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Delivering accurate topographic surveys with drones

Dramatically increase the speed of data capture compared to traditional ground-based collection methods while reducing the need for boots on the grounds: enriching captured data, improving site safety and reducing emissions.

Benefits

- Airborne data capture is safer, faster and cheaper.
- Clients receive rich data sets including features never before visible to the ground surveyor
- Concept design of large projects can be based on real data from an early stage
- Different payloads or capture methods can produce multiple data sets for the same site.
- Remote capture can eliminate the need to access private property to gather important survey details
- Contextual data can be added to sites for significantly less cost
- Multiple stakeholders can use and analyse the data for different purposes

Impact

Economic



Social



Why does this matter?

The UK has a commitment to spend on infrastructure, with the promise to build one million new homes by 2025. Add to that £27 billion to finance earmarked for National Highways to rebuild some of the country’s strategic road network including most important motorways, £12.2 billion allocated to affordable housing, and £5.2 billion that will be used to improve flood protection infrastructure. Also consider existing ageing infrastructure, the need for smart, cost-effective planning and design and include the requirement for sustainable, lower carbon solutions to traditional methods, and drones stand out as an obvious tool to support development.

Why drones?

Drones are revolutionising the way that construction and infrastructure assets or sites are surveyed. Planners, Designers and Engineers can commission drone-based surveys to drive safety, productivity and efficiency whilst also reducing landowner disruption or tricky access issues.

Traditionally, grounds-based teams with delicate surveying instruments would take weeks or even months to survey large sites for the production of detailed site plans or topographic survey drawings. Drones enable surveys to be completed much quicker and at less cost enabling stakeholders to plan, bid, build & manage sites far more efficiently and with more up to date data. Organisations responsible for these stages can reduce the risks associated with insufficient or outdated data and stay on top of project progress in near real-time. The Royal Institution of Chartered Surveyors (RICS) has acknowledged technological miniaturisation of laser scanning equipment, such as Light Detection and Ranging (LiDAR), and the emergence of high accuracy photogrammetry (and its related software) have meant drone output and accuracy can now compete with the more established technology, such as satellite imagery and manned aircraft surveys.

Requirements

About drone surveys

The use of drones allows for a safer, faster and cheaper data capture and surveys which can deliver a range of benefits compared to the traditional ground-based approach. They can also be flown over built environment, infrastructure, or terrains of all types to capture high levels of detail and with accurate, survey-quality results. The data collected by drones can be used to inform and reduce risk at all stages of the build process, from planning to management.



Action Plan

What needs to be done to make this happen?

Technology → → → → → Industry

Global Navigation Satellite System (GNSS) receivers present in high-end drones and accurate ground control points allow for the potential to undertake accuracy, construction-grade surveys. High-resolution cameras along with LiDAR sensors allow the payloads to capture and visualise vast areas with high levels of

detail. With the software and know-how to compute the final results/deliverables, these systems can transform traditional workflows and bring massive efficiencies, in addition to consistency of data and accuracy.

Automation → → → Operators and Industry

Extended autonomous functionality will be a staple in the professional drone world, but it will come in steps. Beyond Visual Line of Sight (BVLOS) functionality will be approved within defined perimeters. By allowing BVLOS operation, drone pilots will be permitted to remotely man their drones in secluded areas from a digital screen. Drones will

be able to cover more ground in shorter times, and the entire operation will be overseen from a distance, keeping inspectors out of harm's way. Increased data integrity enabled through wifi/internet and associated 5G/6G infrastructure will eventually enable fully remote operations removing the need for personnel on-site.

Regulation → Government, Regulator and Industry

Professionalism within the industry is a key factor for growth, however, research makes a key assumption that the regulatory environment poses no barrier to the operation of drones across a range of use cases. Regulation is an evolving area, and industry bodies together with Government are developing a framework that provide safeguards, yet do not stifle innovation and adoption. An independent report by The Regulatory Horizons Council has recommended a review which explicitly seeks to

change the appraisal of the requisite clearances required for drone operations, to speed it up via automation so that the CAA (Civil Aviation Authority) can focus their manual efforts on complex cases. To become commercially viable, logging individual flights with regulators will soon need to give way to a more automated approvals process, e.g., along pre-approved routes. This is particularly desirable for repeated operations of a very similar nature where only a small change has occurred.

