Innovate UK
Technology Strategy Board

Directory of projects

Technology-inspired feasibility studies 2014

Introduction

Enabling technologies underpin the development of high-value products and services to meet market needs across all economic sectors, generating significant SME growth. Innovate UK is seeking to kick-start the delivery of genuinely new products and services, with substantial and scalable commercial potential in four particular areas:

Biosciences

Electronics, sensors and photonics

Information and communication technology

Advanced materials

Our investment of up to £2m in these areas will keep the UK at the forefront of technological developments and their application. It will also help develop new business models that are scalable and sustainable. The feasibility studies we support will help businesses to attract further investment for R&D, validation and eventual commercialisation.

This directory showcases the feasibility studies we have funded in 2014 and the businesses involved. Projects were up to four months long and up to £33k in value. The profiles were provided by the companies.

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Acidophil Ltd

Novel bioreactor design for fermentation of syngas to industrially relevant chemicals

Acidophil Ltd utilises synthetic biology, synthetic chemistry, and bio-chemical engineering for the development of novel compounds and/or production processes for industrial chemical, agriculture, and healthcare applications. Acidophil primarily conducts its R&D programme via a network of contract research organisations.

What was the aim of your project?

Synthesis gas (syngas) is a gas that can be produced from a number of waste feedstocks. Syngas can be used to make a large number of useful chemicals via micro-organisms that can consume syngas. Since syngas does not dissolve well in liquid, existing systems struggle to provide the microorganism with enough syngas. We are testing technology to improve this process.

Why did you want to do this?

We have designed a novel growth chamber that is expected to increase the rate at which syngas can be taken up by microorganisms and reduce the energy required to do so. This project was designed to generate a prototype and proof of concept data of this novel system. We compared the prototype to standard growth chambers to determine if our system was effective and safe for the micro-organisms.

How will you make money from it?

Successful completion will advance a technology that has the potential to dramatically expand the number of chemicals that can be economically produced from waste material via fermentation of syngas. We are pursuing biological routes to the production of a small number of specific compounds from syngas, but this technology, if successful, could be applied to a broad range of industrial chemicals. We are, in essence, turning waste into new consumer products.

What are your next steps?

We performed basic testing on a small prototype of the growth chamber. Using lessons learned from the small prototype, we will develop larger prototypes to test and demonstrate the effectiveness of the novel growth chamber and, eventually, at commercially relevant scales.

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Anvil Semiconductors

Low-cost, high-intensity LEDs using gallium nitride grown on 3C silicon carbide on large-diameter silicon wafers

Anvil Semiconductors is a power semiconductor company developing technology that delivers the performance and efficiency benefits of silicon carbide at the price of silicon. This enables significant reduction in conversion losses, currently 10% of all electricity, at no additional cost.

What was the aim of your project?

Our intellectual property (IP) resolves the inevitable stress problems associated with growing silicon carbide (SiC) on silicon (Si). We believe that this IP may have similar applications in light emitting diodes (LEDs) by providing an effective buffer layer for gallium nitride (GaN) growth on large diameter Si wafers. The purpose of our project is to fabricate and characterise GaN/3C-SiC/Si wafers using this technology and determine their potential in LEDs.

Why did you want to do this?

Fabricating non-polar GaN LEDs on large diameter silicon wafers instead of sapphire or bulk SiC is recognised as a key enabler for reducing the cost of LED lighting. However, the layers used to bridge the incompatibility between Si and GaN are complex and costly. Using 3C-SiC/Si could result in the elusive cubic GaN producing LEDs which provide higher power warm light with double the efficiency at half the cost.

How will you make money from it?

We would expect to commercialise this technology through licensing. Lux Research predicts a market for LED epiwafers of around $4bn by 2020. A high-quality, low-cost GaN-on-SiC-on-Si structure could take a significant proportion of this market. Anvil's intention would be to license the enabling substrate IP to LED manufacturers or epitaxy foundries.

What are your next steps?

If cubic GaN can be grown, after demonstrating the successful fabrication of LEDs on the material with a suitable partner, we would approach major LED manufacturers to garner interest. We would undertake further development as necessary to build value in the licence proposition.

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Applied Nanodetectors Ltd

Measuring diabetic ketoacidosis through an exhaled gas acetone sensor array, using inkjet-printed nanomaterials

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 was the aim of your project?

Earlier diagnosis of blood ketones associated with hyperglycaemia helps prevent diabetic ketoacidosis (DKA) and enables treatment. Most ketone testing is routinely undertaken using dipstick test strips for urinalysis. Urine ketone strips are semi-quantitative and are also affected by environmental factors. We are investigating the fabrication of an exhaled gas acetone sensor array using inkjet printed nanomaterials.

Why did you want to do this?

We needed to develop low-cost gas sensors that were sensitive to specific volatile organic chemicals (VOCs) associated with ketoacidosis. We designed and fabricated printed sensor arrays using standard inkjet manufacturing techniques. We then developed nanomaterial formulations that could detect the relevant VOCs and could also be printed on plastic substrates. We have produced the world's first printed exhaled breath gas sensors on plastic substrates for the early detection of ketoacidosis.

How will you make money from it?

Despite advances in diabetes care, the burden from DKA remains substantial. In 2009–2010, hospital admissions due to DKA accounted for over 66,000 bed days in the UK. A new easy to use and more convenient breath ketone test could reduce hospital admissions and improve self-management. Preliminary discussions with diabetes clinicians estimate that up to 50% of hospital admissions could be reduced using a ketone breath test and better self-care.

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

Mushroom production: integration of novel bacteriophage biocontrol technology

Founded in 2004, APS Biocontrol is an innovative company developing natural, safe and sustainable antimicrobials as alternatives to synthetic chemicals. Our flagship technology, Biolyse®, utilises bacteriophage to reduce bacterial-induced spoilage in the fresh and packed food markets.

What was the aim of your project?

High production costs are challenging the UK mushroom industry, which is also facing extremely strong European import competition. Disease control is a major concern and the opportunity we addressed was to develop an effective, sustainable biocontrol solution to bacterial blotch of mushrooms. It is one of the key challenges in the UK industry and is responsible for industry losses of some £20m annually.

Why did you want to do this?

The main technical challenge was to overcome the extreme specificity of bacteriophage, allowing significant coverage of the many bacterial strains causing mushroom blotch and reducing the incidence of disease. During the study, we applied innovative approaches designed to create bacteriophage 'mixes', resulting in a first 'mix' of bacteriophage giving over 50% bacterial control. This is the first look at applying the company's Biolyse® technology within a protected growing environment.

How will you make money from it?

An effective bacterial-blotch control will have significant benefits for the mushroom industry and, with a substantial global market, there is a clear business opportunity for our company. Potential products include an irrigation additive and compost treatment, EU markets of £56m and £13.2m respectively. Social benefits include job creation throughout the production chain and, given the safety of bacteriophage, the technology aligns with EU policy to reduce the environmental impact of pesticide use.

What are your next steps?

To realise the potential of the innovation, we plan an extensive R&D programme to develop the feasibility study's results, including full-scale commercial trials. We will address product formulation and scale-up, together with relevant regulatory requirements. We will work closely with the industry to maximise our chances of commercial success.

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Aqua21 Ltd

Low-cost dissolved ozone sensor using ultra-violet LED

Aqua21 has been established to deliver reliable water purification technology to global markets. Ozone's superiority over other treatment methods is scientifically accepted and widely acknowledged, but capital costs, energy requirements and unit size have previously restricted its application. Our technology overcomes these hurdles.

What was the aim of your project?

We had developed a low-cost, low carbon ozone generator and through this project we have been exploring the potential for associated sensor technology. We are looking for a solution whose application complements our core technology. This will help in the task of commercialisation and matches our approach to tackling the energy/carbon/water nexus.

Why did you want to do this?

The capital cost of measurement is currently disproportionally high, owing to the cost of our ozone production technology. If we could develop an appropriate, real-time system of measurement, we could deliver the benefits of ozone disinfection at a much lower cost point. That could make the technology available to a far larger market.

How will you make money from it?

Adding these sensors to our existing technology package will dramatically enhance our commercial offering, the breadth of our market, our price point and our competitiveness.

What are your next steps?

We will continue to work on refining the results of this project so that we can develop a product for inclusion in our portfolio.

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Aragreen (UK) Ltd

Control device for advanced bioreactor photonics

Aragreen was established in 2011 with the aim of producing a portfolio of high-value chemicals from micro algae. The company has pioneered a novel algae production platform and has two target chemicals under development.

What was the aim of your project?

Our aim was to develop a novel photonics device for an internally illuminated photobioreactor (PBR) to create a scalable micro-algae production platform. The project aims to show incorporation of this device into a prototype. PBR can transform micro-algae production dynamics, translating into increased yields and biomass productivity.

Why did you want to do this?

We wanted to offer an alternative to open pond cultivation of algae biomass by developing a low-cost PBR operating on a fraction of the land footprint. The device is also sunlight and heat independent and so is particularly suited to production in northern European climates. The objective is to develop an industrial-scale production platform for bio-products and high value chemicals derived from algae.

How will you make money from it?

We will use the PBR to manufacture biomass, to produce a portfolio of high-value chemicals and derivatives from micro algae, with applications across biosciences, human health, food and animal feed. Two existing chemicals are currently produced at lab scale and will be ready to enter industrial scale production, once the production platform has been completed. Our company aims to position itself as a manufacturer of novel chemical compounds.

What are your next steps?

Following completion of the testing of the device at lab-scale, we aim to build a pre-industrial scale production platform of some 4,000-litre capacity, utilising the technologies and experiences gained from this project. We will use this platform to support market entry for our first target product.

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Arrow Labs Ltd

Fully automated analysis of parasitic egg cells in faecal preparations

Arrow labs is a technology provider applying machine vision techniques to detect and identify cells in digital images. We design bespoke sample preparation hardware and software to support automated analysis at the point of treatment.

What was the aim of your project?

Our aim is to automate detection of helminth eggs in grazing livestock faeces. We are already developing an autonomous cloud-based system to identify cells in a digital image. Our objective was to design, prototype and test a device to capture an image of a faecal preparation at the point-of-care, and transmit that image for remote analysis.

Why did you want to do this?

The detection of helminth egg presence in the faeces of grazing livestock, domestic pets and humans is of increasing worldwide interest as anthelmintic drug resistance and ineffectiveness takes hold. The faecal egg count (FEC) is the key diagnostic for treatment decision-making. This test is laborious, and requires a trained parasitologist equipped with a microscope and sample preparation equipment. Automation of FECs at the point-of-care is clearly desirable, but technically challenging.

How will you make money from it?

Helminth infections cost the UK farming industry around £54m a year. Annual global spend on antiparasitic drugs in animals exceeds $5bn and accounts for approximately 26% of expenditure on animal health products. Regular use of faecal egg counts can reduce the number of treatments by 35% to 75%. This reduces costs for farmers, while also increasing production rates, improving animal welfare and reducing greenhouse gas output.

What are your next steps?

Our prototype will be used by the AutoFEC programme, whose farm trials are scheduled to start in spring 2015. We will seek commercialisation and marketing partners during this development phase. By 2016 we aim to deliver an end-to-end, pen-side helminth diagnostic product sufficiently mature to commercialise and market.

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AvantiCell Science Ltd

Cryopreservation of complex cell models for cell-based analysis

AvantiCell delivers services and products for cell-based analysis to clients in the pharmaceutical, natural products and nanosafety industries. The company was established in 2006 by Dr Jo Oliver (CEO) and Dr Colin Wilde (CSO), employs 20 staff and is profitable.

What was the aim of your project?

Our objective was to produce the first frozen-cell product for cell-based analysis in an advanced culture format. That established the principle of delivering highly-predictive cell-based analysis using 3D cultures without end-users needing either biomaterials or cell-handling expertise.

Why did you want to do this?

Increasing demand from industry for complex 3D cell models reflects a drive towards pre-clinical analysis more predictive of clinical value. This depends on using human cells expressing tissue-specific functions, and requires the architecture of a 3D culture environment. Techniques which deliver 2D frozen cell products will not satisfy market expectations, and 3D cell cryopreservation must embrace end-user need for similar assay utility in a convenient, plug and play format.

How will you make money from it?

Our study's commercial impact lies in creating a new market for cell-based products beyond expert laboratories and well-equipped service providers. Market intelligence indicates that this has industry traction. First, it will change the dynamics of pre-clinical R&D by allowing smaller drug discoverers to add value to candidate therapeutics before licensing-on. The same cost-benefit argument applies to contract research organisations, allowing them to increase assay portfolios without committing to expensive up-front model development.

What are your next steps?

We will translate the assay prototype into an assay kit, in production form. The intention is first to place assay kits with beta testers and use their feedback to optimise performance. We shall then take it into the marketplace using our existing international marketing and sales network.

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Environmental sampling for nanosafety testing

AvantiCell delivers services and products for cell-based analysis to clients in the pharmaceutical, natural products and nanosafety industries. The company was established in 2006 by Dr Jo Oliver (CEO) and Dr Colin Wilde (CSO), employs 20 staff and is profitable.

What was the aim of your project?

Nanosafety testing lacks robust analytical tools to measure nanoparticle biological impact. This unmet need arises because biological models lack standardisation and are not portable. Also, environmental samples cannot be presented to a biological model in a consistent manner, to measure their health impact. We aimed to develop a cell-based tool to enable reproducible nanosafety screening of environmental samples.

Why did you want to do this?

We developed a tool to collect nano-objects captured from the environment and present them to human lung cells or immune cells from an environmentally-sensitive species, the marine mussel. The tool design is based upon a biocompatible scaffold with chemistry designed to trap nanoparticles. For testing purposes, scaffolds were loaded with nanoparticles of known toxicity and presented to cells in a culture-compatible format. We measured nanoparticle impact as cellular inflammatory response.

