CASE STUDY

WHO WE ARE

The Connected Places Catapult (CPC) is an independent, trusted, expert broker operating at the intersection between the public and private sectors and between local, regional and national decision making. We promote UK innovation and broker relationships between government, academia and industry providing support and solutions for innovators to commercialise their projects and research. With our deep expertise in technology, we bridge the gap between buyers, suppliers, innovators and industry. Our agile approach enables us to convene our partners to act rapidly to create new market collaborations responding to public funders and industry needs. We boost demand for innovation to unlock wider economic and environmental benefits.

Government Pathfinder Programme

Pushing the boundaries for the adoption of drone technology

Challenge

The Government's ***Industrial Strategy*** [Link] identifies the potential for deploying drones across multiple industry sectors including: Emergency Services, road and rail transport, the environment, energy infrastructure and construction. The PwC report '***Skies without Limits: Drones – taking the UK's economy to new heights***' concludes that by 2030 the use of drones in business and public services could deliver a £42bn increase in GDP, £16bn net cost savings to UK economy, 76,000 drones operating in UK skies and 628,000 jobs. The UK could become a world leader in the exploitation of done technology.

Regulation is a barrier. The Civil Aviation Authority (CAA) aims to enable the routine and safe integration of all Unmanned Aerial Systems (UAS) operations into the UK's aviation system. Currently BVLOS (Beyond Visual Line of Sight) operations are restricted. Unlocking this type of operation will create significant benefits in terms of applications. CAA recognises that it is not sustainable to operate on a case-by-case basis alone and that a business-as-usual approach is required. Achieving this requires agile approaches allowing regulators and industry to build, test, learn and work toward creating a Regulatory framework for BVLOS operations together.

Solution

The Government Pathfinder Programme was launched in 2015 as part of an initiative across government promoting emerging technologies as drivers for growth. Pathfinder projects push the boundaries of state-of-the-art technology, operational or regulatory barriers for the adoption and exploitation of drone technology. The Programme was reviewed in 2018 under the governance of the Department for Transport (DfT), the Department for Business, Energy and Industrial Strategy (BEIS), the CAA and the CPC. The imperative is to drive progress in drone technology and regulation over the next 10 years.

DfT nominated CPC to take leadership of the year-long Programme starting in April 2019 buildng on CPC expertise in providing a technical and market steer as an independent broker engaging industry, government and the CAA. The Programme's remit is to identify and overcome technical, operational, and commercial barriers. CPC works closely with the CAA Innovation Hub streamlining BVLOS processes and maturing technology readiness levels. The Hub bridges the gap between innovators and the regulator enabling safe innovation.

The Pathfinder Programme addresses four types of Operational Challenges: long linear operations, large area operations, urban and one-to-many operations. CPC are progressing learning in the different types by project managing real-world live Pathfinder testing trials, encouraging more Pathfinder projects to come into the pipeline and actively searching for Pathfinders to contribute to each operational type.

CATAPULT Connected Places

Department for Transport
Department of Science

Stakeholder engagement

The Programme focuses on real-world testing trials to achieve routine sustainable BVLOS operations. CPC brokers cross-sector partnership where operators partner with customers to demonstrate business value and safety. Trial benefits are shared across sectors. The Pathfinder community includes:

- **Transport Infrastructure/Construction: Rail, buildings, bridges and mining:** Sensat, Costain Group, IUK.
- **Energy Infrastructure: Oil and gas, electric power, solar, wind power:** EIC, Callen-Lenz, Wales & West Utilities, Cadent, National Grid Transmission, Northern Gas Networks, Northern Powergrid, Scottish & Southern Electricity Networks, UK Power Networks.
- **Telecomms:** BT and Unmanned Life.
- **Geomapping:** Ordnance Survey, Blue Light: Ambulance, Fire, Police, NHS, NPAS.
- **Rail:** Network Rail.
- **Maritime:** Maritime Coastguard Agency (MCA)

Outcomes

CPC is at the heart of the 100-strong Pathfinder Community and convened quarterly Community Days open to everyone across industry. Five stakeholder workshops reached different audiences: Environment and Agriculture Workshop (Host CPC), Regulations Workshop (Host CAA), Data and Drones Workshop (Host CPC), Energy Pathfinder – Linear Asset Operations Workshop (Host CPC). There were some 50 cross-sector participants. All the Programme's stakeholder engagement feeds into the development of policy and investment cases across the drone ecosystem in UAS Traffic Management and R&D – another of CPC's DfT funded projects.

PATHFINDER PROJECTS

Maritime and Coastguard Agency (MCA) Drone Demonstration & Development Pathfinder

This Pathfinder project aims to explore and develop, through demonstration, the regulatory environment to support the use of BVLOS drones in all classes of airspace. This will facilitate regular and routine use of drones, allowing the Maritime and Coastguard Agency to discharge its time critical, reactive Search and Rescue and Counter Pollution international obligations. ***https://cp.catapult.org.uk/mca-drone-demonstration-and-development-pathfinder/***

Local BVLOS in Controlled Environments Pathfinder

This Pathfinder project aims to develop and demonstrate the viability of a new approach to flying beyond visual line of sight operations. The 'Local BVLOS' operations addressed are those that take place in controlled environments such as industrial sites or where the area is under temporary emergency service control. ***https://cp.catapult.org.uk/local-bvlos-in-controlled-environments-pathfinder***

Early Detection of Biohazards with Unmanned Aerial Vehicle (UAV)

This Pathfinder project led by Cranfield University and EDF aims to use UAVs for early detection of dense accumulations of jellyfish blooms and kelp near EDF's coastal nuclear power plants at Totness, Hunterston and Heysham. High resolution aerial imaging collected from UAVs is anticipated to provide better estimates of jellyfish blooms and the extent of the kelp, addressing the Pathfinder 'long linear operations'.

