

Results of Competition: Future Flight Challenge Phase 2: Strand 2, Development

Competition Code: 2004_ISCF_MMM_FUTUREFLIGHTCHALLENGE_FULLSTAGE_FASTTRACK_STR2

Total available funding is £34,000,000 over 2 strands

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
GKN AEROSPACE SERVICES LIMITED	SKYBUS	£345,457	£120,910
CONNECTED PLACES CATAPULT		£99,214	£99,214
PASCALL + WATSON LIMITED		£71,040	£35,520
SWANSON AVIATION CONSULTANCY LIMITED		£225,600	£112,800

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Project description - provided by applicants

Drivers in the U.K lose an average of 178 hours a year due to congestion costing them nearly £8 billion in 2018\). The largest impact is seen in London, one of the most congested cities worldwide, however the overall economic impact of travel delays, including public transport delays, across the UK is colossal. This creates an increasingly obvious need for more innovative and intelligent transport systems.

The Skybus transport network, based on large electric Vertical Take-Off & Landing (eVTOL) vehicles capable of carrying between 30-50 passengers each, takes the "Park and Ride" concept into the air for mass transit over extremely congested routes eliminating the 2-Dimensional constraints of current surface transport modes including cars, trains and buses. This will not only offer direct benefits in reduced travel time at affordable fares but also reduce the congestion on current ground transport vehicles thus reducing overall travel time for all passengers travelling on these routes regardless of their chosen mode of transport.

This new transport network could offer a larger, cheaper and more accessible aerial mobility solution in the most congested urban areas for the benefit of the wider public.

A consortium of experts in aircraft manufacturing (GKN Aerospace), eVTOL infrastructure/operations (Swanson Aviation Consultancy & Pascall + Watson) and transport systems (Connected Places Catapult) has been assembled to carry out an extensive multidisciplinary study into this proposed transport system concept.

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HEATHROW AIRPORT LIMITED	Fly2Plan – Enabling a new model aviation data system-of-systems	£1,043,086	£52,154
ALTITUDE ANGEL LTD		£427,068	£298,948
CONSORTIQ LIMITED		£115,354	£80,748
Cranfield University		£245,352	£245,352
DIGITAL CATAPULT		£289,558	£289,558
IAG GBS LIMITED		£110,034	£55,017
IBS SOFTWARE EUROPE LIMITED		£206,928	£66,217
NATS LIMITED		£40,080	£20,040

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ROCKPORT SOFTWARE LIMITED	£723,000	£380,153
SITA INFORMATION NETWORKING COMPUTING UK LIMITED	£630,720	£157,680
SNOWFLAKE SOFTWARE LIMITED	£52,510	£26,255
TEKTOWR LTD	£528,000	£369,600
University of Oxford	£259,242	£259,242

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Project description - provided by applicants

Fly2Plan - _Enabling a new model aviation data system-of-systems_ seeks to develop a new model for aviation data exchange to allow new entrants in urban air mobility and autonomous operations to participate. By researching the use of modern and emerging internet technologies of public cloud infrastructure and distributed ledger technology, the decentralised operating models built over generations of pioneering aviation discovery can be preserved, whilst transforming operating resilience and costs for the community.

Fly2Plan directly addresses the following themes:

- * ATM&UTM: Fly2Plan vision is to develop a set of open-source Electronic Data Interchange (EDI) technologies and platform that underpin all aspects of airport, ATM, UTM, flight and UAV operations based on distributed ledger technology such as Blockchain.
- * Digital Infrastructure: solution for the transformation of legacy systems into agile, on-cloud interoperable platforms, to enable secure plug-and-play interactions between partners in the ecosystem.
- * Digital Communication Systems: as digital data and voice communication systems mature in the ATC environment, a natural evolution to more data traffic and less voice will occur. Fly2Plan offers the tools in order to enable this transformation.
- * Viable, challenging, use cases: a variety of users will benefit from Fly2Plan technology: drone operators, traffic controllers, UTM platform providers, ANSPs, airlines, airports, military, baggage handling providers, ground handling providers... As part of this, end users are represented within the consortium and the rest have been approached during proposal preparation to gather their insights and needs and will be part of WP5 conversations to refine use cases. There are several of them already being considered:

1. Flight Plan and Operation of Autonomous UAV BVLOS in non-segregated air space
2. New Capacity Model definition, with headroom quantified
3. Trajectories management, enabling fuel burn reduction in stacks and rewarding excellence in planning.
4. Vehicle technologies enablement -- autonomous flight (UAVs, eVTOLs, automated aircraft,...) will not happen if there is no provision of data such as flight data (FIXM), aeronautical info (AIXM) and weather (WIXM) from an open, reliable system-of-systems as the one Fly2Plan will develop.

The Consortium is well balanced and formed by thirteen partners from across multiple sectors and disciplines. Within these partners, big corporates, start-ups and research institutions are included:

- * Operations: Heathrow Airport, IAG, Consortiq, Altitude Angel, Cranfield University, NATS
- * Technology: SITA, IBS, Snowflake Software, TEKTowr, Rockport Software
- * Research: Oxford University, Cranfield University
- * Product Management Office: Digital Catapult.

The project is divided into five costed 'Industrial research' work packages.

- * WP1 -- Product Design and Project Management

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- * WP2 -- Governance model definition
- * WP3 -- Development of the new open-source DLT platform\]
- * WP4 -- Trust Assurance Mechanisms
- * WP5 -- Communication, IPR strategy and Phase III preparation

The project has obtained letters of support from relevant stakeholders as: Eurocontrol, ACI, UAE GCAA, Gatwick Airport, Microsoft and the Industry Resilience Group interested in the value Fly2Plan could unlock for them and want to monitor the progress of the project.

