A business approach for the use of drones in the Engineering & Construction industries
The engineering and construction industries are based on the human relationships between many project stakeholders to achieve delivery excellence.

Enhanced processes and digital tools cannot replace people, either as individuals or teams, but they are required to increase quality, reduce costs, mitigate safety risks and improve decision-making.

Drones, more accurately described in a business context as unmanned aerial vehicles (UAVs), present increasingly attractive opportunities for achieving these goals. They have significantly improved since the simple radio-controlled aircraft created for military use in 1938 and civil applications are no longer science fiction.

For example, a team of scientists has demonstrated that UAVs were able to build a rope bridge, assemble items to create a structure, or detect and catch an object in the air. Clearly, UAVs now offer a high level of automation enabling operators to reach previously inaccessible areas, while capturing a large amount of data very quickly. However, this is not their only use.

Accenture Consulting studied all possible applications of these unmanned aircraft in the engineering and construction industries, and the risks and opportunities they can bring. So what does it take to turn them into value delivered?

Introduction
UAVs: a wide range of aircraft for different applications

UAVs can take different forms, with different levels of controls and the capacity to carry a very wide range of payloads. There are many types supporting different uses, but they are also subject to different regulations, depending on whether the aircraft is in or beyond the field of vision. They are built with intelligent stabilization systems to keep them flying and can carry sensors to perform dedicated functions. One of the most common devices is a camera mounted on gimbals to obtain high-quality video and still photography.

However, depending on their lift capacity and payload specifications, UAVs can also carry multiple sensors to extract a wide range of information, increasing the number of possible applications and the business value of their outcomes.

"There are many types of UAV, supporting different uses, but also subject to different regulations"
What value will UAVs bring to engineering and construction businesses?

No longer limited to commercial activities, UAVs now demonstrate numerous possibilities to add business value. Potential business applications are wide ranging and they offer disruptive opportunities for companies in the engineering and construction industries. They can dramatically extend human operations by enabling remote sensing as well as actuation and predictive capabilities. Such capabilities offer key benefits such as cost reduction, risk mitigation and quality improvements, thereby bringing a competitive advantage to their adopters.

Optimize project and maintenance costs

UAVs can be used to automate simple tasks and reduce labor costs significantly, while providing better accuracy through the use of multiple sensors on the same platform. They are already used in quarries for topographic surveys, and the measurement of reserves and storage volumes. They allow quicker stock assessments with less workforce needed. UAVs can also replace workers on operations that normally require the shutdown of machinery, avoiding costly downtime and the use of expensive security equipment. For example, they are used for maintenance operations in the utilities industry to keep refineries and rigs operational during inspections.

Reduce Workers' Exposure

UAVs enable organizations to inspect hard-to-reach or contaminated areas and to deliver supplies without exposing employees to the potential risks. For example, engineers used UAVs to inspect the 343 meter high Millau Viaduct in France, controlling them from the ground and thereby reducing personal risk.

A highly specialized UAV is also under development to carry out an autonomous inspection inside the Fukushima N°1 Plant using lasers to detect and avoid obstacles in flight, and being able to land and replace its batteries without human intervention.

Enable best decisions to improve quality

Real-time information is a key challenge for engineering and construction companies. UAVs can assist project managers by providing a picture of the entire project and keeping them informed about day-to-day progress. They are then able to take informed decisions quickly and anticipate planning delays. For example, UAVs developed by the university of Illinois were used to capture video data showing construction progress at the Sacramento King's new stadium in California.
Local experiments are already happening today in several countries and in several industries, particularly engineering and construction.

**Aerial monitoring**
Power line network surveillance to check for vegetation growth and to detect damaged areas and rust formation.

**Stockpile monitoring**
Use of volumetric calculation to measure extraction areas and stockpile volumes, height, diameter and density to monitor inventory, prevent theft and to plan deliveries and collections.

**3D mapping**
Development of detailed 3D maps to support planning and designing of new worksites and evaluate distances between installations.
Monitoring of gas emissions

Use of thermal imaging to identify and pinpoint gas leaks on platforms or towers, avoiding potentially dangerous high level operation and exposure to emissions for workers, and the costly shutdown of the activity.

Traffic monitoring

Filming of road traffic enabling communication and efficient decision-making in real time.

Pylons Maintenance

24 hour inspection of electrical equipment using thermal and UV cameras to detect failures such as overheated connectors or corona discharge, and maintenance.
Our recommendations to get the best out of UAVs in the engineering and construction industries

Companies have to reinvent business processes to fully leverage UAVs

To take full advantage of UAVs, companies should reinvent business processes rather than attempting to integrate them into existing operations, because UAVs change the role of current employees (e.g., field operators, analysts or IT operations) as well as data, IT infrastructure and operations. They should be seen as complementary to the company ecosystem and their use should address specific operations supported by a tangible business case.

UAVs are a means, the value is in the data and in knowing how to integrate it

UAVs and their sensors will bring a huge amount of data to global companies, multiplying capabilities and applications within a company’s business processes. The analysis of the data will significantly improve operational intelligence and preventative or predictive maintenance. For this reason, companies will need a datamanagement platform to capture, process and analyze incoming data to identify notable events and createreports. Integrating this data into core business processes will enable the increase of automation in multiple business processes.

Data analytics is at the heart of the UAV value chain
A global UAV strategy to enable each project to create business value

Many organizations intend to leverage UAVs in multiple geographies. Although we encourage enterprises to prepare for such global deployments, these plans will have to be adjusted to accommodate local guidelines and regulations, which vary dramatically based on jurisdiction. Moreover, enterprises must be aware of the potential risks unmanned aircraft can bring and take steps to mitigate them. The safe operation of UAVs within civil airspace will also be dependent upon reliable mechanical and navigational systems, as well as repeatable operational processes and training.

Hardware, infrastructure and operational areas should be addressed. In order to bring consistency, we encourage engineering and construction companies to develop a capability to ensure the best integration of UAVs into their business. We recommend companies to:
- Support local initiatives with global expertise
- Maintain a permanent technological survey
- Follow up evolution of local regulations
- Define mission guidelines to support standardization
- Coordinate the impact on the company’s different departments

Finding the right partners is key to supporting the global strategy

The UAV market is dynamic. The number of start-ups created continues to grow and investors are increasingly interested. There was more funding raised in the first five months of 2016 than in the past three years!

The market includes UAV manufacturers, operators, application developers, UAV systems integration and deployment providers, training and insurance companies. This list is not exhaustive and some start-ups cover several services.

To integrate UAVs into their businesses successfully, engineering and construction companies should draw up a roadmap aligned with their strategy, targeting the different alliances and phases of the transformation.
Current research will transform the future of the industry

Technological improvements will make UAVs faster, stronger and safer. Recent innovations such as hydrogen fuel cells promise to keep them flying for hours. But the real innovations will not come from the aircraft itself, but from its equipment, the analysis of the data gathered and the algorithms that make UAVs react to the external environment.

A team of scientists has demonstrated that UAVs were able to build a rope bridge, assemble items to create a structure, or detect and catch an object in the air. These improvements in capabilities are still at an experimental stage but they open up great perspectives for applications in the engineering and construction industries in the coming decade.
About Accenture

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