

Innovate UK

Results of Competition: January 2018 Sector Competition: Strand 1, Health and Life Sciences
Competition Code: 1801_EE_HLS_R4

Total available funding is £9,518,871

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

Participant organisation names	Project title	Proposed project costs	Proposed project grant
SPG INNOVATION LIMITED	SmartSalt - salt reduction in food	£69,925	£48,948
University of Nottingham		£29,930	£29,930
Project description - provided by applicants			
SPG Innovation and the University of Nottingham seek to develop and demonstrate the commercial viability of a novel salt reduction ingredient which will maintain the saltiness perception for consumers whilst reducing the overall content of sodium in food product.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
PBS INTERNATIONAL LTD	Tents for Pollination Control - Innovation to Improve Crop Breeding	£86,880	£60,816

Project description - provided by applicants

Innovation in agricultural practices is the basis of human civilisation as we know it. Plant breeding is one of the keystones of agricultural improvement; helping to provide more nutritious, disease resistant and high yielding crop varieties, capable of withstanding adverse climatic conditions, whilst minimising the ecological damage caused by intensive agriculture. Many technologies have been investigated to speed up the breeding process; including various genetic technologies (e.g. genetic modification, marker assisted selection or CRISPR/Cas9). This project aims to expand the capacity of breeders to scale up new varieties without introducing contamination by foreign pollen, by creating an advanced wind pollination (anemophilous) control tent (PCT) using specialised non-woven fabrics. Such a product will provide an affordable, flexible and user-friendly alternative to previous approaches (such as polytunnels, crop spacing techniques or emasculation). As the world's first dedicated anemophilous PCT, an innovative tent design is required to accommodate PBS' novel pollen proof materials that are scaled to a variety of sizes to control pollen flow for different crop varieties and growing conditions. Expertise in design of polytunnels and canvas structures will be deployed to avoid weaknesses that occur as the size of the tents increases, saving time and resources. Once developed, the PCT will be tested for applicability with customers. Plant breeding in the UK is a £230m industry, with the impact of improved varieties being much greater. A British Society of Plant Breeders study, estimated a ROI of £40 for the production, processing and consumption of UK produced cereal-based products to every £1 spent on breeding -- for instance the gross value of yield increase in wheat alone, attributable to plant breeders is £373-445m p.a. In addition, improved varieties offer environmental benefits such as reduced Nitrogen run-off (estimated 50% weed sward uses 17% of Nitrogen applied vs 100% for newly replanted ryegrass). In addition to allowing the benefits of improved varieties to be felt more rapidly and more fully by UK agriculture, this project also extends the UK's reputation for agricultural technology innovation, and will increase global exports, essential to the post-Brexit economy.

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REVIVOCELL LIMITED	"CELLBLOKS" - A novel 3-D liver model platform to predict human drug-induced liver injury (DILI)	£99,605	£69,724

Project description - provided by applicants

Drug-induced liver injury (DILI) is one of the leading cause of drug failure during development as well as number one cause of post-market drug withdrawal. There is a need for a more predictive tools to assess liver toxicity risks early in drug discovery. Human cell based laboratory models for safety screening are increasingly being developed as alternative methods to animal testing. Cell culture involves the growth of living cells in laboratory conditions without using animals in order to gain better understanding of body function, disease or to develop new drugs. Conventionally, cells are grown in 2-D glass or plastic surfaces such as Petri-dishes and plates. Researchers across many sectors, including pharmaceutical industry, research organisations and universities apply conventional cell culture for the growth and testing of mammalian cells. Cell culture has played a vital role in many life science discoveries such as the development of new drugs or vaccines. However, the results often lack efficiency as cell growth is constrained within the available 2-D surface when compared to true three-dimensional (3-D) environments of living tissue. ReVivoCell Ltd is developing a novel cell culture platform, that can better simulate the function of the liver in an _in-vitro_ setting. Existing 3-D cell culture technologies lack liver specific functionality, are expensive, difficult to use and are not easily adaptable for different experiments and cell types. This technology would potentially increase the success rate of developing new treatments and reduce the reliance on animal testing. The objective of this project is to assess the feasibility of a newly developed 3-D cell culture platform to mimic liver-specific microenvironment. ReVivoCell's invention will provide a reliable, fast and cost effective device that could be used worldwide.

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BIOVORN LIMITED	SPX - Novel Mastitis Treatment	£99,955	£69,969
Project description - provided by applicants			
Biovorn Ltd, an innovative UK biotechnology company, is developing a novel anti-microbial ("SPX") to treat mastitis in livestock, helping farmers to improve productivity and livestock welfare whilst reducing the need for antibiotics and negative side-effects associated with current treatments. The proposed project will allow Biovorn to further investigate the effectiveness of SPX and to evaluate potential commercialisation options.			

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UBIQUTEK LTD.	Battery powered electrical weed control as alternative to chemical herbicide	£70,677	£49,474
Project description - provided by applicants			
The need for weed control for food is growing as the world's population increases. This market is currently dominated by herbicide manufacturers. However, that industry is under significant pressure for two keys reasons. The first is that weeds are increasingly becoming naturally resistant to herbicides. The second is that regulators have recognised this challenge, and couple with health and environmental concerns, have started to restrict or ban their use. Using electricity to kill weeds addresses the fundamental shortcomings of chemical herbicides and other thermal or mechanical alternative methods. This project will see if it is feasibility to run electrical weed killing technology from a battery. Achieving this will allow the technology to be used in any current and future weeding platform, allowing it to become a viable, scalable and organic alternative to chemical herbicides.			

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TROPIC BIOSCIENCES UK LIMITED	GEiGS (Genome Editing induced Gene Silencing)	£99,984	£69,989
Project description - provided by applicants			
GMO crops incorporate foreign DNA into the genome to create specific improvements such as yield increases or disease tolerance. However, this methodology requires extensive development processes, strict regulatory approval pathways and encounters strong public stigmatization. There is a new method for crop protection which utilizes RNA interference (RNAi), which promises to allow us to address some of agriculture's greatest priority challenges (including root knot nematodes \[\$10'sBn damage annually\], _Potato leafroll polerovirus_ \[\$100'sM damage annually\]) and increase food security on a global scale. However, there is a significant technological barrier which is preventing RNAi being used in most crops in a non-GMO manner. We are developing a unique and highly innovative approach to enable RNAi mediated disease protection to be imbued to all agricultural crops in a non transgenic manner.			

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COBRA BIOLOGICS LIMITED	Feasibility of single use systems for flexible pDNA manufacture and improved service offering	£99,749	£59,849
Project description - provided by applicants			
Cell and gene therapy products are changing the lives of patients receiving treatment as part of clinical trials. Plasmid DNA represents a critical material required to enable the development and production of viral vectors to support both clinical trials and in-market supply for these innovative Gene Therapy products in order to treat patients. This project, lead by Cobra Biologics, aims to perform small scale feasibility studies utilising state of the art single-use technology and 3D printing to deliver critical process information required to progress towards large scale plasmid DNA manufacturing in the UK. The project will support a larger investment by Cobra Biologics to enhance production capability, enabling retention of UK business and developing opportunities to move into new markets for clinical and commercial manufacture. Delivery of an enhanced manufacturing service offering will support existing and new customers' clinical and commercial ambitions, leading to more innovative Gene Therapy medicines reaching patients.			

