FRONTIER SI

UAV USER NEEDS REPORT EXECUTIVE SUMMARY

We know where.

FrontierSI profiled 56 UAV applications across 12 industries. We have included a few examples from the report in this summary.

MINING:
REHABILITATION MONITORING

The ability to successfully rehabilitate mined areas is fundamental to the mining industry's social license to operate. UAVs offer rehabilitation practitioners the ability to measure rehabilitation performance effectively, and over the spatial scales that are typical to many mine rehabilitation projects.

RESOLUTION

≤ 10cm

SENSORS

MULTISPECTRAL, LiDAR

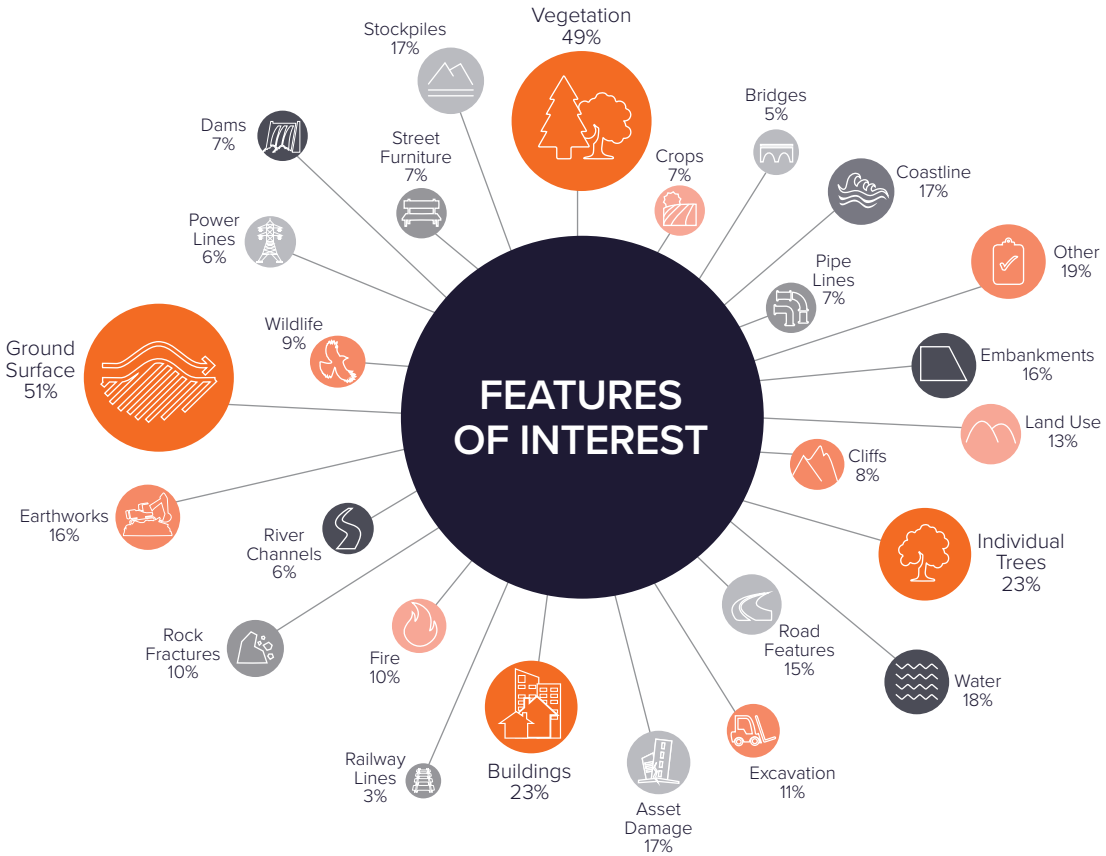
FEATURES OF INTEREST

GROUND SURFACE, VEGETATION, TREES, DRAINAGE, RIVERS AND WATER BODIES, SEDIMENTS

PRODUCTS

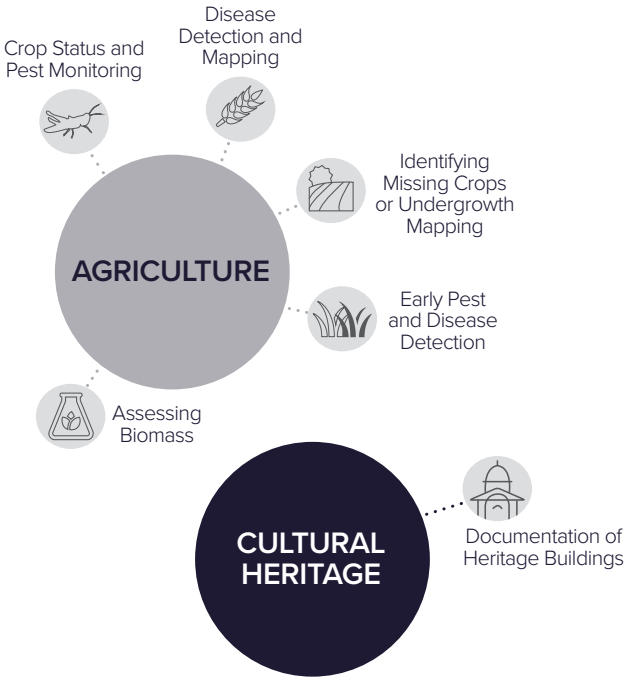
RAW IMAGERY, CANOPY HEIGHT MODEL, DEM/DSM

The 135 participants in the research were interested in the following features extracted from UAV surveys.



Unpiloted aerial vehicles (UAVs) have come a long way from their military origins. In addition to being one of the latest must-have gadgets for tech enthusiasts, UAVs – or drones – are now indispensable tools across a wide range of sectors.

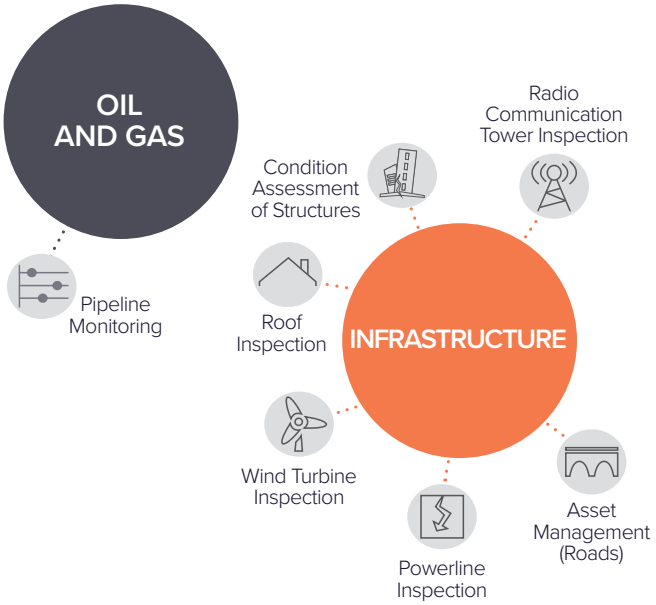