Energy Pathfinder 'Above and Beyond' successful first flight trials

Duration: Three years. **Objective:** This large-scale Pathfinder project is designed to establish and regularise a framework for BVLOS linear infrastructure surveys across electricity and gas networks transforming the way the industry carries out essential maintenance tasks. **Consortium Partners:** Wales & West Utilities in collaboration with Cadent, National Grid Gas Transmission, Northern Gas Networks, Northern Powergrid, Scottish and Southern Electricity Networks and UK Power Networks (CAA) and Civil Aviation Authority. **Project Coordinator:** EIC

Wiltshire based aviation specialists Callen-Lenz were tasked with creating the operational framework and demonstrating the project through flight trials. The first phase of trials focused on evaluating specific technologies and techniques that will support business as usual implementation of BVLOS flight operations on gas and electricity network assets. The trials took place under CAA approval.

Successful completion of the first stage of BVLOS flight trials took place in 2019 in segregated airspace. The trials covered a total distance of 688km BVLOS over a combined 640 minutes. This is a milestone in establishing a regularised framework for the use of drones BVLOS in the UK.

Energy Pathfinder partners are adopting these learnings as part of business as usual. Routine and non-routine inspections are carried out quickly, easily and cheaply. There are improvements in survey and maintenance methods with UAVs reaching remote grid sites and hard-to-reach assets. Checking storm damage, detecting leaks, providing live location and data is a safer and lower-cost solution to inspecting high-pressure pipelines by helicopter. Above all this approach puts people safety first eliminating the risks of scaffolds and cherry pickers.

Infrastructure Pathfinder trialling BVLOS operations over a live construction project

Objective: To validate the business case for safe BVLOS flight capabilities up to 12km in a controlled and uncontrolled environment whilst capturing data to successfully create a digital replicate of the project site. The requirement was to reduce delivery and operational costs in a construction inspection on the A14 between Cambridge and Huntingdon improving safety, enabling better decisions and to improve quality by providing an accurate 3D model of the entire project through a BVLOS flight.

Project lead and end-user Costain deploys innovative engineering solutions across UK energy, water and transportation infrastructure. Technical supplier Sensat's capability is in drone-based modelling digitising large linear infrastructure by capturing data turning it into a 3D model. CPC provided project management developing the Operational Safety Case and trials. Project completion: September 2019. The project was extremely useful for Sensat to build links to the CAA and expertise on BVLOS. SME capability grew. Costain will further demonstrate how drones can support the construction industry.

The project demonstrates a number of firsts: First time a US Air Force base has agreed to aid in civilian Temporary Danger Area (TDA) activity. First successfully trialled BVLOS operations over a live construction project reaching a total distance of 12km from the remote pilot on the A14 between Cambridge and Huntingdon. First on gaining a deeper understanding of drone BVLOS feasibility and challenges in the context of UK road infrastructure inspection.

Communication between all airspace stakeholders was key to the successful implementation of the TDA in Cambridgeshire. Sensat contacted over 50 individual stakeholders inviting them to submit online feedback. Danger Area Activity Information Service (DAAIS) Communication with airspace stakeholders was achieved through automatic and manual communication between ATCU and other users including Duxford, RAF Mildenhall and Lakenheath (USAF). During the operations WhatsApp was the preferred communication channel.

CPC creates value

- CPC has a Secretariat function and as a member of the Steering Board creates an environment where DfT, BEIS, CAA and CPC can take the pulse of a fast-moving sector and feed information into relevant Programmes in their organisations across policy, R&D funding and CAA Innovation Hub services.
- The CPC creation of the Pathfinder Framework and application process has allowed new Pathfinder projects to be onboarded. Industry innovators engage with the Government and the regulator at early stages to explore solutions and share information addressing adaptations to regulation. SMEs and new industry entrants gain an understanding of regulatory challenges.
- CPC enables cross-industry sector sharing of lessons learnt. For example, transfer of knowledge from the Energy Pathfinder to rail and highways with Network Rail and Highways England engaging closely with CPC.

Benefits

- The Programme has three workstreams: Core Pathfinder Programme, Pathfinder Projects and Stakeholder Engagement.
- Encouraging collaboration to address safe, routine BVLOS drone operations across different applications to enable efficiency and improve capabilities reducing risk in daily activities.
- Encouraging organisations to become self-funded project participants in the Pathfinder Programme.
- Communicating the Programme to participants, stakeholders and the Drones Industry Action Group (IAG).

Next steps

The outputs of stakeholder engagement for the future include gaining insight and capturing knowledge around the requirements of industry members such as offshore, rail and road. There is the opportunity to increase collaboration and connections across those industry members.

CPC will engage further with universities building on the work achieved over the year engaging with 16 universities. CPC will engage further with SMEs building on the 14 start-ups who attended the Community Day.

CPC will gather further inputs to share at future events including Westminster Forums, the Commercial UAV Show in November 2020 at ExCel London. CPC will hold Community Days around the UK supporting regional growth and will continue to share Pathfinder Project outcomes through the Government Drone Pathfinder website *https://cp.catapult.org.uk/case-studies/pathfinder/*

To become a nominated Pathfinder Project organisations can request an application form by emailing *drones@cp.catapult.org.uk*

To find out more about the Connected Places Catapult and how we can help you develop the future skills that address the needs of your organisation please contact info@cp.catapult.org.uk

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