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ANTIVERSE LTD	Computational Antibody Design with Machine Learning	£99,643	£69,750

Project description - provided by applicants

Due to their high specificity and low toxicity, antibodies are attractive candidates for improved, more efficient, easier to deliver, and safer therapeutics. In 2016, 5/10 best-selling drugs worldwide were antibodies, including the record-breaking Humira which took £12bn in sales, the highest ever for any pharmaceutical. The global antibody therapeutics market is expected to continue to grow at a remarkable pace, reaching £88bn by 2020, driven by the high incidence of chronic diseases which urgently require more effective treatments. High R&D costs and strict regulatory measures may however remain the longstanding challenges for pharmaceutical companies, hampering market growth. Antibody discovery is the process of discovering an antibody to bind to a particular antigen. Existing methods are through immunisation of animals (rabbits, mice), or by screening a large antibody library. While these physical platforms are usually able to discover binding antibodies, they require targets that are well-formed and available purified in sufficient quantities. Even then, the process is time consuming and expensive, and existing techniques suffer from throughput, scalability, repeatability and quality issues. Antiverse is building a world-first computational antibody discovery platform combining state-of-the-art machine learning techniques to predict antibodies that bind to a given antigen target with high affinity. The company has a vision to overturn the £3.5bn antibody drug discovery market, replacing existing antibody discovery techniques with a novel solution to design antibody drugs *in silico*, whilst massively reducing the cost (up to £300K/candidate) and time to discover new candidates, from 3 to 18 months down to just one day. Antiverse is well placed to exploit this opportunity, having already established a basic model with an initial dataset containing public data to prove technical feasibility. The company has secured laboratory space for generating a proprietary dataset at scale to develop the model and has good industry links and connections with major biopharmaceutical companies and contract research organisations (CROs) that have already expressed a keen interest in trialling the solution once developed. This project will enable Antiverse to develop the machine learning algorithm and a large proprietary dataset with at least 10,000 data points required to prove the generative model, facilitating the subsequent development of a platform that can be trialled with industry partners to accelerate the service offering towards commercialisation by mid-2020, helping to establish this UK SME at the forefront of the antibody drug discovery market poised for significant growth.

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CLEVER SWEETS LIMITED	Cle-VER-CANDY: Development of a range of Clean Label, Vitamin-Enhanced-Recipe Candies	£99,241	£69,469

Project description - provided by applicants

We all know that the human body need minimum levels of vitamins and minerals to function effectively, and that most of these are present in the required levels in a balanced diet. In a perfect world, we would all consume these in a balanced diet, but we know that very few of us achieve this. A healthy individual can manufacture Vitamin D in their skin under the action of sunlight. Whole foods obviously contain vitamins in their natural forms but over the past 100 years, science has progressively found ways to synthesise the vitamins that our bodies need, and it is generally these forms that are added to processed foods. Whilst at first glance these artificial forms are identical to the natural forms (in that their chemical structures are the same) there is increasing awareness that these synthetic forms are not made available for absorption by the body in the same way as the natural compounds, and that therefore their full value is not being realised. We have been producing our Cleverpops confectionary since 2013\. Cleverpops contain only five ingredients (all natural). Sugar is replaced by Isomalt which provides a level of sweetness, that in combination with our natural flavours, gives them the taste that children and adults alike love, but without the harmful effects of sugar. Cleverpops contain Vitamin C (in synthetic form), but there are a number of additional vitamins that we would like to include in our candies. However, we don't want to add synthetic forms of the vitamins -- we want to build our reputation as a supplier of purely natural confectionery products. The Cle-VER-CANDY project will develop recipe formulations for a range of tasty, all natural, vitamin fortified hard confectionery products suitable children and adults alike.

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ACCUNEA LTD.	Real time continuous point of care monitoring of human kidney function	£71,011	£49,708
Imperial College London		£28,968	£28,968

Project description - provided by applicants

Across the world today, one fifth of all hospital patients will suffer a kidney injury, and one quarter of these patients will die from this. In the UK alone kidney injury is responsible for an excess of 40,000 deaths per year, and £1bn of NHS spending. We can change this. We have invented a portable bedside chemical analysis device which continuously monitors a patient's blood for indications of kidney damage using just a standard drip line placed into a vein. From these chemical traces we can use artificial intelligence software to detect and predict any changes in a patient's kidney function earlier than ever before, and automatically warn doctors of any problems. But our system isn't only useful on critical care units. Because of its small size and simplicity it can be applied to any hospital patient who doctors think needs closer monitoring than is currently possibly with ordinary blood tests. We are confident that our device will be particularly useful in kidney transplantation, and have interviewed outpatients at Europe's largest hospital to ask their opinions too. Our device can be used to check the quality of a transplant kidney before it gets transplanted, so that surgeons know they are giving their patients the best possible chance at a new lease of life. And then when the same patient comes out of transplant surgery, our device will be right by their bedside to give continuous readings from the new kidney and detect any worrying signals early enough to make a difference. By monitoring kidney function in real-time, we can guide clinicians to make earlier decisions about implementing therapies for their patients, and to help develop new ones. We believe this approach has the chance of saving thousands of lives, and hundreds of millions of pounds in NHS spending each year.

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SECURE HARVESTS LIMITED	Homegrown protein: Trialling lupins for a UK breeding programme	£50,298	£35,209

Project description - provided by applicants

This innovative project will provide the critical first step in a project that will provide UK farmers with a much-needed profitable break crop alternative to OSR and help to reduce dependence on imported soya. Arable farmers urgently need technology that reduces inputs, reduces disease and enables a better profit. As a nitrogen-fixing break crop with excellent protein content, lupins could enhance agriculture at a global scale. However, as a relatively newly domesticated species, an intensive breeding programme is needed to optimise varieties for a range of environments. This project will assess white lupins (*L. albus*) in the UK to identify genetic material with traits useful for a subsequent breeding programme focused on developing varieties better suited to UK and temperate conditions. The core innovation comes from previous work on genetic analysis of *L. albus* that will enable introduction of novel germplasm and rapid recovery of the elite germplasm traits, most notably low alkaloid content. Wild lupins have high alkaloid content making them bitter and unpalatable. Current breeding programmes of *L. albus* have been limited to a relatively narrow range of germplasm, all descended from a single source, in order to maintain low-alkaloids in the crop. As a result, much of the diversity of the domesticated portion of the species, and the potentially useful traits contained within, has been under-utilised. Now, with our unique knowledge of *L. albus* genetics, this diversity can be integrated into a marker assisted breeding programme focused on improving lupins for UK and temperate agriculture. This project will conduct the initial field trials of a wide range of *L. albus* material to assess and identify the most useful lines for the subsequent breeding programme. The early stage project will enhance the knowhow of Secure Harvests Ltd. (the applicant company, a UK SME), leveraging private investment in a large scale breeding programme. As such benefits to both SHL and the UK economy are expected, making this project excellent value for money for both the company and the public purse.

