

Competition Code: 2010\_COVID\_SIF\_TF\_R3

Total available funding is £10.9m

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
LARRY WALSHE LTD	Developing sustainable, plastic-free solutions for the flower industry	£86,245	£68,996

The global cut flower industry is valued at £22.8 billion(Global\\_Industry\\_Analysts\\_2020), with the UK cut flower industry accounting for £1.6 billion of retail sales(NFU\\_2016). There are an estimated 14,077 florists in the UK, responsible for selling approximately 25% of UK cut flowers. Florists are typically micro, owner-operated businesses. Operating on low margins, developing new technologies or adopting more sustainable practices is presently out of reach for many.

Larry Walshe is a luxury events florist founded in 2014\. Over the last 6 years, we have built a nationally and internationally renowned brand, commissioned by Royal Households and globally leading British brands including Stella McCartney. However, COVID-19 has had a devastating impact on our business, with weddings cancelled or postponed as a result of national and international bans on large-scale gatherings. The future for large-scale events remains highly uncertain.

In response to the COVID-19 pandemic, Larry Walshe is building a luxury e-flowers business, which will deliver resilience in the face of potential future global disruption. Our ambition is to "build back better" and be the first UK-based sustainable, carbon-neutral, and plastic-free e-florist. We have already taken significant steps towards achieving this:

- \* \*\*Carbon-neutral:\*\* Working with the Carbon Trust, we have committed to measure our carbon footprint, reducing carbon emissions wherever possible (e.g., sourcing UK-grown flowers), and offsetting unavoidable emissions.
- \* \*\*Plastic-free:\*\* Our bespoke flower arrangements are instead packaged in recyclable materials, including FSC-certified cardboard.
- \* \*\*Ethical:\*\* We source Fairtrade flowers wherever possible, which ensures safety and working conditions for flower workers.

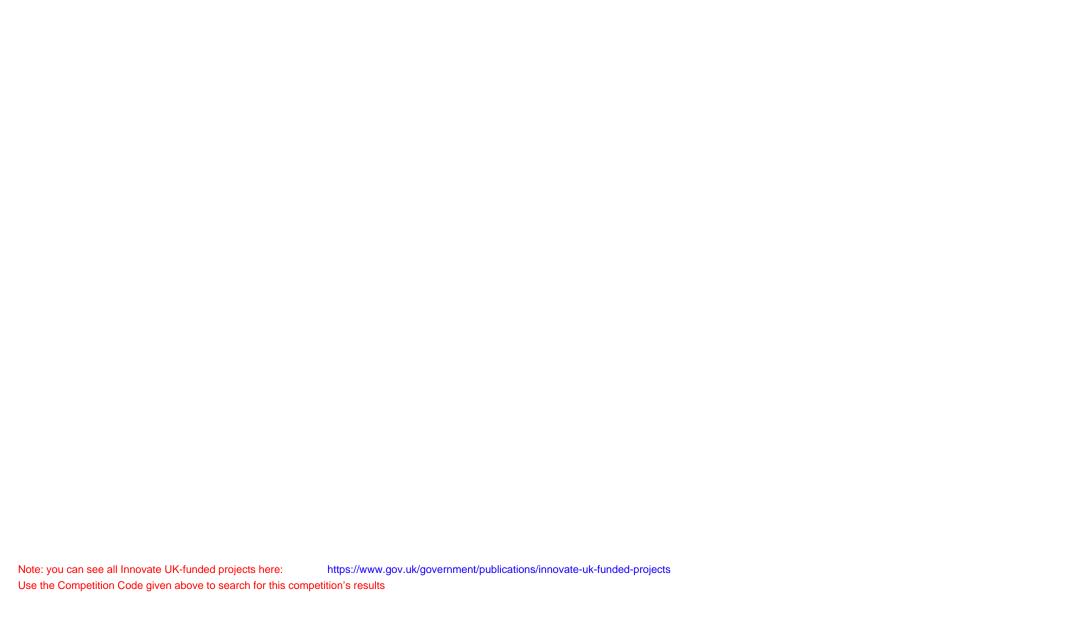
However, in developing our sustainable e-florist offering, we have come across one major hurdle: the plastic sachets of flower food, which are provided free with each bouquet of flowers. Flower food plays an essential role in prolonging vase life, by up to 60%. However, plastic flower food sachets contribute to the estimated 855 billion single-use sachets that are thrown away every year (enough to cover the entire surface of our planet). We estimate that 0.5 billion plastic flower food sachets are distributed each year solely by florists in Europe. Although this accounts for a small percentage of the total single-use sachets, as an industry that relies on the beauty of nature, we have a responsibility to our planet to stop profiting from unsustainable practices.

Inspired by emerging plastic-free bio-based materials being developed in response to the global plastics crisis, we have developed a product concept for a plastic-free flower food sachet. With Innovate UK support, we propose to work with identified bio-based materials manufacturers to reach experimental proof-of-concept stage for our plastic-free flower food sachet, which delivers not just on its environmental credentials, but also offers improved usability, guided by inclusive design principles.

Post-project, we plan to further develop and commercialise our sustainable flower food sachet within our new e-floristry business, but also to supply sustainable plastic-free flower food sachets to florists based across the world. Thus, this project will demonstrate UK leadership in sustainable packaging and support the global floristry industry to transition to a more sustainable future.

Leaving an impact, not a trace.

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TREECONOMY LTD	Nature-based Carbon Removal Verification	£108,300	£108,300

- \* This project will provide a robust and quantitative assessment of nature-based carbon capture in the UK, and the requirements for scaleup of this method for meaningful climate change mitigation & adaptation
- \* We will build a quantitative model of tree carbon capture using a mix of historical data through the Woodland Carbon Code, drone-LiDAR surveys of existing woodlands, and satellite imagery.
- \* From this ecological & technological model we can design the appropriate financial model needed to increase afforestation by landowners and landowning businesses, similar to the success seen in the renewable energy sector with wind and solar in the UK.
- \* For background: the UK has set a legally binding 2050 Net Zero target. The Committee on Climate Change (CCC) sets 5 year budgets and recommended actions to achieve this target. Currently, to reach net zero, the CCC recommends 30,000 hectares (ha) of trees are planted annually in the UK. However, only 13,400ha were planted in 2019\. There is clearly a tree-incentive problem, and after discussions with landowners, a large part of the problem is financial compensation. The overall outcome of the project will be an appropriate financially engineered solution to compensate landowners and businesses for the climate action, and enormously valuable public good, that they undertake by removing carbon dioxide from the atmosphere. It will provide a base for active impact investment into this sector, and place the UK as a leading technical expert in nature-based carbon capture & storage.
- \* The capture and storage of CO2 and other greenhouse gases is fundamental to limiting warming to 1.5 degrees celsius, as demonstrated in the IPCC special report (2018) and supported by their models. It is simply not possible to limit warming to this extent without carbon dioxide removal from the atmosphere, therefore there is an imperative to develop effective methods to do this. Indeed, there are less and less scenarios where limiting to 2 degrees celsius can be achieved without carbon removal.
- \* Nature-based methods for CO2 removal, such as planting trees and mangrove forests, can provide more than 1/3rd of the cost effective mitigation required between now and 2030\. Therefore, it makes financial sense to focus on this methods first. In order to do this in a scientifically robust manner, we need better and more scalable methods to attest and attribute carbon removal to these sites. Despite being called nature-based solutions, technology will still be required in order to ensure the necessary action is being taken and that the action-takers are appropriately rewarded for their actions.
- \* This project will lay the groundwork for such a methodology, and seek to go further and build the financial and commercial basis for delivery. We will both; build the technical framework for calculation, design an effective financial solution, and consider the routes to market delivery.
- \* The outcome of this project should help landowners to 1) pay less 2) earn more, and 3) earn faster from afforestation projects.



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HEALTH COMPANION LIMITED	Enabling Self Management for COVID 19 high risk groups	£78,750	£62,000
THE RESEARCH NETWORK LIMITED		£30,952	£24,000

Early during the COVID-19 pandemic, it became clear that people with multiple conditions such as heart disease, chronic respiratory disease, diabetes, cancer and high blood pressure are particularly clinically vulnerable to COVID 19\.

What has also now become clear is that people of British Black, Asian, and minority ethnic (BAME) origin are at a higher likelihood of testing positive and dying with COVID-19\.

A recent report from Public Health England stated that an analysis of survival among confirmed COVID-19 cases showed that, after accounting for the effect of sex, age, deprivation and region, people of Bangladeshi ethnicity had around twice the risk of death when compared to people of White British ethnicity. People of Chinese, Indian, Pakistani, Other Asian, Caribbean and Other Black ethnicity had between 10 and 50% higher risk of death when compared to White British.

In order to move forward, the report and experts made a number of recommendations to meet the challenge that this provided to the UK. In particular one of the recommendations (recommendation 5) stated that was to develop and implement culturally competent COVID-19 education and prevention campaigns. Another key recommendation was to (recommendation 6) Accelerate efforts to target culturally competent health promotion and disease prevention programmes for non-communicable diseases promoting healthy weight, physical activity, smoking cessation, mental wellbeing and effective management of chronic conditions including diabetes, hypertension and asthma.

Health Fabric has been a pioneer in the Digital Health space. Our current platform accredited on the NHS App Library and has over 2000 users across different conditions. The apps on the NHS library are trusted by patients and practitioners as they have gone through an exacting level of due diligence on compliance around Effectiveness, Clinical Safety, Adherence to clinical regulation, Data Protection, Security, Usability & Accessibility, Interoperability, and Technical Stability. As a result, we have a deep understanding of the data points around effective self-management.



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VISTALWORKS LIMITED	Protecting the farming industry from illegally traded pesticides	£99,011	£79,208

Governments and regulators set the rules of engagement for economic growth, environmental protection and funding of public services. Law enforcement agencies & the legal system ensures compliance.

The majority of good, legitimate businesses follow these rules. They assume their share of responsibility for employees and social impacts, and pay associated costs and taxes. They make considerable investment into innovation, IP protection and regulatory compliance. This drives growth, which in turn funds public services and wider economic competitiveness.

Criminal sellers and illicit traders do not follow the rules. They do not ensure product safety or legality, and do not pay tax, actual or social costs. They steal or negate the R&D investments of legitimate businesses, and undermine progress towards sustainability and economic. The revenues from illicit trade fund other criminal activities, rather than social good.

This is not a fair fight, and legitimate businesses, citizens, communities and economies are the losers. The winners are organised criminal gangs -- illicit trade is the biggest funding source of organised crime (Source: UN, Europol, UK Police). And crime has moved online during COVID-19, using mainstream delivery services and ecommerce platforms, making it harder to detect and intercept. The UK's National Crime Agency and Europol have documented an increase in cybercrime, online criminal selling, fraud and illicit trading of counterfeit goods directly linked to those exploiting the chaos of the Covid-19 crisis.

For post-COVID business recovery to be fair and sustainable, it is important that criminal sellers and illicit traders are detected and their unfair advantage over legitimate businesses is stopped.

Vistalworks are experts in online illicit trade detection. We've built an AI system to reduce consumer demand for illicitly traded goods and provide intelligence to better focus law enforcement resources (used by HMRC, Police Scotland, and Trading Standards Scotland).

This project brings a new capability to the business with global market potential, evolving our value from consumer protection, to B2B facing. We're proposing a prototype of a new data-driven product that will ultimately reduce B2B buyer demand for illicit pesticides (and other chemical products) sold online. We'll do this with advanced risk-scoring and fraud detection, combined with "nudge" messaging that alerts the user of risk. We'll start with farmer/grower users, and focus on crop protection products, with the co-operation on the agrochemical industry.

When COP 26 comes to our home city of Glasgow in 2021, it is our ambition to present a solution than can be used by the world to tackle illicit trade and directly reduce the associated economic, social and environmental harms.



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Visualist Technologies Ltd	The Future of the Fashion Shoot: Virtual & Semi-Virtual	£125,101	£100,081

Project description - provided by applicants			
Visualist is designing a new platform to streamline communication within the team in fashion/creative projects, and centralise all communication, documentation, and assets from planning to post-production.			

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RANPLAN WIRELESS NETWORK DESIGN LTD	C-NODE: Cloud-Native Orchestration of Distributed Services for network planning and optimisation	£173,095	£112,512

COVID-19 has had a profound impact on mobile network operations: 1) network loads have surged far beyond capacity; 2) network energy consumption has increased, resulting in a higher CO2 emission; and 3) engineers have limited access to sites, in particular, for in-building wireless networks, which has caused significant problems on network deployment and maintenance.

The above points emphasise that: 1) mobile networks must be able to adapt to changes; 2) the planning, commissioning, and operations of networks, need to be automated so that the number of physical site visits, can be minimised.

To this end, many what-if scenarios need to be carefully evaluated before changes of network parameters are commissioned. This calls for the development of 'perfect computer replicas of the real world' -- aka as a digital twin - reflecting the environment, the network components, and radio network simulation.

In this project, Ranplan will develop a digital twin of environment, network device and radio network simulation based on a microservice architecture to enable automatic network planning and optimisation in the cloud.

Mobile networks are a key enabler for economy, social connectivity, remote working/ teaching. As the use of network increase, so does energy consumption. Recent studies suggest that mobile networks will produce 320 million Tonnes of CO2 by the end of the current decade. Ranplan believes that the proposed project can enable 30% savings on mobile network CAPEX/OPEX, resulting in a substantial reduction of use of equipment and CO2 emissions.



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IMPACT LABORATORIES LIMITED	CellMine	£49,998	£39,998

Lithium batteries are notoriously difficult to recycle. Impact have identified a process (CellMine) which will allow the Cathode metals to be suitable for recycling. As a result a large volume of batteries which was previously sent to landfill, incinerated or lost into the environment will be recovered and could be reused in new batteries.

As the popularity of electric vehicles starts to grow explosively, so does the pile of spent lithium-ion batteries that once powered those cars. Industry analysts predict that by 2020, China alone will generate some 500,000 metric tons of used Li-ion batteries and that by 2030, the worldwide number will hit 2 million metric tons per year.

At home in the UK, the Faraday project predicts Britain will have 3 fully functional gigafactories running by 2030, creating up to 6500 cells per day. This equates to a potential 2000 tonnes of battery waste at end of life-- 730,000 tonnes per year, leading to 1.8m t/CO2 of extra GHG emissions.

With demand for lithium, cobalt and other metals set to grow and companies looking at deep-sea strip mining, a commercial solution to recover and reusing these metals must be found to meet future demand and prevent the further destruction of our environment. Without commercially viable methods for recycling lithium ion cells the UK risks these being lost or dumped in the environment where the heavy metals contained within them risk leakage into the environment as well as this scarce resource being lost.

Benefiting from CellMine technology the UK will aim to prevent this battery waste from ending up in landfill sites up and down Britain or being housed in hazardous waste storage facilities, possibly located in socially deprived areas.

CellMine's ambition is to create a new industry in the UK. An industry that will provide jobs and financial stability for families up and down the UK. It will help propel Britain to the forefront of green technology innovation, closing the loop on battery recycling.

Funders Panel Date: 30/10/2020

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CONSTELCOM LTD	HPCVisuALL: revolutionising High- Performance Computing (HPC) access for sustainable innovation	£217,153	£173,723

ConstelCom is a pioneering UK based SME founded in 2013, with a strong track record in facilitating access to High Performance Computing (HPC), including successful collaborations with large industrial clients and research partners on projects that create insights and value using high performance computing, big data analytics, simulation and modelling.

HPC is the practice of getting more out of computing power in a way that delivers much higher performance that one could get out of a typical desktop computer or workstation in order to solve large problems in science, engineering or business. Traditionally, using supercomputers is not as straightforward as using a 'normal' computer. Unless on site, supercomputers need to be accessed remotely and may have complicated file systems, require utilisation of queueing systems in order to submit jobs and often lack a native User Interface (UI), making systems complex to use for the uninitiated.

ConstelCom has created Constellation, a web-accessible, collaborative platform which connects HPC centres and users in a private environment, designed to be application agnostic; it is not focused on a particular application or field and can be used for anything that can take advantage of HPC and large storage facilities. The name Constellation has been chosen to reflect the fact that the ultimate goal is to offer an environment or ecosystem encompassing all aspects: people, software, hardware and management tools.

HPC is a vital tool in the fight against COVID-19: it is being used to run a myriad of calculations in epidemiology, bioinformatics and molecular modelling, in an effort to drastically cut the time of discovery of new molecules that could lead to treatments and a vaccine. The UK has added more than 20 petaflops of HPC computing capabilities to the global efforts by joining the COVID-19 HPC Computing Consortium \[UKRI, 2020\].

This Innovate UK-supported project will directly contribute to the UK's efforts to "build back greener" by making it easier for 'non-experts' in all fields to access HPC, accelerating innovation across multiple fields, making it more attractive and affordable for businesses to harness formerly elusive HPC services. This speeds up project flow by simplifying connectivity, collaboration and unlocking true supercomputing for all, regardless of applications, organisation size and computing expertise.

Specifically, this Innovate UK-supported project will:

- \* Revolutionise the remote access process and software utilisation experience for HPC users
- \* Enable remote 3D visualisation and rendering

Project outputs will facilitate pan-industry transition towards remote working (enabling homeworkers to access the full benefits of on-premises HPC from their browser), and support Constellation to become a disruptive platform, that changes the way HPC is used (easier, more flexible and improved collaboration methods from any location).

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UNIFAI TECHNOLOGY LIMITED	Carbon Sequestration of Soil - converging sensing with AI to monitor the quality and carbon carrying capacity of soil	£102,769	£82,190

COVID-19 hit the agriculture sector hard. Farmers need new, diverse sources of revenue if we are to maintain a thriving UK rural economy. The Agriculture and Horticulture Development Board (AHDB) estimates dairy farmers alone lost £28m in April and May due to COVID-19\.

At the same time, climate change is probably the largest single threat to our planet and our civilisation. Recognising this, in June 2019 the UK Government showed global leadership by passing a commitment into law to achieve Net Zero by 2050\. Every sector in the UK economy will have to make fundamental changes if we are to achieve this bold vision, and we will have to develop new ways to measure and sequester carbon.

Understanding the role of natural capital in achieving Net Zero is essential, and this means more than just planting trees. DEFRA recognised this in the recent Agriculture Bill, which paved the way to replacing current Direct Payments to farmers with a new payment scheme which will reward farmers for reducing emissions and better managing soil quality.

This project is aimed at helping resolve both challenges.

By using sensing and artificial intelligence to monitor and understand soil quality, including the microbiome (bacteria, fungi and other organisms), in order to measure, verify and improve the carbon sequestration of soil, we will not only help the agriculture sector to achieve Net Zero, we will unlock new revenue streams for COVID19-hit farmers through accessing carbon credit markets.

The role of natural capital in combating climate change is being more widely recognised, but the role soil plays in the carbon cycle has so far been difficult to measure in a practical way for farmers and agronomists. This project will resolve that challenge by using both existing data sets and data from new inexpensive sensors, integrated with UnifAl's proven artificial intelligence capabilities, to demonstrate a cost effective and simple to deploy solution for continually and remotely measuring and monitoring the carbon sequestration of soil.

UnifAl Technology already has a strong and proven capability in combining low-cost sensing with Al to create highly innovative environmental monitoring capabilities in water. UnifAl's water quality solution uses a small number of directly measured parameters and a trained Artificial Neural Network to understand the real-time quality and microbiome of water, including the presence of harmful bacteria such as \_E.Coli\_ and \_Legionella,\_ and understanding the risk of eutrophication events and biofilm build up.

Expanding this ground-breaking work from water to soil was interrupted by COVID-19 when UnifAI, like many companies, saw commercial activity slow and in some cases stop altogether. We are now back on track, and with this InnovateUK grant we can get back to helping farmers in the UK and eventually elsewhere to diversify their revenue streams through the carbon trading markets, and to ensure that they adopt the right techniques and practices to maintain and enhance the quality and carbon sequestration capacity of the soil in their care in order to help decarbonise the agriculture sector.

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EALAX LTD	CP-Mark: A conformal prediction benchmark for measuring the performance of fraud controls	£82,200	£65,760

During COVID-19, the financial behaviour of people changed. Crime evolved to a new level. We are starting to witness rising financial crime rates where there is no presence of the cardholder and abuse of government support for the crisis. These problems require new ways for control systems to rapidly adapt to this reality, which will demand a corresponding benchmark that can appropriately measure the performance of transaction monitoring systems, which is one of the biggest challenges financial institutions face today.