The project has a total duration of 15 months and total cost of £4,670,932, where partners are co-funding 51%.

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BLUE BEAR SYSTEMS RESEARCH LTD	Project HEART: Hydrogen Electric and Automated Regional Transportation	£1,423,092	£690,200
BRITTEN-NORMAN AIRCRAFT LIMITED		£332,230	£161,132
Edinburgh Napier University		£107,813	£107,813
FLEETONDEMAND LIMITED		£189,462	£91,889
HIGHLANDS AND ISLANDS AIRPORTS LIMITED		£13,054	£6,331
INMARSAT GLOBAL LIMITED		£243,242	£117,972
LOGANAIR LIMITED		£258,945	£125,588
PROTIUM GREEN SOLUTIONS LIMITED		£298,651	£209,056

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WESTONWILLIAMSON+PARTNERS LLP		£98,170	£47,612
ZEROAVIA LTD		£767,332	£308,391

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Project description - provided by applicants

The consortium's vision for HEART (Hydrogen-Electric and Automated Regional Transportation) is to develop a sub-regional air transportation network that is zero carbon, affordable, scalable and safer and with a targeted entry into service in 2025. Consortium partners include: Blue Bear, ZeroAvia, Loganair, HIAL, Britten-Norman, Inmarsat, Protium, Weston Williamson + Partners, Fleet-on-demand and Edinburgh Napier University.

Project HEART is aimed at sub-regional aviation (9-19 PAX aircraft, <500NM). Today's operations are economically uncompetitive due to the high operating costs of the aircraft relative to the number of seats and labour-intensive ground operations amongst other factors. By introducing state-of-the-art technology and infrastructure, the consortium will unlock a sub-regional air travel market that will avoid major congested airports and instead utilise the >100 licensed airfields around the UK. Passengers can then experience shorter door-to-door travel times, cheaper ticket prices, and a zero-carbon travel option.

The key enablers that the HEART consortium will develop during the Future Flight Challenge to unlock this market are:

- * Novel aircraft with hydrogen fuel cell powertrains and on-board automation (to reduce pilot workload and enable remote support) that will significantly reduce marginal cost of operations.
- * Green hydrogen infrastructure (production, storage, handling and refuelling) to support and sustain full scale operations together with a skilled workforce to operate and maintain this infrastructure and aircraft.
- * Single (not two) pilot operations through use of next generation digital towers and remote co-piloting stations to assist pilots during high workload situations which, in turn, enable higher operational safety and scalability within a high-volume network.
- * Use of a hybrid connectivity solution which combines high bandwidth terrestrial networks (3G/5G) with high-reliability satellite communications to support remote co-piloting and mission critical communication in the cockpit, as well as additional revenue streams from in-cabin use.
- * Use of autonomous ground robots to 'guide' aircraft, automate baggage loading/unloading and handle refuelling operations. This will increase operational safety, reduce operating costs and enable scale-up of operations.
- * Radical new aircraft terminal designs that are low-cost, modular and scalable. These terminals will ensure quick intermodal transfers for passengers and automated infrastructure.
- * Integration of the HEART network with other transportation modes through mobility-as-a-services solutions to enable fast intermodal transfers, door-to-door journeys and 'just-in-time' operator models. Other modes to include existing first/last mile options such as buses and taxis and future solutions such as eVTOLs.
- * Addressing social acceptance issues such as 'perceived safety of hydrogen powertrains', 'remote co-pilot operations' and understanding the various levers that will affect public perception of these technologies.

In Phase 2, the consortium will undertake various proof-of-concept demonstrations to work towards a certifiable commercial demonstration at the end of Phase 3. The two phases of the Future Flight Challenge project will fast track market readiness by 2025 and full deployment in the UK between 2025 and 2030.

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HEATHROW AIRPORT LIMITED	Future Flight Challenge (Phase 2) - Project NAPKIN	£470,052	£173,919
CRANFIELD AEROSPACE SOLUTIONS LIMITED		£230,349	£115,174
Cranfield University		£49,391	£49,391
DELOITTE LLP		£116,269	£23,254
GKN AEROSPACE SERVICES LIMITED		£355,139	£131,401
HIGHLANDS AND ISLANDS AIRPORTS LIMITED		£12,034	£4,453
LONDON CITY AIRPORT LIMITED		£151,005	£55,872
ROLLS-ROYCE PLC		£901,660	£351,647

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University College London		£347,047	£347,047
University of Southampton		£118,754	£118,754

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Project description - provided by applicants

****Project NAPKIN - New Aviation, Propulsion, Knowledge and Innovation Network****

****NAPKIN is** **developing** **the blueprint for a UK sustainable aviation system supporting the UK's leadership** **position in aviation innovation and action on climate change and directly addressing its need for rapid, affordable** **and** **sustainable regional connectivity.****

Our high quality UK consortium draws on existing knowledge and expertise to deliver this timely project which will help to pave the way for low and zero carbon domestic and short haul aviation this decade.

Moving towards a sustainable aviation system requires transformative change and coordinated action. NAPKIN uses a '5As' model of the aviation ecosystem - integrating Air passengers, Airports, Aircraft, Airspace, and Airlines - building a comprehensive picture of the conditions that will enable the transition to regional electric and sustainable aviation and the landscape of future products, services and infrastructure.

