

FLYNEX



STATE OF DRONE TECH 2020

DRONE TECH REPORT

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1. MARKET DEVELOPMENT

IT'S BUZZING IN THE AIR. RARELY VISIBLE, BUT WITH INCREASING SPEED, THE NUMBER OF DRONES IN THE AIRSPACE IS GROWING.

Commercial use of drones is gaining in importance as a result. In terms of the entire UAV market, the number of devices for commercial UAV flights is still small compared to hobby UAVs. On the other hand, the main turnover in the UAV sector is almost entirely accounted for by companies and groups that use drones.



STRONG GROWTH IN COMMERCIAL UAV FLIGHTS

According to industry experts, the drone market is still in its early stages. More and more companies are discovering the possibilities of unmanned aerial vehicles for themselves.



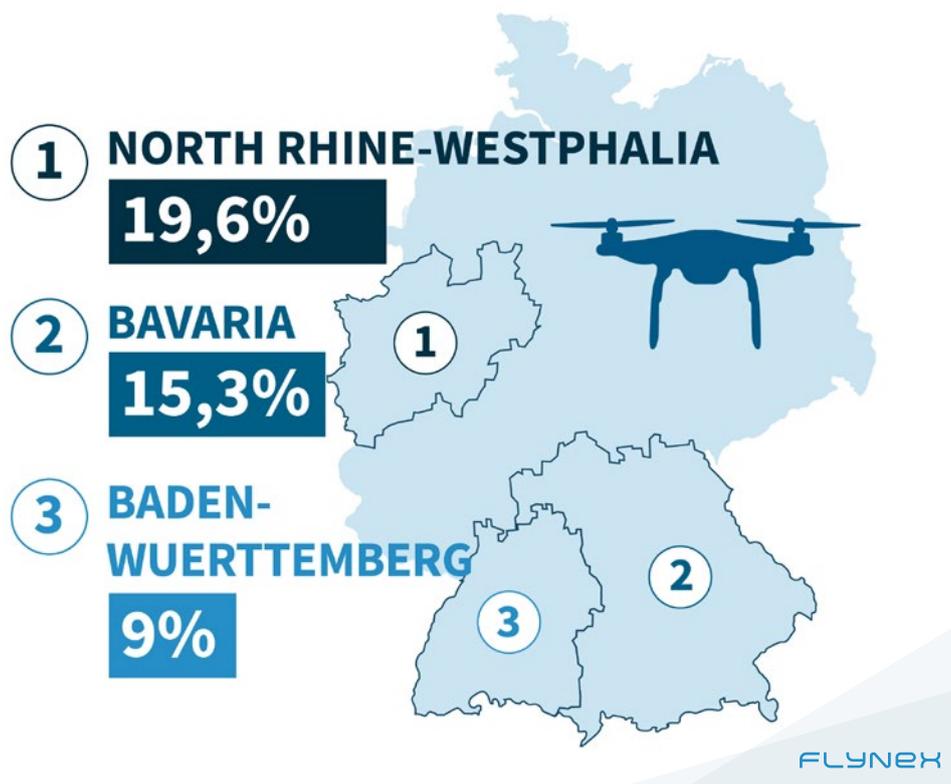
“We see how, despite Corona, or perhaps because of it, many companies want to use drones. Especially in the construction and energy sectors. We also expect that the urban and metropolitan infrastructure sector will become much more involved with drones over the next two years.”

Christian Caballero, FlyNex Founder and COO



IN 2020 THE COMMERCIAL UAV MARKET IN GERMANY HAS ALREADY RECORDED GROWTH OF OVER 21 % COMPARED TO THE SAME PERIOD LAST YEAR. THE NUMBER OF COMMERCIAL FLIGHTS SUCH AS THE INSPECTION OF FREEWAY BRIDGES, NOW TOTALS 55 %.

So although far fewer drones are used by companies than by hobby pilots – around 20,000 commercial drones compared to 500,000 private drones – the business sector now accounts for the majority of all flights.



Top 3 of Drone Flights – Use of Map2Fly in Germany

WEATHER AND CORONA RESTRICTION EASING UPLIFTS

Good weather conditions as well as the reduced corona restrictions have led to an increased number in flights this summer. The trend from the past few years show: In rural areas, especially in southern Germany, drones were used more often.