The performance measurement of machine learning algorithms is usually done with metrics like precision, recall and others that derive from these values, such as F-score. Precision allows us to identify, from the whole set of criminal behaviour detected in a given dataset, how much of it is actually crime, whereas recall gives the number of real crimes detected in proportion from the total amount of crime present in the dataset. The biggest issue of relying on these metrics as benchmarks in fincrime analytics is that the exact amount of hidden crime present in the real dataset is unknown, effectively invalidating the reliability of these conventional metrics for fraud analytics. This project introduces CP-Mark, a benchmark for evaluating controls in financial institutions.

Financial institutions tune their control systems according to applicable regulations, which carries two clear objectives: detect and prevent as much criminal activity (increasing true positives), and reduce the number of innocent people wrongfully accused (reducing false positives). Financial institutions' efforts to achieve these goals are hindered, mainly because of their inability to adequately assess the actual amount of hidden crime present in their datasets, rendering conventional metrics with little benefit.

Criminals leave fingerprints of their activities in financial institution's records. Unfortunately, the use of this data is very restricted under privacy regulations such as GDPR, significantly reducing the possibility of collaboration between different stakeholders to improve fraud control tools and prevent financial crime. A crucial part of the solution to these problems will require a combined response of enriched synthetic dataset generation and proper metrics that can adequately benchmark performance and effectiveness of machine learning algorithms that operate as part of transaction monitoring systems.

PaySim is a payment simulation software that creates digital synthetic data enriched for advanced solutions based on machine learning techniques to understand the patterns in data that lead to financial misbehaviours. These patterns are extracted from real data sources preserving its privacy constraints, capturing the dynamics of fraud and combining them into tailor-made scenarios of diverse crime typologies. This project will allow us to evaluate the use of Conformal Prediction (CP-Mark) as a reliable benchmark tool to test the effectiveness of our software and other Machine Learning algorithms used as part of transaction monitoring systems.

We will then perform benchmarks on several controls using these datasets with a state-of-the-art machine learning framework called conformal prediction to build predictive models capable of detecting known and currently undiscovered patterns of fraud.

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CROPDESK TECHNOLOGIES LIMITED	Agricultural HR - Protecting migrant workers and employers post pandemic	£160,776	£128,620

\*\*The UK farming industry employs up to 90,000 seasonal workers\*\* at peak, to grow and harvest its crops. Employees converge on farms from all over the world, and a high proportion will move from farm to farm over a 6 to 8-month period. The transient nature of such employees can make it very difficult for an employer to confidently control the risk of a COVID outbreak, especially where it is expected that multiple occupation accommodation is provided with a job. In addition, employers are required to provide detailed training and inductions for new employees, which involves multiple touch points and involves large quantities of paper records moving around the business.

An average fruit or vegetable farm has about 300 people working and living there in harvest season, in caravans of 4 or 6 people. On arrival, new workers go through an induction process to register their details and submit identity paperwork before undertaking a minimum of 1-week training. \*\*Government guidance related to COVID-19 has required employers\*\* to increase the amount of records kept for these employees, normally filed as paper records, increasing the level of induction and training.

#### \*\*Impacts/challenges:\*\*

- \* The ability to fast-track effective induction and to track the location and movement of workers, which has never been important, is now essential to assure that farms are COVID-compliant. The logistics technology to manage this new paradigm, and to help recover/maintain/grow farming productivity levels, does not yet exist.
- \* 60% of farms do not keep digital reports (Agrimetrics, 2020). Most farms use spreadsheets and manual records for this extra burden and, should a COVID outbreak occur, whole farms would need to be shut down, which prevents the time-sensitive crop being harvested and would potentially have a catastrophic impact on the business.
- \* Teams of 40 are a traditional average to be operated by 1 supervisor in the fields. COVID requirements have led to a reduced quantity of workers in each team, requiring more supervisors, leading to less efficiency/productivity. Farming operations are under huge pressure from supermarkets to produce more food, from the same land, for the same cost; but costs continue to rise, and running an efficient business is critical to sustainability.
- \* This leads to potential increased commercial unsustainability of farms, job losses in rural communities and disruption to UK food supply chain (NFU et al, 2020).

We will build a unique web and smartphone application. This product allows an employer to manage their workforce on farms in a COVID-safe way, without the extra administration burden and providing extra technology to increase efficiency, even on pre-COVID levels. Any induction and training which does not require face-to-face interaction will be provided in a self-service mobile app. Accommodation is allocated and recorded, and small teams of workers are created and tracked using 'households' by accommodation. Workers will be provided with a mobile app which includes automatic track-and-trace technology whilst on the farm, enabling swift control of small cells and avoiding complete shutdown if a COVID outbreak occurs.

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MULTUS BIOTECHNOLOGY LIMITED	Proliferum M: Reinventing growth media for the cultivated meat industry.	£140,041	£112,032

Current animal agriculture is highly unsustainable, it is one of the biggest contributors to climate change and has a significant resource uptake. Furthermore, global meat demand continues to increase at 3% per year.

Current methods of meat production must be changed in order to prevent the impending global food crisis and hinder the further progression of climate change. The concept of reducing meat consumption in order to reduce the climate impact of agriculture has been around for a long time. Many people have decided to become flexitarian, vegetarian or vegan fueled by the success of plant-based meat replicas such as Beyond Meat and Impossible Foods. However, many people still struggle with eliminating meat from their diet because meat consumption is a part of their culture, and thus cannot easily be changed.

Cultivated meat is the food of the future and companies are making this meat because it means we don't have to slaughter millions of animals every year to meet our growing demand for protein. It is also healthier, requiring no antibiotics and grown in a sterile environment without contaminants. But most importantly, cultivated meat is going to be one of the most powerful ways to mitigate the ongoing climate crisis. Growing meat this way releases up to 87% fewer greenhouse gases than conventional meat and uses just a fraction of the land and water.

The key challenge holding back this entire industry is the cost of feeding the cells, where over 80% of production costs come from the growth media alone. Current solutions we're never designed for the food industry, for example, animal-derived blood serum is often used in biomedical research to grow cells, which goes totally against the ethical and sustainability aspirations of the cultivated meat industry.

We are reinventing growth media specifically for the cultivated meat industry. During this Project, we will develop MediOP - a novel way to optimise growth media to achieve high performance across multiple stem cell types. MediOP will be used to develop Proliferum M - growth medium designed for growing cow and pig cells, which we test and validate with prospective customers. Through developing a replacement for expensive, animal-derived feed ingredients, our technology will shorten routes to market, lower entry barriers, and provide a collective benefit to the cultivated meat industry. But most importantly we will be accelerating the forefront of an industry that will replace the devastating impacts of livestock agriculture.

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RAYNESTORM LTD	FHOSS Hospitality Smart Field - Intelligent signage and people movement to maintain social distancing	£99,611	£79,688
REGENCY PURCHASING GROUP LIMITED		£19,026	£15,220

Hospitality - -restaurants, pubs and hotels -- is set to suffer a 31% contraction in economic activity this year, due to the Covid19 pandemic. 90% of businesses were forced to close. Since re-opening, many have used outdoor space to effect social distancing. However, with cooler weather and darker nights on the way they must now use indoor space as safely and efficiently as possible.

Businesses need to manage the paths that customers and staff take through their premises and highlight the importance of maintaining distance between individuals. Many are using adhesive signage to do so. However, they cannot easily adjust this once placed. Operators cannot change their premises' layouts to accommodate different groups of customers. Some may need extra space due to poor mobility or for pushchairs and highchairs. Many signs rapidly wear and look shabby, leading would-be customers to go elsewhere. When operators do replace or remove signs, they are faced with extra staff costs to clean residues left behind. There is also environmental impact from harsh chemicals used and in repainting costs. In extreme cases, flooring must be replaced, further adding to the 600,000t of commercial flooring waste produced in the UK each year.

Our vision is to adapt projected lighting technology, developed for use in construction and warehousing, to hospitality. We will combine this with Bluetooth beacon technology to produce exclusion zones around groups of customers to enable social distancing. In this project, we will produce a proof-of-concept demonstrator. Following a further three months of development and integration, we will be ready to launch a product offering the following advantages to hospitality businesses:

\\*Easily adjustable signage; no need for staff to move adhesive signs

\\*Aesthetically pleasing, presenting a welcoming ambience to customers

\\*Integration with smartphone apps for staff and customers to manage social distancing

Several trends, many related to the Covid emergency, have created our market opportunity. Mid-priced restaurants are losing ground to food halls and night markets, where multiple traders in the same venue use common apps to display menus. Many consumers thus accept mobile apps as a modern way to view menus, order food and pay in restaurants. Hard-copy menus and non-contactless payments present a means for Covid19 transmission. This has provided further impetus for consumers to adopt restaurant app technology. Our current route to market is thus to integrate with a restaurant app provider and hospitality suppliers. Our project partner, Regency, supplies to \>3000 hospitality businesses (including hotel groups and restaurant/pub chains). Within five years, we predict an extra £1M EBITDA from selling to 10,000 hospitality businesses.



Competition Code: 2010\_COVID\_SIF\_TF\_R3

Total available funding is £10.9m

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
ENVIRUP LIMITED	Innovative insulation system for large scale greenhouses to cut CO2 and increase productivity	£108,250	£86,600
CROP HEALTH AND PROTECTION LIMITED		£17,821	£17,821

Agriculture produces 9% of the UK's greenhouse gases (GHG) and over 30% of GHG globally. With growing population and stark logistical limitations created by COVID-19 the nation needs greater agricultural independence and to reduce the sectors energy needs and carbon emissions. Large-scale commercial greenhouses, especially those with precision technologies (CEA), allow greater productivity of fresh produces and have potential to increase the UK domestic production, but these systems have a high initial capital investment and operations costs, which can result in variable economic return-on-investment and low margins.

The Envirup insulation technology addresses the need for sustainable recovery with a novel design for energy-efficient cost-effective greenhouses. An initial assessment of the innovation was conducted by the University of Wolverhampton's Built Environment Climate Change Innovations (BECCI) initiative using software-based model (WUFI Plus). They concluded that the Envirup insulation system rate of heat-transfer (Uw value) of 2.7 compares significantly better than 5 for glass and 4.8 for multi-wall polycarbonate greenhouses. This could increase the growing season by 11% and reduce energy costs by 10%. The reduced running costs will increase economic return-on-investment in new greenhouses and leverage development and uptake of new precision-technologies increasingly being evaluated for use in this sector, and increase the range of crops grown in greenhouses.

The rigid structure of the panel, made from easily recyclable polymers, requires significantly less of the aluminium framing required by glass and polycarbonate sheeting, the product allows in more light and reduced construction costs and more secure walling to withstand challenging weather conditions.

This innovation could unlock the growth of low carbon, low energy, highly efficient large-scale greenhouse-based UK agriculture, including Controlled Environment Agriculture (CEA) systems. In addition to helping the UK to increase domestic production of fresh vegetables and fruits and reducing the seasonality of the sector, this innovation seeks help reduce the environmental footprint of greenhouse-based agriculture around world to tackle the sectors contribution to global CO2 emissions. Increasing local production will also reduce the need to transport fresh produces across the planet, and reduce emissions from cold storage and transportation too, as well as answering retailers and consumers concerns with food provenance and 'low food-miles' products.

This project brings together the innovator, industry specialist, system manufacturers and consumer perspective to carry out detailed feasibility study, define attractive business model, technical design set, carry out further software modelling and set the foundations for a UK and international commercialisation plan.



Competition Code: 2010\_COVID\_SIF\_TF\_R3

Total available funding is £10.9m

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
CURTIS ANALYTICS LIMITED	Reduction of acrylamide formation UK global policy	£65,006	£45,500

Acrylamide formation in food is a problem recognised by the food industry. The imminent enforcement of EU legislation may lead to significant loss of EU markets to UK goods. Acrylamide is found in groups of commonly consumed foods including baked and fried potatoes, bread, breakfast cereals, coffee and baby food, and is a result of the Maillard reaction between free asparagine and reducing sugars present in raw ingredients, which occurs during cooking. In recent studies, the extensive contribution of acrylamide associated mutagenesis in human cancer has been identified.

The Commission Regulation (EU) 2016/2158 established mitigation measures and benchmark levels for the reduction of acrylamide levels in food. It also highlighted compulsory codes of practice and forces all food businesses to monitor the levels of acrylamide in their products, keeping records of the mitigation measures they apply.

To respond to the elevated levels of acrylamide in foodstuffs in the UK, this project will develop a novel test for acrylamide which will result in a faster and cheaper test than those currently available. In addition, Curtis Analytics will provide three months of free testing (\*\*600\*\* samples) to the most COVID-impacted food manufacturers. This will give Curtis Analytics the baseline data to be able to form acrylamide mitigation advice specific to the food type and origin. The data will also allow us to verify the novel analytical method.

This project emerged as a direct result of COVID19 restrictions having a direct effect on Curtis Analytics services. The new technology would allow Curtis Analytics to keep providing services independently of other larger institutions should the UK enter further COVID19 restrictions.

This project will result in a novel method for acrylamide testing which will then be subject to UKAS ISO-accreditation, giving our clients confidence in the services we provide.

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Competition Code: 2010\_COVID\_SIF\_TF\_R3

Total available funding is £10.9m

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
VALLA LTD	Reduce employment tribunal backlog with data tools for lawyers	£109,387	£87,509

COVID-19 has devastated the UK employment market. As of August 2020, [106,319 people have lost their jobs as a direct or indirect result of the pandemic][0], and unfortunately the cuts have not always been fairly distributed. TUC found that [one in four pregnant women and new mums][1] have experienced unfair treatment or discrimination at work during the pandemic, including being singled out for redundancy or furlough. Another survey found that a staggering [58% of BAME employees][2] have had their work affected by the pandemic, compared to 47% of white employees.

Unfortunately, there is little support available for workers who want to understand or use their legal rights. [ACAS has reported][3] that calls to its redundancy line tripled across June and July 2020\. With a lack of funding alongside this surge, [Parliament has heard][4] that "the entire not-for-profit legal advice and rights sector is at risk \[of collapse\] right now"

When an employee tries to make a tribunal claim, they now face a huge barrier: the backlog of employment claims has risen by 50% during COVID to [40,000 cases][5], forcing employees to wait 12 to 24 months to get even an initial hearing in court.

The worst is yet to come: with a potential [4 million job cuts][6] looming and the current systems buckling already, there is a rapidly growing emergency of access to basic legal rights for millions of UK employees.

Our project directly addresses this growing emergency - our innovative technology scans tens of thousands of employment tribunal cases, using AI to extract critical award and legal data, then provides both a data platform and decision analytics tools for the legal market to use. This product will save significant time per case, reduce unconscious bias in the settlement process, and will open up an unprecedented new opportunity to provide high-quality, low cost legal advice tools for the [32.9m Britons in work][7].

- [0]: https://www.cityam.com/hollowed-out-which-uk-companies-have-made-job-cuts-during-the-coronavirus-pandemic/
- [1]: https://www.tuc.org.uk/research-analysis/reports/pregnant-and-precarious-new-and-expectant-mums-experiences-work-during
- [2]: https://www.turn2us.org.uk/About-Us/Media-Centre/Press-releases-and-comments/BAME-workers-take-biggest-financial-hit-from-coron
- [3]: https://www.bbc.co.uk/news/business-53644103
- [4]: https://committees.parliament.uk/publications/1681/documents/16439/default/
- [5]: https://www.lawsociety.org.uk/campaigns/consultation-responses/beis-proposals-to-better-equip-the-employment-tribunal-for-current-and-future-challenges
- [6]: https://www.mirror.co.uk/money/citizens-advice-taking-redundancy-calls-22321114
- [7]: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/employmentintheuk/january2020



Competition Code: 2010\_COVID\_SIF\_TF\_R3

Total available funding is £10.9m

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
PERSEPTIVE LIMITED	GreenCare: Decarbonising the NHS through digital transformation of older adult health and social care	£103,851	£83,081
University of the West of England		£34,362	£34,362

COVID-19 has had an unprecedented impact on the health and social care sectors, increasing social isolation amongst older adults and disabled people, particularly within ethnic minority and deprived communities, and providing good care in this situation is challenging. Repercussions from the pandemic include reduced face-to-face consultation, neglected chronic disease management and non-COVID emergency admissions, and severe backlog on resuming normal service. This disproportionately affects healthcare access for older adults and minority groups, who are now at even greater risk of succumbing to ill-health, through accelerated functional decline, leading to falls, which are the leading cause of accidental deaths in seniors costing the NHS a staggering £2.3Billion each year.

The NHS contributes 6.3% of the UK's carbon-footprint (27.1MtCO2e), 24% from buildings and 17% from transport, is the largest contributor of public-sector carbon emissions, and one of the principal targets of the Government's Clean Growth Strategy to achieve Net Zero by 2050\. Hence, COVID-19 has increased the burden on an already overstretched and unsustainable health-service and digital transformation is urgently needed to maintain current care standards in the face of a rapidly ageing population.

There is strong evidence that preventative physiotherapy/exercise interventions in seniors increase disability-free life years by reducing injuries/falls. GreenCare delivers a first-of-a-kind avatar-led interactive remote-physio system. Innovative 3/4D machine-vision biomechanical analysis and class-leading Al algorithms will be used to precisely measure joint position and other postural characteristics, enabling on-demand performance assessment and personalised exercise intervention via a user-led mobile-interface design, sharing data with primary care electronic health records.

GreenCare directly addresses the necessity for remote consultation and proactive care management, minimising infectious disease transmission, helping the NHS to build-back post-COVID in a sustainable manner, prolonging independent living in seniors, whilst decreasing elderly-care NHS costs and entrenched healthcare inequalities. Reducing Face-to-Face outpatient-consultations (£25-£100 and 50KgCO2e per appointment), and minimising avoidable hospital attendances (£1,600 and 380KgCO2e per emergency-admission), through early remote-physic intervention offers potential for overall NHS savings of £1.4Billion and 312KtCO2e---1.2% of NHS 2050 sustainability targets.



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Total available funding is £10.9m

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
MIJIT LTD	BrandForge	£64,740	£51,793
PSYCLE INTERACTIVE LIMITED		£153,859	£123,087

A fundamental building block for every new business is a strong brand identity but creating this in-house is usually far trickier than anticipated whilst hiring a specialist agency is prohibitively expensive for most companies.

COVID-19 has changed the way we work. Given that for the time being at least, traditional face-to-face workshops are an obsolete project delivery forum for brand identity projects, a new solution is required that better tallies with the "new normal" of remote working.

Furthermore, research suggests that a strong indicator of future business success is a registered trademark. Yet, despite its potential value, trademarking often passes smaller companies by.

BrandForge is an affordable online tool that uniquely utilises AI to intelligently generate brand names and logos by learning from existing, historically successful brands. Our interface will enable users to iterate name and logo outputs until a final brand identity design that meets their needs is reached. Trademark and domain name registration services are also provided.

By offering agency-quality brand identities at a fraction of the cost, BrandForge gives companies a great start in life and a trademark protected building block from which they can successfully promote their business.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
INSIGNIA TECHNOLOGIES LIMITED	The Development of Smart Label for the Food Delivery Market	£58,727	£46,981

Like many sectors, the food industry has been impacted by the COVID-19 pandemic. However, Insignia Technologies, experts in smart label technology, are developing innovative smart labels which can add real benefit during these challenging times. This project aims to develop intelligent labels to help ensure food deliveries occur quickly, safely and at the correct temperatures, providing reassurance regarding the quality and safety of the food being delivered.

COVID-19 has significantly changed consumer behaviour regarding how food is purchased and consumed, with more consumers now using online delivery services rather than shopping in-store or dining out. Supermarket deliveries have boomed in 2020, as consumers avoid safety challenges associated with inperson shopping. The trends show many households who previously shopped in-store are now committed online shoppers. Hot food delivery companies have also seen a surge in demand recently as consumers swap dining out for takeaway deliveries.