Cranfield Aerospace (via project Fresson), GKN and Rolls-Royce (via Fresson, Efan-X, Accel etc) have developed electric aircraft conceptual designs. Cranfield University, University College London and the University of Southampton bring deep expertise and sophisticated modelling, complemented with input from Deloitte. Heathrow Airport, Highland and Island Airports and London City Airport bring the different contexts and ground operational experience to demonstrate viability across the UK. An airline focus group brings the project to life guiding the project with a clear pathway to a commercial reality.

A model of affordable domestic sustainable aviation has the potential to solve carbon, connectivity and commercial challenges together. We believe that regional and sub-regional sustainable flight presents the necessary an economic and environmental opportunity the UK must grasp with urgency.

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SNOWFLAKE SOFTWARE LIMITED	ATOMICUS - Advanced Traffic Organisation and Management of Intelligent Cargo Unmanned Systems	£287,707	£112,206
ANRA TECHNOLOGIES UK LTD		£328,410	£190,478
CONNECTED PLACES CATAPULT		£168,994	£168,994
DISTRIBUTED AVIONICS LIMITED		£66,305	£46,414
GE AVIATION SYSTEMS LIMITED		£153,968	£76,984
NEURON INNOVATIONS LTD		£185,500	£129,850
THE GUILD OF AIR TRAFFIC CONTROL OFFICERS		£100,000	£20,000
University of Southampton		£32,054	£32,054

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Project description - provided by applicants

ATOMICUS will deliver a significant pragmatic step towards safe operation of unmanned aircraft logistics by enabling integration with regional airfield operations. The approach of data based integration with existing physical infrastructure, will enable unlocking of significant cost savings and productivity gains in the logistics market. This project aims to create and demonstrate the digital infrastructure and operational procedures that will allow long-range unmanned cargo systems to safely and efficiently share the airspace and ground infrastructure with manned aircraft.

The project will develop and demonstrate a concept of operations (CONOPS) and safety case, enabling scalable Unmanned Aerial System (UAS) operation and airport ground operations integration. The project will build upon the DfT Open Access UTM Framework being developed by Connected Places Catapult, creating new data infrastructure, products, APIs, and data flows to implement necessary interfaces.

Through this approach, ATOMICUS will demonstrate the ability to provide logistics between airports and airfields, demonstrating the capacity to, as part of a planned, sequenced flight, with an allocated slot, safely operate a drone through controlled airspace to land at a manned airport and arrive at a 'gate'. Following arrival, the vehicle is inspected for damage, wear and tear.

By demonstrating how UTM can enable scaling of the benefits of UAS, the project will provide the foundation for demonstrating during Phase 3, a middle mile solution for integrating drones as quickly as possible into the existing Air Traffic System and infrastructure with minimal disruption to today's manned aircraft air and ground operations.

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BRITISH TELECOMMUNICATIONS PUBLIC LIMITED COMPANY	XCelerate	£1,306,073	£644,286
ADJSOFT LIMITED		£231,698	£114,227
ALTITUDE ANGEL LTD		£663,458	£325,094
ANGOKA LIMITED		£227,038	£113,519
DRONE-I LTD		£82,466	£49,480
HEROTECH8 LTD		£145,790	£72,895
MYRIAD BUSINESS LTD		£71,000	£35,500
SKYBOUND INNOVATIONS LTD		£87,463	£52,478
SKYPORTS LIMITED		£196,661	£98,330

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Project description - provided by applicants

XCellerate partners' goal is to take UTM systems out into the real world, by providing a repeatable framework that towns, cities and wider can follow in order to open up portions of the skies and enable suitable safe BVLOS operations, including highly automated (no-pilot-in-the-loop) scenarios.

Project XCellerate will be enabled by a network of existing and new technologies underpinned by Altitude Angel's proven GuardianUTM OS, incorporating existing air traffic management and communications systems and augmented by new technology, such as 5G, cyber secure Drone Remote ID as well as Drone Detection and Surveillance/Counter capability with the most advanced aviation infrastructure in Europe.

Through Future Flight, BT will leverage their market leading communications experience, network, and infrastructure to enable drones to have greater connectivity and lower latency for quicker transfer of high precision data. The use of 4G/5G as primary or backup infrastructure will ensure drones remain connected for greater situational awareness, positional accuracy, and collision avoidance. This is a key enabler to unlock drones to fly BVLOS operations.

To ensure location and position of drones is available at all times and to increase reliability, Project XCellerate will establish secondary systems including; Satellite (Galileo), 4G/5G networks as backup.

In presenting the Arrow Drone Zone (ADZ) , we will establish a repeatable pattern for safe automated BVLOS operations, with automated drones facilitated by an independent surveillance and tracking system (including surveillance by humans in-the-loop) for low level aircraft along with separation and deconfliction services via the UTM system to assure safe operation in a manner that is achievable now and fully scalable in line with the industry growth rate.

The ADZ points the way, going from concept to routine operations, by providing the physical and digital infrastructure necessary, coupled with complete concept of operations, to create 'automated drone zones' that are fully connected into aviation management systems and paradigms.

By bringing together BT's strength in connectivity and national assets (i.e. reliable, secure, high bandwidth, low-latency radio and fixed connectivity; digital and physical infrastructure), with leading partners including; Altitude Angels' experience in UTM and ADZ frameworks, combined with leading drone service providers HeroTech8 and Skyports, public acceptance researchers from Myriad - a collaborative team of recognised academic experts, cyber security provider Angoka and end user experts SkyBound Rescuer (Emergency Response) and Dronestream (NHS), we are powerfully placed to realise the world's first live commercial UTM. XCellerate will establish certainty to the regulator, public, and the drone industry on the scalability and safety of routine BVLOS flights.

