders.

## What is the market opportunity that you have identified?

Therapeutic compound screening in vertebrate models is costly, time-consuming and unsuitable for high-throughput. The nematode *C. elegans* is a cost-effective and tractable model system for studying drug efficacy in a range of human diseases, including neurodegenerative disorders such as ALS. With its short lifespan and tractability, the worm can potentially be used in high numbers for fast assessment of multiple drug combinations and/or dose ranges. A major stumbling block to incorporation of this simple animal into high-throughput screens is effective tracking and assessment of motility in such models. Our model has the potential to provide readouts of movement deficits with high n-numbers in a genuinely high-throughput context, allowing whole-organism screening with the rapidity and low cost of cell-based technologies.

## How will you deliver value from this opportunity?

Chronos Therapeutics already has a wealth of experience with drug screening in *C. elegans*, both for increases in chronological lifespan and in models of human neurological disease. This opportunity will allow expansion of existing screening modalities towards a high-throughput platform to accelerate the identification of candidate therapies for development, shortening time to market and providing screening services to external companies.

## What are your next steps?

Higher-throughput assays building on our model will require the use of automated handling and imaging facilities for dispensing and analysing animals. We would ideally develop a collaboration with partners experienced in microfluidics and/or automated handling, or would seek investment for purchase of a large-particle sorter for accurate set-up of drug screening plates.

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# Clean Technology Solutions Ltd

SubChrome: chrome hexavalent substitution for aerospace industry

CTS is an innovative SME, developing and commercialising customised technologies and products in the fields of thermal spraying, advanced materials and clean technologies in general.

## What is the market opportunity that you have identified?

The technology targets at the hard chrome market for the aerospace sector, in particular landing gear which has a market value about £0.5 billion per year.

## How will you deliver value from this opportunity?

The landing gears' outer diameter chrome plating is readily replaced by HVOF WC-Co spray. However, the internal diameter chrome cannot be replaced by HVOF WC-Co using current HVOF equipment. The alternative plasma sprayed WC-Co cannot produce low-porosity coatings required. Our technology will fill the gap.

## What are your next steps?

We are looking for the possibility of partnership with coating companies or equipment manufacturers to bring this technology to a wider customer base.

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# CloudTomo Ltd

User-friendly security and privacy to increase confidence in cloud-based systems

CloudTomo is a recent spin-out from University of Birmingham which aims to commercialise ideas in cloud computing security. Led by two professors and a PhD student, it is currently developing products.

## What is the market opportunity that you have identified?

We focus on the secure email and cloud storage markets. Our market analysis shows that they are large and rapidly growing markets. Our customers will include companies (e.g. financial and health-care related organisations, retail companies, universities) and individuals (e.g. journalists and lawyers) that want to protect sensitive data, such as financial data, medical records, customer data, intellectual property, etc. Our market analysis shows that existing competitors, such as Hushmail, Virtru, Mega, and OwnCloud, have limitations of providing encryption-only solutions, and they are either hard to use, or not as secure as claimed. Our USPs are user-friendliness with end-to-end security, with the ability to process encrypted data, and with the ability to detect whether that the compromise of end devices has happened.

## How will you deliver value from this opportunity?

Different markets represent different opportunities and different challenges. The home-user market is probably the easiest one to begin with, because we can offer a 'freemium' pricing approach. We don't need to have produced physical devices at this stage, because we can offer virtual devices in the cloud. For companies, we will approach it by providing advanced physical devices.

## What are your next steps?

We are currently looking for funding to enable us to develop the ideas and to acquire evidence around the business proposition. We are also expecting potential cooperations to develop software, and to market our products.

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# Demoncode Ltd (t/a Smesh)

Dynamic, weighted interest modelling for target audience analysis & content matching

Demoncode Ltd (Smesh), est. 2009, builds social network + digital advertising data analysis & visualisation systems, for consumer engagement and business intelligence. End applications involve simplifying and summarising complex data to drive actionable insights. Clients include Google, Unilever, EE, The Guardian, OMD, Mindshare.

## What is the market opportunity that you have identified?

Anyone (brands, agencies, publishers, educators, etc.) spending money putting content in front of an audience, be it advertising or otherwise, needs to shape that content to fit the interests and values of the target audience -- this underpins the advertising industry's efforts, on and offline. Social technology platforms (Twitter, Facebook, LinkedIn, etc.) offer large amounts of typically unstructured textual data that represents the interests of the individuals who make up target audiences. Although technology exists to define the members of a target audience (Demoncode Ltd and other companies already do this in various ways), it is very hard to formally capture, represent and reason about these interests based on the unstructured raw text of social data. This is the core problem (and opportunity) that our feasibility study addresses.

## How will you deliver value from this opportunity?

Primary value is via bringing the benefits of careful targeting of the interests of recipients to digital marketing, particularly on social platforms (i.e. relevancy and efficiency manifest as better engagement rate & cost per engagement). More general value exists in large scale mapping of audience interests, across a range of applications involving understanding those interests (research, publishing, etc.).

## What are your next steps?

We'd like to meet early customers and commercial development partners, who can help monetise the new capabilities, in part to fund further development of the technology to maximise its potential. We're also interested in meeting direct funding partners such as Innovate UK, and early stage tech investors.

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# Demuris Ltd

Rapid genomic library generation feasibility study

Demuris is an antibiotic discovery company founded by Professor Jeff Errington FMedSci FRS in 2007. Demuris has unique and world-leading expertise in key technologies of genome engineering, natural product production and isolation and target-based bioactivity screening.

## What is the market opportunity that you have identified?

The discovery of new antibiotics from Actinomycetes has become increasingly difficult as known compounds are repeatedly being identified, despite their genomes encoding large numbers of silent (or cryptic) Natural Product (NP) gene clusters. Compounding this, most Actinomycetes grow very slowly, demonstrate various morphologies, give poor antibiotic yield, and express only a limited range of their estimated antibiotic capability. Cloning and heterologous expression of antibiotic biosynthetic gene clusters can eliminate these problems. One of the bottlenecks for this technology is the cloning step for these very large gene clusters (upto 140 kb). We are investigating a new approach to genomic DNA recovery and utilisation. Our proposed methods are operationally simple and rapid and also have potential for strong IP protection.

## How will you deliver value from this opportunity?

We believe that the outcome from this project would also us to pursue more aggressively a synthetic biology approach. Not only accelerating the development of our antibiotic portfolio, Demuris is building capability and expertise in an area that could profoundly enhance its competitive position, potentially providing a service applicable for any NP compound in many bioscience sectors.

## What are your next steps?

We are currently seeking funding and investment in order to develop our process of biosynthetic gene cluster cloning and combine this with high-titre production Superhosts. Our immediate intention is to demonstrate this with our lead gram-negative active antibiotics.

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# DigitalMR Ltd

Scalable image sentiment analysis engine

DigitalMR was established in 2010 and is a next generation market research company with focus on social listening and online communities for insights. Big data analytics and machine learning is our expertise. The team of 10 consists of data scientists, insights experts and software engineers.

## What is the market opportunity that you have identified?

DigitalMR proposes to evaluate the feasibility of constructing a scalable image sentiment analysis engine. The idea is to study the patterns in images online to determine to what extent they are positive or negative. So far, the computational analysis of sentiment mostly concentrates on text and DigitalMR achieves consistently market leading accuracy of over 80% in any language. Automated image sentiment analysis is an unsolved problem. An image in a tweet combined with text may alter the sentiment that the text alone would imply. The target of our study is to discover the potential of automated visual sentiment analysis for commercial applications. This capability will ultimately enhance DigitalMR's listening247, a social media monitoring and analytics system whose effectiveness has been proven by a range of private and public sector organisations.

## How will you deliver value from this opportunity?

Every day, around 500 million tweets are tweeted and 50% of all ecommerce sales is attributed to social media. Sentiment analysis is revolutionising social analytics. Nevertheless, sentiment analysis is largely ignored when it comes to images. According to Twitter itself 36% of tweets contain images. DigitalMR will provide brands a way to include posted images when they perform social analytics.

## What are your next steps?

We will apply for a tech inspired grant to continue our R&D and solve this problem with a commercially viable solution. We are looking for collaboration partners with access to distributed processing and also pilot customers who are willing to work on use cases with us.

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# Dithen Ltd

ACAME: Advanced Control Aspects for MEdia workload processing

We are a dynamic team of 4 PhDs in electronic engineering and computer science and 1 mba that has developed a novel cloud-computing solution that offers unique flexibility and ease-of-use. Our product is offered as a freemium service, with the free tier offered at dithen.com.

## What is the market opportunity that you have identified?

With millions of users creating and processing exabytes of image and video content each day, cost-effective processing of large visual media workloads remains the least manageable element of the big data ecosystem. Therefore, delivering cost-effective and scalable solutions for image- and video-processing workloads within analysis, recognition, and data coding & transmission services is of paramount importance to many commercial & end-user stakeholders in the UK & abroad. Dithen is a new Computation-as-a-Service (CaaS) platform that aims to address this problem. Dithen is deployed over commercial cloud infrastructure providers (e.g. Amazon Web Services). Therefore, its primary operational expenditure is the billing cost incurred by the usage of such infrastructures. In this project, we designed, validated and deployed an advanced control algorithm that minimizes the incurred billing cost within our service.

### Ioannis Andreopoulos

Director

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## How will you deliver value from this opportunity?

The ACAME project will be commercialised in two ways by Dithen: providing an added-value platform to those wishing to utilise cloud computing infrastructure for their own services, and providing granular access to direct services such as video transcoding and face detection, using a library of open and added-value tools.