Growth of the food delivery sector as a result of COVID-19 brings new challenges. It is essential that controls/procedures are in place to ensure deliveries are quick, safe and at the correct temperature. Delays and poor temperature controls during grocery deliveries result in poor food quality and perishable items spoiling prematurely, ultimately leading to food being wasted. With hot food, customers expect their food delivered hot and fresh every time and failure to fulfil orders quickly and efficiently leads to customers receiving unsatisfactory food, again leading to food being wasted. Food waste is one of the top sustainability challenges globally and the UN states that if food waste were a country it would be the third largest greenhouse gas emitter, with the resources consumed producing food that is then wasted having a CO2 footprint of ~3.3bn tonnes. Therefore, it is important that consumers know their food has been stored and transported correctly, and hot food orders have been fulfilled quickly and efficiently, to avoid unnecessary waste.

This project will address this challenge by developing innovative labels for use as a tool to indicate food has been maintained at correct temperatures and delivery has occurred within a set timeframe. Using Insignia's patented sensing technology, labels will be designed to change colour over pre-set timeframes at specified temperatures and, if these temperatures are exceeded, the label will change colour faster. When receiving deliveries, if the label has not fully changed colour then customers know the expected temperatures and delivery times have been met and their food is still at optimum quality. Different label constructions will be tested to achieve a series of time/temperature profiles and the labels will be tested under different conditions to optimise them for use in various delivery settings.



Competition Code: 2010\_COVID\_SIF\_TF\_R3

Total available funding is £10.9m

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
COMPOSITES EVOLUTION LIMITED	Antimicrobial bio-resin composites for rail and aircraft interiors (COATECT)	£57,685	£46,148
HMG PAINTS LIMITED		£42,901	£34,320
Transport Design International Limited		£110,535	£88,428

The COATECT project will explore the feasibility of combining antimicrobial coatings with bio resin-based prepregs, to deliver a new class of sustainable composite materials for use in mass transport interiors, which combine antimicrobial properties with exceptional fire, smoke and toxicity performance.

COATECT we will help the UKs badly-hit rail and air travel industries recover following the COVID-19 pandemic by supporting their efforts to provide safe, COVID-secure services to their customers.

COATECT will also bring significant environmental sustainability and climate change benefits by providing a solution which can: 1) provide significant weight - and therefore fuel - savings when used to replace metal components, and 2) accelerate the phase-out of harmful, fossil fuel-derived phenolic composites and replace them with a non-hazardous, bio-derived alternative.

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects Use the Competition Code given above to search for this competition's results



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
PHASE CHANGE MATERIAL PRODUCTS LTD	Innovative Cold Packs to Minimize Heat Stress for Wearing Personal Protective Equipment in a Health Care Environment (BeCool Pack)	£50,739	£40,592
KMD COMPANY LIMITED		£41,019	£32,816
University of Nottingham		£39,261	£39,261

NHS staff, health and care workers have been working hard to save patients' lives suffering from the COVID-19\. These front-line workers are required to wear, for very long periods, Personal Protective Equipment (PPE) such as masks, aprons and gloves to protect themselves to prevent exposure to virus-carrying droplets or aerosols from infected patients. However, they suffer heat stress and thermal discomfort while prolonged wearing PPE in high-risk enclosed and crowded working environments. Surveys were conducted to report issues with wearing PPE that medical staff experienced, most (82%) said sweat and irritation (73%) presented major challenges, limited use and thus effectiveness. Due to the fabric thermal proprieties of PPE suits and working environments, heat exchange between the body and the environment can be significantly limited or impeded, thus result in heat stress, a decrement in physical performance capabilities and increased risk of heat-stress-related injuries. As the main symptoms of COVID-19 are a high temperature and continuous cough, patient cohorts experience fever, dehydration, and thermal discomfort, this is especially problematic in elderly people with coronavirus in care homes. Moreover, the transportation of COVID-19 patients with high temperatures over long distances can cause heat stress as ambulances are rarely equipped with effective cooling or ventilation systems.

Therefore, it is urgent to provide measures to address the above-mentioned heat stress issues, thus provide better thermal comfort and protection. Cool packs could be an option to lower the body's temperature thus to avoid the risk of heat stress. However, several types of cold packs on the market using phase change materials (PCM), namely ice packs and chemical reactions with slat/fibrous sheet materials. They are not compact to integrated PPE, difficult to operate, rigid/uncomfortable, short cooling time, expensive, poor heat transfer/long freezing time and do not conform to the body of the users. In this project, innovative cooling 'BeCool Packs' is proposed which use a multi-cell bio-polymer structure that contains endothermic composite particles such as urea/ammonium chloride separated from cells that contain water. The cooling is achieved by breaking the seal between the particles and water using hand pressure. As the particles dissolve in the water, heat is absorbed, and a cooling effect is generated. The cooling temperature can be controlled by the user depending on the demand. BeCool Pack can also be made as fast freezing ice packs by placing in a freezer for reuse. The simple and flexible BeCool Pack can be produced in a range of sizes and configurations so that they are appropriate to a range of applications and anatomical placements, such as placed at the back of the neck for body cooling or as a cooling blanket to lower the body temperature for emergency medical settings. BeCool Pack uses safe, non-toxic, degradable materials, which are not harmful to human and the environment in the disposal. BeCool Pack will be designed to reduce user's heat stress and minimal thermal discomfort. Furthermore, BeCool Pack allows local rapid mass manufacture/production to meet the urgent demand to protect health workers and others from heat stress.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
BROADSWORD EVENT HOUSE LIMITED	Virtual First - unlocking events for a sustainable future	£39,698	£28,000
AXIS WORKSHOPS LIMITED		£98,638	£78,910
EVENT MARKETING ASSOCIATION LTD		£9,698	£7,758
GET DICE LTD		£20,000	£16,000
PRIVATE GOODNESS LTD		£11,380	£9,103
PURPLE GOAT SOLUTIONS LIMITED		£15,000	£12,000
REALISEMEUK LIMITED		£18,793	£15,000

\*\*Vision\*\*

Conferences and meetings generate £18.3B annually for the UK economy (BVEP). COVID-19 has been catastrophic.

In conferences and meetings breakout groups are a core part of the agenda. The project will deliver a new Broadsword proposition, underpinned by unique UK-developed technology (Axis) to enable engaging, inclusive and high-impact break-out sessions for virtual and hybrid conferences and meetings. This will:

\\*Reduce the carbon footprint associated with conferences and meetings by enabling full or partial virtualisation and hence avoided travel

\\*Address latent demand for meetings and conferences not met by the high cost structure of live events

\\*Increase event accessibility to those living with a disability, without detracting from the critical need to increase accessibility within physical venues

\\*Increase event inclusion and reduce the impact of bias -- gender, ethnicity -- in breakout events

\\*Substantially increase the quality and quantity of outputs generated driving a bigger impact and return on the investment of attendees' time

\\*Help drive economic recovery for business following COVID-19

Current state of the art for virtual breakouts as part of a conference is the use of video calling / event hosting technology to provide breakout rooms with the ability to share content, discuss ideas and poll, collaborate visually with a digital whiteboard (Miro, Mural, Teams) vote and score (Slido, Mentimeter). There are three key limitations:

\\*The impact of dominant voices and bias and fragmented experience across content creation (digital whiteboard) and voting undermines the depth and quality of the output and prevents every voice from being heard

\\*Manual and tricky process to aggregate the individual breakout outputs into a single useful output that can be shared and disseminated in the plenary following the breakout and after the conference. And hard to understand levels of engagement and participation to inform continuous improvement

\\*Variable quality in facilitation within each breakout group -- highly dependent upon the skills and experience of the facilitator, which impacts output quality and participant experience.

Technical limitations are compounded by the challenge of establishing an appropriate commercial and business model that addresses the near-term virtual need and creates a sustainable engine for growth by addressing latent demand with innovative propositions.

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#### \*\*Innovation\*\*

This project will define the characteristics of effective virtual and hybrid break-out sessions, define a compelling client proposition and commercial model and extend the existing Axis platform for digital collaboration -- creating an events version of the platform -- to make the proposition viable, scalable and differentiated.

To deliver the innovative technical solution will involve applying React Hooks, GSAP and canvases on the existing web-based Axis platform to deliver the enhanced functionality specific to virtual and hybrid break-out groups.

To ensure that the solution fully embodies sustainability and inclusion partners include Private Goodness (sustainability and CSR) Purple Goat (disability) and DICE (inclusion and diversity in events). And to ensure market fit and engagement as key to driving profitable growth the EMA (represent the buyers of virtual / hybrid events with 1,400 members) and Realise (specialists in events consulting and growth).

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Competition Code: 2010\_COVID\_SIF\_TF\_R3

Total available funding is £10.9m

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
THE GLOBAL VEHICLE TRUST	Feasibility study into a UK variant of the OX Zero Emissions Pickup Truck for the Agricultural Sector	£109,971	£87,976
PENSO CONSULTING LTD		£218,400	£173,883

This project will enable the UK agricultural & land-use sectors to "build back better" from Coronavirus and expand automotive R&D in the Midlands.

This will be achieved by establishing the technical feasibility and commercial viability of bringing an electric OX truck, e-OX, to the UK market. The e-OX is an off-road capable, high payload, zero-emissions light truck; a sector \*\*world-first\*\*.

For agriculture the e-OX will:

- \* Reduce vehicle emissions by 4.3Mtonnes of CO2 lifetime within 5 years
- \* Increase productivity through increased payload offsetting labour shortages due to Covid-19 and Brexit
- \* Reduce vehicle fuel and servicing costs by up to 80% p.a. improving farm viability
- \* Reduce dependency on oil, exposure to fuel price fluctuations and need for diesel subsidies

For GVT the project will add a new high-revenue market increasing the profitability of an innovative UK manufacturing and service business. For Penso it will bolster R&D.

\*\*Context\*\*

GVT is a start-up founded by a UK charity to provide affordable transport in the developing world. GVT commissioned automotive designer Prof. Gordon Murray to create an all-new vehicle designed specifically for low-cost transportation of heavy loads on dirt roads.

Four diesel prototypes have been built and tested. At a major farming show, OX generated huge interest due to the high load capacity, and the simple, adaptable design.

However, the OX was not designed for the UK market, to offer it here will require engineering changes to meet UK emissions and safety regulations.

GVT are currently investing \>£1m in developing an affordable electric powertrain which will enable zero-emissions.

This project will build on this by supporting the R&D necessary for UK safety regulations and building the commercial business case.

It will enable the decarbonisation of agricultural transport by offering a more capable AND zero-emissions alternative to the pickup trucks found on most UK farms.

\*\*Vs a Toyota Hilux e-OX offers:\*\*

\* 80% lower operating cost

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- \* 260% larger loadspace
- \* 50% larger payload

In this project, GVT will collaborate with Penso, a leading engineering consultancy and will seek agricultural context and knowledge from Harper Adams University (HAU) to:

- \* Confirm the feasibility of creating a UK e-OX variant capable of meeting UK safety regulations
- \* Develop a new compliant cabin design
- \* Study the use of additive and composite technologies to deliver low weight and minimise investment.
- \* Conduct in-depth market research into the agricultural sector demand
- \* Develop a clear business case and route to market strategy

This project will pull forward R&D on a UK variant of the OX by a minimum of 2 years and enable the project partners to secure commercial funding for production by reducing investor risk.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
CITY SCIENCE CORPORATION LIMITED	Zero Carbon Mobility Exchange	£99,225	£79,381

\*\*PROJECT CONCEPT:\*\* Influencing positive travel behaviours to help decarbonise while providing an enhanced user exprience will be essential to enabling a shift to more sustainable, low carbon modes. With traffic back to 95-100% of pre-COVID levels this will be especially true as we emerge from the COVID-19 pandemic.

Our proposal develops an optimisation and exchange engine to underpin payment incentives to prioritise sustainable modes. We will enable this by developing an offsetting / "green miles" solution tailored to incentivise low carbon behaviours in the transport sector.

The solution will be a world-first to seamlessly integrating:

- \* All (nationwide) public transport options
- \* National micro-mobility options using MDS
- \* Mode-choice modelling
- \* Carbon accounting and
- \* Cutting-edge optimisation techniques developed with the University of Exeter.



Competition Code: 2010\_COVID\_SIF\_TF\_R3

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
CATAGEN LIMITED	DRIVE CYCLE EMISSIONS SIMULATION FOR AIR QUALITY IMPROVEMENT	£217,952	£174,360

COVID-19 is having a devastating effect around the world with over 32million confirmed cases and over 980,000 deaths to date and rising daily according to the WHO. Air pollution is known to weaken the immune system, compromising the ability of individuals to fight off infection. A recent study on Covid-19 found that "people who have been living in places that are more polluted over time are more likely to die from coronavirus", as the virus is particularly deadly when it attacks the respiratory system.

Economically the pandemic has also had a devastating effect with major economies in lockdown for many months. With Government advice to people to "Stay at Home" and only undertake essential travel, the effect on the automotive industry has been particularly devastating. The consequence of this is reflected in the number of new car registrations which, for example in the UK alone, were 51.4% lower at the end of May 2020 compared to the same period last year after a 97.3% and 89% reduction in new car registrations in April and May respectively as the effect of the pandemic took hold.

Vehicle manufacturers (OEMs) are therefore cutting jobs and have reduced budgets for new vehicle development and are critically looking to reduce development costs of new vehicles whilst improving vehicle emissions. We aim to address this need by using our proprietary toolset to develop a new full drive cycle WLTC (Worldwide harmonized Light vehicles Test Cycles) test that provides them with a more accurate data set using a test that is more repeatable, at a reduced cost and in a shorter timeframe, leading to better even cleaner new vehicles being developed.

This project can improve the UK's competitiveness in this international market and in doing so, we can make further positive changes to the way in which vehicles are developed, de-carbonising the process and improving air quality for the benefit of all.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
LYTEGRO LIMITED	Production, formulation and consumer testing of an organic extract of waste bananas which boosts the efficiency of distilling and brewing fermentations	£50,426	£40,340

Lytegro makes Baclyte - a patent-protected extract from waste bananas which sends bacteria and yeast crazy. It increases end product yield for distillers by over 20% and halves the amount of yeast or reduces the time needed to produce beer. This project will facilitate the production of samples of our Propagreater product (a 5x concentrate of a common yeast culture media and Baclyte) which is used as a simple supplement to treat brewing or distilling yeast prior to its addition to the production fermentation. These samples will then be trialled at full-scale by 5 UK distillers and 5 UK breweries to determine the scalability of the effects that we have seen with Propagreater at laboratory-scale.

Successful trials will result in Lytegro generating precious end-user validation data which can be used to enhance our patent portfolio and will hopefully lead to us gaining our first commercial orders from the companies that are participating in our trials. We project that users can generate £1m profits for every £200k of Baclyte purchased - this project will help to demonstrate and quantify these economic benefits for future marketing of our Propagreater product.

The Waste and Resources Action Programme (WRAP) reported that there are 1.4 million edible bananas thrown away daily in the UK - which accounts for 83,000 tonnes of avoidable waste. By extracting value from and in reducing this waste stream we will see less material go into landfill. In the near future we expect to be using our Baclyte waste banana extract to increase the efficiency and speed of anaerobic digestion - a sustainable process for deriving value from waste biomass by generating green energy and reducing organic landfill waste.

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Competition Code: 2010\_COVID\_SIF\_TF\_R3

Total available funding is £10.9m

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
DATAQUBE GLOBAL LTD	Thatch Connect Extension	£217,609	£174,087
PRISM POWER LTD		£225,176	£175,000

Project description - provided by applicants
ThatchConnect is an innovative 5G edge solution that will reduce connectivity and latency issues in rural communities, the project delivering the first integrated prototype combining both 5G connectivity optimised for rural deployment and energy efficient data processing. The project will also create the world's first dedicated energy efficient 5G edge solution which can form the basis for a range of similar modules for the global market. Dataqube Global Limited and Prism Power Limited will create a production-ready solution ready to go to market a few weeks after the project close.

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Competition Code: 2010\_COVID\_SIF\_TF\_R3

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
LatchAid Ltd	LatchAid: A Smart, Accessible, and Scalable Solution to Support Women's Breastfeeding and Early Motherhood Journey	£79,318	£63,454

The breastfeeding support sector has been paralysed by COVID-19\. Face-to-face support can barely reach mothers due to social distancing measures. Postnatal support from the NHS staff, commissioned support is reduced to minimum, mainly phone-calls / leaflets. Breastfeeding peer-to-peer support groups were shut-down nationwide, with few replaced by on-line meetings. A UK-wide survey shows 81% of women felt they were not getting sufficient breastfeeding support due to social distancing measures; 75.3% felt isolated; and 58.2% felt their breastfeeding journey was negatively impacted because of COVID-19\.

The UK already had the worst breastfeeding rate globally. The pre-existing breastfeeding support system was patchy, unscalable, and reliant on face-to-face delivery. Research shows 90% of mothers gave up breastfeeding before they wanted to. Top challenges mothers faced are: lack of health professional support (57%), pain, health issues (55.8%), and feeling of isolation/depression (46.1%).

Using digital solutions to deliver breastfeeding education and support is urgently needed. LatchAid's Beta mobile app has been co-designed/co-developed with top infant-feeding experts and commended as a revolutionary, much-needed innovation by users across 6 continents. This project aims to expand/enhance our R&D in four game-changing areas to deliver personalised, accessible, 24/7 digital breastfeeding education/support/communities at scale.

- 1. \*\*Accurate, Diverse 3D Breastfeeding Animations and Augmented Reality\*\* enable users to interactively, immersively learn vital breastfeeding positions/skills from 3D animated characters in anatomical views, flexible camera angles, and AR mode. Virtual characters have customisable breast shapes/sizes, skin colours for inclusion and diversity.
- 2. \*\*Scalable, Robust, 24/7 Virtual Breastfeeding Support Groups\*\* digitally replicate real-life peer-to-peer support groups accompanied by qualified experts. We will focus on scaling the system to manage thousands of virtual support groups globally, concurrently by leveraging human experts and virtual supporters powered by Artificial Intelligence. This also includes automatic moderation; automatic escalation for physical/emotional issues detected in conversations; and Al/virtual supporter's ability to discern users' intents with sensitively-worded/evidence-based responses.
- 3. \*\*Comprehensive AI Knowledge Base\*\* we are evolving a deep neural network to cover breastfeeding, infant-care, and maternal health domain knowledge to answer users' questions 24/7 via an interactive chatbot.
- 4. \*\*Personalised Al-based Virtual Supporter\*\* models a variety of virtual supporter persona (i.e. fixer, empathy) to interact with different users differently based on their needs, personalities.

Breastfeeding organisations, professionals severely disrupted by COVID-19 pandemic can resume service delivery using LatchAid as a remote support tool. LatchAid's AI virtual supporter can triage and resolve over 80% of users' questions/concerns using neural networks. More complex issues can then be handled by healthcare, breastfeeding support professionals digitally. These responses are used to train the AI virtual supporter to improve its effectiveness, robustness continuously. This innovation not only helps the breastfeeding support sector recover but also helps it transit to a digital new era where peer-to-peer and professional support can be delivered 24/7, at scale.

Increased breastfeeding rates will bring significant socio-economic, environmental benefits by tackling health inequalities; improving immunity, well-being, and life expectancy of mothers and babies; and significantly decreasing costs, carbon emission from unnecessary hospital trips/treatments and from mass

formula milk production, packaging, distribution, and consumption.	

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
ENTRUST SMART HOME MICROGRID LTD	Smart home EV charger based on Entrust Smart Home Microgrid	£125,427	£100,342
Cranfield University		£48,155	£48,155

This project will develop a smart home EV charger, supplying both AC and DC power for EV owners to charge from home. For those properties with off-street parking and rooftop solar PV installation, the smart home EV charger, will boost the smart home power (microgrid) system performance, reduce the microgrid system cost and maximise user's benefits from both the smart EV charging and smart home microgrid with solar PV power generation.

In addition, the project will develop an EV user's smartphone App and associated cloud-based management system to aggregate and manage users' resources, including electric vehicles, to enable users to participate in the electricity market in a collective manner so as to further enhance user's economic benefits, whist also providing the grid with load balancing services and support for the grid.

The project will have a major impact on the uptake of zero emission vehicles because the innovation will enable EV charging directly from solar PV power at the highest power efficiency, enable EV's in the home to provide grid ancillary services, both balancing the electricity grid and improving the grid operation efficiency.

The project will play a key role in facilitating road transport electrification, domestic home solar PV installation and smart home microgrid implementation. Reuse of after-service or end-of-life EV batteries in the smart home microgrid, and therefore will have very positive environmental impact through carbon emission reduction and air quality improvement. The project will generate and safeguard jobs and benefit the UK economy, have major impact on the electricity grid infrastructure planning and operation, facilitate time-of-use electricity tariff.