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THALES UK LIMITED	Airspace of the Future	£1,421,569	£461,299
ALTITUDE ANGEL LTD		£483,258	£198,136
BLUE BEAR SYSTEMS RESEARCH LTD		£717,499	£367,144
CONNECTED PLACES CATAPULT		£357,200	£357,200
CRANFIELD AIRPORT OPERATIONS LIMITED		£80,000	£38,400
Cranfield University		£180,002	£180,002
INMARSAT GLOBAL LIMITED		£253,489	£88,721
OCADO INNOVATION LIMITED		£116,999	£37,440
SATELLITE APPLICATIONS CATAPULT LIMITED		£223,840	£188,026

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Project description - provided by applicants

The vision for the Airspace of the Future (AoF) project is to enable routine operational drone services in a safe coordinated environment on a regional and national basis in cognisance of realistic end user requirements; validated by robust business cases, simulation, stakeholder and public engagement; underpinned by an integrated transportation model with aviation at its core and an exploitation roadmap for the UK.

The key deliverables of AoF are as follows recognising that activities will transition from the development into demonstration phase:

1. Develop the rules, system of systems and operational safety cases to allow mixed use airspace by manned and unmanned traffic,
2. Develop a virtual experimentation environment and digital twins to test new rules, processes, systems, technology and operating concepts rapidly at scale,
3. Establish a national test and evaluation facility for commercial unmanned vehicles with representative operational environments which are digitally trusted and secure,
4. Develop customer use cases for large-scale virtual and live demonstration in an expanded and open access environment during Future Flight Challenge (FFC) Phase 3, and
5. Develop a blueprint for the future national airspace structures and ground infrastructure.

The innovative and new capabilities to deliver the AoF project are:

1. Enable unsegregated Beyond Visual Line of Sight (BVLOS) and complex autonomous flights,
2. Establish a Live, Virtual and Constructed (LVC) test environment at Cranfield to support the regulatory system of system safety case,
3. Commission an incremental national test environment with the regulatory and local authorities at Cranfield and expand to explore more complex ground and airspace challenges for the use cases to enable commercially viable operations at scale,
4. Develop innovative surveillance and traffic management capabilities to safely manage airspace interaction with current systems, and
5. Develop a future airspace blueprint while balancing the existing Air Traffic Management (ATM) systems, future Unmanned Traffic Management (UTM) systems, digital trust of users and equipment, cyber resilience of infrastructure and data connectivity.

The AoF builds on investment in UK Digital Aviation Research and Technology Centre and UK National BVLOS Experimentation Corridor. Research by the members includes Open Access UTM Framework project for the DfT and regulatory activities in the CAA Innovation 'Sandbox'.

The AoF consortium has the capacity, skills and world-leading domain expertise, knowledge and facilities to deliver this innovative project which has export potential.

This project will drive growth, innovation and accelerate adoption of the air mobility sector and the clean growth challenge.

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AGS AIRPORTS LIMITED	Urban and Rural UAS-eNabled health-care Over Scotland (URANOS)	£369,275	£126,181
ANRA TECHNOLOGIES UK LTD		£329,952	£197,971
ATKINS LIMITED		£113,572	£56,786
CONNECTED PLACES CATAPULT		£195,696	£195,696
DGP INTELISIUS LIMITED		£104,797	£73,358
LEONARDO MW LTD		£49,986	£0
NATS LIMITED		£103,436	£51,718
SCHNEIDER ELECTRIC (UK) LIMITED		£331,933	£49,790

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SP DISTRIBUTION PLC	£150,000	£0
THE DRONE OFFICE LTD	£84,100	£58,870
TRAXINTERNATIONAL LTD	£172,015	£116,970
UAVIONIX LIMITED	£287,067	£200,947
University of Strathclyde	£362,986	£362,986

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Project description - provided by applicants

This project brings together expertise and skills from large and small organisations, universities and non-profit research and technology organisations to demonstrate the technological and socio-economic viability of a drone-enabled distribution network for medical items such as organs, blood products, high-value medicines and medical consumables over Scotland. The goal is to design an innovative logistic network capable of providing increased responsiveness and capillarity of medical delivery in urban and rural geography uniquely found in Scotland, while ensuring lower costs, reliability, robustness, safety and regulatory compliance.

A digital demonstrator will be created with computer models of the different components of this system of systems, such as a digital model of the drones, the ground infrastructure needed to recharge the vehicles and the system used to manage the traffic of drones while flying. By exploring various operating conditions and different configurations of the network and by ensuring that appropriate market analyses and public perception are accurately taken into consideration, a digital blue print of the drone delivery network will be created connecting potentially hundreds of hospitals, pathology laboratories, distribution centres and GP units.

The integration of digital technology demonstration with market analyses, stakeholder engagement and assessment of public perception is a key objective of the project as these elements are recognised barriers to adoption of drone services that need to be addressed to be able to reach a viable and accepted solution and therefore develop this emerging sector which is expected to bring a significant social and economic benefit to Scotland.

Regulatory challenges are another key focus area, URANOS aims to address these by conducting a series of live trials aimed to inform the regulatory pathways in the definition of protocols and rules for safe operation of autonomous drones in the same airspace as civil transport aircraft.

Despite focussing on such a specific use case as medical delivery and being tailored to the specific geographical region of Scotland, URANOS could also have impact on a larger scale. In addition to the healthcare sector benefits, URANOS will open the way to the deployment of drone-enabled logistics in other sectors of the economy. It will change the way airspace is managed and utilised by manned and unmanned vehicles and will favour the realisation of sustainability goals, such as the carbon neutrality of distribution networks, supporting the energy transition and contributing towards the Scottish Government's target of a 75% reduction in greenhouse gas emissions by 2030 and net-zero emissions by 2045).