## What are your next steps?

We have already begun building an initial customer base for our product. We are looking to expand our customer base to more businesses looking to utilize cloud computing for their testing, software development and data processing needs without having to develop cloud-computing expertise in-house.

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# Eluceda Ltd

The feasibility of developing a robust scaffold for binding protein development and a new platform of sensors that can operate in harsh solutions

Eluceda has been operating since 2009 and specialises in small molecule detection and novel assay systems. We've successfully worked with several blue-chip companies, saving them considerable money through application of our technologies and expertise. We are a team of four passionate, driven and curious scientists.

## What is the market opportunity that you have identified?

Current detection technologies that include antibodies, nucleotide aptamers and modified binding proteins are inadequate for industries that regularly test and use solvents and non-aqueous solutions. Many applications such as pharmaceutical production, waste testing and chemical anti-counterfeiting would benefit from a stable, usable detection system that can be designed around molecules of choice. The application of a configurable binding protein with a high tolerance for harsh solutions and conditions would mean easy, straightforward detection of identified molecules such as pharmaceutical products, security markers or trace amounts of waste product.

## How will you deliver value from this opportunity?

Eluceda will leverage current contacts in the testing, manufacturing and detection sectors to present a versatile test component. We will incorporate it into our current test methodology to produce a detection system that is fast, sensitive and robust. It will complement other exciting, Eluceda developments such as novel electrode material and connected devices.

## What are your next steps?

We would like either a collaborative partner that can participate in a grant application or investment.

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# Exporior Micro Technologies Ltd

Fully integrated smart sensor solution for improved hydroponic growth

Operating since 2012, Exporior Micro Technologies are specialists in the development and supply of advanced electronics and software solutions. We are utilising our IP portfolio in the development of Irrisense – a range of monitoring and control solutions for the Controlled Environment Agricultural market.

## What is the market opportunity that you have identified?

The market for Controlled Environment Agriculture (CEA) systems which maximise crop yield through precision control of growth environments is predicted to show rapid expansion over the next five-to-ten years due to an increasing demand for fresh, high quality, low-cost varied vegetable, salad and berry varieties. Advances in CEA and vertical farming will impact the multi-billion dollar worldwide market for hydroponically grown food through increases of up to 400% in crop yield per hectare and reductions of up to 75% in the time-to-harvest compared to traditional agricultural methods. Despite the commercial opportunities for CEA, there is lack of reliable, integrated turn-key sensing and control hardware and software which fulfils the monitoring and control requirements of precision CEA in order that its performance and therefore full market potential can be achieved.

## How will you deliver value from this opportunity?

Utilising their strong IP portfolio and range of adaptable, modular high-performance hardware, software and web-based technologies, Irrisense, part of Exporior Micro Technologies Ltd, design, supply and support turn-key sensing and control solutions which enable CEA system manufacturers, hydroponics companies and commercial growers to maximise the performance and reduce the

## What are your next steps?

Working together with academic organisations and CEA suppliers, we have completed the development and evaluation of Irrisense sensing and control systems for the expanding CEA market. We are now looking for business partners and funding to enable us to expand our customer-base, roll-out hardware at scale and establish Irrisense as a market-leader for CEA monitoring and control solutions.

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# FibreFlight Ltd

Damage tolerant, lightweight lattice core technology for composite structures

FibreFlight Ltd. is a design consultancy and composites manufacturing business specialising in projects containing aspects of aerodynamics and composite materials. Incorporated in 2003, We have has undertaken projects in the motor sport, unmanned aviation, transport and marine sectors.

## What is the market opportunity that you have identified?

Lightweight structures made from composite materials (e.g. wind turbine blades, lightweight vehicle panels etc.) offer many advantages (e.g. CO2 reduction in transport applications). However, there are two main problems: 1. producing parts rapidly and cheaply enough; and 2. making them light yet sufficiently robust. Current production solutions are complex, costly and damage prone (when lightweight). The technology arising from this project reduces process time, the amount of tooling used, enables the use of lower cost materials and delivers a tougher part for a comparable weight (relative to currently used techniques). These advantages allow composite structures to be produced more profitably and have a lower cost of ownership.

## How will you deliver value from this opportunity?

We intend to deliver value from this opportunity in two ways; firstly by utilising it in a product marketed under Fibreflight's name and secondly by working with larger companies to use the technology in their product(s). At this time, we have a potential product under consideration and we have begun the process of talking to potential companies.

## What are your next steps?

To take this technology from its current 'proof of concept' stage to a point where it can be integrated with a product will require further development work. Whether this work is funded internally or by an external source remains to be determined. This depends on the nature of the application.

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# Folium Optics Ltd

Manufacturing processes for simple plastic displays

Folium Optics was formed 2 years ago to develop and commercialise plastic displays which are low power and highly visible. We have grown from the founding group of 4 engineers to the current team of 7. We have our own cleanroom and labs in Bristol.

## What is the market opportunity that you have identified?

We are developing plastic display technologies and in this project we have tested the feasibility of new processes to significantly reduce manufacturing costs so that we can address a new market opportunity: animated eye-catching graphics in safety products. High visibility markings are commonly used to help draw attention to vulnerable people or hazardous environments. We have developed a colourful, low power, reflective, animated high visibility marking that is more effective than existing static products, so could save lives. Applications include cyclists, road signs and workwear. Whilst this is a promising entry point for the emerging plastic electronics industry, the manufacturing costs will need to be significantly reduced.

## How will you deliver value from this opportunity?

Our business model is to develop solutions to customer problems that we then license to partners to commercialise. We have filed a patent on the high visibility concept and have made demonstrator devices. This project tests the feasibility of manufacturing at a lower cost which will be a key part of any licensed solution.

## What are your next steps?

We are looking for partners to help us commercialise the technology; in particular we are looking for partners that can help us apply the basic technology in real applications, particularly road safety products. We would like to speak to people currently using high visibility marking or LEDs who are looking for new more effective solutions to differentiate their products.

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# Functional Technologies Ltd

Cluster inference of big multimedia databases

Functional Technologies, established in 2009, currently has four employees and specialises in multimedia forensics and security, multimedia retrieval, computer vision and biometrics. We are a medalist of 2011 BCS UK IT Industry Awards. We provide consultancy services to help our clients achieve their business objectives.

## What is the market opportunity that you have identified?

The opportunities lie in the law enforcement agencies' acute needs for an effective clustering technique in order to group photos based on the 'fingerprint' deposited in the photos by the cameras. This technique will enable the police 1) to establish the connections among images, cameras and their owners, and 2) to identify the cameras of newly confiscated photos by comparing the camera fingerprint extracted from the confiscated photos against the reference / average fingerprint of each group should photos taken by the same cameras be in the database.

## How will you deliver value from this opportunity?

We will achieve this by addressing two technical issues: 1) The problem where the number of clusters is far greater than the average size of clusters; and 2) With millions of images in the database (e.g., the ICSE DB currently contains 5 million images), the computational complexity of traditional iterative clustering processes based on pair-wise matching is prohibitive.

## What are your next steps?

We will protect the IP through a patent application. Based on the patent application, we will look for business partners that operate in the law enforcement sector to commercialise the IP. We will also develop new applications for the clustering methods.

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# Generic Robotics Ltd

Advanced control system for next generation force feedback haptic devices

Generic Robotics is a small collective of engineers and academics. We are excited about technology and love a challenge. We specialise in novel human computer interfaces (particularly touch/tactile interaction) and robotics. We excel at projects requiring unusual and creative technological solutions and are now exploring commercialisation of our own IP.

## What is the market opportunity that you have identified?

Haptic (touch feedback) technology has an important role to play in the rapidly growing clinical skills training market as well as more broadly in modern HCl. However, its uptake is limited due to the high cost and non-generality of haptic interfaces, necessitating specific, often bespoke devices for different applications. As GR moves towards a more general purpose solution we will be able to cover a common platform for a wide variety of different training needs and be uniquely positioned to competitively enter both established market segments and new areas where it has been difficult for existing approaches to be applied.

## How will you deliver value from this opportunity?

With a general purpose platform we will be able to capitalise on economy of scale as the manufacturer but we can also disrupt the way end users buy and use these technologies. End users will now be able to purchase a single hardware system for multiple training needs, spreading the capital cost across different training disciplines.

## What are your next steps?

We need to quickly broaden the range of available training applications for our technology to solidify the unique benefit of buying into our approach and technology. For this we need to engage customers with new manual skills training problems which we can create new applications for using our core technology.

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# GeoGreen Power Ltd

Innovative energy saving sorption-storage heater

Since 2011 GeoGreen Power has designed and installed electricity generation/storage systems. GGP is the UK's premier installer of 20kW-200kW solar PV in the agricultural and commercial sector. The MD of GGP, Andrew Cunningham, is an engineer who invests in technology companies.

## What is the market opportunity that you have identified?

The project's main aim is to provide a high density, low cost, efficient, safe, thermal energy storage material that will enable surplus energy to be stored for use at times when energy is only available at a premium rate. This will lead to development of a 'sorption-storage heater' that uses advanced energy materials (sorption materials). Thermochemical heat storage (THS) materials have the potential to store heat at ambient temperatures for extended periods of time without any degradation or heat loss. The project has identified efficient nano-composite sorbents that have as much as six times the energy storage capability per unit mass as liquid water. The project has also proposed an improved energy charging process for the material that utilises the waste heat. The product enables reliable renewable heating.