The mining industry uses UAVs for calculating stockpile volumes; foresters use them to count trees; local governments use them to count roof-top solar panels and assess the state of footpaths; environmental managers use them to count wildlife or look for landslide risk areas; and emergency services use drones during bushfires and for search and rescue operations. UAVs are also used in agriculture, forestry, surveying, construction, and even to document heritage buildings.



Whether they're fixed-wing, multi-rotor or hybrid versions, unpiloted aerial vehicles are not only relatively cheap to use, they can also be deployed more quickly and easily than other remote sensing methods such as piloted surveillance aircraft.

Despite the advantages of UAV capture, an ongoing issue with the low quality of the data provided by some UAV data suppliers is causing considerable frustration, cost and set-backs for users. This situation often arises because UAV data suppliers don't necessarily understand what the end-users need from the data.

The FrontierSI report aims to capture, explore and address that gap in understanding. FrontierSI, in collaboration with the Mineral Research Institute of Western Australia (MRIWA) and Department of Environment, Land, Water and Planning (DELWP) Victoria, has investigated how UAVs are being used to capture and acquire data, and how that data is being used.

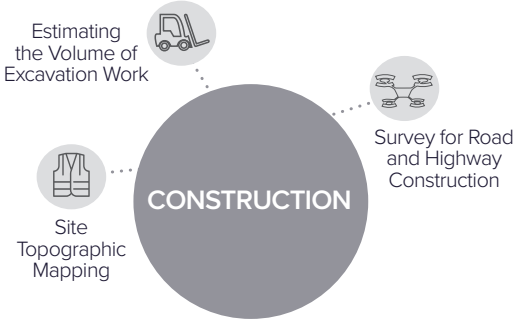


The research involved consultations with 135 people from 80 organisations across government, private sector, industry and research.