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AMPAIRE LTD	2ZERO - Towards Zero Emissions in Regional Airline Operations	£1,446,943	£643,890
CORNWALL AIRPORT LIMITED		£34,881	£17,440
EXETER AND DEVON AIRPORT LIMITED		£59,916	£29,958
HEART OF THE SOUTH-WEST LEP C.I.C.		£14,714	£0
LOGANAIR LIMITED		£213,126	£106,563
ROLLS-ROYCE PLC		£2,607,430	£1,119,891
University of Nottingham		£525,270	£525,270

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Project description - provided by applicants

Sustainable transport and mobility are crucial to the global environment, economy and society. Today's larger aircraft can operate efficiently with high passenger numbers or high freight loads. This has led to the current Hub-and-Spoke (HAS) model of airport operations designed for large aircraft. This results in very congested major airports and long door-to-door travel times for passengers. This is costly to both passengers and air transport system operators. These larger aircraft also contribute significantly to the climate emergency through carbon emissions.

The UK Government has pledged to make air transport net-zero by 2050 -- balancing production and removal of carbon by the sector. Tomorrow's **smaller electric aircraft, with more frequent departures,** will enable the move from HAS operations to a more direct Point-to-Point (PTP) model. This net-zero aviation system will improve public access to flight routes, reduce congestion at major hub airports, create more economically viable regional air transport operations and **cut carbon emissions**.

This project uses a holistic systems approach to simulate and physically demonstrate the viability of electric aircraft in regional air transport operations and the changes needed to achieve a **scalable ecosystem with demonstrable** economic and environmental impact. The 2ZERO project will carry out flight demonstration of a novel 365KW initial prototype of 6-seat hybrid electric (HE) aircraft to assess performance capabilities and operational requirements.

The project will also integrate a parallel HE architecture and novel battery pack energy system into a 1MW 19-seat hybrid electric (HE) Twin Otter aircraft to prepare for flight demonstration in Phase3. This would be the largest passenger capacity for which HE flight is demonstrated. Modelling and simulation will be used to optimise flights based on this class of HE aircraft. This research will uncover the system-wide changes necessary for future operations of HE aircraft, including new standards and certification, airport infrastructure, demand management for renewable ground power (storage, distribution, and charging), optimisation of ground operations and air traffic route systems. Significantly reduced operating costs and the PTP route structure will dramatically improve flexibility for airline operators and ease congestion at major hubs by creating viable routes from smaller regional airports.

Environmentally, HE aircraft enables 100% clean energy operation in the UK through infrastructure changes and near-term bio-jet fuel use, achieving up to 75% emissions reduction. Additionally, aircraft in-flight noise will be reduced by 40-50%, and by 90% on the ground. Both the noise and emissions reductions improve quality of life for communities surrounding airports. Economically, HE aircraft will cut direct fuel costs by 50-75% and maintenance/overhaul costs by 25%-50%. The overall airline operating costs will decrease by up to 25%. As the PTP model will serve more city- and village- pairs at an affordable cost, communities will be more connected, creating more economic opportunities.

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

Results of Competition: Future Flight Challenge Phase 2: Strand 2, Development

Competition Code: 2004_ISCF_MMM_FUTUREFLIGHTCHALLENGE_FULLSTAGE_FASTTRACK_STR2

Total available funding is £34,000,000 over 2 strands

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
ATKINS LIMITED	Aviation Innovation in the South West - Development of an operational environment in a representative urban region	£586,919	£278,787
ALTITUDE ANGEL LTD		£424,385	£201,583
CONNECTED PLACES CATAPULT		£99,624	£99,624
Cranfield University		£100,164	£100,164
GE AVIATION SYSTEMS LIMITED		£104,377	£49,579
NATS LIMITED		£103,814	£51,907
NEURON INNOVATIONS LTD		£242,147	£115,020
SKYPORTS LIMITED		£361,036	£171,492

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

VERTICAL AEROSPACE GROUP LTD		£435,957	£207,080
West of England Combined Authority		£10,500	£0

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

Project description - provided by applicants

Urban Air Mobility is the future of travel, but before this technology is ready for the public to use we need to test the system as a whole in a real life environment. We will create this demonstration environment - a European first - within the controlled airspace of international airports in the South West of UK. It will allow us to identify and fill technological gaps and establish viable markets and business cases for these services.

The project will assess the demand for UAM services in the South-West UK by developing the use cases for this technology, then evaluating the integration and impact on the wider transportation system and the benefits to cities and residents. We will also undertake social research into public perceptions and attitudes to eVTOL aircraft so we can allay any concerns and ensure the public see the benefits of the technology.

To future proof flight operations we will establish an automated UAM/ATM traffic management system to accommodate high volumes of users in tightly controlled airspace, this will facilitate the entry of new, diverse vehicles into an already complex communications environment along with establishing robust safety cases to meet evolving certification standards. We will also consider the whole UAM ecosystem, including infrastructure and contactless passenger processing and security which has become even more necessary with the recent worldwide developments.

The project will culminate in a series of live flying demonstrations, over the Severn Estuary area, of advanced drone operations in preparation for eVTOL flights in Phase 3. This along with outreach and public engagement will provide a compelling demonstration of Urban Air Mobility, securing the South-West of UK's status as a worldwide aerospace hub.

