© DLR

# ARCHITECTS OF A NEW AIR TRANSPORT SYSTEM

How unmanned aircraft systems are ‘taking off’, where they are useful and what remains to be done for them to enter everyday service.

Christian Eschmann talks to the DLRmagazine

**They are becoming an increasingly familiar sight in the sky. Whether in the transport sector, among amateur enthusiasts or in disaster relief, Unmanned Aircraft Systems (UAS) are increasingly changing the image of the airspace. And they are now also the subject of widespread debate. The impact that these technologies will have on the future air transport system depends on achievements in research and development as well as policy decisions, but also on the level of public acceptance. In this interview with Christian Eschmann, DLR’s UAS Coordinator, the DLRmagazine examines what hurdles still need to be overcome before the use of UAS becomes commonplace and when, for example, air taxis will really ‘take off’.**

**Christian Eschmann**
is DLR’s Coordinator for Unmanned Aircraft Systems. He is the initial point of contact for government bodies, research institutions and industry. In this capacity, he is the representative for this area both within DLR and for external customers and partners from Germany and further afield. In addition, he serves as the DLR liaison officer at the European Union Aviation Safety Agency (EASA) and heads the ‘Urban Air Mobility’ theme as part of the European Research Establishments in Aeronautics (EREA) ‘Future Sky’ research initiative.

© DLR/Marek Kruszewski

With the unmanned helicopter superARTIS, DLR is researching topics such as aircraft and environment recognition, flight path planning and flight control. It has also been used for humanitarian aid and research missions over the sea.

**A few months ago, Volocopter GmbH, a company based in the German state of Baden-Württemberg, made headlines with its first public flight of an unmanned air taxi in Europe. Was this just a successful marketing operation?**
: UAS are becoming increasingly important in the civilian sector. A completely new industry is emerging thanks to a number of technological advances. It is very exciting to witness the speed at which innovations are occurring, particularly when compared to the long development cycles that we are used to in the mainstream aeronautics industry. The pace is more like that of IT companies. Enterprises such as Volocopter and the southern German start-up Lilium GmbH, which have already taken some initial steps towards the development of air taxis with prototypes and feasibility studies, are part of this new innovation landscape. However, public acceptance is key to the success of air taxis, so this has to be taken into account. Although the Volocopter flight certainly had a marketing component, it served as a test for opinions amongst the public.

**How are UAS being used today?**
: They are used for acquiring images and recording videos, conducting surveying tasks, and for aerial inspections – all primarily within the commercial sector. However, national authorities and organisations dealing with security and safety, such as the police, fire brigades and rescue services, are increasingly integrating UAS into their standard procedures. Hospitals have also recognised their benefits for transporting blood and tissue. In humanitarian missions or disaster relief operations, UAS can deliver the necessary supplies and support services quickly and flexibly. DLR and the United Nations World Food Programme worked together in July 2018 to demonstrate the effectiveness of UAS in such situations under realistic operational conditions in the Dominican Republic.

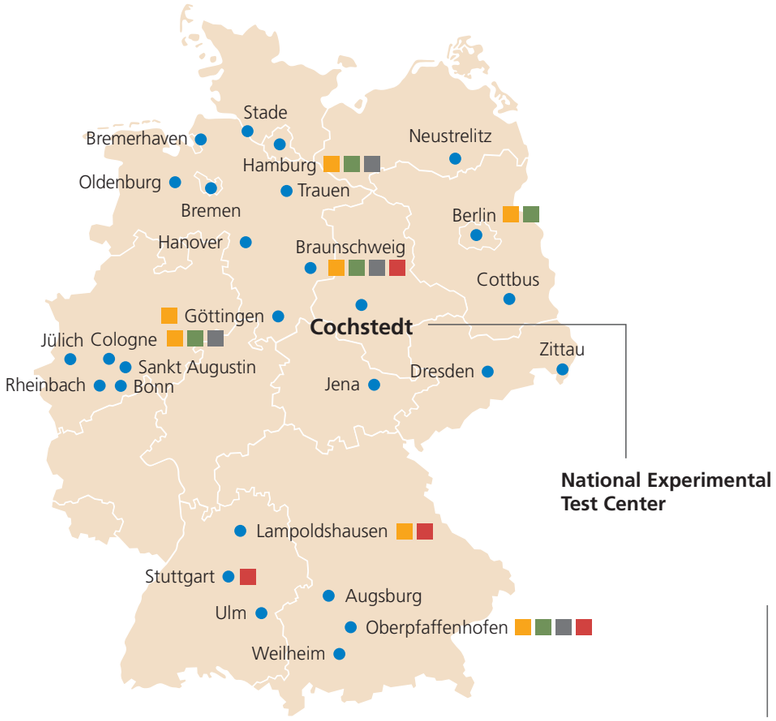
**What is the next step in the use of UAS?**
: Some of these examples are ready for the market. The obvious goal, however, is ‘Urban Air Mobility’, which means the introduction of an entirely new form of transport. An unmanned and, in this case, pilotless mode of passenger transport enables the introduction of new urban modes of transit, as well as better connections with outlying districts and economically underdeveloped regions.