How will you make money from it?

We will achieve commercial impact by producing a novel, disposable device able to capture environmental particulate material and submitting it to physiologically-relevant testing for biosafety risk in a cell-based model. As nanoparticles agents are likely to affect biological systems in airborne or aqueous form and activate toxic or inflammatory responses in higher organisms, our study meets an unfulfilled market need.

What are your next steps?

The route to market requires us to engage with the nanosafety R&D sector, and with industrial suppliers of environment-sampling instrumentation. In preparation, we have built relationships to: inform further device development; recruit beta testers; and engage with potential customers to ensure the system is precisely tailored to user needs.

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Badrilla Ltd

Feature display diagnostics: a new approach for a new class of medical biomarker

Badrilla is a life science reagents company specialising in cardiovascular research. We make antibodies and calibration standards to post-translationally modified proteins for research clients world-wide.

What was the aim of your project?

An increasing number of medical biomarkers comprise particular chemical features on proteins. Antibody reagents to such features can be produced. This project sought to establish the equivalence of antibody recognition of isolated features and whole biomarkers, as a foundation for new diagnostic assay construction.

Why did you want to do this?

A growing number of biomarkers of potential diagnostic value comprise chemical modification sites on proteins. This is particularly important in cancer and neurodegenerative disease, where early diagnosis is critical to management of the condition. Badrilla plans to make diagnostic tests in these disease areas.

How will you make money from it?

The pathway to a new medical diagnostic is well understood. We are at the very beginning, and will invest in new programmes of R&D with partners in academia and the diagnostic industry to develop products for market. We plan to create research jobs, laboratory and clinical/biomedical analyst posts in the early stages.

What are your next steps?

With partners in academia and industry, we are identifying areas of unmet clinical needs that can be served by this distinctive approach.
We plan to build and perform technical validation of assays in an initial area, and with UK diagnostic company partner will conduct the clinical validation of this test.

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Barnard Microsystems Ltd

ENSA – enhanced situational awareness for robotic vehicle control

Barnard Microsystems Ltd (BML) was established in 1986, initially as a design consulting company. BML develops unstaffed aircraft systems for use in civilian applications such as oil, gas and mineral exploration, oil pipeline monitoring and land and maritime border patrol applications.

What was the aim of your project?

In this feasibility study we planned to demonstrate a new user experience to better enable an operator to manually control a robotic vehicle, typically in an emergency. The overall aim was to demonstrate the augmentation, and not the replacement, of the surrounding visual and aural reality by superimposing computer-generated symbols and sounds to increase situational awareness.

Why did you want to do this?

As an example, we considered a remote pilot on the ground (RPOG) manually controlling the flight of a remotely piloted aircraft (RPA). Experience to date has indicated that we need to improve the situational awareness of the RPOG if we are to reduce the probability of a crash during take-off and/or landing of a RPA.

How will you make money from it?

This technology is intended for use in the control of robotic vehicles. The Association for Unmanned Vehicle Systems International (AUVSI) forecast that in 2019 RPA system activity will create 70,000 jobs in the USA and contribute over $13 billion to the US economy. By population ratio, this scales to the creation of 14,100 jobs in the UK and a contribution of over £1.65bn to the UK economy. The need for a rapid exploitation is clear.

What are your next steps?

We plan to add an inertial measurement unit to the glasses so the computer can add contextual information. We would then aim to develop a production version in 2015, followed by the introduction of the ENSA unit to the marketplace in early 2016.

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Cadscan

Low-cost, mid-range 3D scanner

Cadscan designs, develops and manufactures 3D scanning systems

What was the aim of your project?

Our project assessed the feasibility of a high-performance, mid-range 3D scanner with powerful, low-cost LEDs projecting a structured pattern over a range of 1-3 metres. We identified and addressed a number of technical barriers to adapt this technique over a much greater range without loss of scanning precision. We are targeting a price 10 times lower than the nearest competitor.

Why did you want to do this?

Mid-range 3D scanners that can capture larger structures, such as vehicles and home interiors, are used in a variety of fields, from architecture to product design. However, highly accurate devices are very expensive at £15k to £100k. This inhibits the uptake of 3D digitisation with its associated benefits in lower cost and efficiency. We aim to disrupt the market place by offering professional-grade 3D scanning for a fraction of the cost of current systems.

How will you make money from it?

We plan to commercialise the mid-range scanner as a stand-alone 3D scanning product. We will use our established supply chain to manufacture the system, for sale through our reseller and distribution network. We will also identify niche uses for the system and tailor its design to specific applications as appropriate.

What are your next steps?

Our concept will require further development before commercialisation. We have applied for a Smart award and will also investigate funding through other routes, including Horizon 2020.

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Cadscan

3D photocopier

Cadscan designs, develops and manufactures 3D scanning systems.

What was the aim of your project?

The projected established that a 3D scanning module, based on a unique structured light technique, could be miniaturised and integrated into a 3D printer. The aim was to assess the technical and commercial feasibility of developing this precise, compact, low-cost 3D sensor for both retro-fitting to existing FDM printers and installing in new products.

Why did you want to do this?

3D printing systems are available today costing under £2,000 and able to print with a resolution of up to 25 microns. However, no 3D photocopier exists that can scan objects with a corresponding resolution. Our novel approach will enable copying and replication, as with 2D copiers. There is potential to further enhance the 3D scanning capability by sharing electro-mechanical components.

How will you make money from it?

We are discussing the concept with a number of 3D printer companies with a view to developing an integrated module. We will also develop a stand-alone module for retrofit installation on existing platforms. We will use our existing marketing channels to bring this product to market once fully developed.

What are your next steps?

To develop the concept through to production we intend to apply for funding through both UK and EU routes. We also plan to work with 3D printing companies to adapt the sensor to operate with other 3D printing techniques.

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Cambridge Xray Systems

A carbon nanomaterial, advanced X-ray source

Partner company
Cheyney Design

We are developing and manufacturing paradigm-shifting X-ray emitters tailored, through the use of novel one and two-dimensional nanomaterials, to the ever-increasing demands of continuous inspection systems for varied diagnostic applications.

What was the aim of your project?

Existing X-ray sources employ heated-wire technologies as an X-ray source. Cambridge Xray Sources was established to develop desktop-scale, advanced nano-engineered X-ray sources based on our established knowledge of nanomaterial engineering. This followed more than a decade of research on the cold cathode electron emission from carbon nanomaterials in the Department of Engineering at Cambridge University.

Why did you want to do this?

X-ray sources represent a significant international market and are widely employed in an ever-increasing range of inspection systems. These cover electronics validation, pharmaceuticals assessment and baggage scanning, in addition to the more familiar medical diagnostics. Carbon-based nanomaterials have a number of functional advances in electron emission-based bombardment X-ray sources.

How will you make money from it?

Working closely with industry, and through our commitment to pragmatic development of the technology, has given us a clear route to market. Our incumbent system may present a significant barrier to market entry but the enhanced functionality of our nano-carbon X-ray sources will enhance the rate and rapidity of the technologies' adoption.

What are your next steps?

Commercialising the technology at high level, driven by wider adoption of broadband, remains our ultimate goal. Following further technological developments and formal data sheet compilation we will seek further machine-scale companies to broaden our existing customer base.

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Chromacity

Modular picosecond seed lasers for industrial laser processing

Chromacity was incorporated in early 2013 and is run by a team of four. The company specialises in manufacturing ultrafast laser sources for the life sciences and the laser machining sector.

What was the aim of your project?

Increasing demand for industrial, ultrashort-pulse (USP) laser processing means established industrial laser manufacturers with no experience of USP systems must adapt their existing high-power technology for this market. Competitive products lack the wavelength, pulse duration and repetition-rate versatility needed for an original equipment manufacturer (OEM) solution-processing market. Chromacity aims to meet this need.

Why did you want to do this?

Responding to feedback from industrial laser manufacturers, this study is using our fibre laser expertise to demonstrate a robust, versatile, modular and cost-effective picosecond laser architecture. It provides 1–10pS pulses and is aligned to the needs of manufacturers/systems integrators in the industrial laser processing market.

How will you make money from it?

Having established the technical feasibility of the laser technology, our strategy is to engage with potential OEM customers to understand their integration requirements. That will inform our design of a generic module which can be configured for their needs. By opening up a potentially lucrative OEM market for our products, we expect that a successful outcome to the project will transform our company.

What are your next steps?

The next step is to better understand how our technology can be adopted by laser machining integrators. We will achieve this by talking with the laser machining community to understand how our proof of concept solution should be adapted into a minimum viable product suitable for field trials.

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Composites Evolution Ltd

Fire-retardant bio-resins for sustainable aircraft interiors (BIOAIR)

Composites Evolution supplies innovative, lightweight, sustainable materials to the composites industry. Products include fibres, resins and intermediates based on natural and recycled feedstocks. They are suitable for a wide range of applications including automotive, mass transport, sports and consumer goods.

What was the aim of your project?

The aim of the BIOAIR project was to study the feasibility of using a fire-retardant bio-based resin (PFA) in applications such as aircraft interiors. Our work included developing the resin formulation and the glass-fibre impregnation process ('prepreg'), and then producing laminates and honeycomb sandwich panels for testing to aircraft interior standards for mechanical and fire performance.

Why did you want to do this?

Aircraft interior structures must be very lightweight and fire-retardant. These structures are currently made from phenolic resins, owing to their good fire performance. However, phenolic resins are toxic and emit harmful volatile organic compounds (VOCs) which create health hazards in the workplace. Polyfurfuryl alcohol (PFA) bioresin is 100%-renewable, water-based, non-toxic and has similar fire performance to phenolic. However, its suitability for use in aircraft interiors requires significant work.

How will you make money from it?

There is a significant market opportunity for resins which overcome the health and safety issues of phenolics and an increasing drive towards sustainable materials and products. Once developed and tested, we will market and sell to customers in aerospace and other industries, including rail, oil and gas and construction. This will lead to increased revenue, job creation and improved environmental and social sustainability.

What are your next steps?

Our next steps are to optimise the material and manufacturing process, scale up to production quantities and work with customers to develop commercial applications. We are looking for original equipment manufacturers (OEMs), suppliers and composite moulding companies interested in development partnerships.

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Constelcom Ltd

Collaborative, web-enabled remote visualisation and analysis of in-situ, large high performance computing data

Constelcom is a start-up company with 20 years experience in simulations and collaboration with the UK's largest high-performance computing (HPC) centre. Our vision is to deliver the power of HPC to all, through our very user-friendly, non-expert, ConstellationTM web environment.

What was the aim of your project?

We sought to explore the feasibility of visualising remotely the big datasets which are generated with HPC, from different systems and over the ConstellationTM web platform. The aim was to establish the 'state of the art', what technologies were available or would be required in the future, and how they could be used to analyse simulations remotely.

Why did you want to do this?

While lack of access and expert knowledge is a barrier to widespread uptake and use of HPC for virtual engineering, analysing the datasets generated is also an obstacle and can require significant computing power in its own right. Visualisation of data in-situ, where it has been generated, removes the need to transfer very large datasets, makes it possible to optimise simulations as they are being carried out, and enables collaborative analysis.

How will you make money from it?

Our vision is an all-encompassing environment for members to carry out all virtual engineering tasks, collaboratively and with seamless access to simulation software and HPC resources. By identifying technologies, both those available and missing, the project brings the full design closer to completion and makes it possible to expand the targeted market. We can also demonstrate and emphasise to early adopters and investors those functionalities which are above and beyond competitors' products.

What are your next steps?

We will implement the technologies we have identified in the ConstellationTM demonstrator, both at the interface level and the back end on the super-computers. We will carry out fuller trials on all mobile platforms, get user experience feedback, work on early adopters' sales and marketing, and fund-raising. We will then further develop the technologies for full commercialisation.

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Cool Game Arcade

A virtual simulation system for autonomous environmental exploration

Cool Game Arcade is a 3D simulation and computer game developer. We are a start-up founded in 2013. Our main area of expertise is 3D game development, virtual reality and artificial intelligence solutions.

What was the aim of your project?

Our objective is to create a virtual environment that allows for the development and testing of robot artificial intelligence. There are robot simulators for simple table-top environments and very expensive real world simulation environments for military use. We are looking to create an easy-to-use, cost-effective simulator of a kind that is not currently available.

Why did you want to do this?

We have extensive experience and intellectual property in simulating robots and autonomous control for computer entertainment applications. We wanted to see if existing technologies and solutions have a wider set of applications in the real world. We are looking to create a simulator which can run on a wide range of devices, be affordable and yet allow for meaningful accurate robotic simulation.

How will you make money from it?

Having good robotic simulators allows for quicker and cheaper testing of machine learning and robotic artificial intelligence. This opens up a range of research options, including training deep learning systems through continual iteration. We will be able to provide clients with better, more accurate solutions and sell a platform for others to use for simulation. As robotics become more mass market, consumer friendly tools will be required.

What are your next steps?

We are going to take our demonstrator and talk to a range of professionals in the robotics industry to establish the best way into the market. We will need further investment in the product to make it a useful feature set for customers and we will investigate further R&D funding.

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Cybula Ltd

Low-cost supercomputing: LCS

Cybula is a profitable SME spun out of the University of York in 2000. The company employs 14 people, led by Professor Jim Austin. It develops high performance pattern recognition hardware and software systems for diagnostics and prognostics.

What was the aim of your project?

Computers are used in nearly every aspect of everyday life, however in some areas very large amounts of calculation are needed to solve the problem, many of these are cost sensitive. Based on simple to use hexagonal blocks and special interconnection methods we built a proof of concept prototype, 256 core adaptable supercomputer prototype that reducescost by >300%.