## How will you deliver value from this opportunity?

GeoGreen Power will introduce the technology to the market and create new jobs with further employment throughout the supply chain in the sustainable material, construction and agricultural sectors. It will benefit UK PLC by exploiting a high knowledge based technology with excellent export potential. To achieve significant UK CO2 emission reductions, We will form partnerships with key energy companies.

## What are your next steps?

We will be looking for suitable academic and manufacturing/engineering partners to create a marketable product. We Power will also need to identify suitable distribution and export partners.

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# Glass Manufacturing Services

Development of glass-based saturable absorber Q-switch (Glass SAQS)

GMS was formed in 2010 as a joint-venture spin-out company between University of Leeds and Glass Technology Services, specialising in the flexible manufacture of high specification glass based components and novel processing techniques.

## What is the market opportunity that you have identified?

Saturable absorber Q-switches are optical elements inserted into laser cavities to cause them to produce short pulses. For certain types of lasers, such as 1.5 micrometer eye-safe lasers, the only materials available are cobalt doped transparent ceramic or crystal which are very expensive and difficult to source. GMS is developing new glasses as alternatives which offer advantages such as being much cheaper and easier to fabricate, along with novel techniques for incorporating the elements into the cavity in such a way that simplifies the laser cavity, reduces losses and aids the manufacturing process. During the project GMS will assess the feasibility of using glass as an alternative material to ceramic and crystals for Q-switching by engineering and characterising bespoke glass compositions.

## How will you deliver value from this opportunity?

We have strong links with manufacturers and end users of laser devices systems which have expressed a great deal of interest in the development of more cost effective Q-switches and novel techniques for their incorporation into laser cavities. We therefore have immediate customers once the technology is proven.

## What are your next steps?

This technology can potentially be extended beyond the eye-safe laser market and be used for lasers operating at a range of wavelengths, therefore we will seek exploitation partners which can assist by providing information on material requirements and testing and prototyping of new materials in laser cavities.

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Project Manager

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# Glass Technology Services Ltd

Complex Glass-based Millilitre Continuous Flow Reactors (Glass-MCFRs)

Glass Technology Services (GTS) provides a wide range of services to the glass industry, and companies in the 'glass' supply chain. These services include technical support, consultancy, contract R&D and analytical services. We also conduct a range of internal R&D activities alone or in partnership.

## What is the market opportunity that you have identified?

Offering improvements in energy efficiency, reaction speed, yield, safety, reliability and scalability, continuous flow chemistry is gradually becoming adopted into a range of high-value chemical manufacturing processes (e.g. pharmaceuticals, cell biology research, protein crystallization) as well as in point of care testing within healthcare. However current technologies for manufacturing these devices out of glass are very expensive and have limited design freedoms, as such the technology is limited to specific applications. Our challenge was develop a low cost route to manufacture glass-based millilitre-scale continuous flow reactors (MCFRs), containing complex channel structures to facilitate controlled flow & mixing of fluids.

## How will you deliver value from this opportunity?

This novel technology will provide more effective, customisable, compact and lower-cost routes for manufacturing specialist chemicals e.g. for biopharmaceuticals and functional foods. It will make the technology accessible to new sectors of the chemical development industry and enable more rapid development of speciality chemicals.

## What are your next steps?

Now that the concept has been demonstrated on a small scale with simple structures the next step would be to undertake a further development project with academic and end users to demonstrate the ability to produce larger reactors with more complex geometries, which are customized for specific reactions. We will also look to file a patent to protect the technology.

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# Greenclick

Data exploration system for guiding energy reduction through the supply chain

Greenclick provides specialist services in energy and environment with focus on resource productivity, product design, and enterprise transformation. The company is scientifically and technology rich, and offers competitive perspectives on business innovation and visibility through the supply chain.

## What is the market opportunity that you have identified?

Large companies wishing to build sustainable supply chains need their suppliers to reduce energy waste. This would help to lower costs, drive down greenhouse gas emissions, and enable businesses to protect their brands. Suppliers, however, are generally reluctant to disclose their energy consumption, let alone cost reduction opportunities. Greenclick has developed a system that shines a light through the 'dark supply chain' and provides estimates of energy use, and energy and cost savings in each supplier down to the equipment level. No information is required from suppliers and this overcomes the widespread deadlock in supplier disclosure. The Greenclick system enables the large company to shine a light into each supplier, provide bespoke calls to action, allowing a better supply chain to be built based on visibility.

## How will you deliver value from this opportunity?

The Greenclick supply chain engagement platform will deliver value to the large company and its suppliers by guiding suppliers through programmes of energy and cost reduction to enable a lower-energy lower-cost supply chain to be established. Value is delivered by creating visibility and engagement where previously there may be very little.

## What are your next steps?

Proof of concept and system designs for the platform have been established and development work is planned. Next steps include: 1) securing early-stage capital for build of the on-line platform; and 2) on-boarding a small number of pilot-stage companies wishing to gain strategic advantage in the marketplace.

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# Hodos Media Ltd

Driving data for road management

Hodos Media's transport 'game' for the commercial vehicle market, fleetfoot, takes driving data and turns it into gameplay and achievements. We use telematic hardware and the concept of gamification, that is adding game mechanics, rewards, leaderboards and other engaging elements to motivate positive driver behaviour.

## What is the market opportunity that you have identified?

In a previous study, we have produced heat maps for the insurance sector, using standard archived data provided by our telematics hardware providers. In this study, we want to use data collected from our fleetfoot system and generate visualisations for non-expert government users. For example, we could place regular braking events on a street view to find potential accident hot-spots at concealed entrances, before they happened. UK public spending on road transport infrastructure was £7.7 billion in 2012/13 (Road Users Alliance). However, decisions on the location of roadside infrastructure is based on anecdotal and ill-researched evidence. This is why the transport consultancy sector is estimated at earning £125 million in 2013 (PlanningResource.co.uk) from outdated and inaccurate methods such as mass surveys on travel patterns.

## How will you deliver value from this opportunity?

A more accurate and cheaper way of planning infrastructure is needed – based on informed fact. Better and cheaper infrastructure planning will save money, reduce congestion, reduce CO2, improve air quality, and reduce fatalities. The study will allow better exploitation of different data elements and patterns around our pre-existing driver and vehicular sensor network.

## What are your next steps?

We needed this study to make a credible case for larger scale investment into this potentially new area of the business. Although it could open up a new market for us, as a SME, without some support, it remains an interesting but risky concept. We are looking for future customers and strategic investors to take the concept further.

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# In-Cycle Ltd

Micro-cellular 3D printing filament

## Partner companies

CCm Research

In-Cycle develops material separation and recycling technologies, largely for difficult to recover waste-streams, such as shoes, textiles and plastics. CCm Research has invented and patented technology to efficiently use industrially segmented CO<sub>2</sub> and to safely convert it into materials with a commercial value.

### What is the market opportunity that you have identified?

The global 3D printing market is presently estimated to be worth over £2.5 billion and is predicted to grow at approximately 45% per annum until 2018. The sale of innovative new 3D printing materials therefore offers significant opportunities. 3D printing using cellular (foamed) materials could serve many new product applications, where lightweight, yet strong and flexible materials are desirable. Products such as prosthetics/broken limb support structures and components for personalised footwear. However, the chemistry of traditional foamed polymers, such as EVA and PU, make them unsuitable as a filament based 3D-printing material. We propose using eco-friendly Supercritical CO<sub>2</sub> based technology to produce a micro-cellular structure in a biopolymer based filament.

### How will you deliver value from this opportunity?

Now that basic feasibility has been proven, In-Cycle will begin the commercialisation process. Micro-cellular filament production will be done in-house, within the UK, using bespoke equipment. The uniqueness of the filament should create a steady demand. We also believe extended value lies with the material enabling novel product applications, opening up new revenue streams for UK companies.

### What are your next steps?

Once our commercial scale manufacturing process is fully operational, product beta testers will be sought, to trial the material for different product applications. Eventually, if demand is high enough, global distributors will then be required.

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# Industrial Phycology

Use of acoustic separation for the separation of hydraulic retention times and harvesting in the production of microalgae

Partner companies  
Sonic Systems

Industrial Phycology is an advanced water treatment company founded in 2012. Their current focus is the development of its algal based wastewater treatment technology. Since its formation the company has won a range of high profile awards including 'most commercial potential' at the Pitch@Palace.

## What is the market opportunity that you have identified?

One of the biggest obstacles to efficient use of algae is the separation from the growth media so the biomass can be recycled / reused. This is even more complex when considering algae for use as a water treatment technology. Industry wants processes that are robust, energy efficient and do not require the addition of flocculants/chemicals. Acoustic separation is a robust technology with the ability to separate out particles over a range of sizes, without the need for chemical additions or large energy inputs. Successfully adapting it for use with algae would be a significant step forward in their commercialization.

## How will you deliver value from this opportunity?

Industrial Phycology has combined its industry leading understanding of algae with Sonic Systems expertise in sonic technology. We have collaborated to conduct assessments of acoustic properties of algae and conduct initial tests. Both companies are familiar with industrial process development. Moving forward we will work together to design a fully specified solution for trialling, scale up and commercial use.

## What are your next steps?

We will seek funding and partners in order to define, fully develop and pilot the technology for use with algae and effluent treatment. Following this will be full specification, scale up and piloting. We would then seek additional industry support to carry out integration and full field trials using Industrial Phycology's advanced algal technology.

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# Inova Design Solutions Ltd

Non-invasive continuous vital signs monitor

Inova Design Solutions Ltd is a life sciences company incorporated in 2011. Inova is involved in the research, development and commercialisation of innovative technologies to improve the monitoring of various vital sign parameters of the human body.