The project brings together UK's leading expertise in smart EV charging and smart home energy management from both industry and academic sectors and will generate first-hand education materials, and knowledge transfer for universities/colleges and students to further facilitate the interest in and uptake of both zero emission vehicles and domestic solar PV systems.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
VIALOG LTD	A Unique Collaborative Asynchronous Video Discussion Tool for Universities for Flexible Online Teaching Interactions.	£91,474	£73,179

Project description - provided by applicants
Vialog will deliver a collaborative asynchronous video discussion tool to assist universities in delivering courses online in a way that closely resembles face-to-face learning. Vialog will improve the learning experience for students and the teaching experience for lecturers because it will allow students to ask questions by uploading video comments and allow lecturers to respond to the whole class. Vialog is led by David Sarlos, Tamas Turcsanyi, experts in VOD and digital products. By enhancing the engagement of students in online learning, this project will prevent the loss of university admissions.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
ARCOLA ENERGY LIMITED	Innovation in control systems for zero emission refuse collection vehicles	£194,164	£155,000

Arcola Energy is a leading business in the development of fuel cell electric powertrain systems and integration into heavy duty vehicles. Our powertrain platform is integrated and optimised from tank-to-wheels to provide leading power delivery and energy efficiency.

This project will develop innovative control systems for energy management for zero-emission refuse collection vehicles. The project will develop a deep integration and optimisation of the RCV body and chassis systems into the Arcola Energy powertrain to deliver a zero-emission RCV product with best possible safety, efficiency and reliability

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
BETA BUGS LIMITED	Go forth and multiply: Developing the blueprint for Black-Soldier-Fly genetics scale-up	£51,067	£40,853

This project will develop a black-soldier fly multiplication facility that will supply continuously improving high-performance genetics to insect-as-feed producers globally.

Livestock and aquaculture protein demand is increasing due to human population growth, yet current production depends on volatile and unsustainable soy and fishmeal imports. An alternative source of protein for livestock and aquaculture feed are insects, which are rapidly growing in importance globally. Today there are 55+ black-soldier-fly producers in the UK, Europe, the Americas and Asia. Market calculations predict 300 production facilities worldwide by 2025, with a capacity of 10,000 tonnes of insect protein/yr and £2.1B/yr revenue. Black-soldier-fly producers need high-performance genetics because production facilities are capital intensive. However, black-soldier-fly producers do not have breeding resources and expertise to develop high-performance genetics, while there are no suppliers of such genetics (breeding programs).

The objectives of the project are to develop the blueprint for a black-soldier-fly multiplication facility by conducting operational, technical and commercial analyses of the scale-up process.

The project will deliver the objectives by using the in-house expertise of BetaBugs, coupled with sub-contracted inputs from sector specialists. This will establish the blueprint for a facility that will process food waste to produce live larvae for distribution, leading to company growth and further economic and environmental benefits to the wider agribusiness sector through sustainable local production of protein and new jobs. These benefits will in turn increase the efficiency and resilience of production feed and food and with that address the challenge of cleanly feeding a growing population.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
CODEGATE LIMITED	Fully Autonomous Unmanned Store with Reduced Carbon Footprint	£75,120	£60,095

The 'G1 Store Panel' is a new way of creating a fully automated unmanned store that's open for business 24 hours per day, 7 days per week. Launched in 2019, it can be supplied flat pack, quickly built into any standard shipping container and be fully operational within minutes of being powered up. No store person required, no social interaction, reduced risk of exposure to contamination. Access to each store is restricted to personnel issued with unique identification, and with one person accessing the store at a time, any risk of viral infection is greatly reduced in comparison with a depot visit. Stores can contain any mix hire equipment and supplies. Using passive UHF RFID technology in a revolutionary way the store does not have a manual check-out out, but records every transaction and maintains inventory accuracy above 99 percent. Transactions are recorded against each individual. Using a secure web portal, store managers can view details of every transaction, what the inventory levels are in the store, which items are fast moving or have never been transacted, and what is the utilisation of hire items. That gives them the ability to adjust inventory to suit the customer and local requirements.

Containerised stores can be quickly deployed close to any point of activity, for example a construction site or rail siding. Currently, external mains power must be supplied to the unit, restricting where it can be located. This project is to research and develop wind, solar and replaceable battery power unit options so that stores can be deployed anywhere where a delivery vehicle can gain access. This fully autonomous store will provide 24/7 availability even in the darkest winter months.

Since stores can be deployed right to the point of activity, users save time and money not having to travel to remote depots for goods, significantly reducing the carbon footprint of the operation. Since all transactions are recorded against individuals, making them more accountable, damage to tools and assets is dramatically reduced, cutting the level of contingency costing required for a project. For the store provider the always-accurate automated inventory system improves stocking efficiency, reduces waste and can reduce administrative overhead by delivering a single itemised transaction bill per month instead of multiple paper based transactions.

Smart shelving will also be developed as part of this project, removing the need for small or low cost items to be tagged. This will reduce the number of single-use RFID tags used, and reduces the need for single-use plastic packaging on individual items.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
1796 Ltd.	Novel NLP led communications insight and coaching technology for remote sales professionals in regulated industries.	£186,000	£148,799

We are building a platform to support the future of work. The new reality we all live in is one where remote working from home is necessary to safeguard health and wellbeing of employees. As a result, some employers have already adjusted to a permanently remote workforce.

We are building technology to support this transition, particularly for teams leading the growth and survival of companies the world over - revenue teams. Our project supports the new range of management challenges that have emerged in a Covid-19 impacted world, by applying natural language processing to create a coaching and insights focused technology for sales teams.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
DOMEBLE LIMITED	Research on totally immersive real-world scenes, with dimension depth through true parallax vision	£157,921	£126,336

Domeble is a premium Rights Managed stock library for photographic backplates, 360° HDRI domes and VR environments, tailored towards the automotive and product visualisation sectors. High-dynamic-range imaging (HDRI) is a high dynamic range technique used in imaging and photography to reproduce a greater dynamic range of luminosity than what is possible with standard digital imaging or photographic techniques, and it is this process that enables 3D CAD data to become photo-realistic when textured. As experts in CGI, 3D and VR production, we work with advertising agencies, manufacturers, creative production studios, and artists in producing creative and technical solutions that showcase leading brands and products. Our professional quality imagery is captured and curated to make building beautiful campaigns enjoyable and easy. From early stage visualisation to global billboard campaigns to immersive tech, our specialist imagery is utilised at the forefront of innovation.

This project involves creating ground-breaking immersive VR content that will enable a step-change in the car pre-sale/sale process, and in the longer term benefit car design, enhance automotive design education and potentially many other industries that will also exploit these real-world immersive experiences.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
VAMSTAR LIMITED	Framework for tracking and enhancing sustainability and diversity in healthcare procurement in light of COVID-19	£65,655	£52,458
University of Nottingham		£27,945	£27,945

The COVID-19 pandemic has highlighted the fragility of our healthcare supply chains and exposed our over-reliance on certain countries or regions to ensure supply chain security and sustainability. This has led to massive shortages of goods and services across our healthcare system and has hampered our ability to deliver care when and where it is most needed. The Global-Value-Chain (GVC) framework which has guided the supply chain design in the last two decades has unlocked tremendous trade and benefits to our healthcare ecosystem and society. However, under the lens of a global demand shock and supply shortages, it has shown the weaknesses of just-in-time (JIT) business model that prioritises low-cost foreign-made products, with a focus on reduced inventories to minimise operating costs, while ignoring sustainability and environmental impact.

In the UK, the NHS's existing solutions for supplier selection use GVC framework and subjective assessments of a narrow range of supplier variables and manual analysis of non-real-time internal supplier data to guide selection decisions. To better prepare the NHS for the emerging COVID-19 wave and help prepare the system for post-COVID recovery, Vamstar will leverage data-science and deep learning to create a multivariate diversity-scoring-and-assessment framework to incorporate supplier diversity, supply chain security, and environmental sustainability criteria in the supplier selection mix. This will ensure that the NHS has a capacity to manage the supply risks during COVID-19 using a more integrated framework while creating a sustainable pathway for post-COVID recovery. Moreover, by incorporating environmental sustainability related variables, such as emissions reductions, the UK government and the NHS will be able to provide the first working industrial framework to meet the net-zero emissions target while ensuring supply chain security, sustainability, diversity, and stability.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
ALDGATE EAST TECHNOLOGIES LTD.	An Innovative Platform Designed to Build Internal Communication and Organisational Trust for Deskless Employees by Giving Them an Opportunity to Express Ideas and Thoughts Anonymously	£169,320	£134,470

Aldgate East Technologies Ltd (Aequip) is a rapidly growing UK-based SME operating in the HR tech sector. It is seeking funding to develop an innovative analytics and nudge engine to inform an existing mobile app prototype to actively improve internal communications and trust within organisations. This technology will support improvements in innovation and employee feedback by as much as 64% (Aequip, 2020), especially for deskless workers, and will improve inclusion in companies by allowing all employees to express themselves without fear of repercussion. This is particularly pertinent in light of ongoing COVID-19 dispersed working practices.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
AGUA DB LTD	NTPlus - developing the circular economy in agriculture	£74,370	£59,465
CARBON DATA RESOURCES LTD		£10,302	£8,242
CROP HEALTH AND PROTECTION LIMITED		£9,770	£9,530

This project demonstrates the recovery of nutrients from water, decreasing agriculture's dependence on the Haber process for nitrogen fertilisers and the Mannheim process for sulphate fertilisers, helping agriculture move towards net zero. This has the potential to revolutionise nitrate removal, which is carried out where nitrate levels are above safe levels. Nitrate pollution of ground water occurs in regions of intensive agriculture and treatment uses large quantities of salt, producing a brine nitrate waste stream which often has to be tankered to a large waste water treatment works. The salt regenerates the ion exchange resin used to remove nitrate, but the process is typically ~10% efficient. This is an expensive process: in the UK, the structure of the water industry enables the capital and operational costs of plants to be spread over a large customer base, but, in other parts of the world, the water industry is fragmented, prohibiting the wider use of nitrate removal. For example, in the Central Valley in California, over 200 small community water systems have consistently exceeded the maximum nitrate level for over a decade, without a single treatment system being installed.

Most nitrate treatment sites have adjacent farmland - and the farmer applies potash fertiliser, potassium chloride, out of season so the chloride is washed away before the crops are planted. This project will demonstrate regeneration of the ion exchange resin at close to 100% efficiency, producing low-chloride fertigation products containing potassium, sulphate, nitrate, calcium and magnesium, as well as natural fulvic acids (scavenged by the ion exchange system) which improve soil condition and are involved in the transportation of trace minerals in soils. These could be used by a nearby farm in smart (variable rate fertilisation) irrigation, and could become a new product for existing fertiliser manufacturers, enabling them to ship solid complementary additions and make up the liquid products on the farm.

By encouraging the uptake of smart irrigation in the UK, crop yield gains of 10% would be regularly achieved, along with more efficient use of both fertilisers and water. Irrigation use is increasing in the UK to ensure increased resilience to climate change, particularly where irrigation water storage is used, facilitating winter abstraction and the potential to use such facilities for flood mitigation. The amount of nitrate already present in the Vadose layer is substantial (BGS estimate 600 - 1,800M te) and is seen as a 'timebomb' for water sources.

This project turns this problem into a sustainable solution. The products produced have a greater value than the raw material inputs, which enables the potential for exponential growth. Globally, 90 M te of potash is used annually in agriculture. If 10% of this were used to recover nutrients from water, this would reduce chloride inputs to soil and fresh water systems by over 20 M te and reduce CO2 emissions by over 30 M te, with nearly 1,000 M te of CO2 captured in additional crop production.



Competition Code: 2010\_COVID\_SIF\_TF\_R3

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
EXII LTD	An Inventive Business Intelligence Group Providing Sustainable Growth Recommendations for UK Commerce SMEs, Potentially Adding £1.05b to the UK SME Commerce Economy Annually.	£96,600	£77,278

The COVID-19 pandemic has had a deleterious impact on UK commerce SMEs. Thousands have permanently closed, costing more than 32,000 jobs. This trend will continue unless action is taken. At present, there is no tool that businesses can use to determine innovative growth strategies for difficult business climates. Serial entrepreneur Arun Sharma and data scientist Khalim Conn-Kowlessar make up the core project team of Exii, a rapidly growing UK Business intelligence (BI) SME. Exii aims to develop a sustainable growth recommendation engine that will solve this substantial, unmet, sustainable innovation need. Exii's system will not only save thousands of UK commerce SMEs but could also add £1.05b to the UK commerce SME economy annually -- generating a year-5 post-project revenue of £15.8m.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
BRIDGE HOUSING SOLUTIONS LIMITED	My Social Housing - Using technology to match and facilitate social housing for the homeless.	£166,703	£133,362

Lockdown measures introduced to limit the spread of the virus have led to many people suffering job or income losses, leading to increased rent arrears and homelessness across the UK. Housemark estimate that the COVID-19 pandemic has led to 45,000 extra social homes sitting empty.

The current process for filling these empty homes is vastly time and resource consuming, meaning that despite 320,000 people being homeless in the UK, a majority of these home remain empty. Local authorities currently can only offer accommodation in the borough where they are an accepted homeless case and nothing else -- meaning if no properties are currently available then service users must move between temporary housing or face homelessness (waiting lists are often over 10 years).

Example: A service user is in Brent in Temporary Accommodation and is waiting in a B&B for secure and affordable accommodation. There is a void property in Harrow Council (neighbouring borough) that is vacant as no one from Harrow wanted the property. That property will sit vacant until the council can find someone for it. However, there is 90,000 other families currently in Temporary Accommodation in London, that would welcome the opportunity to be rehoused into a property in Harrow.

There is no current way or process to make these properties available and visible to all service users in the UK. UK councils are in desperate need of a solution to help match service users with available and otherwise empty social homes from outside their borough (either through a neighbouring borough or to another area with strong links such as family).

In order to address this critical issue, My Social Housing are developing an app that helps users find their own properties based on their individual criteria, such as location near family, work, school or other factors. The app requires proof of ID/income and fraud checks are completed, then MSH complete the application form on behalf of the user and send to the housing association to confirm viewing dates.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
TEKIHEALTH SOLUTIONS LTD	Novel digital health solution for the immediate triage of potential Covid-19 cases in nurseries and schools	£226,792	£175,000

This application is presented by a group of GPs who are developing new safe ways to provide patients with access to a doctor regardless of the patients and doctors location. The business is called Tekihealth and it relies on a digitally enabled "Teki-Hub" that comprises a number digitally connected devices (video/stills camera, non-contact thermometer, stethoscope etc...). The aim is to enable persons with the patient, i.e. care staff or loved ones, to examine the patient while the doctor is on the other end of the internet link. The solution has been designed to be very easy to use so that staff with or without medical training can be the "eye and hands" for the doctor.

Tekihealth are focused on developing the Teki-Hub so that it can be used by organisations such as care homes, schools and nurseries. The model is to provide such organisations with the way of calling in or accessing a doctor at very short notice and without the need to move the patient. Removing the need to move patients has become highly important because of the current pandemic as it minimises the risk of the spread of virus.

Tekihealth is currently testing the Teki-Hub in a number of care homes to determine how easy it is to establish this new model of care. The team has been approached by a number of nurseries that are interested in using Tekihealth to manage infants and children with suspected Covid-19 infection while they are still at the nursery. Tekihealth are seeking Innovate UK funding to conduct a rapid research and development project to ensure the Teki-Hub is suitable for use with children and their respective care workers.

This project is specifically related to the The Sustainable Innovation Fund competition because it is specifically related with developing a new safer model for healthcare delivery while respecting social isolation and the need to minimise infection risk in a more sustainable way.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
SEVEN BRANDS GLOBAL LIMITED	A Computer Algorithm to Help SMEs Compete During & Post Covid19	£163,193	£130,500

\*\*We want to explore the development of an algorithm that mimics the human creative processes used by ad agencies to create an app that SMEs can use to automatically produce tailored and effective digital advertisements to help them survive, prosper and adapt, to an advertising landscape suddenly reshaped by COVID-19\.\*\*

COVID-19 has made many traditional forms of advertising such as billboards and posters less effective by moving eyeballs indoors. This has forced companies to move advertising online to follow the eyeballs. SMEs must learn to take their advertising online if they are to survive beyond the pandemic.

COVID-19 has also led to a massive change in consumer behaviour with many previous non digital shoppers gaining confidence in online commerce.

By offering a complete, affordable and intelligent app, SMEs will be better equipped to address COVID-19 challenges and to compete more effectively at home and abroad.

Our team have worked in some of the largest agencies in the world such as Saatchi & Saatchi and understand how powerful advertising works. We believe we can translate this knowledge into an algorithm that can deliver tailored, effective advertising for SMEs at a fraction of the cost of having an ad agency but at many times the efficacy of what they could achieve on their own with existing apps, none of which are in any way "smart" (able to tailor ads, target specific audiences or leverage the secrets to creating really effective advertising).

Once we have written the algorithm, we will build a web app that would put an ad agency in the pocket of every SME in the UK, allowing them to create advertising using nothing more than a mobile phone in a way that was affordable, accessible, effective at driving demand, measurable and transformative.

Our algorithm is different from all state-of-the-art services out there in that it is not a template service where SMEs without knowledge of how to create effective advertising select ads for their business. Ours will translate our own knowledge of how strategy and creativity make advertising more effective into a recommendation engine for creative ads that combines the best of creativity with machine learning.

\*\*In the UK small businesses represent:\*\*

- \* 99% of businesses
- \* 50% of jobs in the UK
- \* 40% of UK revenues
- \* 18% of total advertising spend

\_Sources: The Federation of Small Businesses, IFC & Forbes\_

Giving small businesses access to effective digital advertising (advertising that genuinely drives demand for their products & services) would drive profits, create more resilient businesses that are able to remain competitive in a post-COVID-19 world, protect jobs and rejuvenate the economy.

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Competition Code: 2010\_COVID\_SIF\_TF\_R3

Total available funding is £10.9m

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
IS-INSTRUMENTS LIMITED	LIFFE: Light Induced Fluorescence For the Environment	£54,158	£43,327
University of Hertfordshire		£20,838	£20,838

Two large elements of improving the UK's sustainability and drive towards net zero are energy use and waste reduction. A challenge seen throughout multiple industries returning to work after lockdown has been a dramatic loss in productivity and increased waste production resulting from increased cleaning regimes and PPE use. Currently, these are tolerated as necessary steps, but these are not environmentally sustainable long-term, especially for an economy pushing for clean growth.

An ability to 'see' the current virus, Covid-19 and future zoonotic viruses in workplaces would enable industries to continue to operate safely during pandemics, reducing the severity of lockdowns, remove unnecessary cleaning, resulting in productivity gains, reduce energy wastage and chemical usage, plus allow targeted use for new, energy-hungry decontamination methods (deep-UV). This ability would also improve the sustainability of PPE, seen as a necessity in the NHS. The NHS produces a huge amount of waste, which is not able to be re-used or recycled and instead contributes to airborne pollution through incineration or watercourse/table pollution through landfills. If PPE could be re-employed then this would save scarce resources, both energy, and materials, reduce plastic waste and not lead to the acute shortages experienced during the first pandemic wave. Critical to this is the lack of any instantaneous means to determine if biological contamination has taken place and whether it is still present after cleaning is performed such as via deep-UV irradiation to destroy the virus nucleic acid. There is no currently acceptable method of quality control of cleaning reusable PPE. The ability to 'see' dangerous contamination would thus be an enabling technology.

Similarly, armed with a handheld device, cleaning staff could also employ such imaging systems to inspect sources of contamination which are well-known such as sluices where such infections can linger, and complete adequate targeted disinfection.

LIFFE is a feasibility project to examine the potential of spectral fluorescence to be employed to detect biological material within an indoor environment, specifically on PPE visors, hospital consumables and, ultimately, in airborne droplets. Furthermore, LIFFE will examine the feasibility of detection specificity for Covid-19, ultimately to be deployed as part of a hand-held detection system.