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CAMBRIDGE INNOVATION TECHNOLOGIES CONSULTING LIMITED	humaNase	£99,550	£69,685

Project description - provided by applicants

Cancer cells undergo complex metabolic changes and require the amino acid L-asparagine (ASN) to grow. Starving cancers by depriving them of ASN is a powerful anticancer strategy, notably in the treatment of Acute Lymphoblastic Leukaemia (ALL). ALL is the most common cancer in children, however adults with the disease have a particularly poor survival outlook and represent a disproportionately high public health burden. A cornerstone therapy in the treatment of ASN-avid cancers like ALL is the enzyme L-asparaginase (ASNase), which converts ASN into aspartate which the cancer cells cannot use, thus starving them. Current ASNase drugs use enzymes derived from bacteria, which can invoke allergic reactions in patients, and they do not last very long in the bloodstream, increasing the frequency of treatments. Newer versions of the drug are modified to improve on these issues, but they still suffer from liver toxicity arising from side-effects relating to the glutaminase (GLS; metabolism of glutamine) activity of the ASNase. As a result, there is a significant proportion of patients who have very low tolerability for ASNase treatment and therefore an unmet clinical need for a fully human-compatible ASNase with minimal side-effects. The ****humaNase**** project aims to address these needs by characterising a safer, human-derived ASNase alternative. We recently discovered a type of GLS-free ASNase called human Asparaginase-like protein 1 (hASRGL1) in vesicles secreted by human stem cells; our goal is to compare and contrast the efficacy of this enzyme to currently employed _bacterial_ ASNases, with an eye towards the eventual adoption of hASRGL1 as a more tolerable chemotherapeutic. Towards that end, we aim to perform a series of assays to quantify the activity, stability, safety, and cancer cell-killing ability of the human-derived enzyme. This preliminary characterisation of the therapeutically-relevant properties of hASRGL1, using current bacterial ASNases as a benchmark, is a fundamental first step in establishing the feasibility of employing the enzyme as a potentially safer and more tolerable alternative to current ALL treatments. Moreover, the results of the project are intended to drive the development of a more elaborate drug-delivery platform, based on the hASRGL1 enzyme, for broader and more efficacious chemotherapeutic applications.

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METRION PHARMA LTD	Development of a novel human primary T-cell assay for translation of preclinical discovery to patients with autoimmune diseases	£99,985	£69,990

Project description - provided by applicants

Metrion Biosciences recently (January 2018) established a specialist ion channel drug discovery subsidiary, Metrion Pharma Ltd (Metrion). The Company is wholly owned by Metrion Biosciences. Ion channels are proteins located in cell membranes that are responsible for controlling nerve impulses, muscle contractions, beating of the heart, function of the senses and the physiological activity of many other cells and tissues. Based at Granta Park, Cambridge, Metrion Pharma has a expert understanding of the function of ion channels in health and disease and a unique skillset to design and develop medicines against these proteins. Metrion Biosciences identified small molecule inhibitors of potassium channels involved in auto-immune conditions such as psoriasis, multiple sclerosis and atopic dermatitis, and this portfolio has been licensed to Metrion Pharma (Metrion). This grant will enable Metrion to create a unique human T-cell model of autoimmune diseases to improve the likelihood of success in clinical trials and to decrease attrition in the drug development process. If successful, this grant funded project will enable Metrion to pioneer the development of medicines that have been tested in human cells, thereby reducing attrition of the drug development process. This project will form the foundation for Metrion to build its drug discovery pipeline. Metrion's management team and advisors have extensive experience in ion channel research, autoimmune drug discovery and medicinal chemistry, and have a successful track record in delivering new drug molecules to the clinic. Through this grant Metrion will exploit its drug discovery expertise to create new assays to reduce risk in the development process. Testing of Metrion's lead potassium channel molecules will support the generation of orally active disease modifying agents for the treatment of autoimmune diseases, with a particular focus on unmet medical needs in multiple sclerosis, psoriasis, and atopic dermatitis.

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BLUE SKY BIO LTD	A novel AD fermenter to increase energy output by 20% and improve throughput by 3x to improve AD profitability and productivity	£99,531	£69,672

Project description - provided by applicants

Anaerobic digestion (AD) is a well-established, renewable energy solution that plays a role in the supply and security of the UK's energy -- generating biogas fuel (methane & carbon dioxide) from organic waste (agricultural waste, food waste, wastewater etc). There are currently ~17,300 biogas and 460 biomethane AD plants in operation across Europe (European Biogas Association, 2015) -- with 523 of these in operation across the UK (EBA, 2016). However, the first and last stages of anaerobic digestion (hydrolysis and methanogenesis) are severely rate-limiting and result in the current long throughput times of 30 days and low degradation rates of 50-70%. As a result, although the technique has been adopted widely throughout the agricultural and wastewater sectors, its cost-effectiveness is considerably hindered and AD processors often rely heavily on government subsidies in order to remain operational. However government subsidies (green energy subsidies and feed in tariffs) have been reducing dramatically over the past few years, in some cases by as much as 40% (Department of Energy & Climate Change, Jan 2017). Our novel concept will address the poor performance associated with the methanogenesis stage of anaerobic digestion in order to maximise energy output (more energy generated from renewable sources) and improve throughput time of feedstock in order to increase profitability of AD for the benefit of processors and UK society.

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ENTOCYCLE LTD	DOWNSTREAM LINEAR SEQUENCE PROCESSING AND VALUE CAPTURING FOR AUTOMATED INDUSTRIAL INSECT FEED PRODUCTION	£99,436	£69,605
Project description - provided by applicants			
Proprietray technology.			

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OXFORD MEDISTRESS LTD	Leukocyte ImmunoTest™: point-of-care test for monitoring chemotherapy-induced neutropenia	£99,960	£69,972

Project description - provided by applicants

Drug companies are continuing to develop new and improved drugs and medications in the fight against cancer, and more cancer patients are benefiting from these so-called "chemotherapy" drugs. However, a key challenge is the risk of unwanted drug side effects which are called adverse drug responses (ADRs). A common ADR that is also quite severe affects the white blood cells of the immune system, reducing the effectiveness of the body to ward off infection (a condition known as "neutropenia"). Patients with severe neutropenia are more susceptible to bacterial infection and, without prompt medical attention, the condition may become life-threatening. To address this unmet clinical need, Oxford MediStress (OMS) has recently developed the Leukocyte ImmunoTest(tm) (LIT(tm)) for rapidly assessing the function of neutrophils (a type of white blood cell and a key aspect of the immune system). This blood test is rapid (taking only ten minutes), portable, and uses a hand-held point-of-care (POC) electronic device; it uses a tiny pinprick of blood and shows how well your immune system is working. This shows the doctor how well your body is responding to you medication; it shows this quickly and at any point in time. Importantly, the device can eventually be developed for use at home (much like the well-known home diabetes test). Eventually, we will also have a smartphone-enabled app to communicate the results directly to the doctor (but that is not part of this project). Importantly, in order to make it suitable for home-use, some aspects of the device need to be improved. In this project, Oxford MediStress will lead a small team to improve the device by developing a new reagent cartridge that has the necessary chemicals already pre-loaded so that it is easier and quicker to use. As a side benefit, we will also learn whether and how our test can be used to monitor other disease conditions and how doctors in the NHS would likely use this technology to help both the patients (by saving lives) and the healthcare service (by reducing cost and making the provision of excellent healthcare more efficient).