Why did you want to do this?

Our aim was to show how the concepts can produce a revolutionary and disruptive solution. Making supercomputers in 3D results in them operating faster - and being smaller, they fit in an office. We wanted to use modular blocks, to avoid the expense of configuring. Running costs are also lowered through a low-cost water immersion cooling system.

How will you make money from it?

The machine is made up of processors, memory and other elements, embedded in universal hexagonal blocks. These can be combined to address a problem and are interchangeable between manufactures for flexibility. Companies can put any type of computer component in the blocks and combine them with others. We will license the concept to other companies and also manufacture our own blocks.

What are your next steps?

Many aspects could be improved for mass production and standardisation, such as the communication software. We will start building the systems in small numbers while aiming to raise £2m to £3m to start production and refine the design. We are seeking licensees and demonstrator applications.

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DigitalMR

Concerted real time social media and marketing monitoring system

DigitalMR is a next-generation market research company that helps organisations make informed marketing decisions, using its two main software-as-a-service (SaaS) platforms for: social media listening (listening247) and for private online communities for insights and co-creation (communities247).

What was the aim of your project?

The aim was to enable senior executives, not generally data crunchers like their consumer insights managers, to see at a glance how their social media activity is performing. We created a simple real-time dashboard that combined social media listening data, engagement metrics from owned social media assets and sales/ marketing performance.

Why did you want to do this?

The challenge was to combine a multilingual social media monitoring system incorporating high sentiment accuracy and true engagement metrics, along with a way to measure social media campaign results. We have used listening247 for social media monitoring, Twitter and Facebook application programming interface (APIs) to connect and show metrics that the challenge partner chose, and Google analytics of the landing pages used in the campaigns to judge their success.

How will you make money from it?

We will offer it as a SaaS on annual subscription to companies that are active in social media. We listened to the needs of a potential customer and we are developing a tool that hopefully will be widely used in FMCG (fast moving consumer goods), retail, financial services and healthcare. It will also help us sell subscriptions to our listening247 platform.

What are your next steps?

We will enter a three-month trial with our client. We hope the client will find enough value on the real-time dashboard to sign up and be our first subscriber. After that we will actively market the solution globally.

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DZP Technologies Ltd

Laser-assisted graphene patterning

We are a Cambridge-based technology company, formed in 2008 and currently employing seven scientists and researchers. We specialise in advanced materials and processes for the fabrication of printed and plastic electronics and optoelectronics.

What was the aim of your project?

We investigated whether our proprietary laser transfer technology could produce high-resolution graphene patterns. Such patterns are needed to realise the potential of graphene in electronics and optical devices, including miniaturised electronics. Our study focused on understanding and optimising the process parameters, as well as characterisation of the graphene patterns we obtained.

Why did you want to do this?

Many applications of graphene remain unexploited because of the lack of reliable processing methods for its integration into functional devices. Our technology provides a unique solution for producing such graphene patterns in a single step, using additive, highly reproducible and reliable laser processing method. This innovation may accelerate the graphene supply chain development by providing a critical link for graphene processing, bridging the gap between manufacture and end-users.

How will you make money from it?

At present, there is no commercially viable method capable of producing high resolution, high-quality graphene patterns, as those required in advanced electronic, optical and sensing devices. Our patented technology provides a unique solution, securing strong competitive advantage for our company. In the short term, we plan to produce customised graphene patterns and devices as a new service. In the long term, we intend to license the technology to device manufacturers.

What are your next steps?

We would collaborate with academic and research partners that have the expertise and facilities needed for advanced graphene characterisation and proof-of-principle studies. We are also looking for potential end-users so that the technology can be developed into industrially relevant product and services.

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e4 Structures Ltd

Low embodied-energy, lightweight, 3D honeycomb structures from hybrid composite materials replacing oil-based polymers in product manufacture

e4 Structures Ltd (established 2010) designs, develops and manufactures products from 100% post-industrial waste polymers, primarily for the construction and infrastructures sectors. Our team has significant expertise in materials development, product design and manufacture, gained over many years.

What was the aim of your project?

This project will develop new sustainable hybrid composites matrix materials incorporating readily available local waste inorganic and organic fillers. The new materials will a) replace current materials with lower cost, lower embodied energy and higher performing alternatives and b) enable manufacture of new, higher performance and added value products for both existing and new customers.

Why did you want to do this?

We will use these new materials to create novel lightweight single and multi-layer engineered structures. A prime focus will be minimising material use while maximising structural performance. Intelligent re-use of waste organic polymers has already enabled us to compete with low-cost overseas competition. However, as demand has increased, access to larger volumes of good quality feedstock has become a major limiting factor in future growth.

How will you make money from it?

Among the project benefits will be: use of sustainable, readily available, currently land-filled materials; new composites reducing feedstock costs by some 50%; manufacturing very low-cost, lightweight fire resistant structures which compete on performance and price with low-cost, less sustainable materials; full end of life remanufacture; job protection and creation; carbon footprint reduction by 70% to 80%.

What are your next steps?

Having addressed the technical material challenges, we will validate the new composite materials within current products: replacing ABS (utilities); replacing ply and MDF construction materials. Technical and commercial approvals received from longstanding clients will be our indicator of a successful project.

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Eddy Labs Ltd

Domestic audio analytics platform

Eddy Labs is developing an internet of things (IOT) sensor technology for the smart home. We incorporated in January 2014 and have expanded to five people who specialise in audio signal processing and machine learning.

What was the aim of your project?

We developed a simple product that can be installed in a home to detect and inform you of anything important happening in your space – all without using cameras. The challenge is to translate complicated ambient sounds and other sensor data into human-friendly information like 'You forgot to lock the front door'. This information will be presented in the context of everyday tasks and situations.

Why did you want to do this?

Smart home has always been the vision, but it has also been very complicated for people to use. We want to develop a product to convert existing spaces into intelligent spaces with minimum effort. We realised that most events have already been sending out signals, so we just need to find a way to receive and understand them. The result is a simple and flexible product for the consumers.

How will you make money from it?

The smart home market is big and growing rapidly. We estimate the addressable market to be around £3.2bn in the US. With the product we are offering, we will be expanding the existing market to a much wider group of people looking for a simple and flexible solution. In 2017, we will be expecting a revenue of about £2.7m considering the market growth.

What are your next steps?

We are developing the technology to make it robust enough for a consumer product. There will be a beta testing phase in 2014. After that, we will need to develop our retail channels and manufacturing/supply chain in mid-2015 to prepare for the public launch of the product.

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Embecosm Ltd

Superoptimising compilers: evaluation of feasibility of commercial deployment

Embecosm provides compiler tool chains and silicon chip models to the semiconductor industry. They are GNU tools and Verilator cycle-accurate modeling experts, noted for high efficiency compiler tool chains, and pioneers of ground-breaking energy-efficient compilation research.

What was the aim of your project?

Compilers translate software written in programming languages such as C, to the binary code a computer can actually execute. They try to optimise, but this is a misnomer, since the result is not optimal in the sense of being the best possible translation. Superoptimisation involves exhaustively searching through all sequences of binary codes to find the very best.

Why did you want to do this?

The potential gains are huge – the original superoptimisation work reduced a common sequence from eight to four instructions. Our project analysed three different designs for superoptimisation: those based on brute-force, those applying machine learning; and those using constructive approaches. We considered the effectiveness of each in a commercial context, and identified opportunities for immediate use, along with medium and longer-term development for increasing gains.

How will you make money from it?

It is estimated that the global compiler market is worth £150M to £170m a year and, more significantly, it underpins the huge processor design market, in which the UK is arguably a world leader. Expertise in this area will further reinforce UK leadership, pulling more of this global business into the UK. This project has laid the groundwork for us to develop a range of new services.

What are your next steps?

Porting and training for GNU superoptimisation is available now, and in-house R&D taking place during 2014-2015 will further increase its value. We could develop commercially viable, machine learning-aided superoptimisation on a 2014-2016 timescale, with support from Innovate UK. There are also additional opportunities for academic R&D which could bear fruits in 2017 and beyond.

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Experto Crede

Simplifying the user experience of emotion sensing via mobile phones

We add value to the success of those who control the sectors in which they operate.

What was the aim of your project?

We wanted to know if recent developments in emotion recognition are worth assimilating into our current approach and if so, how and when. Our aim is to optimise emotion recognition on a mobile phone.

Why did you want to do this?

We have identified an approach to emotion recognition that can use the memory and operating system of handsets more effectively than existing approaches. Our aim is to improve user experience of emotion recognition-powered apps. We are the only people in the world who can make emotion recognition effective on a mobile phone.

How will you make money from it?

We're making money by licensing it to business to consumer (B2C) companies in the following sectors: health, tv and advertising, and services delivered to mobile phones. One example of how it is used is for health organisations to recognise (and act upon) the early stages of depression in service users.

What are your next steps?

We will pursue licensing options with the customers who have been involved in the project, while exploring and prioritising market development opportunities.

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Eyejusters Ltd

Ultra-precise optical machining technology
for next-generation lighting systems

Eyejusters is a company that develops adjustable power glasses and other optical technology. Our main technical capability is in the design and fabrication of freeform optical systems.

What was the aim of your project?

Freeform optics potentially offer fantastic advantages for the manipulation of light. Examples include adjustable lenses, head-mounted displays and tailored lighting distributions. However, freeform optics also require new manufacturing techniques as conventional methods cannot produce the shapes required. Our project is developing a new method for the fabrication of freeform optical geometries with shape, accuracy and quality that are currently impossible.

Why did you want to do this?

It all comes down to making difficult shapes very accurately and with very high surface quality. The explosive growth of LED lighting technology creates opportunities for new designs of lighting but also challenges in manufacturing these designs. We have developed techniques for freeform optical design and fabrication, originally as part of our adjustable glasses product development, but we have realised that there are commercial opportunities beyond this technology.

How will you make money from it?

We will use the project results to extend the range of ultra-precise freeform fabrication services we offer, such as in the automotive lighting sector. We have already encountered designs which will be possible through this new technology and we know of no other company in the world with equivalent capability. We will also look to license the technology to other key players.

What are your next steps?

This project has allowed us to establish feasibility of our ideas and we have developed the technology to a point where selective commercial applications are possible. Further development is required to establish a generalised method and we will also produce a small portfolio of exemplary work of this new capability.

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Folium Optics Ltd

Plastic electronics for protection against lasers

Partner company
Colour Synthesis Solutions Ltd

Folium Optics develops novel plastic display technologies. The business was started in 2013 by former lead engineers of HP Labs Displays Group. CS Solutions is a leading provider of both coloured and non-coloured fine chemicals and bespoke chemistry services.

What was the aim of your project?

Attacks on civil and commercial pilots using cheap, commercially available, high-powered laser pointers have dramatically increased over recent years and now present a real danger to public safety. We propose applying a plastic electronics display technology to this problem, by developing active plastic eyewear.

Why did you want to do this?

The potential market is global, and offers a high-value entry point for a plastic electronics solution. The application also stretches the state of the art in materials and device integration. Innovations in those areas will be valuable to us in a range of other markets too. This project also offered an opportunity for our two companies to work closely together, making the most of complementary technologies.

How will you make money from it?

We are already in contact with a European manufacturer keen to develop an active laser protection solution for prospective customers, including German and Swiss police forces. This project offers a good starting point for developing a solution that we could license to them. The technical outputs will also be exploited in a range of other market sectors where high performance dyes and plastic electronics open up new opportunities.

What are your next steps?

We will follow up with the European manufacturer using the outputs from this project. Folium Optics and Colour Synthesis Solutions are also working together on other applications of the same technology, including in defence and medical sectors.

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GameBench

Analyzer

Gamebench provides mobile hardware companies with reliable performance metrics on the central processing unit (CPU), graphics processing unit (GPU) and battery of android smartphones. Founded in 2012, we managed to quickly establish ourselves in performance benchmarking solutions and now have a team of six.

What was the aim of your project?

Having established Gamebench as the most reliable hardware performance benchmarking solution for android, we wanted to investigate how we could help developers build better and more efficient games faster. Our project is an app that will work on any android device. It will collect performance metrics (such as frames per second, percentages of crashes, slow-downs, and load time), focusing on the software.

Why did you want to do this?

The major challenge was extracting information from different chipsets in a non-intrusive way. This was done through internal device testing, which allowed us to gather information from GPUs provided by the top vendors for android. Most vendors support data retrieval, which means that this new service is feasible.

How will you make money from it?

If successful, this project will help us gain further investment from current investors and assume a strong position in the market. The app will help the 100,000 or so android game developers worldwide to accelerate their development process and save resources previously spent on quality assurance and testing. Halving quality assurance costs can save 2%-3% of total costs, allowing resources to be redirected towards more creative parts of development.

What are your next steps?

Prototypes of our devices will help us integrate all the required metrics into the app. We are also developing our digital marketing plan to reach out to game developers and are preparing for events that will help us promote this service.

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GDE Technology Ltd

Disruptive technology for motor encoders

GDE Technology has been formed to address a potential multi-million dollar business in developing high-update rate, low-cost industrial sensors. This potentially disruptive technology uses proprietary sensing algorithms running on off-the-shelf microcontrollers and integrated, planar printed circuit board (PCB) based sensor.

What was the aim of your project?

We are developing very fast, low-cost rotary sensors using printed circuit boards (PCB) as the sensing elements: a sensor PCB has stator coils for excitation and signal detection; a rotor PCB has coils for providing an angle dependent coupling; and a third PCB connected to the sensor PCB has electronics to provide absolute digital position to the control system of the industrial machinery.

Why did you want to do this?

