



## Exploring larger UAV market opportunities: Understanding challenges and anticipating benefits of emerging technologies

UAV operations have been on the radar for years by many companies, especially airline operators and aviation third-party service contractors for cargo transportation and aerial inspections. But so far, service opportunities are still restricted to small “off-the-shelf” UAVs that are only capable of offering about 30 minutes of flight with short range and limited payload.

It is very likely, though, that this situation will change in the upcoming years with the introduction of more robust UAVs, which until now were only available for military activities or prototypes in start-up companies. This unmanned air vehicle category is in the process of being certified for the general public as the regulations are being established by the aeronautical authorities with significant contributions from manufacturers and customers.

Several examples can be seen in regional markets around the world, such as Europe, the United States or South America and also across a diverse range of industries such as the Oil & Gas, Energy, Mining and others.

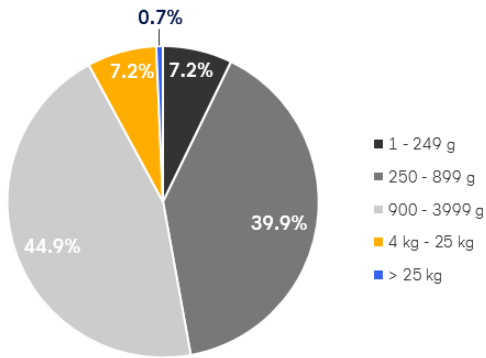
The main question is: Why do I have to - either as an operator or as a third-party service contractor - spend resources working jointly with other stakeholders on something that will certainly be available off the shelf in the next 3 years? And the answer is quite simple: those who can influence manufacturers and regulators, will not need to spend additional time on lengthy post-certification development and will be instantly prepared to introduce more robust UAVs into their operations, while assuring the required level of safety and operational efficiency.

January 06, 2021

By Bruno Picinatti

For years, UAV solutions have been considered as the next market breakthrough in surveillance, cargo transportation and aerial inspections. But those involved in the market will easily recognize that solutions currently available are based primarily on small UAV operating in the "open" EASA category defined as "*...which can be overseen through the police as for cars for instance, and does not require any authorization by Aviation Authorities. This group of operations would only be submitted to a minimal aviation regulatory system, concentrating mainly on defining the limits of such a category of operations.*"

Authorities around the world usually understand that UAVs limited to 25 kg and restricted to flights under visual contact (Line-Of-Sight or VLOS) and up to 400 feet above ground level are not considered to be a significant risk if operated with simple safety measures, such as avoiding public areas and ensuring that any external loads, including cameras, are firmly attached and do not adversely affect the flight characteristics or controllability of the UAV. Other than that, there are no significant restrictions on using smaller units.



These small UAV are in fact quite easy to acquire and to operate, not requiring specially trained licensed pilots and most of them can be purchased on the internet. According to EASA research in 2016, units generally weighed less than 4 kg and, despite some more developed units that are generally around 12 kg, most Commercial UAVs have the Maximum Takeoff Weight (MTOW) below 10 kg as shown in the figure 1. Although not reflected on the pie chart, another conclusion obtained from this research is that Commercial UAVs with their Maximum Takeoff Weight (MTOW) exceeding 10 kg are extremely rare in the market.

Figure 1: Survey conducted by EASA in 2016. Source: EASA

The downside of these small UAV solutions is their limited usefulness in industrial applications, as indicated in Figure 2. So far, we can see only use of simple, lightweight UAVs that are not subject to certification or dense regulation, equipped with professional cameras and having the data processed by Artificial Intelligence (AI), in areas such as precision agriculture, warehouse scanning, mining or inspections on oil rigs or wind turbines. These **activities do not require robust UAVs, capable of flying beyond the visual line of sight, not even for more than 30 minutes to obtain images.**