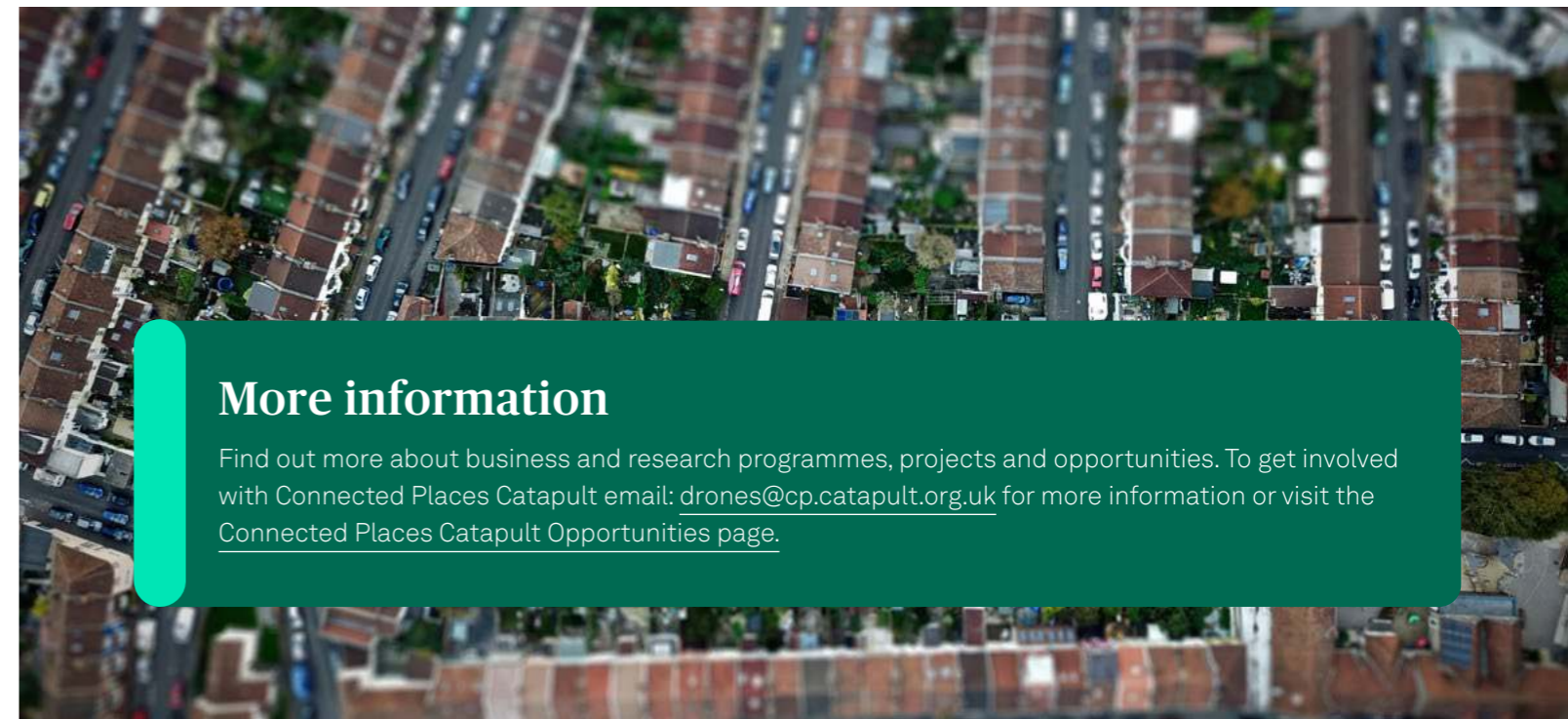
Related use cases

National Highways traditionally expect to wait many months for ground-based surveyors to cover large highway areas or proposed routes and have additional issues around gathering access permissions. A survey was conducted using a UAV platform of a proposed bypass area in Essex at the beginning of 2022. The survey was undertaken in less than a week and the only ground presence was in a few public areas where control points or landing zones were required. The Highways team were able to gain masses of rich context data that would not have been available if landowner permission had been required. The preliminary spatial issues were resolved and designs then created and sent on for planning, long before a traditional survey would have even been completed.

Future use cases

Currently, around 5% of site details may still need to be inspected from the ground where details have been obscured from the air. Current technology allows for accuracies down to a few centimetres. This can also be beaten by a careful ground-based survey team but, as technology and acceptance of the method grows, these limitations will be increasingly reduced.

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More information

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