Owing to their simplicity and low cost, incremental optical encoders have traditionally been used to provide position feedback in servo motors. Now, their market share is shrinking as a result of the wider demand for absolute encoders. However the price premium for absolute encoders is still high and the market would prefer a price closer to parity with incremental encoders. This can be achieved only by changing the sensing technology.

How will you make money from it?

Our approach will allow us to address two major markets – a motor encoders and absolute rotary sensors. Motor encoders is a high volume application but has lower margins. Stand-alone absolute rotary sensors are usually purchased by the original equipment manufacturers (OEM) in much lower volume but, because of standardisation in existing markets, the aggregated volume of such sensors can be substantial. These two segments represent more than $2bn in annual revenue globally.

What are your next steps?

We are in the process of creating strategic relationships with commercial partners – the future licensees of our technology. Joint commercialisation projects will help us to align our R&D roadmap with actual needs in the market and will finance further stages of our development efforts.

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GeneFirst

Sensitive detection of cancer gene mutations

GeneFirst is a molecular diagnostics company. Working in the field of infectious disease and cancer diagnostics, GeneFirst offers robust, simple and inexpensive molecular diagnostics products with a rich portfolio of patented technologies.

What was the aim of your project?

Molecular diagnostics for personalised medicine aim to predict in advance which patients are most likely to benefit from a particular therapy. Current methods have significant limitations of sensitivity and cost, and consume too much clinical material. We are developing a real-time polymerase chain reaction (PCR) based technology which can detect multiple defined mutations with greatly increased sensitivity.

Why did you want to do this?

Current PCR-based products detect 1% to 10% of mutated DNA, and consume a large quantity of clinical material. This sensitivity of detection is unacceptable when attempting to identify rare mutants in genetically heterogeneous mixtures. To overcome these limitations, we are developing a patented platform technology, multiplex mutation detection PCR (MMD-PCR). Based on proprietary primer/probe design, MMD-PCR is ultra-sensitive, inexpensive and consumes minimal clinical material.

How will you make money from it?

Success in this project will give us an opportunity to conduct a further study, leveraging significant investment. This is critical, as molecular diagnostics is a dynamic field and a rapidly expanding market; which means that our opportunity is inevitably time-limited. Innovate UK support will enable us to quickly enter this multi-billion dollar market.

What are your next steps?

Once the development is complete, the product will be ready to enter the process of validating European conformity (CE marking) and clinical trials to establish clinical validation and utility within the patient pathway.

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Generic Robotics

Haptically enabled simulation to train for non-surgical cosmetic treatments

Generic Robotics was formed by academics and researchers from the UK's top universities. With a broad range of experience in software, electronic and mechanical engineering we provide technology R&D services in a variety of areas to research and industry clients.

What was the aim of your project?

Haptic technology adds touch feedback to computer interaction and has numerous applications. In particular, the training of clinical skills as procedures can be practised repeatedly with no risk to humans or cost in terms of consumables. This project assesses the feasibility of using Generic Robotics' IP in haptic (applying touch) simulation to train users in giving cosmetic facial injections.

Why did you want to do this?

We are currently commercialising a dental clinical skills simulator and are seeking alternative applications for this technology to become an established global presence in haptic simulation. By modifying this platform in line with recommendations from expert practitioners we will be able to provide a comprehensive and realistic facial injection training experience, the first of its kind.

How will you make money from it?

We have IP in haptic hardware and software, but no direct access to clinical training markets of this nature. We will form strategic partnerships with leading companies in the non-surgical cosmetic treatment market, as well as relevant training organisations. We will create the simulation platform and oversee its production and distribution through a third party receiving royalties on sales.

What are your next steps?

On completing this project we will have a demonstration system to show leading manufacturers of injectable cosmetics. Ideally, we will find a partner immediately based on the current demonstrator; if not, we will seek funding to progress the platform further towards a commercial prototype.

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Generic Robotics

Low-cost force feedback technology to help computer users with mental or physical impairments

Generic Robotics was formed by academics and researchers from the UK's top universities. With broad experience in software, electronic and mechanical engineering, we provide technology R&D services in a range of areas to research and industry clients.

What was the aim of your project?

We will design a software application programming interface (API) and haptic rendering module to test the feasibility of using our low cost haptic device to interface with a common desktop publishing (DTP) package to feel the shape of graphs and other commonly used visual presentation elements.

Why did you want to do this?

Haptics provides an intuitive way to interact with computers. Although in its infancy, haptics will play a key role in future human-computer interaction (HCI). One area is improving computer interaction for people with mental or physical impairments, who may otherwise find it difficult to access resources on computers. For instance, a visually impaired user cannot see a graph, but with haptics they can feel it.

How will you make money from it?

We have intellectual property in haptic hardware and software and but no access to the educational and computer interface market, which is well established and competitive. With a small team of developers we would be able to create a product which supports haptic interaction with a wide range of common computer applications. We would then need to find a partner with an established route into this large global market.

What are your next steps?

By the end of the project we will have a functional demonstration system which will be shown to both potential user groups and distributors. Our ideal plan is that we find a partner with global distribution reach. However, we may wish to further refine the demonstrator first.

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Glass Technology Services

Advanced composite core-clad eye-safe laser system (ACCES-LS)

Glass Technology Services (GTS) has been innovating for 50 years, using the unique properties of glass. We have a team of 30 glass specialists with interests in photonics, bio-materials, oil, gas, communications, nuclear and the established glass industry.

What was the aim of your project?

We wanted to develop an advanced glass-based laser rod design, offering significant reductions in size, weight and power requirements of the final device, compared to current technology, at lower cost. The innovative Advanced Composite Core-clad Eye-Safe Laser System (ACCES-LS) improves the thermal conductivity and strength of the rod, offering a step change in performance with potential to revolutionise the eye-safe imaging market.

Why did you want to do this?

Thermal performance is a limiting factor in the use of glass laser cavities, including "eye-safe" lasers. We have developed technology to directly form cavities, one that allows novel designs for improved thermal conductivity. This potentially allows performance comparable to crystalline yttrium aluminium garnet (YAG) cavities at 20% of the cost.

How will you make money from it?

By demonstrating the feasibility of this technology we will be able to develop designs with existing customers for specific applications. New applications using laser based sensors will become possible for example in imaging, security and renewable energy. This will allow systems to operate with greater efficiency.

What are your next steps?

We intend to carry out laser testing of some of the novel designs we have developed, with a partner in the defence industry. We will then look at further work with commercial partners on specific designs for their applications.

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Glass Technology Services

3D Clear-Cut

Glass Technology Services (GTS) has been innovating for 50 years, using the unique properties of glass. A team of 30 glass specialists currently have interests in photonics, bio-materials, oil, gas, communications, nuclear and the established glass industry.

What was the aim of your project?

3D Clear-Cut (3D-CC) will meet an industry need for low-cost, flexible manufacturing of glass components with complex, customised 3D shapes to high precision in short time-frames. This will involve minimal energy input, with the option of controlling diffusing properties.

Why did you want to do this?

The market for specialist optics and photonics is growing, while sizes of glass components are getting smaller. Cutting and polishing glass is costly and processing small components is even more expensive, especially where components are in complex shapes. We are aiming to develop a process to cut the costs of processing precision components by a factor of two or more.

How will you make money from it?

We plan to work with establish partners in the industry to develop the technology further for their specific applications. We believe the technology will make possible new designs of optic, photonic and sensing components and will improve the many applications where these technologies are used.

What are your next steps?

Once we are able to demonstrate feasibility we will share the results with potential partners. We expect further studies will be required to apply the technology on a commercial basis.

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Highland Bio Ltd

Flexible piezoelectric materials for diagnostic devices

Partner company
LiquidIC Sensors Ltd.

Highland Bio Ltd is a micro-company, established in 2008. We are just about to launch our first product, which is designed to diagnose blood clotting disorders. Expertise includes engineering, physics, electronics, software, biotech, mathematical modelling.

What was the aim of your project?

We are developing a novel technique to print sensors that will detect viruses and bacteria, while costing only a penny each to manufacture. The challenge is to formulate a printable piezoelectric material and devise a technique to form working microbalance and microresonator devices on the surface of common plastics.

Why did you want to do this?

We have already developed our own technology, and scaled it to a one million units a year manufacturing process. We are marketing our devices, but our current processes use relatively expensive materials. The innovation is to get the same results but with very cheap materials. What we have achieved is an improved understanding of printed electronics, and a significant step towards our next generation of devices.

How will you make money from it?

This will be another product for us and our industrial sister company LiquidIC to manufacture and sell. We are a micro-company but are looking to expand in the next 12 months to support our sales operations, and bring additional expertise to complement what we have. The technique we are working on with this project needs less energy and water during manufacture, and the polymers can be biodegradable.

What are your next steps?

We will leverage its sales of its current products by seeking match funding from Innovate UK to invest in developing these devices and the advanced manufacturing processes needed to scale the process and enable us to be able to supply in volume.

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Hodos Media Ltd

Driving Data - exploration and insight

Hodos Media develops and publishes game-like applications in the field of intelligent transport systems. We apply game mechanics to encourage behaviour change. Goods and people can move around more sustainably and efficiently if everyone plays the game.

What was the aim of your project?

The aim was to take driver data and pass it through a basic driver behaviour engine that could provide visualisations of driver and fleet behaviour over time. We tested it with historic datasets, conducting a variety of analyses to confirm the viability of our approach.

Why did you want to do this?

Application binary interface (ABI) research reports that how a fleet is managed can have a huge impact on the profitability of a business, and knowing where your assets are and how they are performing is a major part of this. The emerging opportunity is accessing and making sense of that data in a meaningful and insightful way, and then actively intervening, rather than passively monitoring drivers and their vehicles.

How will you make money from it?

We need to convince fleet managers that we have a serious service for them, not just a game for drivers, as well as demonstrate the savings. We can then incorporate and monetise different data elements and patterns around driver and vehicular data, promote positive behavioural change, and reassure non-expert users with new insight into their organisational data.

What are your next steps?

We want to turn the demo into a full product, explore opportunities for further investment and breakdown development costs to take the product to market. This feasibility study provided a low risk way to extend our product range and demonstrate benefits to our target market (fleet-managers) and new markets (insurers).

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i3d Robotics Ltd

3D stereo image enhancement using laser-induced fibre speckle

i3d robotics is a specialist 3D vision company concentrating on stereo-camera and thermal imaging technologies.

What was the aim of your project?

Our main aim is to develop a new fibre speckle projector for use in a new class of 3D imaging system. The main competing technology for the target measurement areas are LIDAR (light detection and ranging) systems but these suffer from poor coverage and can only operate on cooler surfaces, owing to air scintillations caused by intense heat.

Why did you want to do this?

Operational downtime in process engineering or furnace installations is disastrous for production costs and environmental impact. Shortened lifetime is the most important reason for conducting a costly maintenance campaign. Any sensor device that can provide accurate and reliable measurements of the internal surface structure will lead to direct efficiency savings. Measuring the effects and levels of erosion and corrosion will enable manufacturers to predict and alter maintenance schedules.

How will you make money from it?

We are working with several companies in high-temperature manufacturing and if this project is successful we will develop a value proposition to manage their facilities. This may include equipment sales, a furnace survey or remote monitoring service. We have identified and are investigating new applications in robotics.

What are your next steps?

After completing successful lab tests we intend to conduct field trials with clients as a proof-of-concept. The next step is to develop an exploitation road-map to ensure that we take all appropriate steps in development and have adequate resources to do so.

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i3d Robotics Ltd

Thermo-PamCam: secured site identification of intruders by merging data from active radio frequency identification validation and thermal imaging

i3d robotics is a specialist 3D vision company concentrating on stereo-camera and thermal imaging.

What was the aim of your project?

This study investigates the linking of thermal infrared stereo-cameras to count/monitor people in an environment with active radio frequency identification (RFID) tags/badges - to distinguish between authorised personnel and intruders. At sensor level the proposed systems combines proven technologies. This study investigates the feasibility of linking the technologies and creating movement map. We will also build a commercial exploitation road-map.

Why did you want to do this?

We are aware of the need for a new intruder and tracking device for secure locations. The core challenge is to build an ICT platform to link proven, reliable sensor technologies able to identify human intruders so that they can be intercepted. We need to ensure that the sensors are low-power, easy to configure and that any system uses communication bandwidth efficiently.

How will you make money from it?

The key to exploitation is to identify potential markets and industrial partners. We have already done this and now intend to develop both a low cost consumer system and more expensive intruder and alarm systems. We are in discussions with several companies. Successful exploitation will create new knowledge-based employment and meet a range of societal challenges from an ageing society to homeland security.

What are your next steps?

Once the concept is proved we will build a commercial exploitation road-map. This will include the next stages of development. That might include pattern recognition and machine learning technologies to predict the eventual target of the intruder. We have identified partners expert in these fields to assist.

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Ilika Technologies Ltd

Optimising synthesis of lithium phosphorus oxinitride (LiPON) from the elements

Ilika discovers new materials for energy and electronics applications through patented, high-throughput techniques. We have more than 30 employees, the majority being specialist materials scientists. The LiPON team is headed by senior scientist Dr Christopher Lee.

What was the aim of your project?

We wanted to deposit thin films of LiPON with demonstrable control over the lithium content and the ratio of nitrogen/oxygen incorporated into the films. This would give ion conductivity comparable or superior to materials prepared using current deposition methods. This would be a novel method of depositing LiPON directly from the elements and suitable for scaling up to manufacturing applications.

Why did you want to do this?

LiPON synthesis is only possible by sputtering lithium ortho-phosphate targets in nitrogen plasma. However, these targets are fragile and cannot withstand the high powers needed for fast deposition rates. Further, sputtered LiPON films are thick, to prevent electrical short circuits, which reduces energy density. Also, the ion conductivity of LiPON materials is known to depend on the relative amounts of Li and N and these are difficult to control using sputtering.