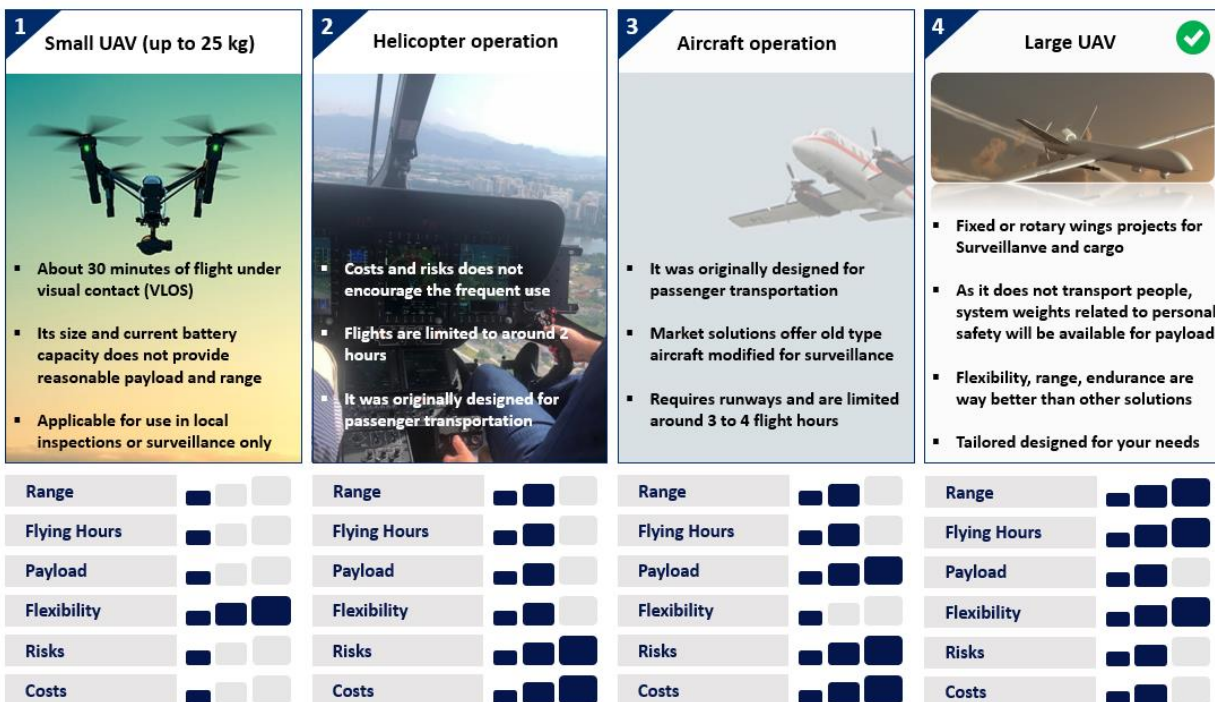


Figure 2: Main advantages of each type of aerial platform, indicating its strengths and weaknesses

When there is the need for longer endurance for better image acquisition using many sensors for example, the only option is to exchange battery packs frequently, leading to time-consuming activities that still pay off, but they can be easily improved with the use of large UAVs capable of offering greater payload and a significantly better range or flight time.

### Expensive and complex operations await innovative market breakthrough solutions

The industry has already realized that, even when facing significant investments, **the introduction of large UAVs** providing reasonable payload and long-range flights will be beneficial for the execution of many simple but demanding tasks, which are currently performed using helicopters, aircraft or even using thousands of man-hours to cover miles of pipelines installations.

One of Lufthansa Consulting’s clients from the Oil & Gas (O&G) industry, for example, runs more than 8 thousand kilometers of pipelines, which need to be monitored several times a year for corrosion control. Currently this is possible either with the use of highly expensive helicopters or the company’s personnel with small drones or cameras “on foot”. The use of large UAVs for this kind of inspection would be a great example for potentials in both an efficiency increase and a cost reduction. It can also be used to prevent pipeline theft and vandalism due to its ability to fly unnoticed for hours and its long range. Figure 2 indicates possible additional areas that will certainly will benefit from large UAVs.