Our consortium is led by Atkins and comprises: Vertical Aerospace (eVTOL aircraft developers); AiRXOS (GE Aviation subsidiary, UTM and regulatory experts); Altitude Angel (UTM providers); Connected Places Catapult; Cranfield University; NATS; Neuron (Conspicuity systems); Skyports (Vertiport developers) and WECA (regional government). We have also secured collaboration with Bristol Airport, Cardiff Airport and Uber Air.

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

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Results of Competition: Future Flight Challenge Phase 2: Strand 2, Development

Competition Code: 2004_ISCF_MMM_FUTUREFLIGHTCHALLENGE_FULLSTAGE_FASTTRACK_STR2

Total available funding is £34,000,000 over 2 strands

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
AMEYVTOL LIMITED	CIRIAS - Critical Infrastructure Resilience Integrated Aviation System	£629,394	£314,697
AMEY OW LIMITED		£94,442	£47,221
ATTOCORE LIMITED		£59,999	£30,000
HEATHROW AIRPORT LIMITED		£99,402	£49,701
lancashire fire and rescue service		£0	£0
National Police Chief's Council		£0	£0
NEURON INNOVATIONS LTD		£189,640	£94,820
ROCKWELL COLLINS UK LIMITED		£317,708	£158,854

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

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Rosemount Aerospace Ltd		£477,036	£238,518
VTOL TECHNOLOGIES LIMITED		£2,999,930	£1,499,965

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>
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Project description - provided by applicants

CIRIAS - Critical Infrastructure Resilience Integrated Aviation System -- is a programme to develop an integrated end-to-end 'system of systems' to enable unmanned drones to fly long range missions Beyond Visual Line of Sight (BVLOS), with the aim of sustaining critical UK infrastructure.

The threats of climate change, economic uncertainty, and more recently a global pandemic, present risks to the health, well-being, and security of the UK population. CIRIAS is designed to minimise these risks by increasing the reliability of the infrastructure required to sustain our society, enabling planes to fly, trains to run, roads to remain available, and facilities to operate.

Developed by a team comprising large global companies, major asset owners and operators, niche technology specialists, and leading consultants and academics, our project will develop all the elements of a system that will:

- * automate the inspection and monitoring of the condition of roads, railways, and airports.
- * rapidly respond to unplanned incidents to restore infrastructure to operational readiness.
- * make critical deliveries of essential products and services regardless of traffic conditions.

These elements comprise:

- * A low noise, long-range, 20kg hybrid drone platform, able to take off and land vertically, hover in flight to gather data or make deliveries, yet with a design and propulsion system to fly for up to five hours and travel up to 100km in a single mission.
- * Advanced avionics, communications, and navigation systems to support safe, collision-free beyond visual line of sight drone operations.
- * A flight planning, control, and simulation system (BVLOS Operations Centre) for precise demonstration and management of proposed missions to satisfy all stakeholders and regulators.
- * An integrated changeable payload capability to enable precision data capture from the air, as well as delivery and collection of critical payloads.
- * Automated data processing and analysis capability to derive maximum value from every data acquisition mission
- * A system for control of operational airspace below 400 feet to enable mission planning and compliance in increasingly crowded airspace.
- * A tactile stakeholder management system to gain social acceptance of all proposed missions.

The integration of these elements will be demonstrated through key commercially viable missions to inspect the condition of critical infrastructure and respond to defects or incidents at a global hub airport and on a national railway network, as well as making critical deliveries to public health facilities.

This integrated capability will contribute to keeping Britain moving, protecting the health of the nation and keeping workplaces operational.

The learning from the development of this project will also be used to inform the greater commercialisation of low-level airspace to support more flexible and sustainable public transport and delivery services.

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

Results of Competition: Future Flight Challenge Phase 2: Strand 2, Development

Competition Code: 2004_ISCF_MMM_FUTUREFLIGHTCHALLENGE_FULLSTAGE_FASTTRACK_STR2

Total available funding is £34,000,000 over 2 strands

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
AIRBORNE ROBOTICS LIMITED	Drone Swarm for Unmanned Inspection of Wind Turbines (Dr-SUIT): Battery Health Management, Hybrid Comms Systems and Operational Platform for Autonomous Offshore Windfarm Inspection	£545,000	£381,500
AVANTI COMMUNICATIONS LIMITED		£499,047	£249,524
BLUELARK LIMITED		£418,646	£293,052
University of Portsmouth		£356,023	£284,818

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

Project description - provided by applicants

Airborne Robotics (AR), Avanti Communications (AVA) and Bluelark are working in partnership with the University of Portsmouth (UoP) to develop drone swarming capabilities and an operational platform for an autonomous inspection in offshore wind farms (OWF). Utilising a system-of-systems approach, the project entitled "Dr-SUIT", will focus on building drone swarm resilience and maximising safety especially when addressing the core Operational and Maintenance (O&M) facing the challenges of this growing renewable energy sector. These challenges include access and deployment within remote and hostile environments hazards, increasing O&M costs, and improving drone performance.

Although drones have been used for wind turbine (WT) inspection, a drone swarm deployment offers the benefits of extensive coverage and reduced inspection time. Since drones are currently not designed for swarm operation as standard, Dr-SUIT will develop an algorithm to interplay, therefore progressively shift the design from a single pilot controlling a drone to a single pilot controlling multiple drones, optimised by the hybrid communication system (4G, 5G, satellite) integration. The utilisation of satellite communications extends the coverage to the communication industries and cost-effective backhaul services. The 5G and Satellite system will reduce latency, and increased bandwidth size and speed for detection's continuous/big data relay, thus enhancing drone-to-drone, drone-to-operator and sensing performance during swarming operation.