How will you make money from it?

Demonstrating this novel method of depositing LiPON from the elements will enable us to prepare solid state batteries with improved performance and at lower cost than current methods. Using ultrathin solid electrolytes will improve the energy densities and using electrolytes with improved ion conductivities will increase power densities. Together, this provides an attractive power solution for micro-scale devices, such as sensors.

What are your next steps?

We hope to proceed to fabrication of solid-state cells based on LiPON solid electrolytes. The first step is to evaluate the effects of deposition rates for samples of the optimum composition. Subsequently, we hope to fabricate complete solid-state cells to demonstrate increased energy/power densities achievable using ultrathin solid electrolytes in micro-batteries.

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In-Cycle Ltd

Advanced leather polymer composites

Partner company
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 carbon dioxide (CO_2) and safely convert it into materials with a commercial value.

What was the aim of your project?

The project aimed to create a new leather polymer composite (LPC) material using plastic extrusion technology. This is a thermoplastic based material suitable for moulding into footwear components, furniture parts, flooring etc. The approach taken was to explore super-critical CO_2 based polymer chemistry to develop a LPC with good fibre-to-polymer bonding, low volatile organic compound (VOC) content and a porous, breathable structure.

Why did you want to do this?

Current leather recycling methods, such as bonded leather production, require significant investment in specialist equipment and are not designed for post-consumer wastes. Previous attempts to create a LPC have been problematic due to leather degradation during moulding and poor fibre-to-polymer bonding. The study has helped overcome these issues using green chemistry coupled with a bespoke extruder design. This could potential be scaled to enable low cost, high volume production.

How will you make money from it?

Currently the UK generates an estimated 100,000 tonnes a year of leather production waste. Making the project commercial results in a significant proportion of this waste potentially being diverted from landfill and converted into new revenue streams, helping move the UK towards a circular economy. In-Cycle has also developed the world's first leather shoe recycling process which could provide an immediately available waste stream for LPC production.

What are your next steps?

The project results have opened the door for further funding possibilities. With suitable investment a pilot-scale LPC production plant could be developed within one to two years. The immediate next steps are to collaborate with potential customers to undertake further testing and development of LPC compounds, tailored for their particular product applications.

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Integrated Materials Technology Ltd (IMT)

Second-generation structural composites

IMT is a composite materials and process consultancy specialising in advanced, thermoplastic structural composites technology. We are currently developing a new process for high-volume, automated production of advanced structural composites targeting the aerospace, defence and automotive industries.

What was the aim of your project?

We wanted to demonstrate a new manufacturing process for thermoplastic composites that would produce materials with improved formability and durability characteristics. The process should allow full automation of production, reducing processing times and thus costs. It should also be scalable, to meet the volume production requirements of the major end-user industries.

Why did you want to do this?

The composites industry has been plagued for many years by high production costs, poor formability of materials limiting the manufacture of complex 3D shaped parts and in-service concerns relating to mechanical integrity. To overcome these issues we are developing, for automated production, a new generation of composites. These will have an aligned, discontinuous fibre microstructure that achieves a wider range of mechanical properties with lower deformation stresses.

How will you make money from it?

A 30% reduction in manufacturing cost could treble the value of the $20bn global composites market by 2018 (Lucintel). We have demonstrated the viability of the new manufacturing process leading to a stepwise reduction in costs and more formable, durable parts. Extending the use of our technology across the composites supply chain will establish the UK as a world leader in the manufacture of second generation structural composites.

What are your next steps?

Our next steps are to: identify development partners in the composite materials supply chain, from material processors to end-users/primes; and seek expansion capital to enable pilot-stage production and comprehensive material characterisation, also to expand R&D and business development activities.

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International Moisture Analysers Ltd

Dew point measurement device

IMA have been supplying a range of industrial gas and liquid analysers for over 23 years. We are active in both the general manufacturing and oil and gas industries in the UK and across the world.

What was the aim of your project?

Our aim is to develop a high-accuracy dew point measurement device that does not suffer from contamination problems. It should have low maintenance, be simple to operate, with the aim of reducing both capital and operating expenses for users who need to maintain the high purity of their process gas.

Why did you want to do this?

Process gases in industry cause a number of problems if their moisture content is too high. The use of wet gases in manufacturing can affect product colour and strength. Although there are a number of moisture sensors on the market, they use inferential techniques that require frequent calibration and we see market opportunity for a high-precision system capable of process measurements.

How will you make money from it?

We have a long track record in industrial moisture measurement and intend to develop the system to a marketable unit to sell through a network of international distributors in key market areas.

What are your next steps?

We are seeking a patent for the technology and we need to perform further work, with tests under a variety of operating conditions, and to develop a user interface. Once we can demonstrate accuracy and stability with the final design we aim to launch the instrument for industrial use.

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International Moisture Analysers Ltd (IMA)

Measurement chamber for raman spectrometry

IMA have been supplying a range of industrial gas and liquid analysers for over 23 years. We are active in both the general manufacturing and oil and gas industries in the UK and across the world.

What was the aim of your project?

Our aim is to develop a measurement cell that improves the performance of our raman spectrometer for gas analysis. The system should have low maintenance and be simple to operate, with the aim of improving process efficiency. Removing the need to drop the pressure of a process gas before measurement reduces the cost for many customers.

Why did you want to do this?

Trace levels of contamination in process gases can cause a number of problems. A simple-to-operate Raman spectrometer system can offer many benefits to users who need to know the purity of the gases they are buying, selling and using in key manufacturing processes

How will you make money from it?

We have a long track record in industrial analysis of gases and liquids and we intend to develop the system to a marketable unit to sell through a network of international distributors in key market areas.

What are your next steps?

We need to carry out further work, with tests under a variety of operating conditions, to define the performance of the measurement cell when combined with a high sensitivity spectrometer. Once we can demonstrate repeatability and stability with the final design, we aim to launch the instrument for industrial use.

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iProov

Pulsar

iProov focuses on the challenge of online user authentication. It has developed world-leading technology for cloud services based on spoof-resistant, zero-effort face verification. Founded in London in 2011, the team comprises experienced industry executives and university academics.

What was the aim of your project?

The objective was to determine the feasibility of using an exciting new published image processing algorithm, in iProov's normal operating conditions. The algorithm can detect pulse in a human subject from a video of a face, but our aim was to make it work using iProov's mobile environment of compressed video, uncontrolled lighting, moving subjects and flashing, coloured illumination.

Why did you want to do this?

We have developed unique technology to provide highly secure, zero-effort authentication of online users, which can also be used to confirm live presence. The system is in a race against increasingly sophisticated attempts to impersonate people with 3D printed masks and synthetic imagery. We need to develop ever more powerful ways to detect and defend against such attacks. This algorithm offered a new, powerful way to do so.

How will you make money from it?

We provide zero-effort, highly secure authentication as a cloud service to enterprises and SMEs. Revenue comes from service fees and per-transaction charges. New algorithms that make the system more robust against attack make it easier for enterprises to decide to buy, accelerating our revenue growth and market share.

What are your next steps?

Our project has enabled us to develop and test some very important new algorithms, which will help secure users and our enterprise clients. These will now be implemented in the high-throughput production environment, and will complete testing in 'shadow live' operation prior to live deployment.

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IS Instruments Ltd

High etendue Raman spectrometer for protein and biological measurement with fluorescence subtraction

IS Instruments is a laser remote sensing company, specialising in the production of Raman instrumentation, 3D vision systems and LIDAR. The company builds systems for the process industry, offering cutting-edge sensing devices for operation in difficult environments.

What was the aim of your project?

We are investigating the feasibility of a Raman spectrometer targeted at making measurements of biological samples using a static Fourier transform spectrometer. To combat the issue of fluorescence this instrument will be combined with a new class of excitation laser which emits two wavelengths. In principle, the two signals can be subtracted to remove the fluorescence background.

Why did you want to do this?

Raman can be used to probe the structure and conformation of native proteins. It can also be used as an identification technique for biomarkers. Progress in this area has been restricted owing to the presence of fluorescence. If the fluorescent technique can be combined with the spectrometer to build a new transmission or spatially offset Raman sensor, it could represent a major advance in this field.

How will you make money from it?

If successful we would target a new class of Raman spectrometer, selling at less than £30k. This system would initially be targeted at the protein marker market. Research analysis estimated the therapeutic proteins market at $93 bn in 2010, with a compound annual growth rate (CAGR) of 16.4% between 2002 and 2010. Any device that can help improve the identification of these proteins is of significant interest.

What are your next steps?

In the near future we plan to continue testing on a variety of different samples. We are also in contact with a major pharmaceutical company to test the instrument in a blind trial.

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IS-Instruments Ltd

Ultra low-cost 3D printed wireless spectrometer for process control

IS-Instruments is involved in the design, development and manufacture of compact, remote sensing instrumentation. ISI was started in 2010 and is a micro-business based in Kent. Our main business is laser-based measurements and spectroscopy.

What was the aim of your project?

We investigated the feasibility of producing a good quality spectrometerusing modern manufacturing techniques, with an on-board computer to provide wireless control, all for a sale price of less than £300. Our target is the process control market where a more ' disposable' unit would be desirable.

Why did you want to do this?

Our customers have expressed a need to monitor their processes in harsh environments where expensive spectrometers cannot be risked. Offering a low-cost wireless spectrometer fulfils this requirement, especially as it allows networks of sensors to monitor all elements of a process line simultaneously. The key challenges have been in developing the hardware using commercial off-the-shelf (COTS) components.

How will you make money from it?

Our value proposition is to offer a flexible, low-cost device that can be networked wirelessly into a multi-sensor platform. Customers will have access to a much cheaper device that is suitable for work where product lifespan may be short. We expect our device to be on the market within 12 months for under £300. We are targeting sales of 1,000 units in the first year, growing to 5,000 annually within three years.

What are your next steps?

Once the concept is proved we will draw up a commercialisation road-map. We will also approach our contacts in the process market to arrange demonstrations and discuss the best way to integrate it with existing systems and procedures. We will also take the product to distributors in the appropriate markets

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Keronite International Ltd

White inorganic coatings for satellites (WiCoSat)

Keronite, established in 2000, specialises in an environmentally friendly advanced surface treatment for light alloys, such as aluminium (Al), magnesium (Mg) and titanium (Ti). Keronite provides industrial coating solutions on critical aerospace and space applications.

What was the aim of your project?

Our aim is to demonstrate a white coating as thermal shield on the exterior surfaces of satellites. White paint has been used with limited performance in extreme space environments while anodising is used with limited performance. Our trials show that using plasma discharges and unique electrolyte formulations can allow the formation of optically white ceramic coatings on aluminium alloys (Al-alloys).

Why did you want to do this?

One challenge was to create white ceramic layer 2219 alloy and carbon fibre–reinforced polymer (CFRP) materials for space hardware and mirrors. The problem on Al was overcome by modifying electrolyte formulations and electrical parameters. Further study is required to enable uniform Al deposition on to CFRP. Our key innovation is the formation of white ceramic layer on Al capable of maintaining long-term thermo-optical properties, compared to traditional organic paints.

How will you make money from it?

We estimate the potential market for the white coating is at least £5m a year from key players such as Airbus, Thales and Boeing Space. We have had interest in white inorganic coating development from Bepi Colombo and other future missions where we could offer a solution and help grow as a leading UK SME on advanced space coatings technologies.

What are your next steps?

We have already agreed to undertake work with Airbus for their qualification and approval programmes. Discussion on scaling up the technology for commercial use is under way. We would like to get further support from Innovate UK and Airbus to take the technology further.

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Kwikbolt Ltd

Adapted metal injection moulding process for maraging steel components for the aerospace industry

Kwikbolt Ltd designs, develops and supplies revolutionary, single sided temporary slave fasteners to prime aerospace manufacturers and 1st tier suppliers using 3D metal printing and materials from our international patented designs.

What was the aim of your project?

Our project investigated producing the same component (fasteners) from maraging steel powder (used within the 3D metal printing process), but using an adapted metal injection moulding process. Our aim was to demonstrate a significant cost saving while achieving total consistency of parts and maintaining their advanced properties.

Why did you want to do this?

Owing to the expense of producing maraging steel products by 3D printing this material is rarely used. However, using metal injection moulding (MIM) to produce such parts could open new avenues for new and improved products with exceptional properties. Our process will allow for reduced costs which can be passed on to the customer.

How will you make money from it?

The successful completion of this project and its results will eventually allow the same parts to be manufactured using an additive process at a greatly reduced cost. This will allow us to pass on savings to the customer as well as make money from the overall reduction in production costs.

What are your next steps?

There is already a market from our customers. The next step in the project is to prove the concept of the designs and properties of the parts. This requires basic prototyping and testing – both by us and externally by specialist centres.

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M Squared Lasers Ltd

Tunable laser source for confocal microscopy

M Squared Lasers develops and manufactures next-generation diode-pumped solid-state lasers and systems. The company expertise spans continuous wave (CW) to broadband femtoseconds (fs), and from ultra violet (UV) to terahertz (THz). It has demonstrated success in delivering innovative solid-state lasers at the highest levels of customer service.

What was the aim of your project?

We investigated a continuously tunable visible light source with the emission in blue/green range, for use in confocal microscopy set-ups. Our module under development will be based on a novel use of nonlinear crystal for an efficient conversion of infrared light to visible light. This will offer an automated and broad tuning characteristic with good beam quality.

Why did you want to do this?