## What is the market opportunity that you have identified?

Heat and cardiac illness are a major problem for individuals in sport, defence, first response and healthcare sectors, including the likes of: athletes, military personnel, fire fighters, the elderly and in- and out-patients. There are no existing solutions to determine both heat and cardiac illness in the field, nor simply or non-invasively elsewhere. In the clinical environment, current solutions for monitoring awake patients are inaccurate and time consuming.

## How will you deliver value from this opportunity?

Our innovation will make ambulatory monitoring of vital signs much more accessible than current methods allow, and will provide improvements in the monitoring of heat and cardiac illness to prevent suffering and mortality. Benefits will apply to those exercising at high intensity, operating in harsh environments, or who lack the ability to control their environment.

## What are your next steps?

Following this successful feasibility study, we will continue prototype development towards pre-production, carry out product trials and approvals, and proceed to commercialisation. We are currently seeking manufacturing partners to help bring the product to the market as well as customers in the identified markets.

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iProov delivers online authentication - outstandingly easy to use yet very secure. We use face verification, uniquely solving the hard problem of detecting forgeries without impacting users. iProov was founded in 2012 and our team combines experienced industry executives and academics from University College London.

## What is the market opportunity that you have identified?

Trust in the online identities of employees, stakeholders and customers is the key to the cyber-security of enterprises worldwide, both large and small. Current methods are either destructively insecure or poorly usable for the user. Biometrics are exciting because the user doesn't have to remember, own or do anything, and face verification is the easiest and most ubiquitous, but suffers from vulnerability to spoofing by forgeries. Having solved this problem, new opportunities arise in areas where security with simplicity is key. An example is IT access control services for small and medium enterprises (SMEs) whose cyber-security is notoriously poor. If such services can be delivered economically and scaleably to large numbers of SMEs, an untapped market addressing over 2 million employees in Europe opens up. CloudNAS seeks to make that possible.

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## How will you deliver value from this opportunity?

iProov is a provider of software as a service. The model of delivering innovative services to SME customers over the internet for a fee is well established and successful, and we will extend this model into new areas of cyber security.

## What are your next steps?

We are looking for forward-thinking small and medium enterprises who are ready to experiment with an innovative service to enhance their security with minimum operational impact. We are also looking for partners who deliver complementary services which could enrich our offering.

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# Jellybooks Ltd

Improving books with reader analytics data (“project pomegranate”)

Jellybooks provides audience insight and reader analytics services to book publishers including the ability to collect reading data from within 3rd party eBook reading applications. The service is the first of its kind in the book publishing industry.

## What is the market opportunity that you have identified?

Book publishers have an increasing need to collect and process data about their audience for the purpose of better serving and reaching readers in an increasingly competitive market place increasingly shaped and influenced by Amazon and other tech giants. Many companies and institutions, who are not book publishers, but who wish to inform and shape the opinion of stakeholders (content marketing), may have a potential need to understand if and long-form writing form instruction manuals to policy white papers is read and consumed.

## How will you deliver value from this opportunity?

We provide a data collection and analytics platform as a Software-as-a-service (SaaS) to authors, literary agents, book publishers and content marketers.

## What are your next steps?

We are looking to engage with publishers in the STM, textbook and educational markets. We are also interested in meeting companies outside publishing who actively generate and distribute long-form content and are interested in understanding how that content is read and consumed.

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# Ketonex Ltd

High Performance Application Specific Polymer (HASP)

Ketonex offers a unique opportunity for the custom design and synthesis of high performance engineering thermoplastics. All materials are based on the polyetherketone platform, with properties located at the apex of the polymer performance pyramid, often exceeding the properties of similar commercially available materials.

## What is the market opportunity that you have identified?

A leading US company which manufactures seals and bearings has identified that new materials would generate increased sales of \$100 million. Other producers of seals and bearings have also informed Ketonex that current materials such as PEEK and the fluoro elastomers are not able to perform satisfactorily at increasing well depths and the associated higher temperatures experienced.

## How will you deliver value from this opportunity?

We will collaborate with seal and bearing manufacturers in designing even higher temperature materials to meet the increasing demands from the oil and gas sector. New operational materials will facilitate the exploration of deeper wells operating at higher temperatures and pressures.

## What are your next steps?

Once small scale polymerisation trials have been completed successfully, customers will require larger polymer volumes to enable them to conduct real scale trials. This will require the installation of larger scale polymerisation plant. Funding for such a plant is required.

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# KidsConnect Ltd

Options for the validation of community-generated online data by non-expert users

KidsConnect is a social enterprise which has created a tool - a smartphone-optimised mobile website - designed to connect the parents of children under five with local activities and services. Our mission is to reduce social isolation and enable children to access great services.

## What is the market opportunity that you have identified?

The problem that KidsConnect has to tackle is collecting and maintaining the accuracy of a massive amount of community-generated content from a large number of disparate, distributed, small businesses and service providers few of whom have experience with ICT. The market opportunity we have addressed with this study is the development of a technical tool to facilitate the effective cleansing of community generated online content to help provide a reliable hyperlocal data directory. We have explored options for creating an automated solution to cleanse our data via an interface which enables non-ICT professionals to validate information as simply as possible.

## How will you deliver value from this opportunity?

There is a substantial market for KidsConnect (1.5 million users in London and the South East alone). At present we are using manual workaround processes to validate the event information provided for inclusion in the KidsConnect tool by service providers. Automating these processes will enable us to scale our product effectively to exploit the full UK market.

## What are your next steps?

We are looking for further grant or equity investment. This will enable us to develop the next iteration of the KidsConnect tool, building on our learning from this study, and improving the experience of our users and service providers.

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# Lein Applied Diagnostics

Multiple sensor confocal probe

Lein Applied Diagnostics provides innovative products for the non-contact measurement of position, thickness, refractive index, concentration and distribution of pharmaceutical drugs, and glucose non-invasively via the eye. Our technologies enable cost effective, compact and accurate products for applications ranging from pharmacokinetics to metrology.

## What is the market opportunity that you have identified?

Lein Applied Diagnostics has previously developed a low cost confocal sensor for distance and thickness measurements of organic and inorganic objects and materials. This optical sensor is proving of great interest in applications such as contact lens metrology, ophthalmology and surface profiling. However, as the focal spot of the sensor is only about 10 microns in diameter, surfaces and materials that are rough or variable on dimensions of that order or greater are very difficult to measure with adequate accuracy. We have a concept idea that may improve the sensor's performance by adding additional light collection capabilities so that it can be used in applications where the surface is rough and/or the material is difficult to measure with the existing sensor.

## How will you deliver value from this opportunity?

This work will expand the range of applications of our technologies and products into new markets. Improved sensors are required for the manufacturing and development of novel materials and products so a successful outcome of this study will also enable our customers to improve their products and processes, thus adding value all through the supply chain.

## What are your next steps?

We are looking for partners involved in industrial metrology to work with us to develop this technology into new applications and markets.

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# MAST Carbon Intl

High power supercapacitor carbon from industrial waste material

MAST Carbon Ltd is a SME specialising in activated carbon materials.

## What is the market opportunity that you have identified?

In applications requiring short bursts of very high power the current defacto approach is the use of supercapacitors, despite their extremely high cost. We have identified a route to potentially drastically reduce this cost yet still deliver exceptional performance.

## How will you deliver value from this opportunity?

We will enable UK-based production of supercapacitor cells and increase development towards high power, short term energy management.

## What are your next steps?

With part of the production in place we require capital investment to purchase analytical equipment for larger scale development.

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# Maximodex Ltd

Language workbench for specifying complex image processing in the cloud

The business is a spin-off from clinical research work at UCL involving the analysis of >1.4 million images. The company is run by Will Stott who has >20 years of commercial software development experience working for companies such as IBM and Accenture.

## What is the market opportunity that you have identified?

There is significant market potential for the advanced processing of images created by modalities such as ultrasound, MRI and X-Ray in healthcare and other sectors, such as inspection in high value manufacturing (HVM) and security. Rapidly growing opportunities in healthcare diagnostic imaging are identified by Frost and Sullivan in 'Analysis of the Advanced Visualisation Solutions in Western Europe', stating that the market for such ISV (independent software vendor) products will grow by 28% between 2013-17 to reach USD228 million.

## How will you deliver value from this opportunity?

We are developing a software product that allows non-ICT specialists to create workflows for processing images which gives potential for developing improved screening diagnostics for ovarian cancer and other conditions. It also opens the way for clinical non-ICT specialists to exploit the huge amount of image data currently held by the NHS.

## What are your next steps?

We want to set up a pilot study to demonstrate the potential of using the metrics obtained by our workflow software to drive improvement in ovarian cancer ultrasound screening. We seek to partner with a company providing quality excellence consultancy services as well as an NHS radiology department in order to obtain grant funding for this pilot study.

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# Metrcarc

ICMetric cloud security software

Metrcarc is in the technology - hardware, software and services - sector. We have been operating for 5 years and comprise of 6 staff. We are developing novel encryption security for cloud based services and are represented by Professor Klaus McDonald-Maier, Dr Karl Heeks & Dr Gareth Howells.

## What is the market opportunity that you have identified?

There is huge adoption of cloud based computing and an associated growth for managing security services that are shaping the future of the cloud based security market. Current estimates are that the cloud security market is worth around \$5.2 billion and forecast to reach nearly \$9 billion by 2019. Metrcarc has developed a unique encryption security called ICMetrics which can add an extra level of security in sectors where this is appropriate. This hardware based methodology is currently being adapted for cloud based services which need a software methodology. Metrcarc will initially develop this for healthcare application which are cloud based and which are an important sector of the cloud services market. We believe this will be substantially better than the current encryption technologies which store encryption keys.