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MODERN BAKER LTD	Democratising access to healthier baking through sourdough innovation	£70,528	£49,370
CAMPDEN BRI (CHIPPING CAMPDEN) LIMITED		£29,069	£29,069
Project description - provided by applicants			
Modern Baker is a rapidly growing UK food manufacturer and retailer specialising in long-fermented and baked foods. Its ambition is to disrupt the baking industry and to redefine the market. The proposed project seeks to use cutting-edge food science to naturally improve nutritional quality and shelf-life.			

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Competition Code: 1801_EE_HLS_R4

Total available funding is £9,518,871

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

Participant organisation names	Project title	Proposed project costs	Proposed project grant
G'S FRESH LIMITED	Onion storage disease monitoring using volatile organic compounds	£30,252	£15,126
ROBOSCIENTIFIC LIMITED		£68,889	£48,222

Project description - provided by applicants

Onion storage diseases cause significant economic losses worldwide ,and £10 to £11m losses in the UK per year alone (Taylor et. al. ,2016; AHDB, 2015),in a UK industry worth £126m (DEFRA).Currently onion growers destructively sample onion stores in making decisions when to empty stores and market the onions. This method is both statistically inaccurate in relation to the size of the store (500 - 1500 tonnes) and often too late before the grower realizes there is a significant disease issue in the onions. Currently there is no non-destructive method of onion disease detection in onion stores which would give early detection of disease. The vision of this project is to develop a practical on site onion disease detection system which would forewarn the grower enabling him to minimize onion waste which otherwise would have been marketed. The main areas of focus would be to use odour or volatile organic compound (VOC) detection to identify differences between a healthy onion crop and one in which disease is present to a level where the grower is required to take action to mitigate onion waste. This project will take the first steps to develop an automatic store monitoring system that gives early warning of crop disease based on the fingerprint of volatile organic compounds given off by the crop. The differences between the VOC's given off by healthy and diseased crops will be detected ,analysed and monitored to give growers a warning when disease has infected the stored crop allowing them to take early intervention to minimize crop waste and so reduce the burden of on farm food waste. This project will be proven initially with onions but the planned solution will also work with Potatoes and other stored crops.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
BIOSYSTEMS TECHNOLOGY LIMITED	TruLarv – novel drug re-purposing platform	£99,713	£69,799
Project description - provided by applicants			
BioSystems Technology (BST) is at the forefront of development of alternative research models and is a world leader in the production of standardised insect larvae ("TruLarv") for research. TruLarv are a non-mammalian technology that can be used to generate pre-clinical efficacy and toxicity data for chemicals, compounds and drugs prior to human trials. They are also used more broadly for microbiological research into fungal and bacterial pathogens. In the proposed project, BST is seeking to consolidate its market leading position by evaluating the development of a new portfolio of supporting tools and services, particularly to support the discovery and development of new medicines.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
VELCOURT LIMITED	Development of a field test kit for identifying ACCasE and ALS resistance in Blackgrass	£35,154	£21,092
Newcastle University		£29,886	£29,886
GENESYS BIOTECH LTD		£34,960	£24,472
Project description - provided by applicants			
<p>Controlling weeds in crops is one of the greatest challenges to global agriculture, responsible for higher yield losses and greater input costs than all other biological constraints such as pests and diseases. Achieving this critical aim has become particularly problematic in UK arable agriculture, due largely to the evolution of herbicide resistance which is now reaching epidemic proportions in grass weeds, in particular black grass. Improved management of resistance in weeds relies on timely and targeted interventions. This project brings together diagnostic providers (Genesys Ltd), underpinning science (University of Newcastle) and agronomists (Velcourt) to provide for the first time an inexpensive in-field test for real-time detection of target site resistance (TSR) in black grass. The results from the tests will directly inform the user on appropriate weed control intervention strategies, enabling selection of the most appropriate class of herbicide at each site. This will reduce expenditure on ineffective spraying, decrease losses maximising yield and crop productivity whilst enabling responsible use of herbicides</p>			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
CENSO BIOTECHNOLOGIES LTD	Censo Alveolar Macrophage for COPD	£98,917	£69,242

Project description - provided by applicants

In the UK today, over 1.2 million people suffer from Chronic Obstructive Pulmonary Disease (COPD) which costs the NHS over £1.5 billion. Patients suffering from COPD are unable to empty air out of their lungs because their airways have been narrowed, mainly due to bronchitis and emphysema. The disease profoundly limits the quality of life of its sufferers. It is strongly associated with the elderly and as our population ages, the incidence and cost of the disease is expected to rise. This is despite falling rates of smoking - the major cause of the disease in the UK. The WHO identifies COPD as the fourth most common cause of death due to both smoking and air pollution. There is no cure. Despite the compelling need for better treatments, there has been little progress in the last 40 years. Treatments include patients inhaling bronchodilators which open up their airways and corticosteroids, which seek to reduce lung inflammation. These provide some short term respite to the condition but do nothing to stop or reverse the damage to the patients lungs. A new method to screen for drugs that can treat the diseases is urgently needed. Our goal for the CAM project is to use stem cell technology to develop a new drug screening technology. In the CAM project, we propose to develop a capacity to transform stem cells into one of the cell types which has a critical role in the development of COPD, known as alveolar macrophage. These cells are found in the lung and are responsible for detecting, engulfing and destroying bacteria and other pathogens and also dying human cells. For patients suffering from COPD, these cells fail to function properly so that they do not perform the essential role maintaining healthy lungs and instead may cause exacerbate the dysfunction of the lungs -- contributing to the chronic nature of the disease. As well as creating alveolar macrophage, we will demonstrate that the "inflamed" state of these cells can controlled by drugs and that these effects can be measured by testing systems in our labs. If we can do this, we will have made substantial progress towards providing a wholly new research technology which will support the discovery of new drugs. Our hope is that the CAM project will accelerate research into ways to address the chronic inflammation which is an important contributor to this terrible disease.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
CHALANTE LIMITED	Novel performance enhancer for efficient growth of food animals	£98,400	£68,880