Optimal drone performance is reliant on adequate energy provision. When calculating power and flight time required for an entire operation (accounting for flying to above ~200m wind turbines and inspecting ~70-90m long blades), battery durability is an essential consideration. A novel swarm-aware battery health management system with predictive analytics will be developed along with a battery recharging/swapping system which is needed for more realistic drone swarming missions. A barge equipped with a 5G mast and satellite, and a small power unit will be utilised as a platform for drones to recharge/swap batteries. A barge with a small power unit will be utilised as a platform for drones to recharge/swap batteries, for a timely operation, and for a 5G mast and satellite. Essential to ensuring safe the swarm safe operations, a real- time inspection, scheduling and routing plans will be developed using mathematically modelling to factor in swarm performances, asset position, and environmental conditions. A live demonstration of an optimised drone swarm deployment performing blades inspections in a wind farm will conclude this Phase 2 project.

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

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Results of Competition: Future Flight Challenge Phase 2: Strand 2, Development

Competition Code: 2004_ISCF_MMM_FUTUREFLIGHTCHALLENGE_FULLSTAGE_FASTTRACK_STR2

Total available funding is £34,000,000 over 2 strands

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
GKN AEROSPACE SERVICES LIMITED	Safe Flight	£489,839	£176,342
3UG AUTONOMOUS SYSTEMS LIMITED		£339,694	£207,213
CALLEN-LENZ ASSOCIATES LIMITED		£201,855	£125,150
University of Bath		£9,898	£9,898

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

Project description - provided by applicants

As unmanned and autonomous systems evolve at pace, uncertainty remains around how to integrate autonomous systems in shared airspace in a safe manner. This proposal, entitled Safe Flight, develops and integrates safe novel autonomous technologies with crew functions and responsibilities, in a framework that demonstrates how risk and uncertainty can be evaluated to provide routes towards certification.

A UK-based consortium of experts in aircraft manufacturing (GKN Aerospace), risk-based planning and avoidance (3UG Autonomous Systems), UAS operations (Callen-Lenz) and autonomous systems research (University of Bath) has been assembled to tackle the integration challenges of developing a system of systems for safe and certifiable unmanned and autonomous airspace operations.

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

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Results of Competition: Future Flight Challenge Phase 2: Strand 2, Development

Competition Code: 2004_ISCF_MMM_FUTUREFLIGHTCHALLENGE_FULLSTAGE_FASTTRACK_STR2

Total available funding is £34,000,000 over 2 strands

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
URBAN AIR PORT LIMITED	Urban-Air Port "Air-One" [Rapidly Deployable Vertiport For Drone-Delivery, Air-Taxi, Disaster Management]	£1,294,606	£906,224
Coventry City Council		£125,002	£125,002
Coventry University		£87,548	£87,548
Hyundai Air Mobility		£0	£0
MALLOY AERONAUTICS LIMITED		£73,303	£51,312
SIX MILES ACROSS LONDON LIMITED		£160,030	£112,021

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

Project description - provided by applicants

Urban-Air Port Ltd is designing & developing the 'worlds smallest airport', an infrastructure solution to support future Electric Vertical Take off and Landing (EVTOL) aircraft. This innovative programme is called "Air-One".

This project employs sophisticated design, Intelligent-Autonomous-Systems technology, sustainable renewable energy input & fabrication processes to create rapidly deployable, small foot-print infrastructure with minimal impact on the environment. Creating a new business model for an emerging era of personal & logistics air-mobility.

This pop-up 'urban-airport' innovation is particularly relevant post-Covid 19, offering flexible, autonomous & safer transportation solutions. For Coventry City of Culture 2021, Air-One will demonstrate a vision of future Urban Air Mobility (UAM), including its capacity to support Disaster Emergency Management & Security (DEMS) in areas exposed to climate change, pandemics or with diminishing resources, a just-in-time, safe & resilient rescue hub.

Air-One, as a global first will accelerate public trust & readiness for this new technology by promoting an exciting, green alternative by demonstrating;

- 1\ Technical proficiency & operational feasibility of dynamic EVTOL logistics, air-taxi-services & DEMS scenarios;
- 2\ The portability, flexibility, sustainability, capacity capabilities & decarbonisation contributions of Air-One;
- 3\ A holistic, ultra compact, vehicle agnostic transport infrastructure solution with modular areas covering passenger/cargo terminal & DEMS needs, with in built EVTOL maintenance, recharging command & control requirements - an all in one solution - 'Air One.'

Air-One is part of the Innovate UK Future Flight Challenge, led by leading British architects, designers & engineers in Partnership with; Coventry City Council, Malloy Aeronautics, National Transport Design Centre, Coventry University, Tritium, Hyundai Air Mobility & Ove Arup presenting a giant step towards greener mobility enabled by game changing new & much needed infrastructure.

The programme has already attracted potential customers from abroad highlighting Air-Ones credibility & UKs UAM export potential & has received investment from globally recognised Partners, Hyundai Motor-Group through their Urban Air Mobility business led by Dr Jaiwon Shin former NASA as Head of the Aeronautics Research Mission Directorate for over a decade.

Air-One gives hope to the UK's aviation & manufacturing sectors post COVID-19 & addresses key targets of the UK's Industrial Strategy boosting the economy with new jobs, empowering the UK's ambitious environmental pledges & advancing UK STEM capabilities.

"As part of the West Midlands Combined Authority, Coventry City Council is 100% supportive of this innovative & ground-breaking Air-One programme, demonstrating how revolutionary new, greener modes of travel will increase mobility, reduce road congestion, improve connectivity & increase UK manufacturing opportunities." Coventry City Council, Transport Innovation Manager, Sunil Budhdeo.