## How will you deliver value from this opportunity?

The funding from this opportunity will enable Metrcarc to build a feasibility demonstrator that will show that our ICMetric technology can operate in a software only environment and be used to verify the authenticity of cloud based services without any user interaction. This will then be used as a marketing tool and to raise further investment.

## What are your next steps?

We will be looking to develop relationships with appropriate cloud providers who would have an interest in ICMetric technology. We would also use the feasibility demonstrator as the basis of proof-of-principle to potential funders. We would seek appropriate investment to enable the company to take the technology to the next stage of development.

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# mLED Ltd

Feasibility of using novel GaN processing techniques for advanced LED capabilities

mLED produce micron-sized inorganic light emitting diodes constructed from InGaN semiconductor material. Arrays of these microLEDs can be constructed to be used as a high brightness display engine in next generation wearable technology.

## What is the market opportunity that you have identified?

The wearables market has been predicted by Credit Suisse to grow to \$50 billion by 2018. mLED believe that a bright display that is easily readable in brightly lit conditions will be crucial for mass market acceptance of wearable technology. mLED's micron sized microLEDs with its patented colour conversion technology will be enabling light engines for next generation wearable technology. mLED have developed a novel fabrication technique to allow pixels down to 1µm to be fabricated and this project is aimed at exploring this technique further to investigate the potential for monolithic integration of some control electronics.

## How will you deliver value from this opportunity?

We will deliver small, low-power pattern programmable displays that are easily visible in brightly lit conditions. These will be an enabling technology for next generation smart wearable technology and will place mLED in a powerful position as OEM suppliers of such display engines.


## What are your next steps?

We are developing a novel colour conversion technology that will combine with its high brightness microLED arrays to realise a full colour RGB display. For such a full colour display to be practicable, fine pitch bonding to a custom developed ASIC display driver IC will be required. This will be a costly step and require significant investment or NRE funding.

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# Nonwovens Innovation & Research Institute (NIRI)

Fibre-based heat-dissipating substrate for cold chain transport (ALSUS)

NIRI Ltd. is a University of Leeds spin-out company formed in 2005 and employing 24 people. We specialise in the development of commercially viable nonwoven products and offer technical support to businesses from many sectors including medical, filtration, construction and automotive.

## What is the market opportunity that you have identified?

There is an acute need for passive cooling in packaging applications in multiple markets. In medical packaging e.g., the contents must remain below a set temperature during transport. This high-growth area is referred to as 'cold chain logistics'. At the moment, a significant portion of vaccines loses efficacy due to out-of-spec episodes in transit temperature management systems and it is estimated that £200 million worth of vaccines are destroyed each year due to improper distribution. Another area that was highlighted is transport of blood products which also requires a simple system for improving temperature control. We believe the fibre-based, thermal management packaging for cold chain logistics developed by NIRI can help in these areas.

## How will you deliver value from this opportunity?

We have proven the feasibility for fibre-based cold chain packaging that protects thermally-sensitive goods from warming up and is more flexible and conformable than the medical packaging that is currently used. Using this product, there is an opportunity to reduce the refrigeration costs (energy consumption) but also reducing costs by limiting product disposal.

## What are your next steps?

The positive results from this project will demonstrate the potential for a future product. To enter variable markets the product would require specific optimisation. For this, we feel a follow-up project is appropriate, to look further into market requirements and benchmark against current products.

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# Optocap Ltd

Development of a high reliability, laser weld attached planar fibre coupling technique for Silicon Photonic devices

Optocap provides contract package design and assembly services for a wide range of optoelectronic and microelectronic devices. Optocap's assembly and packaging know-how enables our customers to reduce development and manufacturing costs, accelerate time to market and reduce risk with new product developments.

## What is the market opportunity that you have identified?

The fibre coupling approach being developed can be developed to a wide variety of different SOI devices. The horizontal coupling approach developed provides a reduction in form factor and improved reliability, by means of the hermeticity and laser weld attachment. Our commercialisation strategy is to initially get this device space qualified. Once we have the space reliability data we can then offer the fibre coupling approach to multiple device manufacturers with the confidence that we have proven and validated the technology in a demanding applications. We expect to generate around £250,000 in development revenue in the first 6 months after completion of the project. For the space opportunity alone we would expect to fiber align several hundred devices per year, which will generate around €450,000 assembly revenue per year.

## How will you deliver value from this opportunity?

Optocap will deliver value by working closely with the end-users. This will ensure that we have a clear specification and provide a easier and quicker route to market.

## What are your next steps?

In order to take the next steps we need to ensure that we develop a close partnership and solid supply chain for the fibre assembly, which is the key component in this development. In addition we would like to get some traction with the European Space Agency in order to ease our entry into the Space market.

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# OptoSignal Ltd

HotSound = thermal imaging with an acoustic intensity contour mapping overlay

OptoSignal is a SME that provides optoelectronic circuit and module design consultancy services. OptoSignal also develops and sells scientific measurement equipment.

## What is the market opportunity that you have identified?

The market opportunities for the HotSound sensor are international in nature. This sensor can be used in both civilian and military applications. At present, our primary aim is to introduce this sensor into the land and airborne robotics market. The challenge we are facing entails performing a large number of complex calculations in real-time on a portable, and relatively inexpensive, processor that does not consume a huge amount of electrical power.

## How will you deliver value from this opportunity?

We plan to manufacture and sell the HotSound sensor throughout the world through our international distribution chain.

## What are your next steps?

For the next steps, we aim to develop a commercial prototype for use in field testing to enable us to identify improvements we need to make prior to market introduction.

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# Orla Protein Technologies Ltd

Advanced protein coatings for biosensors

Orla Protein Technologies (Est. 2011) is a nanobiotechnology company focused on the precision engineering of proteins for applications in the biosensor, cell biology, biomedical and pharmaceutical industries.

## What is the market opportunity that you have identified?

The growing market for miniaturised biosensors is estimated to be worth \$12 billion with a CAGR of 9.7% to 2020. The ability to test for diseases at home is attractive owing to the convenience and cost saving. Detection is based on a specific capture surface, which is usually an immobilised antibody that binds to the disease marker, giving electronic or optical outputs. Orla Protein Technologies has a reliable method for the immobilisation of capture proteins. This project has allowed us to re-engineer parts of our technology to improve performance characteristics and to compete effectively in the biosensor functionalisation market. Although our initial focus is in the biosensor market, the applications of protein coatings are wider: for example in cell culture, surgical implants, targeted drug delivery vehicles and bioprocessing.

## How will you deliver value from this opportunity?

We have immediate channels to market for enhanced bio-coatings. We would supply to and expand our established analytical device and biosensor customer base; and also provide enhanced technology to our mobile health joint-venture company OJ-Bio Ltd. Improving our technology for this application maintains our competitive advantage in the field. We anticipate a 500% ROI over the 2 years post-project.

## What are your next steps?

We will continue to pursue commercial opportunities to take forward the outcomes from this development. Dissemination of the project results will take place through our existing channels. We will promote the project outcomes at trade shows and technical meetings, and thereby secure new partnerships and customers through promotion of the project outcomes.

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# Oxford Biomaterials

Initiation of a novel scalable and sustainable silk biopolymer processing method

Oxford Biomaterials develops silk protein medical implants. Originating from Oxford University in 2002, its business model consists of spinning out companies in various medical fields, including Orthox, testing orthopaedic implants in patients for the first time this year. Current expert team includes 5 people.

## What is the market opportunity that you have identified?

We have identified an emerging opportunity for a specialised supplier to produce high quality, controllable and commercially scalable liquid silk protein feedstock, in response to the increasing demand for sustainable biopolymers. So far, the production of liquid silk used to produce scaffolds has been limited to laboratory scale and confined to the research groups developing silk-based materials because of its labor intensive process, expensive chemical treatment, high energy costs and poor reproducibility from batch to batch. The novel high quality silk protein solution developed by OBM could compete with current synthetic polymers in terms of mechanical properties and economics, whilst surpassing them in terms of biocompatibility and sustainability. Oxford Biomaterials' vision has broadened its R&D strategy to become the first official supplier of commercial, medically approved silk feedstock.

## How will you deliver value from this opportunity?

The feedstock produced would be ISO accredited and would initially aim at the regenerative medicine market. Oxford Biomaterials has been developing various high-value products of this £43 billion medical implant market for the past 11 years and an increasing number of groups around the world which have also started developing silk-based biomaterials would be potential customers.

## What are your next steps?

We are currently testing the feasibility of a novel process to produce this sustainable, scalable, high quality silk feedstock. Before revenues can be generated, further funding is required to develop the protocols currently being implemented and to characterise the material. Funding for an automated manufacturing process and ISO accreditation will also be necessary once the protocols are validated.

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# Oxford Genetics Ltd

Promoter optimisation for recombinant mammalian protein manufacture

Oxford Genetics produces DNA expression systems for maximising protein yield using its proprietary cloning system, SnapFast.

## What is the market opportunity that you have identified?

The recombinant protein market is rapidly expanding, with the mammalian expression segment (antibodies and therapeutic proteins) forecast to overtake the bacterial market by 2020. Oxford Genetics has developed a number of proprietary algorithms and DNA sequences that improve protein yields, and this current project aims to further optimise a subset of these sequences to further improve mammalian expression.

## How will you deliver value from this opportunity?

We aim to establish licenses with biopharma to enable them to use our DNA sequences in their large-scale and clinical manufacturing processes.