Project description - provided by applicants

Globally, there is an increasing demand for high quality animal-derived protein because of population growth and modern society dietary changes, while farmland and water sources remain limited. Thus, there is a need for novel approaches towards an increase of protein yield in the most sustainable and efficient way. To date, the most common approaches to performance enhancement in food animals relied on using antibiotics, anabolic steroids or beta-adrenergic agonists. These agents are under regulatory scrutiny over antibiotic resistance (antibiotics) and animal welfare and safety (anabolic steroids and beta-adrenergic agonists) and do not meet the strict safety regulations for food production in the EU. The animal welfare and environment protection are important drivers for a substitution of existing performance enhancers. Chalante's goal is to develop candidate performance enhancers with excellent safety profiles to directly target muscle metabolism in food animals. The resulting product should be antibiotic-free and overcome the drawbacks of established performance enhancers. The strategy we adopt is centred around nature-inspired products and processes adjusted for use in animal health. Our team's extensive scientific expertise along with an exclusive access to innovative technologies have positioned us well to generate effective bioactive molecules with excellent safety profiles and novel mechanisms of action. The resulting increase in animal performance will provide higher return on investment for a producer and increase availability of animal for the consumer at a lower price. The major markets (EU, China or Brazil) are closed to existing products due to the strict safety regulations. Widely adapted goals of sustainability development put a regulatory pressure on antibiotic-free animal products which in turn enable easier access to market for countries using safe performance enhancers. Our innovative and safe agent is expected to be globally accepted with a potential to generate over £150 million in revenues per year. Chalante's technology ultimately aims for production of healthier, more affordable animal protein that is free from steroids and antibiotics. The successful product development will help alleviate the global problem of malnutrition and improve the wellbeing of both food animals and humans.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
LLEO LIMITED	Axomap Application	£61,995	£43,397
Agriculture and Horticulture Development Board		£25,104	£25,104
Project description - provided by applicants			
<p>The Axomap Application project will carry out a technical validation of a process proven during a pilot study in 2016 and 2017 that is able to identify potato tubers during harvesting so they can be separated into batches that have similar Dry Matter and dormancy characteristics. This will enable growers to be more efficient by reducing chemical sprout suppressant treatments like CIPC, dispatch tubers for processing before they begin sprouting according to the grade they were assigned during harvesting. It will also allow food processors to produce more consistent products, thereby becoming more efficient by reducing food factory wastage. These will be the main outcomes of the Axomap Application project. The study will also quantify the benefits of more regular monitoring of crop growth, using Unmanned Aerial Vehicle imagery, against the cost of introducing these new Remote Sensing practises. As such, this project represents value to partners and the tax payers as it will help to roll-out products and services with many social and economic benefits.</p>			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
CHAIN BIOTECHNOLOGY LIMITED	MICRoMED – Microbial Restoration of intestinal Metabolite balance for type 2 Diabetes	£99,966	£69,976

Project description - provided by applicants

The gut microbiome, the collection of bacteria, viruses and fungi inhabiting the human gastrointestinal tract, has a profound impact on the development and maintenance of a healthy immune system. From birth, the microbiome influences how the human immune system responds to resident and invading microbes, which in turn influences our susceptibility to common diseases and long-term health outcomes. Recent advances in microbiome research have highlighted the importance of a healthy gut in prevention of several diseases, ranging from irritable bowel syndrome, to inflammatory bowel diseases such as Crohn's disease and ulcerative colitis, antibiotic associated diarrhoea (including *Clostridium difficile* associated disease), autism, obesity and type 2 diabetes mellitus. The bacteria present in the gut communicate with the human host by making molecules that not only influence the gut lining but have widespread effects throughout the body. For example, molecules produced by the gut microbiome can have effects on the liver triggering a reduced production of lipids, and the brain by triggering production of serotonin in the gut. In this project, CHAIN Biotechnology Ltd will develop harmless gut bacteria to increase the production of naturally occurring molecules that are often lacking in patients who are suffering from or who are at risk of developing diseases such as type 2 diabetes (T2D) and colitis. Our first focus will be on T2D, which places a huge commercial and medical burden on the healthcare industry and can have devastating effects for sufferers such as amputations or loss of vision. Success in this project may lead to treatments for other conditions that have been associated with a disturbance of the microbiome and an inflammatory background such as inflammatory bowel disease, Huntington's disease and Alzheimer's disease.

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ENXRAY LIMITED	LEXR: On-Site and On-Demand Radiation Processing and	£775,079	£542,555
CELL THERAPY CATAPULT LIMITED	Sterilisation for the Production of	£193,633	£193,633
NORTHWICK PARK INSTITUTE FOR MEDICAL RESEARCH	Affordable Advanced Therapeutic Medicinal Products (ATMPs)	£129,382	£129,382

Project description - provided by applicants

EnXray Limited is working with the Cell Therapy Catapult and the Northwick Park Institute for Regenerative Medicine to develop and validate new commercial applications for EnXray's proprietary & patented technology in the rapidly expanding field of Advanced Therapeutic Medicinal Products (ATMPs). EnXray's Low Energy X-ray (LEXR) platform technology enables irradiation of high value products on-site & on-demand. The technology being developed through this Innovate UK grant-funded project is expected to dramatically improve the development and manufacture of ATMPs by establishing irradiation processing on-site and on-demand, increasing its availability, reducing logistics and the production costs of novel ATMPs. Tissue scaffolding material must be sterilised prior to introducing stem cells when growing new organs, and vaccines derived from immune leukemic cells or pluripotent stem cells must be inactivated to arrest cell growth to ensure patient safety after injection. There are a significant number of active projects in both large and small scale downstream processing with needs for which there are no commercially practical irradiation solutions. Existing sterilisation systems are provided by large-scale 3rd party service providers to which ATMPs must be transported for processing. These facilities are not able to address these unique, high-value products commercially, as they lack the ability to provide customised, safe, and consistent radiation processing, limiting the development and commercial supply of emerging cellular cancer vaccines and engineered tissues and organs for transplantation and other ATMPs. Generating specific (low-energy) X-ray energy with higher dose absorption to a smaller area than existing Gamma irradiation will increase dose efficiency and dose rate which is required for manufacture of high value ATMPs. Controlling dose-rate and dosage delivered on-site & on-demand will be a significant improvement over current large scale, remote, batch-processing facilities. Wider availability of ionising radiation will improve the development and commercialisation of ATMPs, including orphan-drugs and other patient-specific therapies. EnXray's LEXR technology platform will offer a novel solution for ATMP processing, delivering ionising radiation with a safe, small-footprint device. The success of this grant-funded project will address these technology gaps and allow researchers and biotechnology companies to accelerate the development of new ATMPs in the future.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
APS BIOCONTROL LIMITED	Targeted Innovation in the UK Seed Potato Industry to Improve Productivity and Quality	£367,068	£256,948
Scottish Agronomy Limited		£67,463	£47,224
MCCAIN FOODS (G.B.) LIMITED		£60,219	£30,110
University of Leicester		£104,999	£104,999
AGRICO UK LIMITED		£34,309	£17,155
BRANSTON LIMITED		£42,068	£21,034
The James Hutton Institute		£139,702	£139,702

Project description - provided by applicants

Potatoes are the UK's largest vegetable category, producing 5-6 million tonnes p.a. valued at approximately £1.1bn. Production is relatively stable but prices and supply are volatile, with underlying issues including weather effects and related to these, disease. Bacterial pathogens of potatoes in particular are responsible for substantial losses through disease, leading to damage and failure to meet market specifications. Of particular importance to the UK and wider European industry, especially for high-grade seed production is blackleg (caused mainly by *Pectobacterium* bacteria); responsible for >£50M UK total losses p.a. and £750M worldwide. Blackleg is transmitted through the seed-multiplication system and is a major cause of seed downgrading and rejections (at an estimated cost of £100/tonne), together with downstream losses from tuber soft rot across the wider industry sectors. This project builds on previous Innovate UK research in which combinations of novel, highly-specific and safe bacteriophage (naturally-occurring antimicrobials) have been formulated to target blackleg pathogens. These studies have concluded that the main commercial value of the technology is working with the high-grade seed industry, attempting to minimise seed contamination, safeguarding seed potato health for the industry downstream and adding a competitive advantage to the seed producers to compete for larger and new export markets, both within and outside of the EU (particularly post Brexit). Previous work also concluded that the assessment of blackleg controls should be a two-fold approach, recording both diseased plants and also, bacterial contamination of harvested tubers as a measure of their likelihood of transmitting disease to subsequent generations. Key objectives of the proposed project are to follow successive generations of high-grade seed (from clean, field-generation 1 stocks), applying bacteriophage treatments both at planting (targeting seed contamination) and foliar applications throughout the growing season (targeting environmental disease sources). Also, work will be carried out to modify and optimise the initial bacteriophage mix to take into account new, emerging blackleg pathogens. The existing business-led consortium from project 101907 will be further strengthened by two new research partners (James Hutton Institute and University of Leicester), bringing innovative approaches to inform questions of both bacteriophage specificity and mode-of-action. The project addresses a very timely and innovative opportunity given the impact of the disease on the industry. The Lead Applicant has already made significant progress in exploiting the technology to date and the proposed project would further de-risk the technology, allowing the consortium to maximise commercialisation opportunities post project as effectively as possible.