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"Air-One could be the foundation of a UK UAM "Centre of Excellence" where industry can converge to collaboratively test ideas, technologies, new vehicles, operational concepts on an on-going basis presenting immense value for money for the UK taxpayer, improving connectivity, boosting productivity - ultimately transforming cities & helping to build back better."

Urban-Air Port Ltd, CEO & Founder, Ricky Sandhu.

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Results of Competition: Future Flight Challenge Phase 2: Strand 2, Development

Competition Code: 2004_ISCF_MMM_FUTUREFLIGHTCHALLENGE_FULLSTAGE_FASTTRACK_STR2

Total available funding is £34,000,000 over 2 strands

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
SEESAI LIMITED	Distributed BVLOS Aviation System (DBAS)	£907,655	£635,358
Met Office		£58,868	£29,434
NATS LIMITED		£280,436	£140,218
SKY FUTURES PARTNERS LIMITED		£55,602	£38,921
TERRA DRONE LTD		£59,994	£41,996
UAM CONSULT LIMITED		£40,583	£28,408
University of Bristol		£61,755	£61,755

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

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Project description - provided by applicants

This project aims to develop and validate the first aviation system capable of enabling commercial 'beyond visual line of sight' (BVLOS) drone services at scale alongside manned aviation, including complex missions in congested (e.g. urban and industrial environments). It will also enable drone service providers to benefit from economies of scale for the first time.

The project will build a strong foundation from which we can safely extend later to address higher value use-cases such as aerial logistics and urban air mobility.

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

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Results of Competition: Future Flight Challenge Phase 2: Strand 2, Development

Competition Code: 2004_ISCF_MMM_FUTUREFLIGHTCHALLENGE_FULLSTAGE_FASTTRACK_STR2

Total available funding is £34,000,000 over 2 strands

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
HIGHLANDS AND ISLANDS AIRPORTS LIMITED	Sustainable Aviation Test Environment	£1,563,628	£297,089
AMPAIRE LTD		£760,729	£532,510
CLOUDNET IT SOLUTIONS LIMITED		£67,800	£47,460
DENCHI POWER LIMITED		£44,302	£22,151
FLARE BRIGHT LTD		£146,749	£102,724
LOGANAIR LIMITED		£102,500	£51,250
THE EUROPEAN MARINE ENERGY CENTRE LIMITED		£158,048	£158,048
The Highlands and Islands Transport Partnership		£58,823	£44,117
University of the Highlands and Islands		£220,601	£220,601

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

WINDRACERS LIMITED		£378,000	£264,600
ZEROAVIA LTD		£205,900	£102,950

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

Project description - provided by applicants

This Orkney Island -based, innovative project will create the UK's first low-carbon aviation test environment, based at a licenced island airport with all year round scheduled air service operations to UK, and regular off-shore oil and gas helicopter traffic. The Sustainable Aviation Test Environment (SATE) will be a UK first and, should one or more of the new aviation technologies be adopted for island use, it will also help improve the quality of life of the communities it serves (through job creation, improved access to education and healthcare, etc.). The SATE will place the UK at the vanguard of the adoption of next-generation aircraft, and spearheading aviation's response to climate change.

The continued demand for aviation services (air passenger numbers on the 11 HIAL airport network have increased by 33% in the last 10 years) , is at odds with the effects of an international climate emergency. We need to rapidly decarbonise the aviation sector to reconcile these competing imperatives and to reduce the carbon footprint of air travellers.

Indeed, if aviation is to be used as a means to improve the quality of life and maintain or grow the population of remote and rural communities, then the options for the appropriate sustainable aviation technologies must be explored.

The options include the following:

- * aircraft (with electric, hydrogen, or synthetic fuel replacing conventional fossil fuels),
- * changes to the physical airport infrastructure to support the adopted technologies, and transport to the airport
- * green energy supply for terminal buildings and ground operations,
- * necessary digital networks for resilient communication between airport and aircraft (particularly UAVs).

Kirkwall Airport is one of an 11-airport, regional airport group, operated by **HIAL** - who are project lead -, and is particularly suited as a test environment location due to the variety of routes it offers which include: short hops to the inter- islands airfields, eg Westray - best known for being one of the two airports joined by the shortest scheduled flight in the world -, and operated by **Orkney Island Council.** In addition there are regular air services to Aberdeen, Edinburgh & Glasgow, with a summer service to Norway. The project team includes technology developers who will be test ready during the 18 months of this project phase: **Ampaire** , **ZeroAvia** , **Windracers** , **Flarebright** and **Loganair**.

Orkney provides options to fly over water, in a challenging environment & climate, for real-world application testing of the technologies. Decarbonisation of the airport, as part of this project, is important to the Orkney community, which is an exemplar early-adopter for other low-carbon technology, and are leaders in decarbonisation, lead by one of the SATE project members, Orkney-based **EMEC**. This test environment offers a number of integrated energy-system opportunities providing significant wider impacts for potential adoption at other regional airports, which is a focus of team member **HITRANS**. The supply chain and future business opportunity interests are represented by Caithness-based battery manufacturers - **Denchi Group** and Orkney-based **Cloudnet** , **specialists in providing digital services for poorly served rural communities. The people skills necessary to support the development, testing and maintenance of the new technologies are of interest to project team members - **Air Training Services** and the **UHI**. If successful, this project should stimulate inward investment and local supply chain business opportunities in this remote part of the UK, a key responsibility for **Highlands & Islands Enterprise.**

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

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Local community acceptance of new aircraft technology, especially on lifeline services, and the potential impact on their local economy and wellbeing will also be measured, and a local community engagement programme is key to this projects success.

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