Competition Code: 2010\_COVID\_SIF\_TF\_R3

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Puraffinity Ltd	Next-generation materials for targeted PFAS removal in residential Point of Use water treatment systems	£217,522	£174,017

The recent outbreak of the Covid-19 pandemic has highlighted the need to protect public health and ensure populations are immune to pathogenic threats. It is well known that exposure to environmental pollution can cause impaired immune-responses, giving rise to the urgent need to mitigate exposure amongst the population. Per and polyfluoroalkyl substances (PFAS) are a man-made chemical class, comprising above 4700 compounds, widely used in industrial applications, and as such are now ubiquitous in the environment and in water sources, posing severe health risks to exposed populations. They clearly have been linked to thyroid disease, reproductive abnormalities, two types of cancer, and suppressed immuno-responses. Already in 2016, the US National Toxicology Program concluded that PFAS pose "an immune hazard to humans", whilst many studies have found that PFAS exposure impacts the acquired immune system, leading to decreased vaccine effectiveness with higher exposure levels. Annual PFAS exposure-related health costs in the EEA alone are estimated to reach €84 billion (Nordic Council of Ministers, 2019). The importance of reducing exposure to these chemicals is pivotal in being able to promote increased immuno-health in the population, explicitly highlighted in recent EC articles on the PFAS crisis in the Covid-19 context.

In an attempt to curb PFAS exposure, a wave of new regulations has swept across the US and EU. Recent revision of the EU Water Framework to include 20 PFAS compounds, documented exposure of at least 110 million people in the US to severe PFAS contamination, coupled with individual state interventions to implement stringent regulations are driving population protection programmes. Conventional water treatment methods cannot treat broad classes of PFAS, due to their exceptional chemical properties and derived stability in aqueous medium - leaving a significant technology market gap. The harsh reality is that public water supplies are not able to offer immediate protection at the scales required for potable water treatment -- creating an urgent market pull for Point of Use (POU) systems designed to treat small volumes at the actual consumption point (i.e. at the kitchen tap).

POU treatment is found in households, office buildings, airports, schools, restaurants, cafes, industrial facilities etc, and is a market worth £billions. Currently, only a few POU systems are accredited for PFAS removal (based on the removal of two PFAS compounds only -- PFOS and PFOA) and POU market-leading companies are seeking solutions that will meet newer and more stringent potable water supply regulations, recognizing the market gap can be capitalized on.

Puraffinity, a London-based green technology company, develops materials for environmental applications. The technology gap and market urgency has spurred the company to develop dedicated adsorbent materials to remove PFAS from water. The objective of this project is to successfully optimise a suite of adsorbent materials to treat broad spectrum PFAS that can be adapted to a range of POU systems. A successful outcome will have high-value impacts, first and foremost protecting public health and the environment whilst accelerating growth of a UK-based company into a global market leading to significant UK economic benefits.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
PEA SOUP HOSTING LIMITED	A Revolutionary Cloud Service That Uses Liquid-Submersion for Efficient Cooling, Reducing the Environmental Impacts of These Systems and Providing Power Consumption Savings	£142,889	£114,312

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
SILENT SENSORS LIMITED	PROFIT - Protection of Flexible Conductors in Tyres	£43,917	£35,134
DYCOTEC MATERIALS LTD		£65,745	£52,596

Project description - provided by applicants			
PPOFIT will dayolan techniques and harrior layor materials which will protect consitive fl	floxible conductive	interconnects and electronic devices against	ho.

PROFIT will develop techniques and barrier layer materials which will protect sensitive, flexible, conductive, interconnects and electronic devices against the effects of sulphur within rubber, during or post vulcanisation.

The project output will be a batch of UHF RFID tags which will be subjected to a complete tyre manufacturing (vulcanisation) process and tested using a major tyre manufacturer.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
STOPFORD PROJECTS LIMITED	Fast-Track Design of a Novel Clinical Waste Destruction Technology	£163,892	£131,114

This project seeks to fast-track the testing, scale-up and design of a novel mobile microwave induced plasma (MIP) gasification technology, to provide both flexible and additional capacity to enable the safe and sustainable disposal of COVID?19 related clinical waste. With clinical waste arisings being reported to have increased by 600% in regions of high COVID-19 infection rates (Wuhan Ministry Emergency Office/current Defra Survey of Waste Industry on COVID-19 Impacts), additional waste treatment capacity is required to serve existing hospitals and new temporary medical/healthcare facilities that are being erected globally (e.g. NHS Nightingale Hospitals) to prevent the risk of disease transmission, associated with the transportation and handling of contaminated waste streams. The MIP gasification technology will provide healthcare trusts and hazardous waste management companies with an alternative to offsite incineration, enabling waste to be treated safely and sustainably onsite, whilst reducing the costs associated with waste disposal (c.a. £600 - £1,500 per tonne) and energy demand through the provision of renewable energy.

The adoption of plasma gasification systems for waste destruction has been hindered due to operational issues relating to electrode corrosion and high parasitic loads, rendering facilities only economic at a large scale (1000 tpd). As such conventional systems are uneconomic for onsite deployment for the treatment of clinical waste.

Therefore, this project will focus on the rapid testing and scale-up of our highly efficient modular MIP gasification technology to enable viable onsite management of COVID-19 clinical waste at a scale of 1000 tpa. The outputs from the study will comprise design and prototyping of a new MIP torch technology (which will be patented) and the design of a mobile package plant for COVID-19 clinical waste destruction (which will be patented), and an assessment of the energy generation potential of the plant. It is anticipated that the outputs from this study will facilitate further fundraising in order to commercialise the technology.

Enabling the destruction of COVID-19 clinical waste onsite, will present both healthcare trusts and hazardous waste management companies with an opportunity to alleviate capacity issues and safety issues relating to the disposal of clinical waste, whilst also enabling an opportunity to reduce grid-based eissues nergy demand through the generation of low-carbon energy. As such this project presents the global health care sector with a novel process to enhance the safety and sustainability of COVID-19 clinical waste disposal whilst reducing operational costs and carbon emissions.

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Competition Code: 2010\_COVID\_SIF\_TF\_R3

Total available funding is £10.9m

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
CPI INNOVATION SERVICES LIMITED	MET2FOOD	£95,223	£76,178
NEW-FOOD INNOVATION LTD		£19,386	£15,508
NNFCC LIMITED		£21,314	£17,051

As the global population continues to grow apace (by a further 25% to 2050), the demand for food will increase. Traditional, agriculture will struggle to fulfil the demands made upon it. Pressure will come not only from the number of people needing to be fed but from other related issues, such as land use change to accommodate more agriculture, increased water use, chemical use, increased eutrophication of water courses, loss of biodiversity and damage to precious topsoils.

To address this, several approaches which look to change the course of both food (and feed) production and consumer purchasing habits are being explored. One such approach is to use microbial cell factories to produce nutrient-dense, high quality food/feed ingredients. Microbial food products have the potential to help transform the global food industry away from resource inefficient production, which pollutes and denudes the environment, towards production of highly nutritious food in scalable, fully controlled, contained and monitored, fermentation processes.

This project will seek to both improve the process efficiency and sustainability of microbial food production and expand the market opportunity by developing new product streams.

The project will develop novel processes for the production of microbial biomass from sustainable feedstocks. Microbial SCP is naturally high in protein and to increase its value as a food ingredient, processes will be developed to generate a soluble protein isolate fraction for use as a food ingredient, with the insoluble fraction for use as an animal feed ingredient. The soluble protein fraction will be assessed for valuable properties such as gelling, foaming and binding, for replacement of animal-derived proteins in meat-free products. The insoluble fraction will be assessed as an animal feed ingredient for farmed fish and piglets.

The outcomes of this project will be the development of new processes and technologies to produce novel, nutrient rich, microbially-derived food and animal feed products. The processes developed will be resource efficient, reducing CO2 emissions, with low water and land usage requirements compared to traditional agriculture. The processes will be highly scalable and non-seasonal, using technology that can be deployed anywhere.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
WORLD FEEDS LIMITED	Aqua-feed for cultivating cleaner fish to eradicate sea lice from salmon	£112,785	£90,228

Salmon farms across the world are being devastated by infestations of sea lice that target salmon. There is an undeniable need for greater volumes of healthy cleaner-fish to control (eat) sea? lice off farmed salmon. However, the current approach is to extract cleaner-fish from the 'wild' and breeding them in captivity on feeds that are nutritionally deficient. As a result, mortality rates are significant, and sea lice numbers continue to proliferate within salmon farms.

Salmon production in Norway and Scotland combined has been falling by about 10% a year and costing the salmon industry hundreds of millions a year in lost revenues.

Anti-parasitic medicines to control sea-lice are adopted but, treatments are environmentally toxic and can impact upon water quality, affect local wildlife and reduce the quality of the fish for consumers. Using cleaner-fish (larvae extracted from the wild) is an established alternative, but mortality rate is extremely high due to nutritional deficiencies and inefficient feeding mechanisms; 'wild' stocks are dwindling as a result.

World Feeds presents herein a new approach on breeding cleaner-fish sustainably in captivity within hatcheries. The approach will significantly reduce the need to harvest cleaner-fish from the 'wild' (allowing stocks to recover) and will afford salmon farmers an unbroken supply of disease-free cleaner-fish.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
TEXFELT LIMITED	Development of Eco Recycled Material to Replace PU Foam in the Mattress Industry	£175,682	£140,545

Texfelt is a fibre specialist, manufacturing recycled non-woven materials for reuse in a number of sectors. It has recently developed an alternative to polyurethane foam use in carpet underlay that is fully and easily recyclable.

The team will undertake a 3-month rapid R&D project to design a new material that would be applicable for the wider furniture market and have similar economic lifecycle benefits as the carpet underlay product.

The team will work with several subcontractors and utilise its innovation and manufacturing facility in Bradford to take the material through design and development stages to then test it for user requirements and production scale up.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
DEMURIS LIMITED	Novel Ansamycin Antibiotics to combat AntiMicrobial Resistance	£90,315	£72,251

As the death toll from the COVID-19 pandemic passes 1 million and healthcare systems around the globe are struggling to cope there is another problem on the horizon, of Antimicrobial Resistance (AMR). The COVID-19 pandemic has increased the usage of antibiotics due to being administered to patients for the prevention of secondary bacterial infections. The pandemic has highlighted how unprepared the world is for significant healthcare disruption and the need for investment in medicines to combat these disruptions.

AMR was already a global problem, each year the US Centers for Disease Control and Prevention estimates that 2.8 million Americans acquire serious infections caused by antibiotic-resistant bacteria, and 35,000 of them die as a result.

AMR is a growing problem with vast societal and economic consequences. Pathogenic bacteria are becoming increasingly resistant to antibiotics and some strains are now resistant to all clinically used antibiotics. At the same time, the rate of discovery and deployment of new antibiotics has declined. Unfortunately, most major pharmaceutical companies have curtailed their antimicrobial and anti-infective discovery programs in favour of more profitable, lower-risk programs.

Demuris is a SME that through screening a large collection of actinomycete bacteria has identified a novel ansamycin antibiotic. It has good potency towards multi-drug-resistant Gram-negative bacteria, which are greatest threat to the public. This project will enable the production of the compound at a scale which will enable the evaluation of any human toxicity and the potency towards a panel of hospital pathogens.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
AVGO BIOTECH LTD	RecEgg	£137,951	£78,882

This project aims to address 2 industrial problems:

- 1) Over 250,000 tonnes of eggshells are produced across Europe, annually, by the egg processing industry. This waste is hazardous, due to the decomposition of biological materials carried over from processing. Companies contract specialist waste management companies to remove / treat this waste at great expense, \*\*\> £100/tonne, \> £85m across Europe.\*\* Impacting the industry's bottom line and making them less resistant to external threats from global imports and events such as COVID-19\. Additionally, landfill has a \*\*significant carbon footprint, producing over 2 M tonnes of Carbon Dioxide,\*\* across Europe, annually.
- 2) Eggshells offer the untapped natural resource of calcium carbonate (CaCO3), which could be used in high value markets, such as Pharmaceutical/Medical/Food. \*\*The Pharmaceutical industry, in Europe, uses over 100,000 tonnes / year, worth \>£200m (£800m globally).\*\* Currently material is imported from Asia and leads to a number of issues:
- a) Environmental unsustainable, \*\*through mining and transportation great distances (carbon-miles) (77 K tonnes CO2\*\*), when local and sustainable material is available.
- b) Quality / Consistency of mined material is variable. Containing \*\*TOXIC HEAVY METALS\*\*, experiencing rejection rates as high as 20%. Costing the European Pharmaceutical industry \*\*\>£40m/year\*\*
- 3) Eggshells offer an untapped resource of \*\*CaCO3\*\*, which could be used in a plethora of applications, in addition to the pharmaceutical industry. Avgo will convert this resource into high quality/value material for the Pharmaceutical/Medical/Food.
- 4) Many attempts have been made to exploit the resources held within eggshells, they have not been able to manufacture materials that meet Pharmaceutical/Food/TOXIC HEAVY METAL requirements. Within this project we will show that this can be done, through a series of proof of principle experiments, covering the full process, converting eggshell waste into Pharmaceutical grade CaCO3, on a commercial scale and demonstrating complete circularity through the re-use of process co-products.
- \*\*5)\*\* \*\*Avgo will build on previous work, which we had planned to take place earlier in the year but which was delayed due to a lack of access to funds because of COVID-19\.\*\*
- \*\*6)\*\* \*\*We are taking a disruptive combination of new chemical/engineering processes will allow us to achieve this.\*\*

These approaches will be taken in the collect, moving and separating of eggshells and membranes. Allowing, Avgo to valorise both the membrane and shell, which will be treated to a number of novel processes. Producing high grade CaCO3 -- with ultimate co-products being re-introduced into the process. Providing complete circularity. This project will demonstrate all the technologies as yet unproven in this application.

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7) RECEGG is an **"eggshell factory" producing sustainable, high purity, high quality membrane (\>£12m in 5 years-outside of scope of this project) a
pharmaceutical grade** **CaCO3 (\>£20m in 5 years) while offering complete circularity.**

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<sup>\*\*8)\*\* \*\*</sup>Exploitation of egg-processing industry co-products will improve profitability for the UK processors. Providing a buffer against aggressive import activities, help it to grow back strongly from the adverse effects of COVID-19, some processors suffered badly from the contraction in hospitality and provide resilience against any similar events.\*\*



Competition Code: 2010\_COVID\_SIF\_TF\_R3

Total available funding is £10.9m

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
TITAN VR LIMITED	VR-PE: Translating Front-line PPE Expertise to the Workplace Using Immersive Training	£115,916	£92,732

The COVID-19 outbreak has forced many sectors to up-skill in complex areas of personal protective equipment (PPE) and hygiene, previously the domain of frontline medical environments. The care sector has been particularly badly effected due to a combination of factors including vulnerable/high risk clients, lower levels of training/expertise, high staff turn-over and limited resources for training.

Virtual Reality (VR) (portable, quickly setup, convenient, unbounded workspace and content) has a unique role to play in our response to the COVID-19 pandemic and provide training where access is limited or problematic due to cost, loss of staff time (sending people to courses/having to cover multiple staff during group training) or risk (unnecessary social contact in training). VR based training is always 1:1, can be fit around schedules or when the opportunity arises, is easy to scale, provides detailed feedback and is engaging from start to finish unlike a video which may not hold a viewer's interest until the end. Yet, examples of VR in any UK response to Covid-19 training is limited.

The team behind Titan-VR Ltd. have recently developed a Virtual Reality immersive solution for training healthcare staff in medical settings which involve COVID-19 patients. This was developed collaboratively with experts from Kings College Hospital and has allowed us to capture many years' experience working in front-line settings and distil that into an interactive module to help reinforce best practice, reducing the small errors which can have major consequences. This system is in use training staff and students and we are preparing to roll out across London and the UK.

This valuable experience and captured expert knowledge, can be applied to almost sector which has been forced to introduce PPE procedures as a result of COVID-19\. We believe the next most important and urgent need is to translate this PPE expertise into the care sector (care homes and in-home care).

In the VR-PE project we will work with teams from King's College Hospital to design, build and evaluate a modular platform for the rapid deployment of training interventions in the care sector which test appropriate decision making in realistic settings.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
LIBERTY POWDER METALS LTD	Feasibility study of Hot Isostatic Pressing of tool steel powder with Alternative Particle size distributions (HIPAS)	£119,056	£95,245
CARRS TOOL STEELS LIMITED		£44,120	£35,295

Additive manufacturing (AM) has gained significant momentum in the past 5 years due to its freedom in design and high flexibility, with an annual growth rate over 30% in metal sectors. It was predicted the rapid growth of AM will continue for the next 10 years and reach a market size over \$45B. Many laser powder bed fusion processes require powder in a narrow size range, for example from 15 to 45 microns. This creates a great challenge for powder producer. A state-of-art gas atomiser, such the one at Liberty Powder Metals (LPM), can only produce about 40% powder in the 15-45 size range. For other atomising technologies, such as plasma rotating electrode process (PREP), the yield is even as low as 10%. Powder produced in other size range often ends in landfill or recycling. The low yield in AM powder has inevitably led to high powder cost.

At LPM, we are actively pursuing cost reduction by lowering feedstock cost using recycled material and yield improvement by novel nozzle design. However, there is an urgent need to find a solution for powder outside of AM size range. This project has emerged following discussions with Carrs Tool Steels (CTS), the largest tool steel stockholder in the UK, on how the new LPM's atomiser could benefit the powder metal supply chain businesses and produce a faster recovery following the Covid-19 pandemic. This project proposes a new solution using alternative powder size distribution for PM-HIP, rather than a full powder size range currently required. The success of this project will enable powder producer to reduce powder cost, accelerating the adoption of environment friendly net-shape (PM-HIP) and AM manufacturing technologies. It will significantly strengthen the overall competitiveness of UK powder metal sectors.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
MODO25 LIMITED	BOSCO-Connect: Online Advertising Artificial Intelligence Tool for SMEs	£204,151	£163,303

Modo25 believe in putting the power back into the hands of both our clients and our people. Our best of both worlds approach to digital marketing means our clients can count on us for support and guidance to ultimately take their marketing inhouse. We have built our market-leading technology platform, BOSCO, to help eliminate risks when it comes to spending marketing budgets.

This project will allow Modo25 to work rapidly, linking with world-leading specialists to build an advertising spend forecasting software tool, which will be within the reach of all online retailers.

The team will combine layered information from multiple channels to analyse the best return on investment mix to allocated marketing budgets. This will require significant machine learning and artificial intelligence with modelling to support an easy-to understand customer interface. BOSCO-Connect will be live in 2021\.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
TORSION INFORMATION SECURITY LIMITED	Torsion. Providing scalable, comprehensive data security and safeguarded file sharing for remote workers	£187,259	£149,800
ENGLAND AND WALES CRICKET BOARD LIMITED		£13,345	£10,676
MARKEL INTERNATIONAL HOLDINGS LIMITED		£12,595	£10,076

Have you ever had access to files or information that you really shouldn't have had?

Coronavirus has massively increased the need for remote working but many companies don't have control over their sensitive data or who can access and share their files.

Torsion was developed to solve the problem of poor control of access to business files and data, and to stop the serious data security and compliance challenges which arise as a result. Our unique software solution works within the file structures and information systems that businesses already use, and provides clear visibility and precise control of 'who has access to what'.

Currently Torsion software is being used by small and medium sized organisations. Project funding will enable us to substantially increase the scalability of the software to make it suitable for use within large organisations, which may have thousands of users accessing millions of files.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
CODIKOAT LTD	Codikoat. Solving the problem of disposable facemask waste with a novel, reusable anti-viral face mask.	£149,560	£119,648
HARDSHELL UK LIMITED		£32,162	£25,729

Project description - provided by applicants
CodiKoat are developing a novel surface treatment that when used on face masks means they can be reused. We are combining nanoparticles with a specific surface chemistry that means viruses are destroyed within seconds of contacting the surface. This will reduce the need for near continual face mask replacement in clinical settings, and when rolled out to public sales will significantly reduce the amount of poorly disposed face coverings.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
SMART VILLAGES RESEARCH GROUP LTD	Offgrid multi-energy reporting system and AI load controller	£24,948	£19,958

In this project, we will carry out a feasibility study to develop and test a prototype device which at low cost can monitor the detailed performance and power levels of all stages of offgrid energy systems of the type which are installed in rural commnities in Africa and elsewhere in the world.

The problem with these is often that data is difficult to obtain, since different manufacturer's devices and components collect data differently (or not at all), and it is hard to integrate it. Our device will bypass this, making all data easily available to developers and local operators, allowing them to use the systems much more effectively and efficiently.