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GREENGAGE LIGHTING LTD	Lighting for Broiler Enhanced Welfare and Commercial Output	£283,626	£198,538
University of Bristol		£99,780	£99,780
CAMPDEN BRI (CHIPPING CAMPDEN) LIMITED		£19,824	£19,824

Project description - provided by applicants

This collaborative project will develop and validate the first ever bio-adaptive, circadian, smart lighting system for animal husbandry that will recreate natural daylight conditions from dawn-to-dusk. 65 billion chickens are reared globally every year, the vast majority in completely enclosed, carefully managed, bio-secure environments. As the industry has grown, so too have consumer concerns for animal welfare. A key aspect of creating a suitable indoor environment is light. Natural daylight, whilst the ideal, is not practical in the modern farming industry. Lighting has been demonstrated to impact productivity and welfare in the poultry industry but only "day" length and intensity are currently regulated to minimum standards. Recent research has shown benefits but also detriments of rearing animals under single colours. Greengage Lighting Ltd, already an innovation leader in white LED lighting and sensors for animal husbandry, will leverage the very latest in LED technology combined with sensors and a remote management platform to produce the first, truly broad-spectrum lighting that will mimic natural daylight from dawn-to-dusk. The resulting bio-adaptive, smart lighting system will enable dynamic optimisation of economically-important biological effects. The Animal Welfare and Behaviour Group, University of Bristol will validate the new lighting concept by undertaking scientifically-rigorous research trials, conducted under commercially-relevant production conditions at their new Centre for Innovation Excellence in Livestock (CIEL) Poultry Centre. The research team will benefit from globally-recognised expertise in lighting for broiler production from the University of Saskatchewan, offered on an advisory basis. Campden BRI will facilitate key industry stakeholder and end-user inputs to the design concept, and sharing of the project outputs with the UK poultry and wider animal husbandry industry, to maximise productivity benefits and competitiveness for UK industry. Greengage will develop the innovative bio-adaptive, circadian, smart lighting system into a new, market-leading product. Academic presentation of the validating research at IPPE2020 - the world's largest annual poultry, feed and meat technology exposition - and subsequent peer-reviewed publication (e.g. in British Poultry Science), will provide an evidence base acceptable to the commercial production industry. This project will provide a step-change in lighting for poultry production, and wider animal husbandry, enhancing productivity and animal welfare in the food production industry, in the UK and globally.

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UNILEVER U.K. CENTRAL RESOURCES LIMITED	Synergy of novel chemistry & novel biology to combat unmet cleaning needs	£410,905	£205,453
University of Exeter		£149,996	£149,996
University of Liverpool		£149,405	£149,405
PROTEIN TECHNOLOGIES LIMITED		£300,304	£210,213

Project description - provided by applicants

Bio-inspired processes will have a major impact on the challenges of the global society in the 21st century, including those associated with environmental sustainability. The employment of biocatalysts in industrial processes is expected to boost a sustainable production of chemicals, materials and fuels from renewable resources. The scope of this proposal is to encourage and translate academic research and its outcome into a novel industrially usable platform for the sustainable production of scientifically improved biomaterials by exploiting new synthesis pathways for green chemicals and novel biotechnological technologies. Green chemistry, molecular biology, enzyme technology and instrumental analytics will provide disruptive innovation and lead to the development of a novel unique and sustainable product. Amongst the broad spectrum of potential applications for this novel product comprising renewable novel chemicals and a novel detergent biomolecule, we will successfully demonstrate the cost-efficient and industrially compatible production of these new biomaterials using renewable raw materials, chemical synthesis, advanced protein engineering technologies and robust bio-manufacturing technology and its benefits in reducing the environmental and economic costs of laundry. By applying analytical NMR to the novel biomaterials -- chemical and biomolecular, their structural conformity can be verified and sebum contaminations on clothes studied, serving as an excellent technical tool to potentially accelerate design and creation of cold-cleaning relevant novel HPC product formulations with new detergents.

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JELLAGEN PTY LTD	Development of a next generation collagen wound dressing	£462,602	£323,821
NEEM BIOTECH LTD	containing a biofilm disruption	£180,032	£108,019
Project description - provided by applicants			
The project is based around developing a novel wound management dressing to combat biofilm formation and promote wound healing, allowing chronic wounds to be addressed more effectively and increasing the wound healing success rate. Biofilms are a major problem in chronic wounds and the reasons that these infections evade antibiotics and host defences are many, including antibiotic-insensitive physiological states of a proportion of the bacterial cells in a biofilm, and exclusion of host immune cells by the biofilm matrix produced by the bacteria. This makes the wound non treatable and prolonging the healing process, leading to the wound not healing and causing significant disruption to the life of the effected individual and incurring huge medical costs and lost productivity. The dressing will be made of jellyfish collagen, with a novel compound which has proven efficacy in biofilm disruption and in reducing pathogen virulence, allowing the pathogenic bacteria to be destroyed.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
FOUR04 PACKAGING LIMITED	Fresh Solutions - A fresh approach to packaging food	£451,795	£203,308
PROSEAL UK LIMITED		£105,842	£37,045

Project description - provided by applicants

Food waste is an issue of global significance, affecting food security and environmental sustainability. Every year over 7.3 million tonnes of food and drink waste is generated by UK households, of which approximately 60% arises from products 'not used in time' (avoidable waste), with a value approximately £480 per household, the majority of which are short shelf-life chilled products. Similar challenges are found within the Retail sector with, Tesco's stating that 68% of all salad grown for bagged salads ends up being discarded - with 33% of that waste occurring before the salad reaches households. Even a 1-day shelf-life increase could reduce post-production (retail and household) waste by up to 50% for some products. **A global issue ubiquitous across all post-production food supply-chains, innovations that offer shelf-life extension to reduce food waste are viewed as the 'holy grail' within the retail sector.** Despite the scale and the immediate need to address the food waste challenge, few solutions can offer significant further extension beyond current levels primarily due to an inability to effectively control BOTH gas & moisture of the product. Through the combination of the Evap film, which allows the moisture vapour transmission rate to be tailored, limiting condensation but preventing dehydration, and a novel highly accurate and consistent laser perforation system to create optimum atmospheric conditions, Fresh Solutions is able to fully control the detrimental effect of condensation, thermal shock and the respiration rate of fresh produce which contribute to the build-up of moisture in the packs and mould/bacterial growth and in doing so offering a shelf life extension far beyond current approaches. Despite success in supermarket trials (consistent 2-10 days extension achieved), a key barrier preventing market uptake is the current cost of Evap film which is currently 2.5 times that of conventional film. In collaboration with Proseal (leading tray sealer), Four04 aim to deliver a step change in the manufacturing process to improve efficiencies, eliminating steps in the process and further develop the material itself. By reducing the final sale price of the material & extending market application, rapid penetration will be possible upon project end with potential to truly disrupt the Fresh Products and Salads packaging market for the benefit of consumers and retailers and addressing a major Global challenge. Wider potential across broader food markets (baked good, meat, fish) and medical speciality bags (colostomy, cadaver bags).