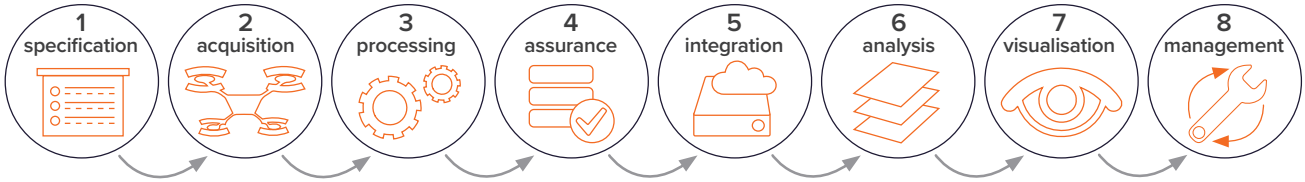
Overall, we profiled 56 distinct applications of UAV data across 12 different sectors; mining, environmental monitoring, agriculture, emergency management, local government, construction, infrastructure, forestry, oil and gas, cultural heritage, and water. These applications are described in the supplement section at the end of the report.

Given the huge range of sectors making use of UAV data, it's not surprising that the types of data being captured vary enormously as well. The most common data acquired by UAVs was photographic imagery of infrastructure and landscape features such as the ground surface, vegetation, buildings, water bodies and coastline. This also meant the most common payload carried by UAVs was optical cameras.

But in fields such as agriculture, forestry and asset inspection, the imagery requirements extend beyond the visible light spectrum to include infra-red and near-infrared, multispectral and hyperspectral imagery. These users often need to obtain crucial insights invisible to the naked eye, such as information about the health of plants. There is also a growing demand for Light Detection and Ranging (LiDAR) – sometimes called laser scanning – although cost and power consumption still limit uptake of this technology.

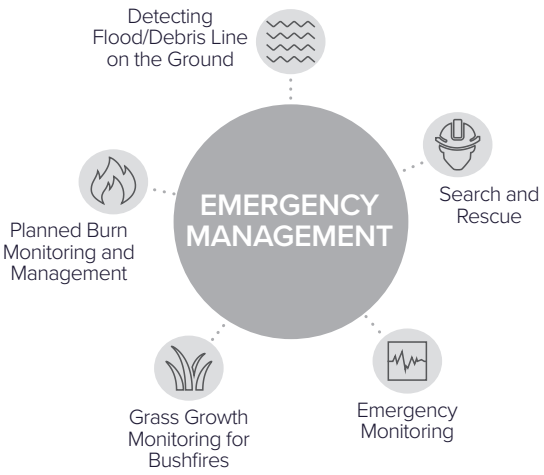


Typical UAV Data Acquisition Workflow

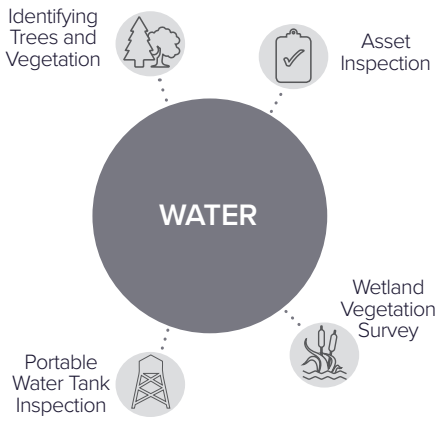


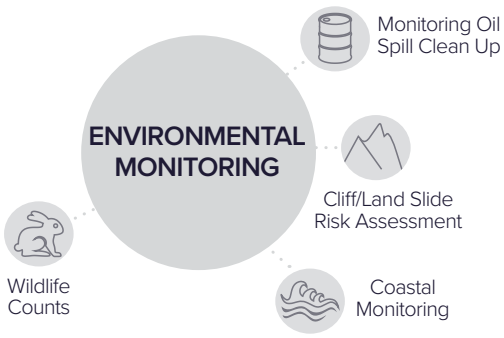
Despite the widespread use and popularity of UAV-acquired data, there are some stand-out issues; chiefly accuracy and image quality.

Around half of survey participants said data accuracy was a problem. Issues included lack of positional accuracy, incomplete data, images not being georeferenced, incorrect units, and gaps in coverage. Furthermore, these errors could take a long time to correct; some of those surveyed reported that it could take more than two weeks to identify errors, contact the data provider to get the data fixed, and then receive the corrected data.



When it came to deciding parameters for data capture, most users said they consulted experts on the particular subject matter, which in many cases were the participant's own colleagues. Around one in five end-users of the data relied on advice from the data providers themselves. The technical specifications for data capture using UAVs are very different from those used in piloted aircraft surveys, so those guidelines do not transfer to the UAV setting.