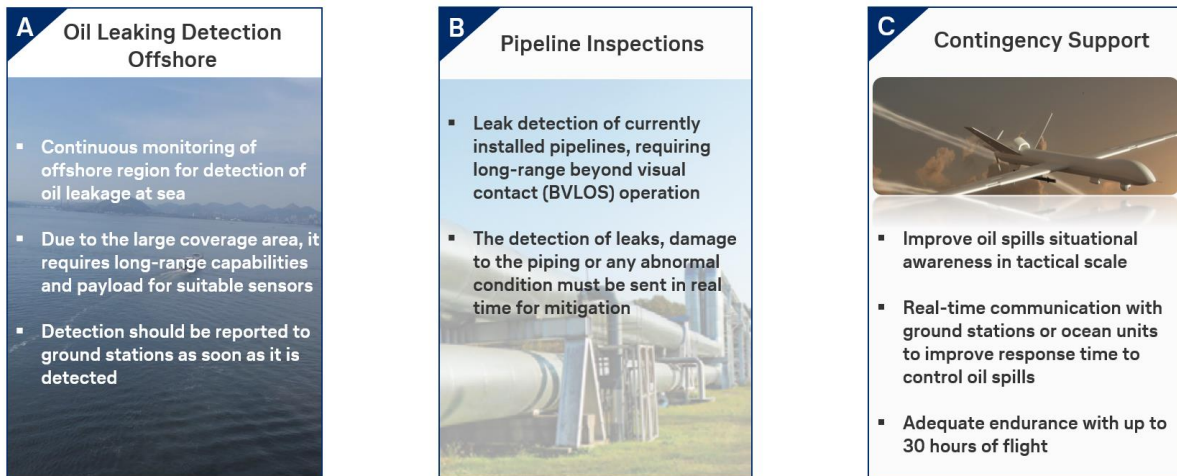


Figure 3: Examples of services that will benefit from the use of large UAVs

If the UAV capable of delivering greater payload and significantly better range or flight time is a major step forward, why is it not readily available to customers? The simple answer is: **to offer better performance, it needs to be larger, which requires certification by the aviation authorities and so it takes time and money to be approved.**

Fortunately, military UAVs or UAV prototypes, currently undergoing initial testing and discussions with civil aviation authorities to become certified as civilian UAVs, are the unique opportunity for the organization to have an unmanned UAV that will meet their needs in the coming years.



## **Experience in current discussions with major manufacturers, contractors and aviation authorities**

Lufthansa Consulting's experience shows that large UAV manufacturers in general have their basic models approved for a particular type of military or government mission, allowed to fly in restricted areas or operating under military regulation. Therefore, before applying for a civil certification, **manufacturers need to understand market requirements, including embedded systems, sensors, type of mission and type of service through feedback from industries that are looking for this innovation.** Once the aircraft's configuration is defined, manufacturers will proceed with the civil certification, making it difficult to change the UAV configuration to address other specific needs.

Many potential customers are unaware of aviation rules, specially the time required to certify new technologies or changes in already certified design, so they mistakenly view UAVs as tools like computers and cameras. It may explain the reason that some are not approaching manufacturers and aviation authorities to indicate their needs.

Customers must also understand that relying on military or governmental UAV solutions, developed for e.g. surveillance (detecting moving targets on ground), will not automatically mean optimized solutions for the civil sector with a need to, for example, detect oil spills in the ocean. For this specific knowledge, you would expect O&G companies to be the experts already, having developed their expertise during the last 50 years of environmental inspections imposed by regulations.

Most non-aviation industries require UAVs as a platform, which would be able to transport sensors, systems or cargo flexibly. The solution to make UAVs more flexible can be developed, but it may be a challenge for manufacturers to properly equip the UAVs, providing a wide range of services, while dealing with certification authorities' requirements and certification tests. Being so, manufacturers must be aware that flexibility is a key feature required by the customer, making it a priority during the development phase.

On the aircraft and helicopter side, operators can either widely benefit from the changes in the market or experience a drop in their sales in the coming years. They are the ones that are currently benefitting from few aerial inspection opportunities using manned aircraft. With the introduction of safer and more capable large UAVs to expand their business and even operational costs, the demand for aerial inspection is expected to increase sales. Considering that large UAVs will require certified air operators, operators can benefit from their experience, using their pilots and maintenance staff already certified by local authorities. Additionally, manufacturers may understand that a partnership with local resources as the best approach to have their products in the market, thus leading to opportunities for current established operators. On the other hand, operators that maintain their current business model will certainly be relegated as soon as UAV becomes a certified civilian solution for non-aviation industries.