We also intend to incorporate a novel functionality that will allow for the diversion of excess supply of power (eg from solar panels) to a productive load such as heating hot water, which saves the use of wood, other solid fuels and fossil fuels, with benefits for women in terms of added productivity and improved health, from not having to breathe in wood smoke.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
ZERO PETROLEUM LIMITED	Commercial Demonstration Plant to Manufacture Synthetic Hydrocarbon Fuels from Renewable Power ("eFuels"): Phase- 1A-Extended (Technology and Design - Catalyst Optimisation)	£79,883	£63,906

ZERO Petroleum will develop technology and production plant to synthesise hydrocarbon fuels using water and carbon-dioxide (as the raw ingredients) and renewable electricity (for the energy). These synthetic fuels are called "electrofuels" or "eFuels".

The focus for the first plant - a 1MW Commercial Demonstration Plant, converting approximately 3000kg of carbon-dioxide to 1000kg of hydrocarbons per day - will be on drop-in replacements for fossil-sourced regular gasoline and LPG products (butane and propane). In later phases the technology can and will be diversified to other hydrocarbon fuels (such as diesel and jet fuel) and other petroleum-based non-fuel products (plastics and chemicals).

The ZERO Petroleum Commercial Demonstration Plant will be

- \* the first synthetic hydrocarbon fuel plant and commercial supply in the UK, and
- \* the first gasoline- and LPG-priority synthesis plant and commercial supply globally.

As part of the technology research phase of the project, supported by Innovate UK funding, ZERO Petroleum will optimise the catalyst technology for the synthesis process (converting carbon-dioxide and hydrogen to the target hydrocarbons) so as to maximise yield. Although the base technology (called "Fischer Tropsch") is well-established and proven commercially, the technology to prioritise gasoline and LPG production is unique and highly innovative. The output from this research stage will enable the best possible efficiency and consequent profitability of the final Commercial Demonstration Plant.

If synthesised using renewable electricity (for example, from wind or solar PV), eFuels are inherently carbon-neutral and compatible with a circular economy. Although the eFuel itself emits carbon-dioxide upon combustion the synthesis process is drawing the same quantity of carbon-dioxide from existing carbon-dioxide emitters (such as a fermentation or cement manufacturing process) or, eventually, from the atmosphere by a process in development called Direct Air Capture. The consumer of the eFuel (vehicle, heating, etc.) is hence operating in a carbon-neutral and fully sustainable manner: material is neither dug out of the ground (fossil fuels) nor buried in the ground to compensate (carbon sequestration).

eFuels are in effect renewable fuels which directly and seamlessly displace fossil fuels where no other options are possible or preferred. The innovative technology and process engineering associated with the ZERO Petroleum programme will therefore play a central and vital role, alongside renewable electricity and hydrogen, in the decarbonisation of global energy. Whilst the COVID-19 epidemic has temporarily reduced the rate of carbon-dioxide emissions and given a perception of "good news", the reverse is actually the case. COVID-19 has extended the carbon budget for 1.5/2.0°C of global warming by 1-2 months at best; meanwhile the COVID-19 lockdown has much further delayed the development and construction of decarbonised energy systems. The global warming crisis is consequently more acute. Innovate UK's funding of ZERO Petroleum's eFuel technology programme within the Temporary Framework is therefore an important component of the UK's response to COVID-19 as well as the Climate Emergency.

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Competition Code: 2010\_COVID\_SIF\_TF\_R3

Total available funding is £10.9m

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
Faraday Battery Limited	Extreme weather Battery pack	£139,935	£111,948
Manufacturing Technology Centre		£59,880	£59,880

This project aims to develop an extreme weather battery pack, based on a proprietary battery pack technology designed, which will enable automotive companies to produce fully electrified vehicles that can operate in both hot and cold climates. The project targets 100% electrification of tractor/buses to achieve zero tailpipe emissions.

This innovative battery technology offers inherently safe, high performance and high power battery pack/system, which can be operated from -20oC to 50oC temperatures and can be deployed in electric vehicles. With this battery pack, a car, a tractor, or a bus can be fully electrified with zero tailpipe emissions and for a reasonable cost.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
LUCID GROUP LIMITED	Content - a system to help dementia patients, carers and clinicians collaborate in reducing bladder and bowel incontinence, delivering carbon-footprint and cost reduction, physical and mental health benefits.	£136,599	£109,280
DISABLED LIVING		£16,239	£12,991

Project description - provided by applicants
The Content project aims to investigate the feasibility of helping dementia patients, carers and clinicians collaborate in prolonging bladder and bowel continence.
Deliverables include investigation of a connected medical-device system that enables carbon-footprint, landfill, greenhouse-gas and cost-of-care reductions, delivering economic physical and mental health benefits.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
SIXFOLD BIOSCIENCE LTD.	RAPOD: Rapid Assembly of Programmable Oligonucleotide Delivery systems for increased gene therapeutic load	£99,658	£79,726

RAPOD aims to expand the drug delivery capabilities of Sixfold's Programmable Oligonucleotide Delivery System (PODS) for delivery of short-interfering RNA (siRNA) gene silencing cargo to specific cancer cells by increasing therapeutic loading capacity. By taking advantage of the interdisciplinary and complementary expertise of the partner/subcontractor --Sixfold and SEDA-- the project allows for rapid scientific and commercial progress directed at early R&D collaboration and licensing with identified pharmaceutical companies.

Compared to small molecule and antibody-based drugs, siRNAs can act on virtually unrestricted choice of --otherwise "undruggable"-- therapeutic targets, with high specificity and potency; while their easy manufacturing allows for rapid lead optimization \*\*\[1\]\*\*. As such, siRNAs have the potential to provide effective treatment options for diverse diseases including cancer. The first regulatory approvals of Alnylam's siRNA therapies for liver disorders in 2018-19 \*\*\[2-3\]\*\* have validated the clinical and commercial opportunity for such therapies. However, the major limiting factor for their further success remains the lack of effective systems for systemic delivery of siRNAs to specific diseased cells \*\*\[4\]\*\*. Current approaches, primarily GalNAc-conjugates, lipid nanoparticles and viral vectors, are sub-optimal given their limited cell targeting specificity, cargo loading capacity, high toxicity, and complex/expensive manufacturing that limit the type of addressable disease indications.

PODS can address this drug delivery challenge given their modular design based on a central RNA nanoscaffold, which can be functionalised with therapeutics and targeting molecules that recognise biomarkers on cancer -but not healthy- cells. Although first-generation PODS demonstrated promising \_in vitro\_ and \_in vivo\_ results, with highly competitive safety and favourable cost profiles, the efficacy remains to be optimised.

RAPOD will aim to address three main objectives: 1) \*\*increase the therapeutic loading capacity\*\* of our PODS technology using three radically different technological approaches 2) in an \*\*environmentally sustainable way\*\* with a focus on reducing API, waste and reagent consumption and 3) devising a \*\*strategic R&D strategy\*\* to accelerate PODS preclinical transition to IND-enabling stage by maximising resources available. This will also enhance PODS versatility and speed of development, i.e. ability to readily adapt to delivery of multiple, different cargo types, creating an intelligent delivery system that goes beyond the limitations of current standards. As such, PODS represent an attractive opportunity to capture a significant portion of the thriving gene therapy delivery market and could accelerate other Advanced Therapy Medicinal Products (ATMP), through improved safety, efficacy and reduced cost of goods, especially compared to viral technologies.

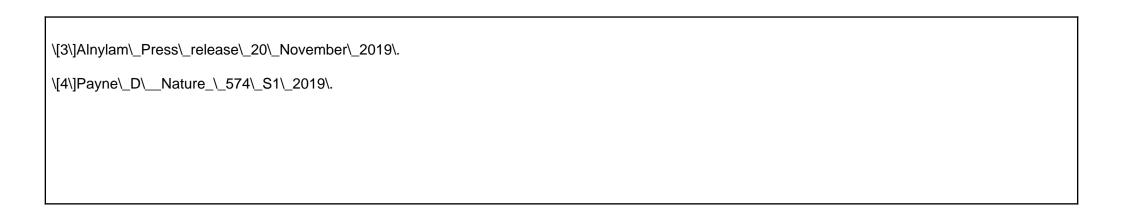
SEDA's unique expertise in delivering numerous products to approval, commercialisation and subsequent product maintenance allows for strategic development of PODS R&D strategy to pharmaceutical industry standards and requirements for rapid commercialization and clinical advancement via licensing.

Sixfold's broad IP portfolio and licensing strategy engage the entire biopharmaceutical supply chain, providing diverse benefits to the wider UK life sciences sector.

 $[1]\Lam_J.K.W_et_al.\_Mol\_Ther_Nucleic\_Acids_\_2015\_4(9):e252\.$ 

 $[2]Alnylam\_Press\_release\_10\_August\_2018$ .

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
MOF TECHNOLOGIES LIMITED	MOF-Based unit foR genErATing Hospital-gradE oxygen (BREATHE)	£155,473	£124,378

As COVID-19 infection rates soar across the UK, the number of patients requiring hospital treatment increases proportionally. Unfortunately, there is not yet a targeted effective cure for COVID-19, however, it has been demonstrated that high-flow oxygen improves a patient's chances of survival. Unsurprisingly, the oxygen demand for hospital and home care treatment has significantly increased by 33% in the last 12 months and it is envisaged to continue growing, as the number of COVID cases is expected to further increase in the upcoming months.

To meet this increased demand and ensure hospitals and doctors have enough on-demand oxygen capacity to treat the UK population, BREATHE will develop a new generation of energy-efficient oxygen concentrators that enable the production of greater oxygen purity.

MOF Technologies is the world-leading company in the manufacturing and commercialisation of metal-organic frameworks (MOFs). MOF Technologies will exploit its product development expertise to develop the first MOF-based oxygen generator. BREATHE will provide improve the on-demand oxygen production in the medical sector by developing an oxygen concentrator with boosted oxygen purity while reducing both unit size and running costs. BREATHE will incorporate a new generation of adsorbents called MOFs to obtain an unsurpassed air separation efficiency and boost O2 purity. BREATHE will increase the number of patients that can have access to medical-grade oxygen, strengthening the UK health care system in these crucial times.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
SPOTTA LIMITED	Smart monitoring solutions to combat Red Palm Weevil	£133,705	£106,964

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
THE ZERO BRUSH LIMITED	TheZeroBrush - a sustainable, fully biodegradable, pre-pasted, single-use toothbrush	£150,302	£120,242

Over \_4.7 billion\_ toothbrushes go into landfill each year globally. The healthcare industry makes a substantial contribution to this providing patients with plastic toothbrushes that are often left on the side and dropped on the floor, either needing to be reused, dirty, or replaced.

We want to replace single use plastic toothbrushes with an alternative utilising an innovative biodegradable material. With the outbreak of COVID-19 we were inspired to take the next innovative step and make a toothbrush suitable for patients (i.e. infectious or bedridden) who face challenges brushing their teeth due to the inability to access washing facilities, they always need nursing support for this simple task.

Public Health England (PHE) has released mouth care guidance for hospitalised patients as part of its care for those with suspected or confirmed COVID-19\. The guidance reads: 'The aim of good mouth care for patients in hospital is to maintain oral cleanliness, prevent additional infection and reduce the likelihood of developing bacterial pneumonia.' All patients must brush their teeth.

TheZeroBrush will be the world's first cold-water soluble, fully biodegradable pre-pasted toothbrush in the market, designed and manufactured in the UK. It is the only fully sustainable toothbrush, which is non- toxic to the environment, wholly degradable and with zero end of life impact, including the packaging (certifications pending).

TheZeroBrush is pre-pasted with quality organic food grade toothpaste. There is no SLS to foam and no fluoride therefore no requirement for spitting or rinsing. Patients in hospitals can brush their teeth comfortably without the need for nursing support. As it is single use and soluble there will be no toothbrush left on the side creating risk of spreading germs.

No other toothbrush is fully degradable like TheZeroBrush. The leading eco alternative, bamboo toothbrushes, utilise nylon bristles which take hundreds of years to degrade. The handles are often made utilising bamboo that is not sustainably sourced and can take up to 4 years to degrade in landfill.

Aimed at single use, TheZeroBrush is an innovative solution for a wide range of end users, such as the healthcare sector (hospitals, dental care, care homes), the military, leisure industry (hotels, camping, festivals) and the travel industry.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
MANCHESTER BIOGEL LIMITED	Fully synthetic animal-free scaffolds: the future of sustainable and scalable organoid culture	£47,766	£38,212
CELLESCE LIMITED		£42,302	£33,842
QKINE LIMITED		£51,610	£41,288

Organoids are 3-dimensional (3D) clusters of stem cells that come together and emulate the microenvironment within individual organs, whether that be liver, kidney, heart, gut or other specific organs. Essentially, they can be viewed as miniature, simplified organs. They typically range in size from a few micrometers to five millimeters and there are potentially as many different organoids as there are different tissues and organs in the body. Organoids can also be grown that mimic diseased such as cancer and brain disorders. Such a diverse range of organoids can form by controlling the differentiation of the specific stem cell used, which can be influenced by the cells receiving instructive signals from the 3D extracellular matrix (ECM) and its components, such as bioactive proteins, and the medium the organoids grow in.

Organoids hold extraordinary promise: they are a truly disruptive technology capable of completely transforming our understanding of basic biology and also revolutionising the drug discovery process, and its reliance on animal models. That said, growing organoids in the laboratory still requires the use of animal-derived components; in particular, the 3D gel matrix in which organoids grow, which is made from mouse tumours. There are very few suppliers of this matrix and because it is made from animals, each batch is slightly different, it is also unusual in that it is liquid at 4oC but sets to a gel at room temperature, this makes it very difficult for scientists to use and not compatible with robotic systems needed in high throughput drug discovery. Thus, to fully develop the potential of organoids in their capacity to reduce the need for use of animals in research, it is essential that a replacement for this type of 3D matrix is obtained, which is not derived from animals. The aim of this project is to develop a new, fully synthetic (non-animal derived) 3D gel matrix which is optimised for the growth of organoids and can be used in the future for industrial-scale organoid production to drive forwards biomedical research, drug discovery and development of new therapeutics. This will be achieved by combining the proprietary synthetic matrix from Manchester BIOGEL with the optimised bioactive cell signalling growth factor proteins from Qkine to create a wholly synthetic hydrogel that recreates the ideal growth environment for the organoids. Cellesce, a specialist organoid company will help tailor the synthetic hydrogels for different organoid types and downstream applications to maximise the impact on science and the commercial potential of the combined technology.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
CREATE INNOVATION SOLUTIONS LTD	KESTREL: Knowledge, Evaluation, Systems, Technologies for the Reduction of Electricity Losses	£139,012	£111,210
Loughborough University		£22,954	£22,954
Queen's University of Belfast		£29,915	£29,914

Our vision is to deploy large numbers of low-cost measurement devices to form a network providing information informing electricity companies and other large-scale users:

- \* about where they can reduce electricity system losses to help with CO2 reductions and EV, heat pump, renewable generation and other low carbon technology integration;
- \* to improve fault detection location, thus helping restore service to vulnerable customers and others; and
- \* to support other network management activities.

There are many proven approaches to the problems of electricity-based losses, overloading and security of supply (although these are often resource intensive, slow and with limited accuracy). The first steps are typically to identify the particular parts of the systems most affected in order to determine both the causes and the most appropriate and economic solutions to deliver the greatest commercial and societal benefits.

In practice, it is necessary to separate out the technical (joule) losses from those arising from issues with commercial operations such as metering, billing and theft - itself a process fraught with complexity. Increasingly it is also necessary to understand when such losses occur and not just the average over time as their critical impact on plant loadings and capacity occurs at peak load times and is non-linear (a 25% increase in loading due to losses producing a 50% increase in the thermal loading of plant, cables and lines -- which, in turn, increases system losses even further).

The increasing connection of various forms of intermittent distributed generation and storage further add to the complexity as at times they can change the direction of load flows and both reduce or increase overloading and losses as well as having a profound impact on the local carbon intensity of the energy supplied.

The main motivation for this project is to provide an electronic measurement product which can form a network of sparse remote low-cost monitoring for locating, visualising and where relevant producing time-profiles of:

- \* areas with poor access and security of supply;
- \* technical losses in real time;
- \* areas with high commercial losses;
- \* local carbon tracking;
- \* available and exceeded capacity, power factor, unbalance and harmonics;
- \* areas with under or over voltage;
- \* automatically generated network circuit connectivity and impedances; and
- \* locations of fault (target accuracy of less than one span) and overloaded circuits.

Project Kestrel is a collaboration between Create Innovation Solutions Ltd., Loughborough University, Queen's University Belfast and ASH Wireless Electronics Ltd. The project will undertake a 3-month feasibility study to produce and test a highly accurate timing device capable of facilitating the calculation

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of losses, fault detection and network event location using voltage phase angles and event timing measurements.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
LABOUR XCHANGE LTD	Recruitment Artificial Intelligence for Social Equality (RAISE)	£49,201	£39,361

Currently labour supply is on a demand-led basis. This is extremely slow and inefficient at dealing with economic and social change and also does not identify people who are currently "under employed" (those who are working but with less hours than they need/could work). The process of person specifications and screening is time consuming and often exacerbates equality and diversity inclusion issues by relying on metrics which can lead to unconscious bias. It inadvertently excludes good candidates by using inappropriate measures and makes it difficult for workers to transition between sectors, even if they have the transferrable skills to be successful.

The recent COVID-19 crisis has exposed how traditional recruitment approaches do not allow for sudden fluctuations in demand for labour which creates demand in some sectors (for example delivery drivers) whilst those in hospitality have no work. It also highlighted difficulties in mobilising a keen, growing volunteer workforce and matching them with tasks requiring completion.

RAISE will rectify this situation by developing a unique AI functionality to place the person at the heart of the system. It will take a 'can-do' approach and learn the best approaches to recruitment utilising candidate's competencies rather than credentials.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
SMARTKEM LIMITED	SMARTLIGHT	£165,417	£132,325
CENTRE FOR PROCESS INNOVATION LIMITED		£43,715	£43,715

The SMARTLIGHT project aims to demonstrate the capability of SmartKem's organic thin-film transistors for driving mini-LED backlights for full array local dimming LCD displays. It will generate a range of formats of active-matrix backlights relevant for high brightness displays, and these will be used to show to OEMs that the technology can help them achieve a lower cost solution to high dynamic range (HDR) displays with good reliability. The project partners include SmartKem as lead, Centre for Process Innovation (Catapult), and Folium Optics as a subcontractor. Demonstrators will be used to secure business for SmartKem such as customer funded development projects and ultimately will lead to volume material sales of high value chemicals.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
THE FLAME LILY HEALTHCARE LTD	CheckUp Health - Saving Black, Asian and Minority Ethnic Lives	£54,327	£43,416

Black, Asian and Minority Ethnic (BAME) people are more likely than Caucasians to have high blood pressure (HBP) or Type2 diabetes (T2D). The UK has ~4 million people with T2D (Diabetes UK, 2020). T2D is up to 6 times more likely in South Asians and 3 times more likely in Africans/Africa-Caribbeans (Ibid). Half of T2D sufferers have HBP, which is 3-4 times more likely to occur in black people of African/Africa-Caribbean descent than white people (Action on Salt, 2020). Health issues resulting from HBP/T2D cost the NHS £2.1bn annually (Public Health England, 2017). Every decade, poor monitoring of HBP/T2D causes the loss of ~7,000 quality adjusted UK life years (PHE, 2017). These losses are unsustainable and need a solution.

Improvements in HBP/T2D prevention and treatment are desperately needed (South Asian Health Foundation, 2020) to avoid BAME deaths and reduce the cost of these diseases to the NHS. A remote monitoring solution for HBP/T2D in the BAME population could address healthcare inequalities exposed by Covid-19; reduce cases requiring intervention (Kim, 2020); and save the NHS millions previously spent on the fallout of poor disease monitoring. Critically, it could save BAME lives.