Solid-state lasers are used for the excitation of fluorescent molecules in confocal microscopy. These sources offer excellent performance at the expense of their complexity and cost and hence limit the widespread adaptation of this non-invasive imaging technique. Visible light sources and conversion modules are commercially available but their use for imaging has been limited owing to poor wavelength tunability or beam quality. Our proposed module could address the existing performance gap.

How will you make money from it?

Our technology is compatible with our flagship solid-state laser product (SolsTiS) and will serve as an important wavelength range extension for existing customers. This can open up further opportunities for this module outside bio-sciences, in areas such as cold matter or metrology. The innovative module we have developed here will enter the market directly, through established sales, marketing and distribution channels throughout Europe, Asia and the US.

What are your next steps?

After a successful demonstration of our module the next step will be to increase the technological readiness through further development of this core technology, resulting in a pre-production prototype. This will enable verification of the system capabilities in non-invasive imaging applications through collaborations with research institutions and potential end-users.

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Medibord Ltd

Reducing radiation backscatter in high-value radiotherapy planning and treatment

Medibord Ltd develops, manufactures and commercialises imaging and radiotherapy patient-positioning products for the treatment of cancer. This draws on our expertise and extensive knowledge in the properties and fabrication of composite materials to deliver UK manufactured products.

What was the aim of your project?

More than one in three people in the UK will be diagnosed with some form of cancer during their lifetime (Cancer Research UK). Radiotherapy is a common cancer treatment using high-energy radiation. Our objective is a product which reduces the radiation effects which can lead to serious healthcare issues, such as secondary cancers and skin damage.

Why did you want to do this?

The effect of radiation from a study in the US states that a CT scan carried out in 2007 could lead to an additional 29,000 cancers. Radiation safety works on the "as low as reasonably practical" (ALARP) principle, so any product improvement can lead to significant patient and commercial benefits. Medibord has extensive experience and knowledge of the trends in this market.

How will you make money from it?

The market for radiotherapy products is estimated to be growing at an annual rate of 5.3% and is forecast to reach $5.8bn by 2016 (Markets and Markets). The UK is the world leader in radiotherapy treatment research and Medibord aims to be a leading development and manufacturing company commercialising innovations in this field. If this project proves to be successful this will extend the competitive advantages of our products.

What are your next steps?

After completing this study we will investigate development of a proof-of-concept (PoC). With such a PoC medical device we will engage with leading researchers and healthcare professionals to evaluate the health economics and healthcare merits. This will allow full evaluation before commercialisation.

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Medifit Instruments Ltd

Non-invasive, digital and wireless brainstem biosensor for monitoring the central nervous system on a mobile device

We develop cutting edge technologies for measuring the autonomic nervous system in real-time – and non-invasively. We have been established for 15 years and have developed a number of award winning technologies being used for clinical and research applications worldwide.

What was the aim of your project?

We are proposing the first non-invasive tonic-clonic seizure detection biosensor not based on neuronal signals, for continuous monitoring of epilepsy. Our innovative approach is to continuously and non-invasively monitor the autonomic nervous system. This offers a clinically validated alternative to electroencephalography (EEG) that can provide a sensitive and easily measured index of central dysregulation in the brain.

Why did you want to do this?

Epilepsy is the most common neurological disorder affecting 50 million people worldwide and with mortality rates 24 times higher than the general population. The fundamental technical challenge is to develop a non-invasive seizure detection biosensor not based on neuronal signals (EEG). The autonomic nervous system offers a viable alternative. It can provide a sensitive and easily measured index of central dysregulation, meaning that seizures can be detected from autonomic efferent.

How will you make money from it?

The digital wireless-sensor market is the fastest growing market in healthcare ($14bn by 2017), and policy-makers within the NHS have acknowledged that this digital wave will be crucial in how healthcare is to be delivered. This is driven by the need to provide healthcare away from hospitals, in people's homes, for cost reasons. We now have the opportunity to grow the business significantly in new markets.

What are your next steps?

The next step is to scientifically validate both the biosensor and the seizure detection algorithm. We intend to do this with Kings College Hospital who are already using our clinical algorithm in their current study of "Sudden death in epilepsy". We are also looking for funding to commercialise the technology.

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Micropply Ltd

3D printer for creating outdoor surface markings

Micropply Ltd was established in April 2013 to develop novel floor/ground surface marking technology, including 3D printing.

What was the aim of your project?

To develop the world's first large scale outdoor ground marking 3D thermoplastic printer - capable of printing ultra-thin machine readable 'intelligent' markings.

Why did you want to do this?

Current ways of marking ground and floor surfaces are typically applied using a thermoplastic bonded-to-surface method, which uses a naked flame and requires user skill. This gives variable results, is time consuming, unsafe, and banned in underground applications/confined spaces. Also, these markings cannot be machine read. We want to offer a system of machine readable markings for a variety of applications, including outdoor playgrounds, road markings, football pitches and on steps, for blind and partially sighted people.

How will you make money from it?

We already have one licensee for creating markings on football pitches - a company who sell turf-treating equipment. The machine only takes one day to mark adverts on the pitch, using ink that can withstand rain, but can be removed using water, so it doesn't damage the turf. We are pursuing other licence deals, where our technology will be licenced to sector OEMs for commercialisation through their global distributed networks.

What are your next steps?

We have built two prototypes, so now need one machine as a demonstrator, to enable usto seek funding, to set up our manufacturing operation.

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NDT Consultants Ltd

Weld assessment using infrared thermography (WAIT)

NDT Consultants Ltd was founded in 1985. We have extended our expertise into all aspects of non-destructive testing (NDT): training, inspection, consultancy, R&D and consumable products supply.
We also provide assistance to businesses to achieve National Aerospace and Defense Contractors Accreditation Program (NADCAP) accreditation in the EU and associated countries.

What was the aim of your project?

The idea was to look into the application of infrared thermography to inspect the integrity of resistance welds. Ultimately, the objective is to integrate the novel technique in the welding line to automatically inspect a higher volume of welded parts than what is achievable today with the destructive methods and ultrasound.

Why did you want to do this?

Although resistance welds are widely used today in the industry there is still no NDT technique to inspect their integrity that is efficient and fast enough to test a high volume of welded parts. Hence, the industry is still using mostly the destructive methods that are not reliable, inspect only a limited volume of welds and result in a high cost and material waste.

How will you make money from it?

The global welding products market was valued at nearly $18.4 billion in 2013 and is expected to increase to $19.3 billion in 2014. Inspection of weld quality is a major part of this global market. The main income from the project will arise from licensing the new technology. NDT Consultants Ltd will also seek to manufacture and commercialize the inspection technique and equipment.

What are your next steps?

Our next objective is to look into the application of the technology for different types and forms of resistance welds, and develop a software and hardware that will enable automatic inspection. We will then seek to partner with manufacturing groups to facilitate field trials of the prototype.

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Optocap Ltd

A novel planar fibre coupling technique for silicon photonic devices

Optocap provides contract package design and assembly services for a wide range of optoelectronic and micro-electronic devices. We offer package design, thermo-mechanical modelling and optical modelling in addition to a wide range of precision semiconductor assembly services.

What was the aim of your project?

The objective is to develop a fibre coupling process that will enable horizontal planar coupling to a vertically emitting silicon on insulator (SOI) grating coupler device. This is done with standard optical fibre, with an end facet polished at an angle and acting as a reflective mirror. This is to couple light while the fibre is presented horizontally and flat to the device.

Why did you want to do this?

Silicon photonics is a growing area of photonics and is finding applications in markets such as telecommuncations, datacommunications, space, military and bio-photonics/medical. The current vertical fibre-alignment approaches have limitations in size and reliability. The study will explore a new method of fibre alignment which will provide benefits in size and reliability and will open up new high reliability applications.

How will you make money from it?

Once we have the space reliability data we can offer the fibre coupling approach to multiple SOI device manufacturers. We expect to generate around £250K in development revenue in the first six months after completing the project. For the space opportunity alone we would expect to fibre-align several hundred AOC devices per year, which will generate around €450,000 assembly revenue per year.

What are your next steps?

We will use this process to fibre-align an SOI-based active optical cable (AOC) for digital communications in the space market. This activity will be funded by an existing customer.

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Oxford Advanced Surfaces Ltd

Adhesion promotion for semi-crystalline thermoplastics

Oxford Advanced Surfaces Ltd specialises in unique adhesion promotion and surface functionalisation treatments to improve the bonding of coatings, inks and adhesives to engineering plastics and composite substrates where other solutions fail.

What was the aim of your project?

We set out to design a spray coat adhesion system for the next generation of thermoplastics to enable much-improved adhesion for paints, coatings or adhesives. Spray coating is a very simple technology that is easily incorporated into a manufacturing process. At present, there is no simple spray coat system that is effective across a wide range of substrates/ coatings for multiple applications.

Why did you want to do this?

The need for ever-improving fuel economy, driven by international legislation and consumers themselves, is leading to lightweighting of components where metals are replaced with plastic or composite materials. Thermoplastic composites have substantial processing advantages over the more commonly-used thermoset composites. However, as with other semi-crystalline thermoplastics, surface treatments for adhering paints, coatings or adhesives are inconsistent and expensive in terms of both labour time and money.

How will you make money from it?

We intend to make money from the commercial supply of the spray coat formulation to Tier 1 and original equipment manufacturing (OEM) in niche automotive and motorsport. We will then transfer the product to the bulk automotive, aerospace and construction markets. By controlling the supply of the material, as opposed to partnering with an established multinational, we intend to retain both intellectual property and value within the UK.

What are your next steps?

To progress the product commercially, we will supply end-users with evaluation packs to gather feedback on the product. We will undertake further development to transfer the resulting formulation to a fully automated spray manufacturing process. We will seek both industrial partners and follow-on funding to achieve this.

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Phytoceutical Ltd

Formulation and delivery approaches for water soluble biological products delivered through the skin, focusing on L-Ascorbic acid

Partner company
Xigo Nanotools Ltd

This project is a collaboration between Phytoceutical, a company with expertise in formulating skin treatments and XiGo Nanotools, who are expert in measuring and optimising nano particles.

What was the aim of your project?

We examined the feasibility of adapting a novel nanoparticle technology to deliver water-soluble bioactives, used in Phytoceuticals products. This was an attempt to generate nanoparticle formulations that stabilise these bioactives in such a way that their shelf life is extended and skin delivery could be enhanced. This reduces the dose for the same effect.

Why did you want to do this?

Phytoceutical has development expertise in the areas of natural products used as ingredients in skin treatments and XiGo Ltd helped test, measure and to stabilise such products to enable improved skin delivery. By combining these two areas of expertise we aimed to develop new formulation methods that can be used to manufacture improved skin treatment products.

How will you make money from it?

The market for downstream products is growing rapidly and this project supports our company's efforts to gain a competitive technical advantage in the market. Benefits to the UK and potential value proposition include: quality of life improvement; reduced adverse effects by optimising dose; environmental; more biodegradable formulae - economic: increase UK/global sales providing revenue and economic growth - social; increased employment in high tech high value industry.

What are your next steps?

The next steps commercially will be to carry out R&D and trial the formulation leading to a prototype product. Licensing the product to a third party is also a potential opportunity.

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Picofluidics Ltd

High deposition-rate superfill copper

Picofluidics was formed in 2009 by executives from the semiconductor equipment industry. The company develops and manufactures micro/milli-fluidic based process tools for use in the semiconductor healthcare markets.

What was the aim of your project?

Through silicon vias (TSVs) are vertical connections that enable the 3D stacking of semiconductor chips. The aim of our project is to fill advanced TSVs (10x80micron) with electrochemical-deposited copper in a fraction of the current time by using novel forms of fluid mixing.

Why did you want to do this?

The productivity of an electrochemical deposition system would be significantly improved through this type of fluid mixing technology. This would provide end-users with a cost of ownership (CoO) benefit over conventional deposition systems. As CoO is one of the critical metrics for end users when selecting production tooling this would provide a competitive advantage to the suppliers of such a system.

How will you make money from it?

To commercialise this technology for use in the rapidly expanding market of 3D packaging we would either develop our own production system or license the technology to existing equipment suppliers. The UK has a number of world class suppliers of semiconductor equipment. As these complex, high-value (more than £1m) systems are typically used in Asia and the US they would make a contribution to UK exports.

What are your next steps?

We would aim to develop a prototype electrochemical deposition module incorporating the new mixing technology that could process 'state of the art' 300mm substrates. We would use this module to demonstrate the benefits of this technique to end-users and prospective investors.

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Pre Chasm Research Ltd

MyPressureManager: mass-market smartphone tyre pressure technology, with novel active machine learning and co-operating devices for enhanced user experience

Pre Chasm Research Ltd (PCRL) is a high technology business with two core activities: generation and commercialisation of intellectual property (IP) through spin-outs or licensing, and provision of bespoke business transformation services.

What was the aim of your project?

To allow machines instead of people to make complex decisions about tyre-pressure using a smartphone.

Why did you want to do this?

We wanted to meet the changing expectations of those who expect to be able to do almost anything using their smartphones. Checking tyre pressure usually involves taking a car to the local service station, buying a handheld pressure 'gadget' (£15-£67), or connecting a dial gauge foot pump. We have developed a world-first, machine learning system.

How will you make money from it?

There are one billion insured cars (1.5bn by 2020) and more than one billion smartphones, of which more than half are in the western economies. In-car tyre pressure kits will not be mainstream for 15 years (Continental, 2013). Incorrect tyre pressure affects tyre wear and road safety and 4.4m UK cars have at least one illegally worn tyre (TyreSafe).We anticipate widespread adoption of a machine learning system at the consumer app level.

What are your next steps?

We are currently raising investment to support future R&D grants, probably applying to Smart (proof of concept). The commercialisation route will be via licensing to the tyre sector and automotive after-market suppliers.