The German Federal Government has selected five cities and regions – Aachen, Hamburg, Ingolstadt, Münster and North Hesse – for practical trials with air taxis and other forms of UAS transport. In doing so, they are taking particular account of regional differences relating to the suitability of and need for unmanned aircraft systems.

**What remains to be done before air taxis can be introduced?**
: It goes without saying that passenger transport via air taxis is of great interest to cities and regions as a new form of mobility. However, if these are to enter service at some point in the future, new infrastructure as well as transport and service models need to be created, alongside the development of new aircraft systems. DLR is also investigating the extent to which UAS are gaining public acceptance. Fortunately, such investigations have now become an integral part of aeronautics research all over the world, when addressing future concepts and business models for UAS mobility.

> “Public acceptance is key to the success of air taxis.”

## DLR RESEARCH ON UNMANNED AICRAFT SYSTEMS




**Are there any clear trends in terms of acceptance?**
: An acceptance study conducted by DLR revealed that there was clear approval in Germany for the use of civilian UAS in disaster management, rescue missions and research activities. In contrast, commercial flights directed towards advertising, recreation or parcel delivery were still regarded critically by at least half of those surveyed.


© DLR

Christian Eschmann knows that before new air taxis take off, there is much to be done – the route from design to integration into airspace.

In the case of air taxis, concerns about safety, noise and light emissions were also raised. DLR's research findings will also be taken into account in future legal frameworks that will regulate the use of UAS in everyday life. DLR is working closely with the European Union Aviation Safety Agency (EASA) in this area. This body establishes the regulatory foundations that will determine when air taxis will be allowed to fly in Germany and the rest of Europe.

**What is DLR's role in the research and testing of UAS?**
: Here, I should mention the bigger picture. A large number of companies and research institutions around the world are working on the topic of UAS – from miniaturised multicopters to helicopter systems weighing several tonnes. Even when it comes to air taxis,

> "The concepts have to be assessed in terms of their suitability and feasibility. This is where DLR comes in."

the concepts and design studies could hardly be more different. For some time, established aeronautical groups and young start-ups alike have been demonstrating that practically anything is possible, at least in theory. The concepts range from more conventional approaches to futuristic flight systems. However, the next step involves varying degrees of difficulty, as the concepts have to be assessed in terms of their suitability and feasibility. This is where DLR comes in, by taking on something of an architectural role.




## THE DLR NATIONAL EXPERIMENTAL TEST CENTER FOR UNMANNED AIRCRAFT SYSTEMS IN COCHSTEDT

Developing unmanned aircraft systems on a commercially profitable scale and operating them alongside manned aircraft in common airspace poses unfamiliar challenges for researchers, manufacturers, users and legislators alike. In addition to the technical aspects, legal and procedural issues must also be investigated and redefined. With the National Experimental Test Center for Unmanned Aerial Systems in Cochstedt, DLR is creating a unique test facility in Europe that will combine DLR-wide, interdisciplinary skills and expertise in the field of UAS. It is intended to function as the hub of a national network that will combine all of Germany's future test activities, while also coordinating with DLR's European partners for the purpose of testing UAS. In addition, it offers support to industrial and scientific researchers on technological issues and verification management, as well as advising policymakers and government authorities on matters relating to legislation and regulation. In terms of structural funding at a German state level, the National Experimental Test Center also functions as an incubator and enabler for start-ups and small and medium-sized enterprises.

Other areas of focus include research into highly automated and autonomous systems, along with their seamless integration into the airspace.

**DLR has been building the National Experimental Test Center for Unmanned Aircraft Systems at the airport site in Cochstedt, Saxony-Anhalt since 2018. What is the intention here?**
: Until now, the global testing of UAS was restricted to a manageable number of tests. Due to the rapid growth of the entire industry, the number of system tests will now have to increase significantly. This will require the development of new testing procedures. The National Experimental Test Center in Cochstedt offers a unique facility for that very purpose, providing both research institutions and industry with a space specifically designed for the safe and extensive study of UAS technology in a unique environment. This will take account of the fact that such complex subjects have to be treated as a whole, rather than separately. In the past, vehicle design has been addressed independently from flight guidance, and also separately from the legal regulatory framework. Neither researchers nor lawmakers can investigate and resolve all of the issues alone. As such, large-scale, whole-system research is becoming increasingly important as a link between technical and regulatory matters. DLR thus sees itself as playing a dual role as a service provider and a pioneer for new and beneficial technology.