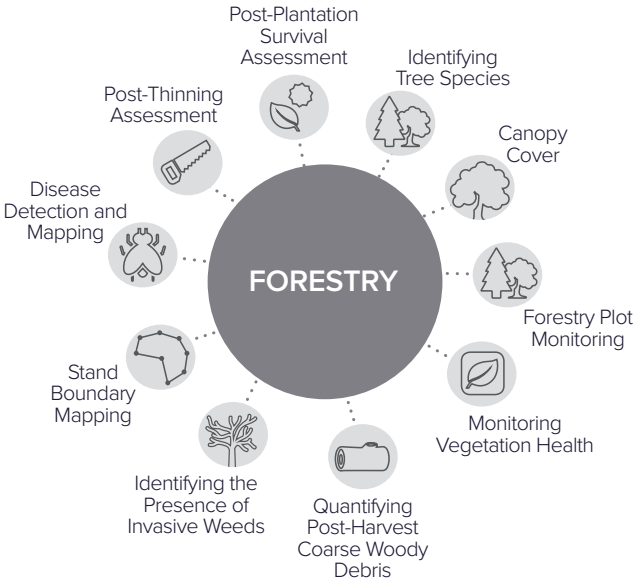


While UAV surveys are generally cheaper and easier than piloted aerial survey methods, they still face their own unique challenges that can be responsible for project delays and setbacks. These included weather-related factors such as wind or lighting, specification-related issues leading to delivery of the wrong product, data processing lags and software issues, timing-related problems where the opportunity to capture data at a specific moment is missed, site access issues, and equipment malfunctions.

Based on the findings, we have highlighted more than 40 quality assurance checks that could help determine if UAV-acquired data is high-quality and fit for purpose.

Clearly there is a need for assisted workflow and quality assurance tools to help end-users and data providers work out the specifications of the data they need, and to check and ensure the quality of the end result. FrontierSI will use the results of this report to inform development of such a tool – called QA4UAV.

UAV data capture technology is advancing rapidly, as are the possibilities for its use, so it is vital that we continue to monitor this exciting field and explore new potential applications.



FORESTRY:
IDENTIFYING TREE SPECIES

Tree species identification is a complex and time-consuming part of the forest management. Understanding tree species across forests enables informed decisions for effective planning and coordination of conservation efforts.

RESOLUTION
≤ 50cm

SENSORS
MULTISPECTRAL

FEATURES OF INTEREST
TREES

PRODUCTS
TREE SPECIES MAP, POINTS WITH TYPES AS ATTRIBUTES

SURVEY:
SURVEYING COMPLEX FACILITIES AND INFRASTRUCTURE

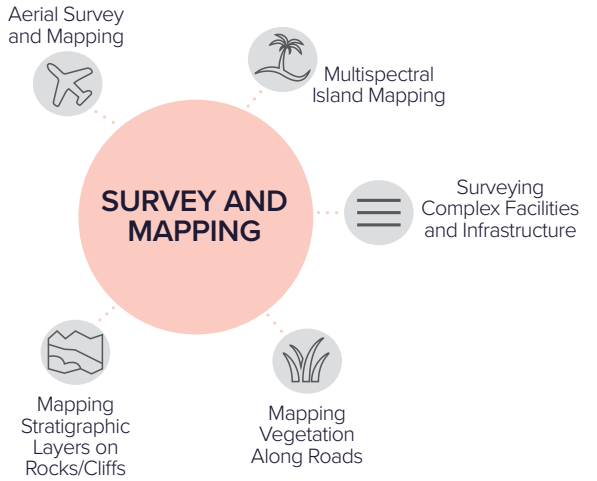
UAVs equipped with LiDAR and RGB sensors can collect 3D images to create highly accurate, 3D models of complex infrastructure. UAVs are used to capture asset condition and to identify areas in need of repair. This data can be collected without the need for disrupting the operations in busy environments such as oil and gas, and manufacturing.

RESOLUTION
≤ 1cm

SENSORS
RGB, LiDAR, INFRARED

FEATURES OF INTEREST
PIPELINES, OVERPASSES, BUIDINGS, ROADS, TOWERS, CRANES, VEGETATION

PRODUCTS
3D MODELS, POINT CLOUD, IMAGERY, HEATMAPS, VEGETATION MAP



See the report for more UAV applications.

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UAV DATA ACQUISITION IN AUSTRALIA AND NEW ZEALAND

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QA4UAV

DOWNLOAD REPORT

To download the full report please visit:
frontiersi.com.au/assets/FrontierSI-QA4UAV-User-Needs-Report-2018.pdf

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