## What are your next steps?

We have sufficient funding to achieve our goals. Our emerging IP should allow us to achieve our objectives in the protein expression markets.

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# Oxford MediStress Ltd

Development of an improved biophotonic system for a novel cancer detection/monitoring blood test

Partner companies  
Bio Nano Consulting

Oxford MediStress is an Oxford spin-out developing a rapid point-of-care test for immune function that is being developed for early-stage detection and monitoring of cancer. We have an experienced entrepreneurial team including Dr David Sarphie (co-founder of PowderJect) and Dr Rubina Mlan (co-inventor).

## What is the market opportunity that you have identified?

The UK has survival rates below the European average for many cancers, with delayed diagnosis being a significant cause. Cancer represents a major drain on the UK health budget, costing the UK economy over £11 billion & leading to over 160,000 deaths p.a. Many studies have highlighted the benefits of early detection in improving clinical outcomes from cancer, but early detection is often difficult due to the lack of robust biomarkers or poor diagnostic protocols; therefore, there is a general need for improved methods of early cancer detection and for monitoring patients during and post-treatment. Our novel point-of-care (POC) diagnostic platform - the Leukocyte Monitoring System (LMS)<sup>TM</sup> - will, through a simple fingerprick blood test evaluating immune function in ten minutes, provide a disruptive approach to early-stage cancer detection and monitoring.

## How will you deliver value from this opportunity?

No competing POC tests provide this crucial clinical information currently. The underlying science is well-understood. This product will address the global cancer biomarker market valued at \$13.2 billion in 2011 (CAGR=14.6%). We anticipate rapid commercial development and European sales exceeding £65 million annually three years after regulatory approval, forecasting an ROI>800%, representing a clear commercial opportunity to exploit a significant growth market.

## What are your next steps?

Clinical trials in collaboration with oncologists at UCH have already started using the current prototype. We are looking for Series A funding to build the team, develop the current prototype into a finished product, scale-up reagent manufacture, complete initial clinical trials & obtain necessary CE Mark approval. We are also looking for development partners for regulatory and marketing activities.

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# Pennog Ltd

Bio-refinery manufacture of a natural flocculant

Pennotec, a trading name of Pennog Ltd, aims to provide market access advice and sustainable technology that enables manufacturers to convert their process waste streams into marketable resources. Chitosan production from crustacean shell by-product is Pennotec's first demonstration project.

## What is the market opportunity that you have identified?

Chitosan is natural polymer derived from chitin, which constitutes 10-35% of crustacean shells. The largest volume chitosan market is as a cationic flocculant. Flocculants aggregate particles suspended in solution forming a 'floc', which separates more efficiently. The European market for cationic flocculants is worth £ 300 million and mainly comprises synthetic, polyacrylamide flocculants for wastewater clarification. Chitosan is generally more expensive than polyacrylamides but sells where customers wish to avoid using acrylamide-containing products, particularly food and beverage industries and industries where the separated solids have some value. We have developed a biorefinery process to extract chitin for chitosan production, diverting UK shell from landfill. This process is less polluting than traditional chemical extraction and enables production of more

## How will you deliver value from this opportunity?

Europe's chitosan flocculant market is less developed than US and Japan's industrial, construction and consumer markets. We initially aim to target small volume industrial customers that value natural, sustainable products and technical performance. Value will be delivered to shell producers by diverting crustacean shell from land fill (avoiding gate fees) and to chitosan

## What are your next steps?

Industrial research grant funding will be sought to support development and demonstration of the first UK biorefinery process for chitin extraction. Capital investment in chitosan production plant and investment in technical sales support will be required to produce quantities for field trials and to develop the market. Support to secure IP developed during this project will also be sought.

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# Piezotag Ltd

Electronically sensing movement in a partially stable body

## Partner companies

E. M. D. Ltd

Piezotag and EMD have been working together for over 10 years; PZT undertakes mechanical engineering tasks, EMD electronics. Between us, we have the right blend of capabilities and experience to make very efficient and small Energy Harvest devices and systems.

### What is the market opportunity that you have identified?

Tyre contact patch measurement is a vital aspect of the intelligent tyre. The tyre is the only point of contact between the vehicle and the ground, understanding this interface will enable designers and users to maximise a vehicle's performance from a range of perspectives - from optimising a competition car's set-up to defining the ideal tyre pressure for a tractor in a particular application. Our work on contact patch measurement intends to fill this gap, and has already attracted the interest of an F1 team and a major UK provider of small off-road vehicles. Ultimately, contact patch data will control electronic vehicle systems such as active suspension, ABS – even engine power in relation to the tyre's grip potential.

### How will you deliver value from this opportunity?

Our plan is to offer one exclusive license to one company in a specific automotive market sector. In F1, we have one customer who will take a 3 year license at the end of the current development cycle (assuming success). At the end of the 3 year cycle, the license is offered for sale to all or renegotiated.

### What are your next steps?

We plan to conduct more trials. As a direct result of the project, an F1 team invited us to test our CP measurement technology at their facility. To keep all the prospects in-line, replicating these tests with small and large off-road vehicle manufacturers and military vehicle makers would help broaden our potential for success.

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# PJH Partnership Ltd

Development of in-situ sensor array for detection of gas leakage in deep well and deep sea environments

PJH Partnership Ltd is a family run process development company which has over 10 years experience focusing on using Supercritical Carbon Dioxide to modify materials and create commercial products.

## What is the market opportunity that you have identified?

The market opportunity arises from key developments in carbon capture and storage. The decision to start development of extensive sub sea CO2 storage has increased public concern over the potential for CO2 leakage from deposition sites into the surrounding environment. The proposed storage wells are extensive, covering thousands of square miles of the North Sea basin.

## How will you deliver value from this opportunity?

PJH Partnership's sensory array will be dedicated purely to deep sea CO2 detection providing accurate monitoring at a cost similar to current low cost gas detection methods such as PH detection.

## What are your next steps?

We are looking for collaboration with industry companies involved in carbon capture, storage, and oil and gas.

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# Polyphotonix

ionic liquid based Screen Print INk DeveLopment for printed Electronics (SPINDLE)

PolyPhotonix Ltd is a SME based in the North East of England. PolyPhotonix works with organic light emitting polymers to develop photonics devices for packaging, advertising and healthcare. Polyphotonix's approach is to develop high value bespoke applications by letting user requirements drive technological developments.

## What is the market opportunity that you have identified?

There is a market need for short lifetime medium/high volume flexible light emitting devices for a number of market sectors. PolyPhotonix is currently producing medical devices to treat eye disease but has identified a need for thin, flexible, light emitting systems. This project will enable PolyPhotonix to develop the cathodic deposition processes required to print print organic light emitting devices in a roll-to-roll environment at low price, quickly, reproducibly and in medium to high volume. The devices produced will fit into a number of market sectors such as advertising, packaging, greetings cards, automotive and medical. High volume flexible production of printed organic lighting will enable new functionality of devices and also reduce weight and comfort of wearable technologies such as the healthcare photonics treatments produced by PolyPhotonix.

## How will you deliver value from this opportunity?

PolyPhotonix develops bespoke applications for printed light, whether this be for medical applications, advertising or packaging. We are planning a factory build in North East England to produce organic light emitting devices manufactured through roll-to-roll processes. The IP and know-how developed in this project will facilitate roll-to-roll processing of flexible light emitting devices.

## What are your next steps?

We require additional funding to take products from the proof of concept stage to market. Scale-up of processes will be required and partners will be needed to develop more efficient light emitting polymers, barrier materials and electrodes for PolyPhotonix's devices.

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# Pre Chasm Research Ltd

Snap4Quote™-a smartphone imaging platform, connecting customers to rated garages for quotes on repair work using a “Snap, Share, Repair™” process

Pre Chasm Research Limited (PCRL) is a high tech business with two core activities: generation/commercialisation of intellectual property through spinouts or licensing and provision of bespoke business transformation services to pre-start-ups, micro SMEs, SMEs, and large enterprises.

## What is the market opportunity that you have identified?

What if you could get a competitive guaranteed quote for car bodywork repairs in <1min? The new Snap4Quote™ smartphone imaging tech connects customers to rated garages for quotes on repair work using our patented “Snap, Share, Repair™” process. Demand: every 4 seconds a bodywork dent or car glass (e.g. a windscreen) is repaired. Problem: Time. Cost. Convenience. Currently, preparing a bodywork quote takes ~4.4 hrs and costs the garage owner on average £308 (just to quote). To obtain a quote, customers must visit a garage. Alternatively, garages visit customers, usually outside normal working hours. Some employ mobile teams, increasing their cost base. No automated remote quoting tech exists. Current systems allow users to enter text-based descriptions of damage and upload 2d photos, which lack detail, therefore cannot guarantee a quote.

### TONY RHOADES

CEO

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## How will you deliver value from this opportunity?

Snap4Quote™.com is a ‘digital handshake’ company connecting 37,000 VAT registered repair centres to the demand. Snap4Quote™ smartphone tech is packaged in an app allowing users to create 3D models of defects, enabling rated garages to quote remotely via our ‘Snap, Share, Repair™’ process. Snap4Quote’s ‘defect engine’ characterises dents, chips, scratches, etc, and learns that defect ‘a’ should cost price ‘b’.

## What are your next steps?

We are now seeking investment partners.

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# Pulseteq Ltd

Integrated RF coil and sample holder for magnetic resonance microscopy

PulseTeq develops and manufactures RF coils for Magnetic Resonance Imaging (MRI) and Spectroscopy. Our market is those undertaking pre-clinical or clinical research. The company has extensive experience in both identifying the need for new rf coils, and then designing, manufacturing and selling to this market.