We offer an alternative solution to the current, high-cost and ineffective approach to HBP/T2D monitoring that is failing the BAME population during the Covid-19 pandemic. Through CheckUp, BAME HBP/T2D patients self-monitor and remotely report to healthcare professionals. CheckUp reduces required GP appointments for BAME HBP/T2D patients, saving the NHS money and reducing the exposure of BAME HBP/T2D to Covid-19 by providing remote monitoring.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
AGRIFOOD X LIMITED	MediFlex: Human-Centred Design for Sustainable PPE	£36,335	£29,068
BIOPOWER TECHNOLOGIES LIMITED		£10,288	£8,230
Brunel University London		£19,427	£19,427
CELLULAR SYSTEMS (GRANTHAM) LIMITED		£26,782	£21,426

\*\*This project addresses an identified environmental, healthcare and commercial demand for sustainable alternatives to single-use plastic personal protective equipment (PPE).\*\* As part of the UK's COVID-19 response, the Department of Health and Social Care (DHSC) PPE strategy identifies a need for an additional 5 billion PPE items to address the increased demands from health and social care providers, however, only 70% will be produced in the UK. The DHSC strategy has also identified the need for innovative and sustainable PPE as well as improved designs to address ill-fitting/uncomfortable items.

Oil-derived plastics used for PPE in clinical settings negatively impact the environment when incinerated due to the release of fossil carbon, contributing to global warming. If disposed of incorrectly, they do not biodegrade leading to contamination of land and sea with unacceptable effects on wildlife and the food supply chain.

\*\*The aim of the project is to address these issues through the development of sustainable bioplastic films to replace or reduce current oil-based plastic PPE usage.\*\*

Bioplastics derived from agri-food by-products have been used to produce materials that include flexible films. These materials can replace existing single-use plastics used as PPE that are used in large quantities in non-surgical situations, for example aprons/clinical waste bags. This project builds on recent advances in processing techniques for agri-food by-products (AFBPs), enabling the manufacture of commercially usable flexible films. AFBPs are available in the UK in large quantities (\>1.6 million tonnes per year), however, they are generally not exploited and frequently disposed to landfill or incinerated. For example, 45,000 tonnes of apple pomace are produced each year as a by-product of juice or cider production. The pomace can be further processed to produce flexible films, whilst blending with other AFBP-derived materials to produce novel features e.g. anti-microbial activity.

To address issues relating to PPE performance and usability, a Human-Centred Design (HCD) approach will be used to establish the specifications and user requirements for PPE materials based on sustainable bio-based alternatives.

HCD methods will be used to enhance and encourage the use of bioplastic films for PPE in the form of a protective apron. The project activities include:

- (i) Evaluation of stakeholder behaviour with respect to current PPE based on flexible films through interviews;
- (ii)Establishing human-centred features and documenting key design specifications that will encourage the uptake of novel flexible bioplastics for widespread adoption;
- (iii)Evaluation of user-expectations such as comfort and usability of the product, as well as requisite performance characteristics including physical properties, mechanical, durability, shelf-life and end-of-life treatment.

The project focuses on production of flexible bioplastics for which there is a substantial market need. Successful production of sustainable materials for single-use PPE applications will reduce imports, grow the UK economy and create employment opportunities, whilst ensuring security of supply.

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Additional benefits include providing additional income for agricultural growers and reducing the quantity of waste sent to landfill. The UK's progress achievement of net-zero emissions of carbon dioxide by 2040 will also be supported.	towards

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
CINEON TRAINING LIMITED	Training Aircrew Competency using Eye- Tracking (TACET)	£39,863	£29,897
AQUILA JET TRAINING LIMITED		£8,432	£6,324

This project entitled, \_Training Aircrew Competency using Eye-Tracking (TACET)\_, will harness the potential of innovative technology and science, in Eye-Tracking, Virtual Reality (VR) and Psychology, to develop a novel pilot training tool that aims to train competency and accelerate skills learning and acquisition.

There is a need within the flight training industry to bridge the gap between desktop learning and simulator training, to speed up learning opportunities and make the training process more affordable for pilots and Airline Training Organisations (ATOs). TACET will be designed to align with, and improve upon, existing Aircrew Competency Training, and will bring benefits and insights that are not achievable in conventional flight simulators. Such simulators are in high demand and expensive to access, while TACET will be relatively inexpensive and can be accessed by trainees remotely.

TACET training will enable pilots to accelerate their skill learning within the early flight training process, and provide remote learning opportunities for pilots refreshing their skills before returning to work. This is particularly relevant during and post COVID-19 pandemic, where there is a need to get pilots refreshed and re-qualified following a prolonged absence from flying. It is also anticipated that this training will have associated benefits in contributing to pilot mental health and wellbeing. It can used as an aid to ease pilot anxiety relating to re-assessment or qualification by providing pilots with the opportunity to refamiliarise themselves with their working environments and practising training procedures.

We aim to create innovative flight training that utilises our own bespoke Pysch Adaptive Virtual Environments (PAVE) software to enhance training experiences, differentiating us from other virtual flight training providers. PAVE is comprised of a number research theories relating to training skills using eye-tracking technology, including Feedback Eye Movement Training and Feed-Forward Eye Movement Training, delivered via an off-the-shelf, head-mounted, virtual reality headset. These tools have previously been deployed with the military.

The PAVE software which forms the core of TACET not only uses eye movements to train proficiency at a task, but can also be used to accurately index a user's emotional state and adapt a training environment accordingly to create an adaptive and dynamic learning environment, for example to make it more or less complex/challenging or add or remove hazards or distractions. It will be able to detect when learning objectives have been completed and advance the training automatically.

Compelling academic research indicates that the ability to adapt an environment to a user's emotional feedback, is likely to bring unparalleled performance enhancements, which can lead to decreasing accidents/events, improving task outcomes and fault finding, and better preparedness for accessing work environments.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
AFTERNOONIFY LTD	Innovative Digital Advertising technology to help SMEs survive & thrive	£205,698	£164,558

PerceptSME will help SMEs and the local economies and communities in which they exist, by enabling them to cost-effectively deploy sophisticated online advertising techniques to better compete with larger online retail and service providers in the face of the hugely adverse economic impact of COVID-19, which threatens business continuation for many Micro/SMEs, their employees, and the self-employed sector.

This will be achieved through adapting and extending existing Digital Media Quality Management technology and techniques that have thus far only been available to large enterprise advertisers with millions of pounds in annual digital advertising budgets. The project will deliver specific innovations relating to the recommendation of bundles or 'playbooks' of actions to deliver outcomes, along with the ability to understand how better outcomes can be achieved by altering and moving ad spend across different ad platforms such as Google and Facebook.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
MATRIX MOULDING SYSTEMS LTD	Ultraflow - Enabling virtual demonstration for improved market penetration of new technology offering sustainable Innovation with energy savings of 27%+ and productivity gains of 20%+	£70,025	£56,019

Matrix Moulding Systems Ltd has just launched a new patent protected ultrasonic melt flow enhancement system for thermoplastic injection moulding, which is a simple retro-fit to many of the moulding machines in the UK. Our first order followed demonstration trials for a large moulding group, validating 27% energy and 20% cycle time improvements. We are keen to promote the technology, but most potential customers are running strict site COVID-19 access restrictions to help safeguard their workforce and our sales process typically involves running moulding trials, necessitating physical presence of both the customer's and our staff. This project is to establish the feasibility to introduce our technology into an industry standard flow simulation software, enabling us to demonstrate our technology in a remote, digital, non-person-to-person environment.

Many plastics industry commentators predict an impact on business operations over the next 6 months due to COVID-19, with a decrease in turnover and export. Using our technology to improve injection moulding efficiency and sustainably could enhance UK GDP growth and generate jobs, contributing to recovery from the COVID-19 pandemic.

It is commonplace to run injection flow simulations using CAD and FEA models to establish moulding parameters, often with several iterations needed to optimize the process. Having presented the technology to an industry leader in flow simulation, we now have a better understanding of the range of parameters required to successfully integrate it into their simulation software and this feasibility project is to gather the relevant data set, seeking to present it in a format that enables its integration into their system. The feasibility will be demonstrated through moulding back-to-back trials with and without our flow enhancement technology being used, comparing results to those predicted by the simulation package.



Competition Code: 2010\_COVID\_SIF\_TF\_R3

Total available funding is £10.9m

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
ARVIA TECHNOLOGY LIMITED	Phosphate Removal from Wastewaters by Combining Different Electrochemical Processes	£48,577	£38,861

Water is essential to life, but during its use it becomes contaminated with many different materials that need cleaning up before it can be safely discharged to the environment. One of these pollutants is phosphorous which is a major constituent in detergents. Increasing standards of living and population growth are resulting in increasing concentrations in sewage. Phosphorous is an essential yet limited resource that cannot be replaced by any other element, resulting in increasing efforts to recycle the phosphorous contained in the wastewater. Phosphorous is a vital component of DNA and the key element of ATP (adenosine triphosphate). Additionally, phosphate is a mined material that is becoming depleted. Recycling this phosphorous is important as the phosphate is used as a nutrient in fertiliser and will be essential to maintaining food production to meet the needs of a growing population. The proposed process aims to recover the phosphorous for reuse, providing a valuable resource from the treatment of sewage.

Phosphate (and nitrates) are nutrients in water and too high a concentration can result in algal blooms (Eutrophication). Phosphate is often the rate limiting nutrient and removal of this contaminant will reduce eutrophication. This is significant as the blue green algae can release toxins that can be lethal to wildlife and domesticated animals (eg lifestock), as well as preventing sunlight penetrating the water, limiting photosynthesis. When these algae die, they settle to the bottom and their decomposition uses up the oxygen in the water, which causes difficulties for fish and other organisms that need oxygen to breath. It can result in the water becoming coloured and cloudy. Reduction in water quality affects the aesthetic and recreational value of the water and results in increased treatment costs.

In addition to fresh water algal blooms, large costal blooms have been detected in a number of locations where rivers discharge their waters. The World Resources Institute has identified hundreds of costal areas that are susceptible to algal blooms.

Traditional biological sewage treatment removes around 20% of phosphorous (significant as humans excrete 3.3 million tonnes of phosphorous annually), but current standards require the removal of 90%. Chemical processes are able to achieve phosphorous removals down to these levels but require significant quantities of chemicals. Sewage works are believed to contribute 70% of the phosphorous in water, leading to increased regulation to reduce this source.

Arvia have a patented, award winning technology (NyexTM) which is used for the removal and destruction of toxic and hazardous organic chemicals in water, eg pesticides and industrial chemicals. This innovative process concentrates the organics onto the surface of the Nyex particles through adsorption with the Nyex being electrochemically regenerated by passing electricity through the particles. This destroys the organics to carbon dioxide and water. However, by combining Arvia's Nyex system with other electrochemical processes, a chemical free process for the removal of phosphorous can be delivered.

This short, intensive project aims to demonstrate that the combination of processes can achieve the necessary water quality and provide data of the treatment costs.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
WASHROOM-WIZARD LIMITED	Finalising EcoBreeze Pure for safe, odour-free business environments	£67,986	£54,317

Project description - provided by applicants
EcoBreeze Pure is a first-of-its-kind air purification solution that boasts safety benefits as well as environmental advantages. The solution comprises of a patented, honeycomb carbon filter that delivers fresh, clean and pathogen-free air without emitting pollutant fragrances.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
DELIVRME LIMITED	An Innovative Online Delivery Service That Protects Customers During the Pandemic and Delivers Items 24–48 Times Faster Than Its Competitors.	£62,574	£50,058

Project description - provided by applicants
DelivrMe Limited (DelivrMe) is a rapidly growing on-demand delivery SME based in the UK. It was founded by Zak Lloyd, a serial entrepreneur with experience building start-ups from zero to seven figures. DelivrMe is solving a substantial, unmet, sustainable innovation need by creating artificial intelligence software that automates the logistics of positioning delivery drivers. This could allow users to receive their orders 2448 times faster and generate a year-5 post-project revenue of £216M.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
ROBOVEG LTD	An Innovative Robot that Automatically Harvests Ready Crops and Provide Farmers with a 70% Reduction in Labor Costs and Reduce Crop Waste.	£158,271	£126,617

COVID-19 has had a severe effect on the agricultural sector. It is estimated that, over the next 1--2 years, there will be a 75% reduction in the availability of manual labourers due to the pandemic and the UK leaving the EU. Additionally, a large proportion of each crop is wasted. There is an urgent need for an innovative, efficient harvester that will minimise waste and replace the sizeable proportion of manual labour that is in very short supply. RoboVeg's three-headed harvester rig will do just that through selective harvesting. RoboVeg is a rapidly growing UK SME, with a core team that has decades of practical experience comprising Mike Phillips, Peter Keeling and Estwick George. RoboVeg will generate a year-5 post-project revenue of an estimated £13M.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
TWO WORLDS CONSULTING LIMITED	Predictive Analytics for Covid-19 Recovery	£176,701	£141,138

Reopening the economy and reestablishing social contact are vital to the recovery of the economy and society from Covid-19\. Early reopening for economic stimulus risks having the opposite effect, as repeated restrictions imposed at short notice potentially do more cumulative damage, and for longer, than maintaining initial restrictions -- shops, offices and factories have invested in reopening and social distancing measures and individuals have made commitments on the expectation of being able to fulfil them.

It is inevitable that restrictions will need to come and go for the foreseeable future, given that the only readily available metrics for the impact of changes in policy are changes in the Covid-19 R-Factor and reported incidence and mortality. The need is for policy-makers in any sector is to be able to make informed and timely decisions that impact the least number of people in the smallest area for the shortest period of time.

In any sector -- government, healthcare, sports and leisure venues, retail malls, factories etc -- decisions are dependent on the quality and range of data available, on its geographical, demographic and sector detail and, crucially, on the ability to integrate multiple sources, identify relevant trends, anticipate what may happen next and make informed choices to continue, relax or reimpose restrictions.

This is where the problem arises: data is scattered across diverse sources, is of variable quality, accessibility, timeliness, completeness and accuracy, and curating it to generate effective local or sector insight is slow and labour-intensive, often using platforms that are themselves restrictive and/or expensive to operate.

This still only reflects what participants knew to look for -- it does not help surface previously unsuspected relationships that might then influence decision-making. Even then, such relationships need to be validated, but the biggest lag is in inspiration -- thinking to look for particular correlations. The pandemic has given us many examples: the correlation of ethnicity with mortality; the impact of living at altitude with severity or the propensity of Covid-19 patients to develop other conditions following apparent recovery.

There we are still simply identifying patterns, trends and relationships and driving specific metrics. All are useful, but prediction is usually by eyeball or simple projection of a trend.

Two Worlds is developing an SaaS service based on udu, a next-generation, Al-driven intelligence platform. The outcome is a system customisable to local or sector need and which dynamically integrates specific data sources with the automated discovery of supplementary data.

We bring a range of statistical, mathematical and AI approaches to the analysis and presentation of information and to the prediction of trends in data. Our approach enables both the creation of repeatable reporting and prediction and the self-organising discovery of new and potentially relevant patterns and relationships. In doing so, it builds on udu's established market, Two Worlds' prior (and continuing) environmental analytics and a first stage Covid-19 analytical study, now approaching completion. This project enables the project to move from prototype demonstrator (TRL5) to being usable by initial test customers (TRLs 7+).

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
MYPOCKETSKILL LTD	An open-banking earning and savings tool for young people	£106,633	£85,306

Young people have been hardest hit by the COVID pandemic, with huge disruption in education and now increasing unemployment in this demographic.

The Young-Digital-Earners project will extend the functionality of our product to integrated financial savings and transactions. Specifically, we want to include functionality that will allow young people on the platform to progress from earning money to establishing earnings and savings goals and making choices around where their earnings are distributed. We are developing this capability through an established team which already has experience in designing and financial apps and has a close understanding of the economics and technology involved in this new application.

By developing this functionality we will become a 1-stop-shop for young people to find opportunities to earn money and to then save/distribute their earnings. It will create a stronger relationship with our customers and open up opportunities for partnerships with banks / financial services providers.

MyPocketSkill is an award-winning edtech/fintech company, recent successes include:

- \* 2020 finalists in the Great British Entrepreneur Awards (Startup Category)
- \* Zara, cofounder, was named earlier this year on TechInvest's Women in Finance Powerlist (Women Shaping the Future of Finance).
- \* Featured in NatWest's 2019 \#PowerUp-100, a list of 100 startups, chosen from 10,000 who "stand out for having a significant impact on their local communities and on the national economy, showing impressive growth, and demonstrating the behaviours and qualities that we expect of the country's future business leaders".

Our platform has also been useful and relevant throughout the COVID19 pandemic, with MyPocketSkill supporting work-at-home parents by connecting them with young people to provide education, engagement activities (academic, art, dance, digital, drama, music, technology help/tuition). These achievements were recognised recently through the EUvsVirus hackathon which was the world largest ever hackathon (20,900 participants and 2,150 projects) where we were a designated finalist.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
MINICABIT LIMITED	Enabling last mile delivery of online shopping packages to the long tail of towns/villages/cities via local taxi cab firms	£121,668	£97,335

Founded by the team of Amer Hasan, Barnaby Hapgood, Nicholas Brown and Sean McDonagh, minicabit leverages its expertise and understanding as the UK's largest cab aggregator with product and software development to create an innovative solution to the problem of last mile delivery of online shopping delivery to lower populated cities/towns/villages around the UK. Despite the surge in online shopping as a result of the impact wrought by COVID-19, there is not enough delivery supply in local areas resulting in Delivery networks having to inefficiently dispatch vans from cities further away, inflating carbon emissions. minicabit expects its uniquely designed algorithms to unlock the latent capacity of local taxi cab firms to meet this demand, to develop into a post-project revenue of £15M.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
WISE SOFTWARE (UK) LIMITED	An Outside-the-Box Approach that Integrates Robots into a Company's Existing Warehouse Infrastructure, Enabling Them to Automate Their Processes at an Approachable Price Point	£89,530	£71,624

Wise Software (UK) Limited (OWRobotics) solves a currently unmet sustainable need for robotic warehouse automation. COVID-19 has increased this need due to the requirements of social distancing and other health and safety measures. Joe Daft (head of robotics), Steve Ridgley (technical director) and Greg Downey (robotics business consultant) comprise the core team of OWRobotics. Drawing on their combined decades of vital skills and experience, the company's automation hub will enable hundreds of warehouses to automate within their existing infrastructures. This cost-effective, rapid robotic automation solution will generate an estimated year-5 post-project revenue of £30M.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
GENOMIC LABS LTD	Next-generation Diagnostics for Bacterial Co-infection of COVID-19	£140,089	£112,072

GenomeKey determines how to treat Sepsis in hours, rather than days. This is important because Sepsis now kills more people than cancer, and can kill within hours. For a patient admitted to a hospital today, they would wait 3 days before the doctor knows which antibiotic will fight the infection. GenomeKey reduces this time using cutting edge machine learning and DNA sequencing to bring those 3 days down to just a few hours. This saves lives, saves money, and saves our last antibiotics for when we really need them. This is particularly important in the case of COVID-19 bacterial co-infection. Not only is our target antibiotic susceptibility test cost substantially lower than other approaches, but we also reduce the time taken to determine a negative bacterial sample from 5 days to only hours, enabling the clinician to confidently avoid antibiotics when no bacteria is present. This substantially prevents unnecessary antibiotic usage.

This programme addresses the challenge of bacterial co-infection with COVID-19, and the increasing debt of antimicrobial resistance. The overall proportion of COVID-19 patients with respiratory bacterial infection is 7.1% (8.1% for critically ill patients). The majority of patients with COVID-19 received antibiotics (71.3%) even though antibiotics are not effective against viral infections. The use of antibiotics is often prophylactic, which is necessary due to the diagnostic uncertainty with a patient presenting respiratory infection symptoms. However, the rise of antimicrobial resistance among bacterial populations before COVID was a global crisis. Now, with widespread antibiotic overuse during COVID-19, we have increased our AMR debt even further. This presents a looming healthcare crisis once the focus on COVID has subsided where our antibiotics will be increasingly ineffective.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
INNTABIZ LIMITED	3Mind Writing - An Asynchronous, Deliberate Practice, Virtual Learning Experimental Development Project	£102,491	£81,992

UK charities are facing unprecedented challenges due to COVID-19\. They have seen a 72% increase in demand for their help during June-August 2020 (Institute of Fundraising Research) and at the same time seen a dramatic reduction in their charitable donations, with a projected £10.1 billion funding gap over the next six months (Pro Bono Economics Analysis). They have an urgent need to find alternative sources of income. At the same time the pressure on already challenged Local Authority health and social care budgets has increased. With a workforce augmented by volunteers, Charities are able to offer best value to the public sector; however they lack to skill and experience to convey this within their tenders.