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ProKyma Technologies Ltd

Enhancing sequencing ability to detect cancer mutations

ProKyma, established in 2006, has developed products to improve molecular tests, such as the ones used in paternity testing. We are focused on cancer, to find a change in the DNA specific to that patient to improve monitoring and treatment.

What was the aim of your project?

We investigated ways of producing a lot of antibody at low cost. One approach is to grow antibody-producing cells in culture, which is easy, but purification is complex. The other approach was to use a sheep's immune response to produce antibody. We will produce and mix a range of antibodies to see which is best for binding to white blood cells.

Why did you want to do this?

We are using state-of-the-art sequencing to find a patient-specific mutation. For this to work we have to remove the white blood cells containing normal DNA. We accomplish this by using antibodies on magnetic beads that attach to the cells and remove them from the blood sample. The antibodies are very expensive and we wanted an affordable method to produce a lot of mixed antibodies to improve white cell capture.

How will you make money from it?

In very simple terms the benefit is improved cancer survival rates. Currently 50% of people diagnosed with cancer will die within five years and most from a re-appearance of the cancer. If we can find a mutation specific to that person, we have a blood test that can spot the cancer returning. If it is killed before reforming, the patient survives. We can make money selling kits to do this.

What are your next steps?

The antibody is one element of a larger project. Cost-effective availability has limited our progress. Now we can perfect our method to capture white cells from blood and screen patients in the Liverpool Cancer Trials Unit to demonstrate the effectiveness of this approach.

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Protein Technologies Ltd

Glass transition biosensors for regenerative medicine

Partner company
Asymptote Ltd

Protein Technologies Ltd (PTL) is a protein engineering company specialising in the discovery and development of fluorescent proteins. PTL was formed in 2011 and currently employs six people. The company is developing products in time/temperature monitoring and track and trace.

What was the aim of your project?

We have developed fluorescent protein-based biosensors that can differentiate between fast freezing events (which are generally benign) and slow freezing events (which can be dangerous by virtue of the formation of large ice crystals). Our aim was to determine if these same proteins or formulations thereof could be used to determine glass transition states.

Why did you want to do this?

If a regenerative medicine product passes into a glass transition state it can cause an immune response within patients. We screened fluorescent proteins as visual indicators by combining them with human and animal stem cells which had been frozen into their glass transition states. At this time, no visual indicators of glass transition are available, meaning that clinicians have no choice but to undertake expensive testing regimes.

How will you make money from it?

Our intention is to manufacture glass transition biosensors as: colorimetric labels attached to individual stem cell vials in a fashion similar to that employed for vaccines to indicate shelf life; and microdots or microblisters, similarly attached to stem cell vials but which can be read spectroscopically. In addition to glass transition, the spectroscopically active labels can also be used for authentication and tracking and tracing.

What are your next steps?

The glass transition biosensors are part of a broader technology platform which we are developing, called Myrida. This technology renders complex, multi-step supply chains (such as international cold-chain shipments) 100% safe and impossible to breach by counterfeiters. We are currently in negotiation with licensees for the Myrida technology.

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Reliawind Ltd

Silicon carbide (SiC) bipolar junction transistor technology for high voltage DC electricity transmission for offshore renewables

Reliawind aims to commercialise electrical and electronics technologies for renewable power generation, especially those related to wind energy, that can reduce the levelised cost of energy (LCOE) and increase reliability.

What was the aim of your project?

We aim to study, assess and quantify the feasibility and economics of a newly developed SiC converter technology for high voltage DC (HVDC) electricity transmission for offshore renewables.

Why did you want to do this?

No commercial SiC inverters are available for high-power applications. Understanding and quantifying the economics and advantages of large-scale SiC based inverters for HVDC applications is important in supporting the development and exploitation of the technology and attracting investment. We addressed these needs by building and testing a 5kW SiC inverter and assessing and quantifying its performance and benefits for HVDC applications.

How will you make money from it?

Improved reliability and cost-effectiveness offered by the SiC inverter technology will reduce the cost of energy from offshore renewables. It will therefore support wider adoption of offshore power generation, which will boost the low carbon economy, reduce CO2 emission and increase energy security.

What are your next steps?

We will continue the development of SiC inverters, specifically with respect to industrialisation of the process flow and gate drive circuits. We will build and test larger scale inverters (100 kVA) to demonstrate the technology for high-power applications.

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RowAnalytics Ltd

Integrated decision support for agricultural production

RowAnalytics is a one-year-old startup developing technology used for 20 years in safety critical industries such as nuclear power plant and railway systems design. We develop innovative data analytics solutions for determining outcomes in large and complex systems.

What was the aim of your project?

We are building a demonstrator of a mobile decision support app to support crop yield improvement by integrating and exploiting environmental, plant phenotyping and omics data. This is designed to help growers optimise the combination of inputs, treatments, doses and timings to apply to specific crop strains in a specific growing environment, which is currently a massively complex challenge.

Why did you want to do this?

Sustainable intensification (improving crop yields while reducing the environmental footprint of agriculture) is fundamental to most governments' food production and security policies. UN and other studies estimate that, to satisfy a growing and more affluent world population, we will need to increase the global production of food by at least 70% by 2050, while maintaining the same level of inputs (land, water, energy, fertiliser etc.

How will you make money from it?

We focused on improving tomato yields (annual UK retail value £625m). We are working with major growers to demonstrate the value that precision agriculture decision support systems can have on crop yields. We intend to develop our applications for tablets and smartphones. If successful, we aim to generate £2.5m revenues by year three from application sales, creating at least five jobs and reducing horticultural inputs and associated energy.

What are your next steps?

We wll identify higher resolution datasets with additional information on longitudinal environmental, input and yields for different species and growers. This will give a more widely predictive model. We will undertake further testing and validation with the National Institute of Agricultural Botany (NIAB) and the UK Tomato Growers Association. We will sell to their members (including major UK growers).

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Ruskinn Technology Ltd

H-GMP - good manufacturing practice
in an hypoxic environment

The core business of Ruskinn (established 1993) is the development and manufacture of sealed hypoxic (low O_2) and anoxic (zero O_2) workstations for cell biology, stem cell and microbiology research applications. Ruskinn exports worldwide from its factory in south Wales.

What was the aim of your project?

Until now, Ruskinn has sold its products for research applications. Now a new market is emerging in cell culture manufacturing in accordance with good manufacturing practices (GMP). Our aim is to explore more advanced methods of decontamination and cross-contamination control, ultimately to enable cell culture manufacturing applications.

Why did you want to do this?

The rapidly growing regenerative medicine market is a priority for many healthcare providers worldwide. We believe there is an emerging market for hypoxic equipment in this context, to mimic In vivo conditions more accurately. To qualify for GMP, the decontamination protocols employed in the equipment must be proven to be effective in a repeatable fashion. This is one key building block towards a full GMP solution.

How will you make money from it?

We will exploit this technology through the manufacture and sale of equipment optimised for GMP applications. We will also provide service contract and technical support services as add-in to the equipment sale. Our company already provides equipment and services for the experimental market, so this is a natural progression of the business and its capabilities.

What are your next steps?

The knowledge obtained from this feasibility study will influence the specification of our next-generation product and will steer ongoing dialogue with target customers. The engineers at Ruskinn are electronics and mechanical engineers. This study helps them to learn the issues confronting biologists and GMP manufacturers.

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Ruskinn Technology Ltd

ROSBA - robust oxygen sensing for biology applications

The core business of Ruskinn (established 1993) is the development and manufacture of sealed hypoxic (low O_2) and anoxic (zero O_2) workstations for cell biology, stem cell and microbiology research applications. Ruskinn exports worldwide from its factory in south Wales.

What was the aim of your project?

Our aim was to evaluate alternatives to oxygen sensors and humidity removal. The state of the art sensors employ electro-chemical effects and hence are subject to wear-out. There are now alternatives which either don't wear out or have improved durability.

Why did you want to do this?

The wearing-out of oxygen sensors affects their calibration state over time, requiring customer intervention to maintain calibration in Ruskinn's Hypoxic Workstation. The sensor also needs frequent replacement. A new sensor technology, needing less frequent intervention, should improve the customer experience. Also, less frequent sensor replacements will cut the cost of regular service to the workstation.

How will you make money from it?

We will profit from this innovation by providing an improved customer experience. A product that requires less service intervention and less frequent calibration will be better received by customers, and will improve the reputation of our product within the marketplace. Improved sales will create more employment at our factory in south Wales.

What are your next steps?

We will employ the knowledge gained from this project to improve our current product line and to influence future products. We have identified several alternative sensors with improved specifications and performance. Our project team has learned some new considerations for measuring oxygen in the presence of high humidity.

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Science Practice

Sequence Bundles: prototyping a novel data visualisation tool for bioinformatics

Science Practice is a research and design company in London. We specialise in work that bridges the gap between scientific and cultural systems. Our work focuses on biosciences, bioinformatics, design of challenge prizes and design for medical interventions.

What was the aim of your project?

Sequence Bundles is a novel method for multiple sequence alignment visualisation. So far, we have only developed its static version. Our project focuses on developing an interactive software tool that will use the Sequence Bundles method, enable advanced graphics rendering of high-throughput data and perform well in browsers. The project will result in building and testing a prototype software tool.

Why did you want to do this?

Modern biosciences depend on the ability to make sense of big data, yet, existing tools for analysis and exploration of big data are still scarce or unsatisfactory. Sequence Bundles can fill this gap. Our method allows researchers to gain additional insight into high-throughput biological data by exposing motifs and anomalies that would otherwise remain hidden, thereby assisting in verification of alignments and generation of ad hoc hypotheses.

How will you make money from it?

Sequence Bundles exists in a challenging business area, as most bioinformatics tools are open-source and developed by their users. This makes it difficult to make money from bioinformatics software. Our project is intended to be open-source, which enables it to gain a wide user base. By creating a popular and valued tool for the bioinformatics community we hope to earn expertise and form partnerships that can take us into profitable consultancy.

What are your next steps?

We are using the Sequence Bundles software prototype to gain additional insight into how it can enhance bioinformatics workflow and bring benefit to genomic/proteomic research. With the browse-friendly prototype we plan to trial various methods for offering Sequence Bundles visualisation tool to its prospective users online.

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Seacoustics Ltd

Constructing control of substances hazardous to health (COSHH) compliant sensors. Building sensors with lead-free materials

Seacoustics Ltd has been established for over 25 years and our business normally comprises the development and manufacture of commercial and military electronics, electroacoustic and sonar systems, and components including hydrophones for UK submarines.

What was the aim of your project?

We set out to examine the feasibility of substituting eco-friendly materials for the lead-containing piezoelectric compounds used in many types of sensors. We will evaluate the performance of suitable alternatives, and then build and test a prototype sensor, aimed at an industrial application.

Why did you want to do this?

Many sensor types constructed from lead zirconate titanate piezoelectric ceramics contain 60% lead. This can be damaging to the workforce and the environment. Over several decades, there have been enormous efforts world-wide to provide lead-free alternatives. Our study has developed one type of sensor using UK-manufactured, lead-free material. The innovation involves adapting the design requirements to permit the use of lead-free materials.

How will you make money from it?

We plan designs of-COSHH compliant sensors, to replace current lead-containing sensors. Once established, this will offer reduced damage to the environment and removal of health hazards to the workforce. The success of this study has provided an example to customers and collaborators of what can be achieved with eco-friendly materials, and places the UK in a stronger position should the use of lead in piezoelectric materials be banned.

What are your next steps?

This will include a market appraisal to evaluate the level of interest from potential customers, and securing European sources of supply of suitable eco-friendly materials. This will include web advertising of the lead-free products, and obtaining materials on a commercial basis.

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Sedgetech

Manufacturing graphite for high-tech industries

Sedgetech is a micro-SME established with the aim of manufacturing high-purity, large flake size graphite for a wide range of industries.

What was the aim of your project?

We are manufacturing a high purity graphite, from a waste material. Our aim is to take previous laboratory results and apply these at a pilot scale, producing large samples for customer appraisal. We also want to improve the manufacturing process. We will work with customers to show how using our materials may benefit their products, while reducing their current costs. A UK source of graphite will also reduce the quantity of imported material and improve security of supply.

Why did you want to do this?

We have identified an opportunity to apply technology for recovering graphite from waste materials. Through this process we can obtain a material that has superior physical properties to the graphite that is currently available. Our material has a larger flake size, giving better thermal and electrical conductivity in final product applications. As the market for graphite in high tech applications is expending, this represents a good business opportunity.

How will you make money from it?

The material we can manufacture is superior to products and minerals that are currently available. We also intend to develop close links with customers so that we may be responsive to their needs. Our process undercuts current prices in this fast expanding market. Once we have optimized the production process in the UK, we will aim to expand through partnering with an international materials processing company.

What are your next steps?

We will link with more customers and continue test work with current contacts - providing them with larger batches of material to demonstrate compatibility as a raw material for their operations. We also aim to expand production.

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Snap Out Ltd

Automated user interface augmentation for multidisciplinary participation in software development projects

Snap Out Ltd is a technology start-up that focuses on the development of new products that aggregate, analyse, visualise and learn from data. That enables customers to deliver services with higher quality and efficiency.

What was the aim of your project?

Our aim was to design, create and evaluate a software prototype to enable effective communication between project team members for software development projects. Our user-friendly tool seamlessly augments a user interface across platforms and devices to enable simple feedback and interaction. The results demonstrated a major step towards advancing software project communication, in particular for feedback and testing purposes.

Why did you want to do this?

Communication is key for successful software development projects. Our technology will improve the feedback generation process by enabling simple interaction and empowerment of non-technical team members. It will lead to an improvement in software deliverables, saving time and money for the industry. Lowering the barriers to contribution and simplifying software project communication will enable stakeholders from important related disciplines to contribute. It will therefore enhance creativity and reduce communication overheads.