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
ANACAIL LIMITED	Shelf life extension, waste reduction and improved food safety in Blueberries (and other high wax bloom fruit) using in-pack ozone treatment	£130,768	£91,538
Berry Gardens Growers Ltd		£135,444	£67,722

Project description - provided by applicants

Blueberries are the 2nd most popular berry after strawberries sold in the UK, accounting for 16.6% of all berries sold (**1**), and the demand for blueberries has increased substantially over the past decade (**2**). As blueberries are imported from countries such as Chile in the winter months, they need to be able to have a long shelf-life and still be safe to eat by the time they reach the consumer. As with many soft fruit, blueberries can harbour human pathogens if contaminated prior to packing, which can represent a risk for the consumer. Therefore, to keep up with demand, there is a market need to identify a method of extending the shelf life of blueberries, whilst also ensuring they are safe and appealing to eat. Anacail have an innovative technology which allows for the generation of ozone (O₃) from oxygen (O₂) in the air within a sealed pack of berries. Ozone is very fast-reacting and effective at killing microbes, from bacteria to moulds, viruses and spores. The ozone quickly decays naturally back to oxygen within minutes, resulting in a pack of berries which has less chance of growing mould within shelf life and is safer to eat by reducing any potential pathogens that may be present prior to packing. As this process occurs after the pack has been sealed, there is no chance of recontamination until the packs are opened at home by the consumer. Anacail have already tested this technology for strawberries and are in partnership with Berry Gardens to supply this technology for their strawberry varieties to extend the shelf life and improve food safety. Substantial work is required to apply this technology to blueberries due to the waxy bloom present on blueberries, which can result in adverse organoleptics when combined with ozone. As a result, this project aims to identify the optimum ozone dose and correct application of ozone for use on blueberries of different varieties, to provide a solution for extending the shelf life and improving food safety for blueberries to the UK. If successful, this will also provide a method for reducing food waste both at depot and at retail for an additional berry product. Finally, it could potentially also open up the market to provide a technology which can decontaminate food products without the need for additional chemicals in a wash, currently required for certain products to ensure significant microbial reduction and food safety.

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Total available funding is £9,518,871

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

Participant organisation names	Project title	Proposed project costs	Proposed project grant
BUHLER SORTEX LIMITED	Precision Food Processing Technology	£889,584	£444,792
NEW-FOOD INNOVATION LTD		£121,572	£85,100
University of Nottingham		£427,071	£427,071
Project description - provided by applicants			
Today, the food industry employs many process machines that are very effective at the removal of foreign objects as well as blemished or misshapen / off-coloured products. This is achieved using a combination of shape, size, colour and other optical techniques. For the next generation of machines, a more refined screening process is needed for the detection of lower levels of contaminants. The key objective of this project is to develop the next generation of food commodity processing machines.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
INSIGNIA TECHNOLOGIES LIMITED	Intelligent inks for creating a range of Time Temperature Indicators	£125,198	£87,639
ANTONINE PRINTING INKS LIMITED	and Open Life Timers for food	£17,339	£10,403

Project description - provided by applicants

Insignia Technologies have been working with a leading UK supermarket on a project to help improve food safety and quality and help consumers reduce food waste at home. It is estimated that over 2 million slices of ham go in the bin every day in the UK alone. Insignia came up with an innovative solution to this problem in the form of an after opening timing label. The timer changes colour once the package has been opened to show how long a product has been open. Consumer research proved that the technology helped to reduce food waste and improve food safety and quality. However in its current form it is too expensive to be considered for use long term. Most film widths for modern packing machines are too wide for standard label applicators to handle, therefore specialist equipment has been required. This equipment is expensive to run and has limited availability, therefore a roll out of the label technology for food categories such as raw meat, poultry, cooked and cured meats, cheese is not sustainable beyond one or two SKUs (stock keeping units). This project aims to revolutionise the technology to create an after opening timer that is printed as part of the packaging material, negating the need for an additional label. This would reduce the price point dramatically encouraging mass uptake of the system. The project will develop an innovative colour changing ink that can be printed into a recyclable mono-polymer construction of the lidding material, replacing the normal multi-polymer material used, which is currently not recycled. The printed indicator will change colour automatically when the consumer opens a product to show how long it has been opened. Insignia have partnered with Antonine Inks, who are specialists in printing inks for this type of packaging, to move the intelligent pigment from its current plastic film format into an ink system. The ink will need to be food contact approved and compatible with wide web flexo / gravure printing processes. The timing of the ink will need to be tuneable to the various manufacturers consume within guidelines.

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OSLER DIAGNOSTICS LIMITED	Development of a small, low-cost, accurate and rapid Point-of-Care diagnostic platform, with primary application to critical cardiovascular markers	£1,001,978	£701,385
Oxford AHSN / Oxford University Hospitals NHS Foundation Trust		£52,499	£52,499
University of Oxford		£252,058	£252,058

Project description - provided by applicants

We are developing the next generation of healthcare diagnostics. Our portable diagnostic device could be deployed in the hospital emergency department, ambulance, or doctor's office and be used to diagnose diseases in under 10 minutes, cheaply, accurately, and from a pinprick of blood; moreover, it could diagnose an ever-increasing range of diseases, and multiple diseases simultaneously. In its first application, our device will be applied to critical cardiovascular diseases, including heart attack (myocardial infarction), acute coronary syndrome, heart failure, and pulmonary embolism/deep vein thrombosis. No longer will patients require unpleasant large blood samples, long, nervous waits for results, or the risk of serious deterioration whilst testing is still underway; instead, testing will be quick and simple, allowing more rapid treatment decisions. It will also result in significant savings for the NHS. The technology behind our device is novel to diagnostics (hence the dramatic improvement in capabilities) and has been developed over the past decade at the University of Oxford. Moreover, it has already been proven to work in feasibility studies on real patient samples. We are now perfecting the technology and translating it to a handheld automatic device to be deployed in healthcare settings. We are also actively engaging all stakeholders of the healthcare system, including end-users, to ensure a quick go-to-market, and seamless integration into patient pathways.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
CLARITY BIOSOLUTIONS LIMITED	Development and demonstration of clinical potential for a multi-biomarker-based, low-cost, point of	£360,524	£252,367
Imperial College London		£153,901	£153,901
Project description - provided by applicants			
Tuberculosis (TB) is a persistent health problem in the UK and worldwide. There has been a steady increase of TB rates in the UK over the last three decades, with the disease burden now one of the highest in Europe. In 2013 the WHO reported that in India in 2012 2.8M active TB cases were diagnosed, with an estimate of 25.2M individuals with presumptive TB, suggesting a diagnosis "success rate" of only 1 in 9\ . This application is to fund an industry-led, industrial research project to develop an affordable new TB diagnostic with the aim of increasing this diagnostic success rate in the four highest burden TB countries, which account for nearly half of all TB cases detected globally each year. The project combines innovation from Imperial College London (ICL) research into the development of a powerful set of TB diagnostic blood biomarkers together with low cost lateral flow technology that will address the worldwide need for a low-cost screening tool for active TB, enabling better disease treatment and containment.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
CLYDE BIOSCIENCES LIMITED	Next generation cardiotoxicity assay platform using cardiomyocytes	£758,092	£341,141
University of Glasgow		£191,784	£191,784
CENSO BIOTECHNOLOGIES LTD		£295,142	£206,599