For over a decade we have been providing tender writing services to clients in the UK. Through the application of our unique 3Mind Writing(r) approach our clients have secured over 80% of the tenders we helped them bid for, resulting in over £1Bn of contract wins per annum.

Our aim is to create a virtual learning platform, process and content that \*\*drives deliberate reflective practice within an asynchronous learning environment, without the need for mentor/facilitator intervention.\*\* If successful this will enable people in the charity sector acquire the advanced tender writing skills they need to compete for, and reliably win, the contract opportunities that exist. The concept moves beyond traditional eLearning approaches which allow learners to acquire understanding of a subject, instead creating a system that uses the latest insights into deliberate practice to actually builds users' capability and competence through the learning process.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
BOW TIE CONSTRUCTION LTD	BowTieSprong Treadgold House	£129,529	£102,620
VENTIVE LTD		£44,046	£35,236

BowTieSprong is a revolutionary approach to wholesale retrofit of apartment buildings. It involves encapsulating the building with a new insulated airtight wall and a new warm roof with a maximally sized solar array. The new roof space forms a service loft providing access to the solar array, batteries, air source heat pumps and MVHR air handling units.

Energiesprong itself is a unique retrofit concept. It guarantees occupants a constant temperature in their living area of 21 degrees, '45 minutes' of hot water a day, a typical electrical plug load, all within a 'comfort plan' or service charge. Residents receive 24/7 filtered warm air delivered by mechanical heat recovery ventilation. These systems do not re-cycle air and are therefore safe to operate in a post-covid19 environment. Furthermore they prevent build-up of carbon dioxide and the depletion of oxygen indoors. The constant inflow of warm air without the need for active heating eliminates fuel poverty. This also eradicates damp and mould as all surfaces \\\> 19° and rooms are kept within the lowest Covid19 transmission humidity range of 40%-60%.

Hot water is heated by Air source heat-pump which eliminates the gas connection and standing charge eliminated. Boilers, wet radiators and associated plumbing are removed. Conversely, indoor temperature will never be above 26°, guaranteed by the Passivhaus design process.

This work occurs with residents remaining in-situ, a totally new possibility for a retrofit of this scale during which residents would normally be temporarily decanted at a high cost to the council and the additional risk of Covid19 transmission. This reduces stress on residents as they do not have to leave their homes and belongings or worry about the security of their homes while they are away. In addition there is very little internal access required to the properties, minimising the risk of Covid19 transmission between workers and residents

As a signatory to 2015's COP 21 Paris agreement, the UK is bound by law to reduce the carbon emissions of its buildings to Net Zero Carbon by 2050\. No government roadmap exists describing the steps to achieve this. EnergieSprong as a concept and BowTieSprong as a product solution shine a light on how to deliver this upgrade affordably and at scale.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
SPOTLIGHT FOCUS LIMITED	An Affordable, First-of-Class, Machine- Learning, Productivity Software that could Significantly Improve Work From Home Productivity via Distraction Filtering, Automation and Scheduling.	£182,245	£145,797

Project description - provided by applicants
Spotlight's team led by Simon Labahn and Alex O'Brien, will develop an intelligent distraction filter with workflow automation to help reduce distraction from digital devices during periods of remote working. Spotlight's filter will identify individualised digital distractions based on user preferences and behavioural data analysed by sophisticated machine learning algorithms. The integration of software will also allow the production of automated workflows.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
NEW STREAM GENERATION LIMITED	New Stream Generation Renewable Support Technology	£124,673	£99,739

New Stream Generation Renewable Support Technology (RST) is a first of-its-kind technology that combines cutting-edge renewable generation forecasts with real time pricing and generation data for distribution system connected assets in a streamlined, easy to use desktop tool. The technology supports energy trading opportunities by identifying real-time changes in power supply and demand. This technology is novel because it integrates forecasting and real time market data with hardware controls specific to each asset. This is something that our current in-house tools are not capable of delivering. With underlying data sources constantly growing, the process of recovering, analysing, and actioning them quickly becomes a real challenge. New Stream RST will have the speed to capture this data quickly and efficiently and then act upon it, by sending physical instructions to the asset and trade instructions to the power markets, as well as recording and reporting a broad suite of performance and carbon data that is fully transparent to all stakeholders via the cloud. To be able to combine all these features into one standalone tool would help to significantly optimise the operation of renewable generation.

The technology will also help with accelerating the closure of legacy gas and coal plants in favour of a greener, decarbonized fuel mix by promoting distributed generation assets as more than capable of dealing with the intermittency of renewables.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
HIGHLAND DESIGN ENGINEERING LIMITED	Bloca - Sustainable Building Blocks	£65,685	£52,547

The Bloca Project is the development of a new construction method for housing. It has been developed as response to the exposed fragility of global supply chains from Covid-19\. The concept is based around decarbonising and circular economy principles, with the maximum possible sustainable content, and a design approach which allows the entire component to be reused at the end of its first application

Scottish Gaelic for "block", Bloca enables rapid building construction, is materially efficient yet structurally stable, highly energy-efficient, sustainably and locally sourced, and adds economic value to local resources. It is a flexible system that can be reused time and again, allowing buildings to be constructed, extended, modified, rebuilt and easily recycled.

The standard nature of Bloca means that it literally fills the gap between custom full SIP (Structural Insulated Panel) construction (bespoke manufacture expensive, large and heavy) and full build at site (time & expertise consuming).

The assembled team represents a blend of innovation, experience, materials expertise, customer input and research capability:

\*\*4c Engineering\*\*, the lead partner, are an innovation & engineering consultancy with a track record of leading technology development from complex wave power devices, through to aquaculture innovation and novel PPE. 4c Engineering will apply an engineering innovation & manufacturing mindset to conventional construction.

\*\*Macbeath Architects/Thermopassive\*\*, another innovative company, are a Highland based architecture firm with nearly 40 years experience, and they are experts in the design of SIP-based domestic constructions..

\*\*Norbord\*\*, the local producer of OSB (oriented strand board), will provide technical advice on the material properties, and provide sample material.

The \*\*University of the Highlands and Islands\*\* (UHI) are contributing expertise from their Construction & the Built Environment Team.

Providing customer input, \*\*Highlands and Islands Enterprise (HIE)\*\* represent the public sector. They have a strong interest in developing innovative, sustainable construction for their showpiece Inverness Campus site.

Additional customer input will come from \*\*Pat Munro Ltd\*\*, an established private-sector house builder with a track record in innovation. They own the Carbon Dynamic modular housing business and build affordable housing for a local housing association.

\*\*Capella IP\*\* will support the project by providing a practical, comprehensive approach to Intellectual Property.

The primary theme for this project is localisation of supply chain as response to Covid-19 crisis, however it also strongly reflects these themes:

\* decarbonising and circular economy - (project has sustainability at its core)

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* geographic or regionally targeted innovation (this is particularly suited to timber-rich, remote and rural areas) * innovation that is aimed at commercial or residential users (the product can be used for self-build or commercial) * climate change adaptation and environmental sustainability (the net effect of the above points).

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
CDS NEW VENTURES LTD	Covid and Staff Compliance management for the Care sector	£94,000	£75,200

SureCert is a digitised background checking system for recruiters. With the first Innovate UK grant, we were able to add significant additional functionality to support organisations within regulated sectors to onboard staff quickly and more efficiently. We are focused on the care sector and are Preferred Suppliers to Scottish Care and Care England and our approach has been endorsed by the Care Inspectorate in Scotland.

Care providers are subject to regulation and their approach and paperwork is checked by regulators regularly. When checking paperwork on staff recruitment and ongoing checks, the regulator would normally make an unplanned visit, which, during covid, has been difficult. Covid now provides all parties with the opportunity to maximise both safety and efficiency when regulating care providers and we propose to focus our attentions on five additional elements:

- 1. Our platform will be able to take and store covid test results and display them on the care providers' websites, providing a real time view of how safe the provider is, when the tests were taken and when they are due again;
- 2. Our platform can be used to ensure all those who are accessing care buildings will self certify that they are not displaying symptoms of covid, providing care providers with a real time view of who is in their premises, helping to manage risk;
- 3. We will develop a second "module" on our platform that can be used to manage the ongoing compliance for staff, enabling all HR records relevant to the regulator to be stored in one place this can then be extended to hold all regulatory documentation beyond HR (e.g. Health and Safety);
- 4. We will develop a "regulator access" to our platform, which will enable, (with consent mechanisms built in), the regulator to log in, access and assess all relevant HR information remotely, without having to waste time on physical visits, as well as help them to plan and manage who and when to regulate. We propose that this will help to enable automation within regulation, only flagging an issue when a candidate fails to meet a standard, or a training course expires, or even if a criminal record check flags an issue in real time; and
- 5. We will build in the final "SureScore" approach and create an "identity standard" for the care and other sectors, which will enable the level of background checking undertaken on a candidate to be turned into a score, ensuring that personally identifiable information is then withdrawn to a secure area of SureCert and retrievable only when requested by the regulator.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
BLACKMORES (UK) LIMITED	ISO Pro Academy	£79,708	£79,708

The project is to address key issues businesses face to address the Climate Emergency and raise standards for UK businesses. Local governments have made a pledge to be net zero by 2030, however in reality this is unlikely to happen unless businesses understand 'how' in very practical terms, they can make a difference are given the tools, training, techniques and support to address the sustainability issues we face.

As a result of COVID-19, our plans have been significantly disrupted in 2020 for planned training and consultancy. Businesses are swiftly embracing new ways of working and learning in order to survive and thrive. The project will productise and digitilise how ISO Standards, and in particular environmental and energy standards are implemented and managed in the UK.

The ISO Pro Academy is a ground-breaking state of the art innovative membership platform, which will support the UK's 2030 pledge on decarbonisation and the United Nation's SDG's. Unique in our marketplace, and a key differentiater, it will lead UK Business to gain a larger share of the international market as they will be able to compete more effectively.

The project covers the research, design, development, testing and launch within 3 months. Once completed, this could be rolled out internationally, and will game-changer in the ISO Standards landscape.

The ISO Pro Academy is significantly innovative both commercially and technically as it is a an incremental application of a trusted and proven resource and technology that meets an emergent opportunity.

We will provide:-

_Step-by-step roadmap :Designed to be concise and easy to follow from Gap Analysis through to preparation for an assessment
_In-depth courses:Learn the essentials fast, and transition seamlessly from foundation to professional level. Saving thousands of pounds on training courses, we provide an an abundance of courses
_Bite-size training: Straight to the point resources to address a specific environmental need

\_Resources - Tools and techniques:\_ L\_earn skills, techniques and innovative tools to achieve your ISO goals. We share proven ways to simplify ISO Standards.. We provide checklists, downloads and guides.\_

\_Live Q & A's\_\_: Interactive Live monthly video calls with our 'ISO Legends' tailored to members specific situations i.e. Sustainable procurement, Leadership engagement.\_

\_Member forum:\_ \_Get answers to questions 24/7 inside our member-only forum.\_

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\_Expert workshops\_\_: In-depth insights on specific tactics, experts provide on-line tutorials such as 'How to decarbonise your business with ISO 50001'.\_

At Blackmores, we've supported over 250 businesses to raise standards and achieve ISO certification. Our popular podcast (The ISO Show) was launched in 2019 to share success stories, hints and tips and dispel myths around raising standards. Now with over 15,000 listeners across the globe, our next step is to have a digital community for ISO Standards to embrace equality, diversity and inclusion for all (various languages and learner methods both audio and visual) to provide practical support and a community where businesses can aim to meet their environmental objectives.

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Competition Code: 2010\_COVID\_SIF\_TF\_R3

Total available funding is £10.9m

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
SATOSHI SYSTEMS LIMITED	Development and commercialisation of an innovative commodity trade and finance platform	£154,138	£123,310

In the wake of COVID-19, most Small-and-Medium Commodity Traders (SMCTs) will need cost effective trade finance to support the recovery of both imports and exports \[[ICC][0]\]. However, increasing regulatory requirements has led to increasing costs to fulfil legal, risk management and administrative requirements for CTF transactions. Therefore, banks have reduced their finance networks to the major commodity traders and their corporate clients concentrating the market into their hands. The processes involved in carrying out CTF transactions are manual, paper-based and require the work of professional lawyers, making it uneconomically viable for most SMCT's to gain access to smaller size loans which they require.

Digital blockchain trade finance platforms have been recently launched in collaboration with banks to help the generic trade finance sector. These platforms facilitate the necessary trade finance workflows, between only the participating banks and their existing corporate clients. Due to the high costs involved in the manual due-diligence, risk-management and legal processes, major barriers for most SME's accessing CTF are still unresolved.

Through this 3-months industrial research project we, Satoshi Systems Ltd are developing Phlo; an innovative R3 Corda blockchain-based machine learning platform which allows all members of the commodity trading supply chain to carry out the essential workflows needed to facilitate CTF transactions. Phlo will create a level playing field for SMEs, providing process transparency, risk reduction, credit when needed, and the rapid, low-cost facilitation of CTF transactions.

[0]: https://iccwbo.org/content/uploads/sites/3/2020/05/2020-10ways-governments-sos.pdf



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
ORIGIN TECH LTD	No Dig Water Pipe Repair Technology	£184,102	£147,282

Everyday in England and Wales around 3,000,000,000 litres of water are wasted through leaking pipes. This is a vast waste of a natural resource and as demand could be 40% greater than supply by 2030 then a solution is urgently needed.

We have developed and tested (lab scale) technology that can repair water pipeline leaks without digging up the pipe to repair it. We are working with Yorkshire Water to develop this technology in order to signi?cantly reduce over 2 billion litres of water that leaks out of pipes every day in the UK.

Water companies have many options for ?nding leaks on their mains, however there are limited methods for repair. Current approaches require excavation to expose the water main, regardless of the size of the leak, and then either installation of a clamp or cutting out and ?tting a new pipe.

This technology will repair any type of pipe and most types of leak, we don't even need to know where the leak is. Its use in the industry will have the following bene?ts:

- \* Save water, prevent wastage, prevent water scarcity
- \* Solve the industry challenge of halving leakage by 2050
- \* Reduce power required to pump water, reducing carbon emissions
- \* Reduce disruption (road works etc)
- \* Reduce number of people required to ?x leaks
- \* Allow social distancing by reducing human to human interaction during repairs
- \* Reduce domestic water bills
- \* Export potential is signi?cant for regions of water scarcity

The outcome of successfully delivering this project will result in a product that will enable the following to be achieved by its deployment:

- \* Reduce resource (water) wastage
- \* Reduce water scarcity
- \* Reduce energy demand
- \* Open up a signi?cant export market for reducing water leakage in countries with water scarcity issues, which in turn signi?cantly reduced energy usage (desalination and reverse osmosis plant)
- \* Take people out water poverty by reducing household bills and allow water companies to divert expenditure on leaks to protecting their most vulnerable customers

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
LONDON FOREST PRODUCTS LIMITED	3D Lignin Carbon Heat Sinks (3DLC-HS)	£80,251	£64,201

Project description - provided by applicants
London Forest Products is developing 3D carbon heatsinks which thermally, economically and sustainably outperform the current aluminium and copper industry standard.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
The Tyre Collective	Electrostatic capture of carbon dust from tyres	£149,972	£120,000

The Tyre Collective will conduct a technical assessment into the development and deployment of an innovative, patent-pending tyre-wear collector.

Tyres shed half-a-million tonnes of carcinogenic, toxic carbon dust every year. Accelerating the shift to low carbon transport will increase carbon emissions from tyres as a direct consequence. EVs and ULEVs are heavier and have higher torque, causing their tyres to wear down 30% faster.

In this project, The Tyre Collective will work with future customers to validate the technical, commercial and environmental feasibility of our solution in preparation for an on-vehicle pilot test with our partners.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
CLIMAVORE CIC	CLIP - Closed-Loop Intertidal Polyculture	£45,428	£36,342

\*\*Closed-Loop Intertidal Polyculture (CLIP)\*\* is a hybrid system combining a sea farm with a food waste recycling process. It is a regenerative aquaculture model growing different marine species that clean the water by breathing. Oysters, mussels and seaweeds filter seawater as they grow; and sea cucumbers pull nutrients from the ocean soil to make their own food for others. They all improve the biodiversity of marine habitats and increase the amount of oxygen in the water. When these species thrive so does the ocean. Additionally, these ingredients are highly nutritious, local to Scottish waters, and do not require chemicals, fertilisers or insecticides to grow.

Continuing four years of work on transitions to cleaner forms of aquaculture on the Isle of Skye, Scotland, CLIP will be located in a sea loch on the island. Waste shells will be collected from the farm, as well as from local food businesses, to transform them into a bespoke tile produced locally. These new tiles made out of food waste will also reduce pressure on the landfill and waterways. The facility itself will become a site providing food experiences for visitors to learn about the coastal environment. This novel material brings together the food, construction and tourism sectors in a common vision to care for the marine ecology of Skye.

This project marks the first steps in realising this ambition, allowing us to conduct prototyping of the bespoke waste shell tile and testing and analysing material trials for the farm structure, alongside establishing the most viable seaweeds and salt marsh greens to cultivate on site.

CLIP is part of CLIMAVORE\_,\_ a Community Interest Company that explores how to eat as humans change the climate. It will improve the availability of ecological and responsible produce in Skye supporting the urgent move to more local food production in the wake of COVID and in the face of Brexit. It helps residents and visitors understand the importance of these species in keeping the ocean and ourselves healthy.

CLIP also supports businesses to become more sustainable in the face of the climate emergency and creates skills training and long-term employment and apprenticeship opportunities for residents of the island. That is why we call it a "closed-loop:" it is a circular economy that starts from seafood, collects its waste, makes it into a useful material that improves the ocean, provides novel ways of caring about coastal heritage, which in turn ends up enhancing the presence of nourishing seafood. And the closed-loop cycle of intertidal polyculture starts all over again. This is how CLIP regenerates the water and promotes a healthy ecology.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
WHEREFROM LTD	A Revolutionary Online Platform Helping Farmers and Sustainable Suppliers to Connect Directly with Consumers, Independent of Supply Chains.	£162,263	£129,811

Wherefrom is a UK-based SME that provides sustainable technology solutions to companies with a strong sustainability focus. These solutions will provide two-way communications between farmers/producers and their consumers to provide actionable insights and supply-chain management solutions. The platform will give more visibility and customer-base access to businesses who invest more time, energy and resources on creating greener, more ethical products, in line with Wherefrom's overall philosophy of prioritising sustainability.

It will also connect consumers with local producers to guard against any supply-chain shortages during these increasingly uncertain times while helping them to find the best companies to match their personal interests/needs.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
MODERN SYNTHESIS LIMITED	Developing a sustainable and high performance biofabricated leather-like material	£97,693	£78,154

In the UK and globally the fashion industry has been severely disrupted by the COVID-19 pandemic with shifts in consumer demand and supply chain disruption. Moving forward, consumers are prioritising more durable, sustainable materials and products but the development and funding necessary to develop these has been disrupted.

Whilst novel biobased textiles are becoming more widespread, suitable alternatives to plastic based synthetic leathers are not able to meet industry requirements for aesthetics, performance and cost.

At Modern Synthesis we have developed and patented a novel biobased leather like material. The production process, developed in collaboration with academic experts combines biotechnology with innovation in processing and material science. The material life cycle has radically improved sustainability compared to synthetic and animal leathers. CO2 emissions are at least 10x lower and the material is recyclable or biodegradable with zero hazardous chemical or microplastic pollution at any stage.

This project will adapt the production process to utilise UK sourced waste biomass feedstocks and develop innovative processing to maximise the performance advantages of the material. We will also perform testing necessary to unlock product development collaborations with fashion industry partners.



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Participant organisation names	Project title	Proposed project costs	Proposed project grant
HEY SUMMIT LTD	A Platform for Virtual Event Management, Offering Virtual Facilities and Products to Events Organisers	£143,553	£101,188

Project description - provided by applicants
Founded by Rob Gelb and Benjamin Dell, HeySummit is a rapidly growing UK-based SaaS SME that aims to address the lack of functionality and integration in current virtual conferencing platforms. COVID-19 has caused most in-person events to be cancelled, with many moving online. HeySummit will address this issue by developing an app store that will allow seamless integration of multiple separate platforms for different organisers with diverse conferencing requirements. Based on this much-needed development, HeySummit proposes a year-5 post-project revenue of £50M.

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