How will you make money from it?

We have demonstrated an attractive value proposition that reduces time requirements and improves the efficiency of software product teams. There is a clear return on investment for users of the technology. Having proven the feasibility of the technology, we will seek further investment to continue research and development, leading to the release of the first version of the product. The product will be sold to a large worldwide market.

What are your next steps?

We are seeking further investment to continue research and development, leading ultimately to the first release of the product. We are actively looking for a collaboration with existing vendors in the sector, with current focus on software testing companies.

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SoilEssentials

AGRI-AP: applied graphics and rendering innovation for agricultural precision

SoilEssentials has served the precision agriculture community in the UK since 2000 as a distributor for agriculture technology. SoilEssentials provides in-house developed solutions for precision agriculture uses, including mapping services. The company has 16 staff.

What was the aim of your project?

Our aim was to use virtual texturing to provide a simple user interface, enabling in-field 3D crop scouting. This would aid early decision-making by agronomists and growers, to improve crop profitability.

Why did you want to do this?

There is an emerging opportunity in the precision agriculture sector for new ICT approaches to handle the exponentially increasing volume of data available to growers/agronomists (such as, soil fertility, crop yield and weather data). The volume of data can only expand, with the advent of low-cost multispectral satellite and unmanned aerial vehicles imagery.

How will you make money from it?

The global market for agricultural data is projected to reach $20bn by 2020, driven by productivity pressures on farmers. In arable crops, precision agriculture can save up to £19 per hectare (Ha) by reducing inputs and increasing yield profits by £22 per Ha. There is a clear need for optimal input scheduling and mobile software is one of the lowest cost ways to achieve this. We will generate revenue through service subscriptions.

What are your next steps?

We will use the demonstration version of the developed mobile application as the basis for a commercial product.

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Things3D

Anti-counterfeiting 3D printed products using covert and overt 3D printed authentication tags

Things3D is a company aiming to become the de facto enabler of smart 3D printed products, including its T3DSECURE® and OWNERCHIP® Digital Rights Management (DRM) platform, which connects brand owners with 3D printing bureaus.

What was the aim of your project?

To allow machines rather than people to make complex decisions about authenticity of 3D printed objects.

Why did you want to do this?

Traditional anti-counterfeiting involves which is difficult to replicate. This is simple when products are made in factories under common control. However, with advances in 3D printing, the future may see intellectual property (IP) rights owners license to a distributed network the right to create a number of a particular product from an adapted 3D print media file, embedding unique IP rights tags during printing. The challenge is how to integrate appropriate covert/overt tags.

How will you make money from it?

To reinforce the market potential, the threat of counterfeiting is estimated to be a US$1.7tr threat to economy by 2015, a threat amplified by 3D printing. Our system offers an opportunity for widespread adoption of a machine system at the consumer app level, commercialised via Things3D's commercial offerings.

What are your next steps?

Our next steps are development of confidential arrangements with major brands and IP rights owners, targeting a character merchandising market worth US$250bn. Meanwhile, we will seek Smart grant funding to progress our R&D activity, and/or Horizon 2020 grants.

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Things3D

Anti-counterfeiting 3D printed products – machine-based authentication smartphone app

Things3D aims to be the enabler of choice for "smart" 3D printed products, including its T3DSECURE® and OWNERCHIP® Digital Rights Management (DRM) platform, which connects brand owners with 3D printing bureaus.

What was the aim of your project?

To allow machines rather than people to make complex decisions about authenticity of 3D printed objects.

Why did you want to do this?

Traditional anti-counterfeiting involves labelling which is difficult to replicate. This is simple when products are made in factories under common control. However, with advances in 3D printing, the future may see intellectual property (IP) rights owners license a distributed network the right to create a number of a particular product from an adapted 3D print media file. In doing so, it will embed unique IP rights tags. This requires an authentication app.

How will you make money from it?

To reinforce the market potential, the threat of counterfeiting is estimated to be a $1.7tr by 2015, a threat amplified by 3D printing. Our system offers an opportunity for widespread adoption of a machine system at the consumer app level, commercialised via Things3D's commercial offerings.

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UXLabs

A visual framework for search query formulation

Partner company
Flax

UXLabs provides research, design and analytics services to help organisations and individuals create more effective, engaging and productive user experiences. We lead a consortium that has extensive experience in scientific research and in building complex search applications.

What was the aim of your project?

We wanted to create a radical alternative to traditional search query formulation. We are developing a novel, visual framework which allows users to express themselves in a manner that is simple and intuitive and directly leverages the interaction patterns of consumer touchscreen devices. It also enables a user to express complex search queries via a simple but powerful visual syntax.

Why did you want to do this?

Information professionals and researchers often rely on Boolean search queries to express complex information needs. Yet they, and most non-professionals, find the formulation and manipulation of such queries cumbersome and inefficient. Given the nature of this problem and the increasing importance of search as a fundamental enabler for effective data exploration, there has to be a better way.

How will you make money from it?

Our approach could profoundly change the way in which complex information needs are expressed and offers significant potential to a wide variety of industries and market sectors. These include not only traditional information professions such as librarians, researchers and legal professionals, but also emerging sectors such as media monitoring, online recruitment and business intelligence.
We are protecting our intellectual property (IP) and exploring a variety of commercialisation options.

What are your next steps?

We have built a proof of concept of the visual framework and are seeking investment to turn this into a full-scale demonstrator that works across multiple platforms (desktop/tablet/mobile). We will also talk to potential exploitation partners and undertake market research to define the minimum viable product.

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Ventech Systems

A network of accelerometers for remote monitoring

Ventech Systems provides advanced condition monitoring systems and services for the renewables industry. Our primary offering is based on our unique data analysis technology, derived in part from extensive experience of developing condition monitoring solutions for the aerospace sector.

What was the aim of your project?

Our aim was to create a very low-cost network of highly capable vibration sensors. Such a network would consist of a number of sensor nodes on a single bus, capable of transmitting data either simultaneously or individually. The demonstration network has a wired connection, but could be implemented wirelessly if required.

Why did you want to do this?

Although piezoelectric sensors are the standard choice for most industrial vibration measurement tasks, there are a number of applications where a network of the type we are demonstrating would provide a substantially better solution. This could be in cost or performance, or both. Examples would include remote monitoring applications where relatively large numbers of measurements are required, or where the measurements are highly physically dispersed.

How will you make money from it?

The most immediate revenue generation opportunities lie in integrating this type of solution into Ventech Systems core products. This would give us a very clear advantage in the market, boosting sales and growth. However, we can see there are a range of applications outside this area which offer further commercial opportunities. This could be in other condition monitoring problems, for example, or in asset protection or boundary monitoring applications.

What are your next steps?

Our immediate step is to develop the packaging solution, which will be critical to realising the full cost advantage of the technology. The solution would then be integrated into our existing products. We would also seek to partner with organisations directly involved in the wider application areas.

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VIVA Bioscience

Novel cell-based assays for drug screening and toxicity testing

VIVA Bioscience is a specialist developer of cutting-edge research tools for the study of protein degradation-related cellular processes. Our products are used by scientists engaged in biochemical, cell biology and clinical research, drug discovery and development of diagnostics.

What was the aim of your project?

Our project aimed to develop novel fluorescent probes and cell-based assays targeting the cellular mitochondrial quality control system (MQCS), a biomarker for cell health, through the application of small molecule dye technology. Such tools have potential utility in the development of drug screening assays and in drug toxicity testing, both integral parts of the drug discovery process.

Why did you want to do this?

The in vitro toxicology market is driven by the need to reduce animal testing and to achieve faster, cheaper, more predictive methods of identifying toxicity earlier in the drug discovery process. The cell-based drug screening market requires phenotypic assays to better understand the impact of a drug in selectivity testing. Availability of MQCS targeting probes has the potential to address both these unmet needs enhancing the efficient development of novel therapeutics.

How will you make money from it?

Commercialisation will comprise two key elements. We will launch probes and assay kits as stand-alone products for laboratory research into the MQCS and its role. We will also test probes in platform technology applications to investigate the MQCS as a potential biomarker for cell health, leading to the development and market launch of in vitro toxicology and phenotypic drug screening assays.

What are your next steps?

We will validate the assays for use in quantitative applications such as flow cytometry, followed by translation into assay kit format prior to commercial launch as research products. We will also seek commercial partners for the development of the technology as biomarker analysis and drug screening assays through platform application testing.

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Wide IO Consulting Ltd

DARWIN

WIDE IO consulting was created in January 2013 as a subsidiary of WIDE IO Ltd. It helps businesses to connect, using the algoBox platform and has strong expertise in trusted data, natural language processing and video analytics.

What was the aim of your project?

With DARWIN, we wanted to work on the creation of a next-generation framework that allows to us build powerful web applications for the analysis of graphs and data in the browser. We have a strong focus on efficiency, minimising risk, and offering a good user experience.

Why did you want to do this?

We noticed the lack of a modern, browser-based framework for graphs of data although customers would be interested in such a service. Having worked with existing technologies and seen the evolution of browser technologies, there was a real opportunity to make things better. We realised it could be a game-changer for many applications in a world of big data.

How will you make money from it?

DARWIN allows us be more efficient and increase our revenues. But we are also thinking about other applications. DARWIN has been implemented as a P2P web framework for graph data. It allows citizens to own their data and to feel safe about it; it scales well and has potential to be really fast. As a potential paradigm shift, it represents business opportunities in hosting and identity management.

What are your next steps?

DARWIN is an open-source project, bringing a revolutionary way of conceiving all type of web applications based on P2P web (search engines, file transfer, social networks). Our next step will be to establish strategic partnerships to ensure the sustainability and growth of the framework.

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Yomp

Using travel data to support efficient infrastructure planning by local authorities

Yomp (previously PleaseCycle) gets employees heathier and more engaged by using gaming technology.

What was the aim of your project?

We have aggregated multiple global positioning satelite (GPS) data and inferred traffic flow from ours and other apps to produce an innovative visualisation for the non-expert user in our existing local authority client base.

Why did you want to do this?

Current infrastructure investment is based on scant and anecdotal traffic flow information. The Department for Transport (DfT) and local authorities use primitive methods of estimating traffic flow, such as manual counts, traffic flow loops and surveys. These methods are time-intensive, expensive and only provide a point-in time measurement. Our solution will vastly improve this with contemporary and innovative user-driven data visualisation.

How will you make money from it?

Our revenue will come from local authorities buying the data. This will enable them to invest in infrastructure in a more informed manner, relying on accurate and rich data presented through modern technology – user-driven data visualisation as opposed to traditional anecdotal and scant survey data. This will result in better-informed infrastructure planning, reducing congestion, improving air quality and reducing cycling fatalities.

What are your next steps?

We need to focus on marketing and building a salesforce to commercialise this opportunity effectively. We will need to continuously develop the business, reinvesting in R&D to stay ahead of competitors. We will also explore opportunities overseas.

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Zagres Ltd

High-efficiency technology for use in high-volume consumer electronics

Zagres, spun out from Cambridge University, aims to commercialise materials, electronics and electrical technologies for renewable energy and high efficiency applications. These have been developed over more than ten years of research at the university.

What was the aim of your project?

We set out to study, assess and quantify the economics, practicality and market potential of a sintered, nanocrystal, perovskite technology for high-volume consumer electronics applications. The aim is for a high-efficiency, low-cost solution.

Why did you want to do this?

Perovskite cells promise a variety of applications, including consumer electronics. However, the economics of the new technology, regarding materials and fabrication costs and efficiency, must be quantified and assessed for specific applications against competitors. In addition, we had to examine the size, dynamics and trends of the target markets to strengthen the business case and attract investment.

How will you make money from it?

Our potential customers/licensees will be major global players in the third-generation solar cell market. Our market strategy is to engage with global manufacturers to develop bespoke perovskite modules and demonstrate the performance and benefits on real sizes and for commercial applications.

What are your next steps?

We will continue the research and development of the technology, specifically at larger size modules, with aim to reduce fabrication costs and increase stability. We expect to work with the research group at Cambridge University during follow-on development.

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Zagres Ltd

A new low-cost gallium nitride (GaN) microinverter for domestic solar photovoltaic applications

Zagres, spun out from Cambridge University, aims to commercialise materials, electronics and electrical technologies. These have been developed over more than 10 years of research at the university for renewable energy and high efficiency applications.

What was the aim of your project?

Our project studies, assesses and quantifies the technical and commercial feasibility of a laboratory-proven gallium nitride (GaN) metal-oxide semiconductor field effect transistor (MOSFET) technology for solar micro-inverters. The new design enables reduction in the fabrication cost of GaN MOSFET and increases device reliability, contributing to lower energy costs for domestic solar applications.

Why did you want to do this?

In order to exploit the new GaN MOSFET technology, once proven on the device level in laboratory, it must be demonstrated in a micro-inverter and its performance and the benefits quantified at the system level and under real operating conditions. In addition, the benefits of GaN MOSFETs for solar micro-inverters must be quantified with regard to cost, efficiency and reliability. Our project aims to address these needs.

How will you make money from it?

Based on the test results from the prototype GaN microinverter, we will approach major solar inverter suppliers to discuss licensing opportunities and secure orders for prototype inverters that match customers' specifications and requirements. We may need to optimise performance and reduce costs reduction to be competitive with existing Si-based products.

What are your next steps?

High-level discussions with major players have confirmed that a proof-of-principle prototype will allow us to exploit the technology through strategic partnerships with commercial partners. The findings from this project, specifically the testing of a 200W micro-inverter, provided sufficient evidence for us to establish active negotiations with investors.

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