## **Building the future – What is needed to prepare the organization**

The first step is to **carefully evaluate organization needs to correctly identify tasks that are expensive or cannot be performed efficiently without the use of larger UAVs** capable of, in some cases, more than 20 hours of flight or 500 nautical miles range (about 926 km) or to carry payloads above 80 kg of cargo or sensors. The organization's **technical requirements must be well-defined and made clear to all relevant stakeholders.**

**Explore possibilities with UAV manufacturers** and, (if possible) with the relevant aviation authorities. Requirements discussions, including airspace rules and UAV certification steps, using the support of the company aviation department or third-party service provider, are sure to improve results. Many points are not yet clear in the regulations, so authorities tend to appreciate the approach as in any new development.

The next step is to consider not only technical requirements, but the desired **business model**. The customer will generally have to choose between owning or leasing the UAV and operating it, or contracting the operations to a third party. Own operations will require trained personnel in the organization and maintenance, while contracting the service might be a more efficient solution especially for smaller scale operations.

Therefore, the **business model must consider the type of service, costs and also should include company policies of data privacy**, if the mission includes sensitive information to be collected by sensors that will normally be transmitting using a third party satellite or if the UAV is flown and maintained by other companies outside the customer's premises. Figure 4 highlights the main advantages of each aerial platform. Despite the lower risk and cost, the small UAV is limited to specific areas, not offering long-range flights, for example. Helicopters and aircraft are applicable to larger areas and larger payloads, but the risks and costs increase significantly. Finally, large UAVs are able to offer better range and flexibility, while keeping risks and possibly lowering costs compared to manned aircraft.