Project description - provided by applicants

Stricter regulatory requirements, escalating R&D costs and a 90% failure rate of drugs in development are impacting the pharmaceutical industry's ability to bring new drugs to the market to address the needs of a growing patient population with a rising disease incidence. Cardiotoxicity is a leading cause of drug attrition and accounts for up to 28% of US post-marketing drug withdrawal. An integrated approach is now required to reduce costs and improve success rates by eliminating compounds with poor cardiotoxicity profiles at an earlier stage in development. Clyde Biosciences is a specialised provider of cardiovascular testing services driven by a team of experts with unparalleled experience in cardiac electrophysiology. The company has developed the CellOPTIQ assay platform, comprising novel instrumentation and cell culture, maturation and preservation protocols to fulfil unmet needs in Safety Pharmacology, Mechanistic Toxicology and Cardiology Research. CellOPTIQ provides a comprehensive cardiotoxicity assessment to deliver reliable, high resolution functional output from a range of cardiac cell types including human-induced pluripotent stem cell derived cardiomyocytes (hiPSC-CM), improving the accuracy and reducing the time, cost and complexity of pre-clinical cardiotoxicity screening. All drug actions on the heart can be explained in terms of effects on 3 parameters of Excitation-Contraction Coupling (E-C Coupling): electrical activity, calcium and contraction. Studying the E-C Coupling process is critical for the understanding of cardiac cell function. CellOPTIQ is the only assay which measures the three principal features of Excitation-Contraction Coupling (E-C Coupling) in one simultaneous experiment to produce a quality of data unsurpassed among related assays. In collaboration with Censo Biotechnologies, a commercial stem cell technology provider, and academics from Glasgow University, this project seeks to transform CellOPTIQ into a robust, high throughput automated assay, advancing assay performance, cell differentiation, assay efficiency and throughput to overcome current commercial bottlenecks. CellOPTIQ will offer the drug discovery industry a new 'gold standard' cell assay for preclinical cardiotoxicity assessment, establishing Clyde Biosciences as a leading service provider within the growing global _in vitro_ cardiotoxicity testing market, addressing all requirements for cardiac safety evaluation and supporting industry efforts to improve the speed, accuracy and cost effectiveness of drug development programs. The project will lead towards increased business productivity, export led growth and competitiveness for Clyde Biosciences and Censo Biotechnologies in the global safety pharmacology and specialised cell assay market valued at \$1 billion and will generate new knowledge for all partners to stimulate further innovation.

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OPTIBRIUM LIMITED	A Next-Generation Platform for Novel Drug Discovery Using Deep Learning of ADMET Properties.	£542,516	£379,761
INTELLEGENS LIMITED		£184,229	£128,960
MEDICINES DISCOVERY CATAPULT LIMITED		£311,267	£311,267

Project description - provided by applicants

Integrated through Optibrium's existing software offering (StarDrop(tm)), DeepADMET is a next-generation project that will develop and apply novel deep learning methods to extend and improve predictive models of important Absorption, Distribution, Metabolism, Excretion and Toxicity (ADMET) endpoints to guide more efficient design and selection of high quality drug candidates. Data for important ADMET endpoints that are not readily accessible will be curated as the basis for building models for these endpoints, which are not currently available, and extend and improve the accuracy of the current state-of-the-art models. The successful delivery of project objectives will enhance Optibrium's foothold in the Computational Drug Discovery market through the commercialisation of the software licences through our existing sales force or, where appropriate, by partnership with organisations specialising in that sector or region. DeepADMET forms a key part of Optibrium's Augmented Chemistry(tm) strategy, moving beyond 'tools' to support chemistry optimisation. Intellegens is a spin-out from the University of Cambridge that has developed a unique Artificial Intelligence (AI) method for training neural networks from incomplete data sets. The MDC has a wide variety of partners drawn from: UK biotech and enables it to meet its core strategic objectives as a catalyst for enabling innovation within the sector. Specifically, the project utilizes key and rare expertise in information extraction and curation strategies and tools, the further development and validation planned here will be applicable in future translational life science sectors.

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HUMMINGBIRD TECHNOLOGIES LIMITED	Improving productivity in pea, bean and legume growing through advanced data analytics, machine learning and artificial intelligence techniques	£461,284	£322,899
PROCESSORS & GROWERS RESEARCH ORGANISATION		£197,488	£197,488

Project description - provided by applicants

Each year the UK imports >3Million Tonnes of soya protein for use in the pig, poultry and dairy sectors, 98% from South America (the growth of soy plantations being a key factor in the forced eviction of many rural communities, excessive pesticide use and deforestation). It is widely recognised that the UK could cut its dependency on imported soya by >50% by encouraging farmers to switch to home-grown alternative protein crops notably pulses - field beans and peas. However, yield instability, slow rate of germination, challenges in crop management including soil health and lack of confidence in gross margins, have limited efforts to increase home grown protein production. The potential for increased UK production in pulses is higher than in any other crop, however this can only be achieved by creating greater confidence across growers for the inclusion of legumes into crop systems. Improved understanding of factors impacting yield performance and field variability are critical, and whilst precision agriculture techniques such as the use of satellite imagery and ground sensors for plant health data capture are being trialled across wider crops, no form of remote sensing exists specifically to accommodate the crop physiology and growing requirements for pulses with none truly capable of direct application. The partners (Hummingbird and PGRO whose members account for 80% of the UK's legume market) aim to address this market gap through the development a solution which uniquely combines UAV collected imagery along with handheld and historical data with a proprietary data analysis and Artificial Intelligence based crop monitoring platform specific to pulses, to provide real-time actionable intelligence across the crop cycle to give an accurate depiction of in-field performance. Data generated will support growing decisions from varying seed rates through to weed classification, disease detection and accurate prediction of crop prior to harvesting, all aimed at improving crop management, enhancing yields/quality and growth confidence. To date, concept design has been completed with IUK support now required to develop the platform into a proof of concept prototype and based on two seasons of data collection and system testing. If successful, the solution will represent the first remote sensing software analytics for peas and beans growers with the potential to double yields, optimise inputs and gross margins, and alleviating the environmental burden of sustainable intensification of agriculture. The project will deliver significant export led growth for Hummingbird, increased employment with future R&D application across wider crops.

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