## What is the market opportunity that you have identified?

The new device will enable researchers to obtain high resolution MRM data of small samples in a more time-efficient manner, allowing the use of MR microscopy to detect cellular/molecular changes underlying disease. This device will be the first of its kind. Sales revenue will be generated both from the sale of the initial RF coil sub-system followed by repeat sales of the sample holders themselves. The main market opportunity is to sell this device to all the small bore MR systems (over 600 sites). There will also be market for this device on a proportion of the 30,000 whole body MRI scanner sites worldwide. PulseTeq's estimate of sales is in excess of 50 units per year. This level of sales will lead to revenues of £1 million.

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## How will you deliver value from this opportunity?

Sales will initially be to the installed base of MRI scanners. PulseTeq already sells its larger rf coils to this market. The company is seeking investment to expand its world wide sales through additional exhibits and through distributors.

## What are your next steps?

We are looking for evaluation sites - we are working with one site - to help identify the requirements of microscopy coils and associated accessories and software and to evaluate new devices from this project. Further sites will be sort after the project has produced initial results. We are also looking for commercial partners – PulseTeq will seek additional routes to market over its current approach to end-user sales.

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# Reliawind Ltd

Feasibility assessment of a new low-cost Gallium Nitride (GaN) inverter technology for domestic grid-connected energy storage applications

Reliawind aims to commercialise electrical and electronics technologies for renewable power generation, transmission and distribution, focusing on reliability enhancement and cost reduction. The technologies mainly include power electronics devices for compact and reliable inverters and condition monitoring technologies for electronics and electrical systems.

## What is the market opportunity that you have identified?

Grid-Connected Energy Storage (GCEs) is vital in enabling greater penetration of renewable electricity generation and development of smart grids, and to reduce the need for fossil fuel peaking plants. According to a recent report by the Low Carbon Innovation Group, 27.4 GW of grid-connected energy storage is needed to enable UK to achieve its carbon reduction targets for 2050, of which as much as 10 GW can be provided by domestic GCEs systems, equivalent to two million household installations. Reliawind has developed a new inverter technology based on Gallium Nitride (GaN) Transistor devices, which promises significant improvements over Silicon-based inverters; its exploitation can reduce the cost and size of energy storage inverters by 35 and 60% respectively and increase power conversion efficiency by 3%, enabling more cost-effective energy storage systems.

## How will you deliver value from this opportunity?

The substantial reduction in cost and increase in efficiency offered by Reliawind's disruptive GaN inverter technology can accelerate the growth of grid-connected energy storage systems where cost and efficiency are currently the main barriers. We expect to have commercial products in 2017 and take 8% share in the global energy storage inverter market in 2020.

## What are your next steps?

High-level discussions with major players have confirmed that delivery of a proof-of-principle prototype will allow the exploitation of the technology through strategic partnerships with commercial partners. The findings from this project, specifically the testing of a 1 kW GaN inverter will allow us to provide sufficient evidence to establish active negotiations with investors.

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# Rormix Ltd

RORMIX - a music video technology using novel active machine learning to embed image and video on to tagged assets in other music videos

Rormix is a platform for the social discovery of independent music videos. Artists upload videos directly to rormix and the crowd then curates (human curation makes for a better discovery experience on rormix) and tags the content.

## What is the market opportunity that you have identified?

Independent music video content is on the rise. The likes of YouTube and Vevo have become broad giants with a diverse array of content making it difficult for the user to have an experience around one type of content. Video platforms are moving in a way of fragmentation (platforms for only specific types of content). For example a platform called Twitch TV that only hosts videos of other people playing computer games was acquired by Amazon for \$1billion after 3 years. We focus on the curation of indie content and organise it in way to make the discovery experience better for the user. We aim to build an in-video native ad platform so we embed ads into music videos in a cool way to create more engagement.

## How will you deliver value from this opportunity?

This study has allowed us to evaluate the feasibility of this ad platform and has proven to show promising signs. We can do in-video ads manually and now know more about the theory of building the technology behind to automate the ad platform.

## What are your next steps?

We need investment, its as simple as that. For us to build our revenue model we need the investment to build the technology for our platform and access to advertisers or media buying companies.

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# SAL Scientific Ltd

Novel microfluidic assay platform for the assessment of stem cell-derived epithelial function

SAL Scientific are a life science business offering cell biology research services and products to organisations that use mammalian cells in their drug discovery and development workflows. Our team of expert cell biologists are based in state-of-the-art molecular cell biology facilities near Southampton.

## What is the market opportunity that you have identified?

We are developing a novel analytical platform for the assessment of epithelial function across a range of tissue types. The platform integrates microfluidic technology with a range of analytical outputs and delivers more physiologically relevant data than current in vitro models – uncovering previously unseen responses to environmental challenge. By delivering more physiologically relevant data than existing models, a fully developed platform has the potential to replace many of the models (both in vitro and in vivo) used across basic research, drug discovery, safety pharmacology and chemical safety testing. The current feasibility study will determine the feasibility of using induced pluripotent stem cells (iPSCs) as a source of functional epithelia, informing on the scalability of the system and the amount of effort and investment required to bring it to market.

## How will you deliver value from this opportunity?

Based on the outcome of this project, our ultimate aim is to develop a portfolio of products that improve the in vitro analysis of epithelial function. This platform will include instrumentation, consumables, cells and associated reagents.

## What are your next steps?

Delivering this proposal will require us to expand our team to include new skills and to establish a number of collaborations. We plan to fund this development plan using the revenues generated by our service business and additional external funding sources.

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# Senseye Ltd

Automatic semantic annotation for IoT and SMART sensors

Senseye was founded in 2014 with the vision to make ‘easy predictions for a smart world’. The four founders cover a diverse set of skills in addition to engineering, to include executive management, commercial and financials, business development and sales & marketing.

## What is the market opportunity that you have identified?

This project addresses the forecasted growth in sensor proliferation made possible by the IoT, leading to 50 billion connected devices by 2020. This growth in sensors requires a scalable model for exploiting the sensor data for direct business benefit. Current manual methods will not scale at the rate of sensor proliferation and therefore new automated methods are required. Highly qualified data scientists are currently required to understand the data, select and tune analysis techniques and decide how to visualize the data for decision making. This is a barrier to entry for smaller organisations, due to the inefficient nature of this approach, alongside the required complex domain expertise and associated costs. Nothing on the market allows this complex task to be performed automatically, which would remove this barrier to entry.

## How will you deliver value from this opportunity?

The opportunity size relates to the growth of the analytics market, the proliferation of sensors and the adoption of IoT within commercial sectors. At a macro level, the advanced analytics market will grow to \$29.5 billion by 2016 with the predictive analytics market making up \$6.5 billion. Adding IoT, which is set to reach \$7.1 trillion by 2020, the economics are encouraging.

## What are your next steps?

As we only occupy the value-add software layer in the solution stack, we are looking to partner in each of the other areas, in particular: sensors, communications and data hubs.

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# SensorHut Ltd

Technical feasibility of novel sensors for process monitoring and sensing applications

SensorHut is a micro-SME based in Cambridge with patent-pending technology for optical chemical sensors. SensorHut's mission is to commercialise their technology that exploits nano-structured materials to add sensitivity to conventional optical chemical sensing techniques.

## What is the market opportunity that you have identified?

SensorHut is developing a new gas sensing approach to enhance optical sensing techniques. The sensitivity of standard optical gas sensing is limited by the path length over which light interacts with the gas molecules. In our technology, substances are concentrated before they are interrogated with light to identify different components via molecular absorption. A number of sources of market research confirm that at a macro level gas sensing is a significant and growing market. Frost & Sullivan (2013) report European gas detector and sensors market at €550 million and accounts for 25% of the global market. The main drivers are increased regulation process efficiency.

## How will you deliver value from this opportunity?

The aims of this project are to progress the technology from TRL 3 to TRL 4, and plan further R&D. Using our technology for in-process measurements, we will deliver value by improving their process efficiency and improving the quality of their end product by reducing labour costs associated with measurement and measuring important chemicals more accurately.

## What are your next steps?

We are looking for a sensor company as a partner with (i) expertise in product engineering, (ii) existing customers so that there is a short route to market, (iii) and market expertise that will be used to identify applications and further R&D requirements. We are also looking for pilot customers so that we can demonstrate capability and value.

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# SS Scientific Ltd

High-pressure, soft-ionisation, plasma source

## Partner companies

Aurora Technology Consultants Ltd.

This collaboration reunites former colleagues of a leading manufacturer of quadrupole mass spectrometers. Robin Hathaway & Steve Shannon of SS Scientific bring their experience of supply of components and systems to the vacuum industry, and Rob Grant of Aurora Technology brings his expertise in scientific plasmas.

### What is the market opportunity that you have identified?

Water Vapour Transmission Rate, WVTR, of the plastic substrates used in the emerging plastic electronics and solar cell markets is of critical importance. To achieve a device lifetime of better than 10 years requires a very challenging WVTR of better than  $10^{-6}$  gms H<sub>2</sub>O/m<sup>2</sup>/day. Existing WVTR measurement instrumentation falls well short of this requirement, or takes many weeks to achieve a measurement. The 100-1,000 fold increase in sensitivity that this project delivers will enable routine WVTR measurements, in a timely manner, and with a competitive price. An added benefit is that permeation of multiple species through a membrane/substrate can be measured simultaneously, potentially replacing multiple single detection instruments. It is expected this feature will extend the market applicability into the speciality packaging market e.g. pharmaceuticals, food, medical devices etc.