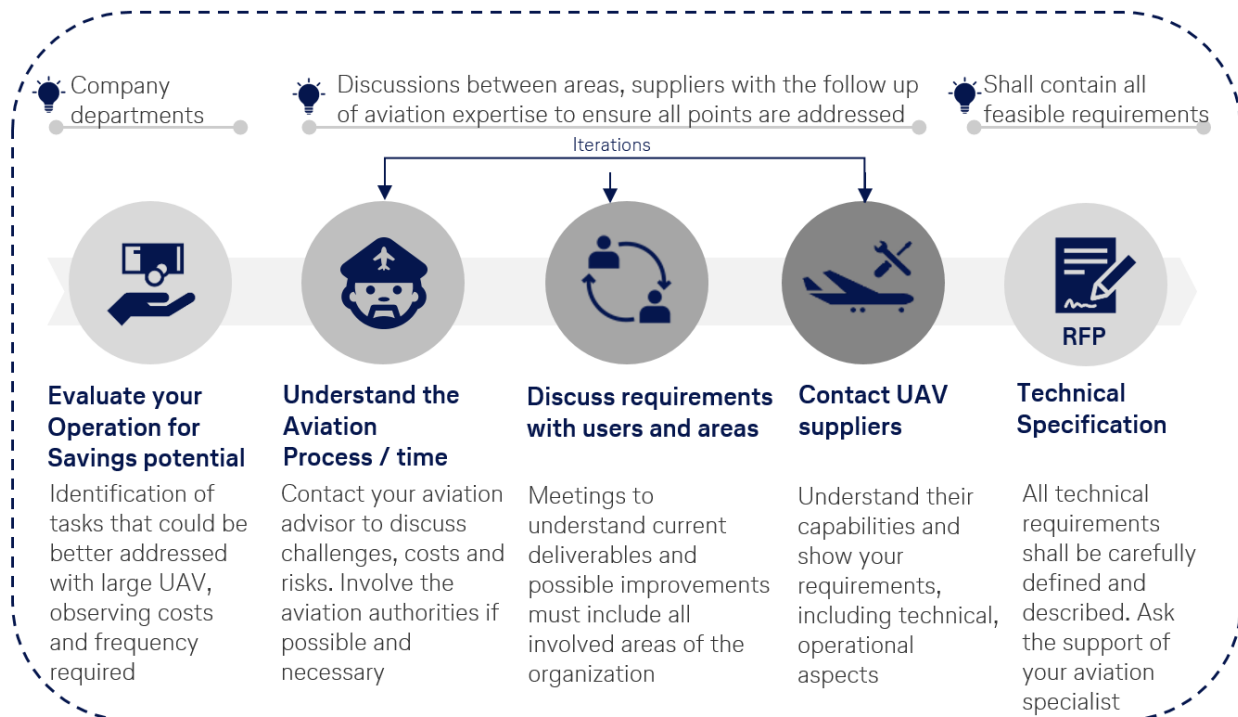


Figure 4: Suggested process flow for any organization willing to procure large UAV



It is important to realize that UAV operations also involve risks. For example, an air collision with another aircraft, a pilot's inadvertent maneuver causing damage and a UAV unable to complete the necessary mission due to incorrect technical specifications. Organizations must identify those risks and define technical or operational requirements to mitigate or eliminate them. Requirements may be related to sensors or systems installed in the UAV as a minimum for manufacturers' solutions or even discussion with authorities regarding operational requirements, e.g. avoiding flying in a shared airspace.

That is why it is important to treat risk identification as part of the process for UAV requirement definition, supported by experienced aviation experts who will be the link of corporations with UAV manufacturers, authorities and operators, this is a fundamental project step.

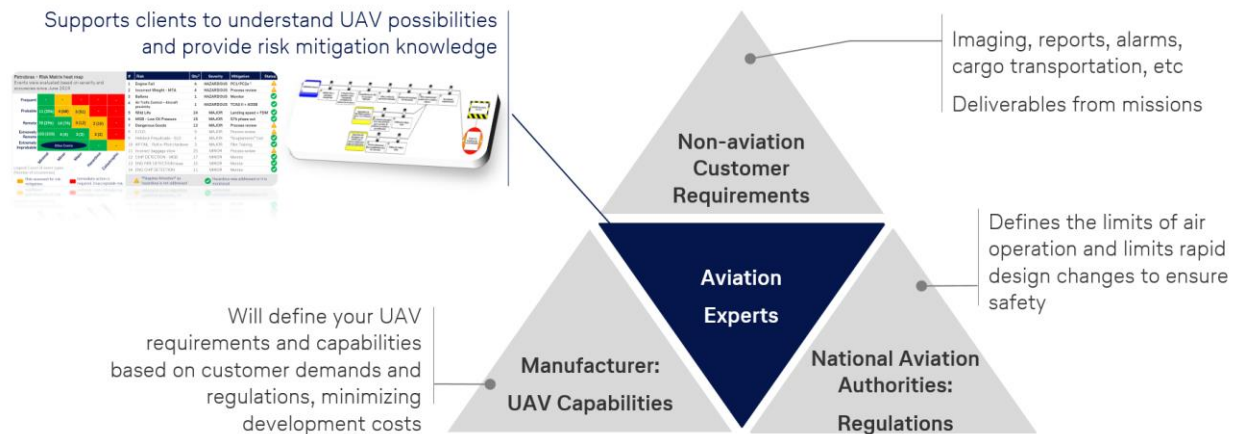


Figure 5: Aviation experts can be the link between the organization and all stakeholders

As large UAVs are the new frontier for achieving efficiency and safety, the organization should seriously consider joining discussions with manufacturers and aviation authorities, to indicate the organization's operational requirements, unacceptable risks and the applicable desired business model, which must be carefully evaluated in advance for an appropriate approach. Only in this way can the requirements of organizations planning to operate large UAVs be understood by manufacturers before authorities start certification processes. **If the organization misses this opportunity, competitors will enforce their specific requirements and the market might use them as a standard for new developments.**

To learn more and discuss how organizations can benefit from Lufthansa Consulting expertise on the evolving UAV market with the next UAVs capable of providing adequate range and payload, please get in touch: [Liege.Emmerz@LHConsulting-br.com](mailto:Liege.Emmerz@LHConsulting-br.com)

***Together, we can make it through to better days.***

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