### How will you deliver value from this opportunity?

We will provide film manufacturers and leading electronics companies working on plastic electronics with a WVTR measurement instrument that actually meets their requirements, enabling new product development for the consumer market. Initial focus will be on R&D of plastic films whilst we develop the measurement system for quality control on the production line and in the wider speciality packaging markets.

### What are your next steps?

We will be seeking film manufacturers and/or end-user customers within the plastic electronics industry to provide sample barrier films and to work with us to optimise the product offering. Our route to market will initially be through the R&D Laboratory, whilst engaging in marketing research on opportunities in areas where simultaneous multiple species detection and/or unique detection is required.

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# Startlink Systems Ltd

Spacelink demountable PGRP truss joint

Startlink Systems is a small company specialising in composites in construction.

## What is the market opportunity that you have identified?

Lightweight bridges; long span industrial roofing; temporary demountable structures; railway electrification; marine structures: the above categories are where steel structures are the norm. The project is aimed at proving a cost-effective alternative using Pultruded GRP (PGRP). PGRP has the advantage of being 1/4 the weight, corrosion resistant and having better thermal properties.

## How will you deliver value from this opportunity?

We are developing a joint that enables trusses to be built from low-cost PGRP box and tube. In addition, the joint will be quick to assemble, cheap, demountable and uses no metal.

## What are your next steps?

We are looking for larger companies active in the areas described, who can take advantage of the Spacelink truss design to add improved products to their range or services.

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# Sunamp Ltd

Enhancement of heat-storage technology using advanced composite materials

Sunamp designs, produces and sells non-toxic, compact, highly efficient heat batteries that can be used to store heat for a number of applications, including many renewable and low carbons technologies.

## What is the market opportunity that you have identified?

The heat batteries are capable of storing four to sixteen times more heat than an equal sized hot water tank, and due to their renewable nature are much lower cost and higher efficiency than competing technologies. As the heat batteries are scalable, they can be tailored to the specific application they are being used for. As such, the product is equally effective for large-scale industrial uses as for compact automotive solutions. There is a growing requirement for extra-rapid response times from these heat stores; as such a composite with high thermal conductivity would lead to new opportunities.

## How will you deliver value from this opportunity?

If successful, the project will increase the power of Sunamp heat batteries and will result in a weight decrease, based on the reduced amounts of metal required for construction of heat exchangers. A successful outcome has the potential to deliver a step change in heat-storage capacity – a heat store without thermal conductivity as a limiting factor.

## What are your next steps?

Project partners or collaborators to trial new high power heat batteries are sought after, particularly for high value products. As graphene costs are currently high, a partnership with a manufacture would also be advantageous.

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# The Electrospinning Company

Bio-synthetic hybrid material for use in internal wound healing

## Partner companies

Collagen Solutions UK

The Electrospinning Company designs, develops and manufactures materials for use in regenerative devices. An STFC spin-out and located at Harwell, Oxford the company sell product and service. Collagen Solutions, located in Glasgow, manufactures medical grade collagen and develops medical device applications.

### What is the market opportunity that you have identified?

The global market for surgical meshes, for example for hernia repair, is over \$1 billion and growing at over 6% CAGR, driven by increasing obesity and an aging population. Hernia repair surgery uses non-absorbable synthetic meshes composed of materials such as polypropylene, which are cheap but sometimes lead to adverse events such as infection, bowel obstruction and mesh migration, or biological meshes derived from animal tissues, which are expensive and considered inappropriate for bridging larger wounds. The opportunity therefore is for an advanced material that is robust enough to bridge gaps and which promotes endogenous healing whilst minimising risk of rejection and infection. The hernia sector alone is a market opportunity of over \$100 million.

### How will you deliver value from this opportunity?

The Electrospinning Company (TEC) and Collagen Solutions UK (COS) will combine their expertise in synthetic and biological materials to develop a 'bio-synthetic' hybrid material that combines the advantages of synthetic polymers with the bio-performance advantages of collagen, and that will deliver a prototype material with features to promote internal wound healing.

### What are your next steps?

We are looking for partners to evaluate the novel materials in clinical wound healing applications and to co-develop wound healing products. We are also seeking grant funding to develop further the results of this study, including technical studies, commercial scale-up requirements and exploitation options.

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# Things3D

T3D UltraScan - a collapsible, 'pop-up' style, accurate full body low-cost 3D scanner

Smart 3D printing and 3D scanning technology.

## What is the market opportunity that you have identified?

In order to capitalise on the current market trend of 3D printed selfies the aim of this project is to investigate the feasibility of building an ultrafast, low-cost (<£10,000) portable full-body 3D HD photogrammetry-based scanner utilising wireless remote sensors, cameras, and OLED lighting.

## How will you deliver value from this opportunity?

Current 'best' scan time is around 12 seconds for existing solutions, but they require repeat scans of the same subject for error correction. Our system will be accurate, low-cost, portable, and fully-automatic that can be setup/calibrated in minutes, and then used to quickly digitise subjects 'right-first-time' in HD to maximise throughput and ROI (return on investment) of a scanning operation.

## What are your next steps?

We are looking for pilot customers (venues), to take part in our trial once the rig has been tested and fully developed.

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# TISICS Ltd

Structural aluminium heat sinks for weight efficient systems

TISICS develops and manufactures silicon carbide fibre and fibre reinforced titanium and aluminium composites. The company is a SME started in 2005 but with a history dating back to 1988. This project focuses on fibre reinforced aluminium for high strength heat pipes.

## What is the market opportunity that you have identified?

Heat pipes are used in space and other sectors to move heat from hot-zones to cool-zones by evaporating a liquid in the hot zone which condenses in the cold-zone and drains back to the hot-zone. This requires no power and is automatic with no control elements. Most heat pipes use aluminium for conductivity but are an additional system mass bolted to the system chassis. The aim of the project is to show that a fibre reinforced aluminium composite system can be firmed around the extruded heat pipe core and provide equivalent or greater strength and stiffness with lower mass. The complex core must not be degraded in the composite process. TISICS needed to model the performance and then demonstrate manufacture and mechanical performance to enable follow on work.

## How will you deliver value from this opportunity?

TISICS is the only European supplier of fibre reinforced aluminium matrix composites and is being supported in the programme by a large international heat pipe manufacturer. By demonstrating the ability to make stronger and or lighter heat pipes, we can demonstrate the potential to save weight in space systems where 1kg saved can be worth between £20,000 and £50,000.

## What are your next steps?

We need a future larger programme of work to demonstrate that the thermal efficiency of the composite matches the base line performance. Ideally we need a space demonstration programme to gain flight experience. TISICS is also seeking investors to develop a range of metal composite parts and technologies and support the industrial growth of this technology in the UK.

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# TravelAi Ltd

MIMoDE - Mode-Infering Movement Detection Engine

TravelAi's smartphone software delights users by letting apps adapt to their situation. It studies speed, pattern and location to infer route and mode. All the time it automatically generates data on how people move, helping cities make transport better.

## What is the market opportunity that you have identified?

Transport data are still gathered by people with clipboards and suffer from recollection errors, small sample groups and processing delays. This flawed, expensive exercise underlies multi-million budget decisions leading to inefficient transport systems. Yet we're travelling more and there's little space or budget for expansion, putting those systems under increasing strain. TravelAi's smartphone software automatically generates rich data on how and where people move, providing a timely, accurate and detailed picture of transport behaviour. It runs in the background studying speed, location and pattern of movement to infer route and mode without any user input. It's light on battery and CPU and powers a suite of useful services for citizens. Our anonymised data gives new insights for local authorities, transport operators and planners, and powers the smart cities revolution.

## How will you deliver value from this opportunity?

We give developers a drop-in solution for personalisation and context awareness for travel. It cuts development time, gives one solution for multiple OS, is light on battery and CPU, and is maintenance free. Commercial opportunities stem from selling data and insights to help local authorities, transport consultants and operators make travel more efficient and enjoyable for everyone.

## What are your next steps?

Our data represents a step up from traditional surveys in timeliness, accuracy and detail. We seek to pilot clients to explore uses for the new data and the value it brings. And because individuals generate the data by installing our software on their phones, we also seek third parties that can embed our transport-detection API to improve their own services.

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# Visionmetric Ltd

Super resolution optical spectrometer

The company's core business is facial identification software. It has sold its software products to the majority of UK police and to law enforcement agencies in many other countries. The company team comprises 5 staff, 4 of whom hold PhDs in science and engineering.

## What is the market opportunity that you have identified?

A spectrometer is a device for measuring wavelengths of light over a specified range of the electromagnetic spectrum. Such devices are used in a diverse range of applications including, medical analysis, environmental monitoring and space exploration. Hardware constraints impose fundamental upper limits on the ability to differentiate between wavelengths (spectral resolution) thereby preventing use of the technology in new application areas. The novelty of our feasibility study is the development of a super resolution spectrometer, with significantly increased sensitivity, using the radical new signal processing method of Compressed Sensing (CS). Crucially, the CS method can be implemented in software and will therefore be compatible with existing spectrometer hardware.

## How will you deliver value from this opportunity?

This feasibility study is high risk but with great potential gain. The software will be tested by a UK SME specialising in spectrometer hardware (arrangement already in place). If successful, a commercial software package would be developed and licensed to a third party with significant presence in spectrometer market.

## What are your next steps?

Having proved the validity of the innovation, a development grant or alternative investment would be sought to bring the product to TRL8.

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