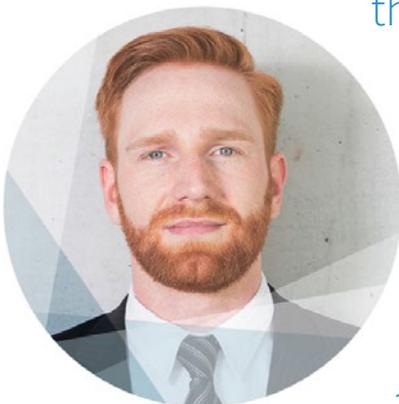
Almost a quarter of all drone flights (24.4%) are currently located in Bavaria and Baden-Württemberg. Among the federal states, North Rhine-Westphalia is top of the list with 19.6%.

GOVERNMENT GOT THE BALL ROLLING

Not only the economy but also politics is setting a clear pace here. In May, Federal Transport Minister Andreas Scheuer and Thomas Jarzombek, the Federal Government's Aerospace Coordinator, presented the Federal Government's drone action plan.

The action plan is intended to promote research & development as well as further innovations and new economic fields with drones. The Federal Ministry of Transport and Digital Infrastructure is currently funding 35 different industry and science projects regarding unmanned flight.

“This is not just about flight taxis or parcel drones. To be honest, these are two applications that we are unlikely to see in the near future. UAV applications for survey, inspection, or documentation flights for construction & energy companies play a much more important role in the commercial sector. These are applications that are already taking place on a daily basis in those industries today.”



Frank Lochau, Chairman of the Branchenverband Zivile Drohnen e.V.

2. DRONES AND AI

SMART HIGH-FLYERS – CAN DRONES BE UPGRADED WITH AI?

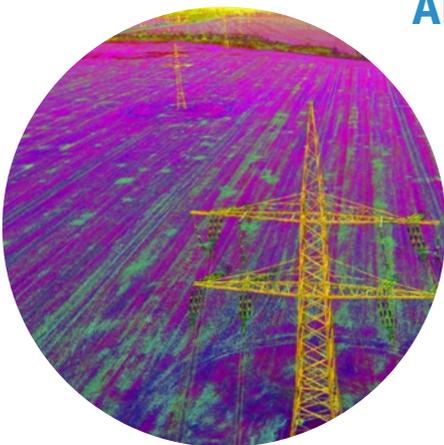
Artificial intelligence is the study of “intelligent” problem-solving behavior. And indeed, our computers and algorithms are becoming increasingly intelligent. The potential that lies behind artificial intelligence is barely tapped. AI can be found in many things of everyday life. For example, in our language assistants, within streaming providers, and in social media platforms using algorithms.

UAS AND AI: IS THAT CLEVER?

In the field of drone applications, AI has also arrived. Unmanned aircraft and AI complement each other perfectly. Today, entire work processes can be automated from start to finish.

From planning the mission to the evaluation of the generated data to further measures, processes can be slimmed down and thus made more efficient.

ONE EXAMPLE IS THE EVALUATION OF THERMAL IMAGES OF LARGE-AREA SOLAR PLANTS. SPECIALIZED IMAGE ANALYSES CAN BE USED TO IDENTIFY AND LOCATE HOT SPOTS AUTOMATICALLY AND QUICKLY.



Artificial Intelligence can be applied at many points in the workflow. Currently, AI is used for evaluation, especially after data generation.

One of the core functions in the future will be the so-called “computer vision”. This is a real-time image analysis that enables the drone to recognize and classify objects. This will allow drones to distinguish between buildings, people, and vehicles during flight.

This capability could contribute significantly to obstacle detection and avoidance, which would make autonomous drone flight safer



Data has a better idea

and more successful. “Intelligent” drones are also included in SESAR’s vision for the future of U-Space. The drones in U-Space are capable of autonomously flying the preprogrammed route from A to B. More about U-Space can be found in our free [White Paper](#).

Unlike in upper air traffic, the surface of the earth must be taken into account. What’s remarkable: Although there are 3D maps of the earth’s surface and altitudes that can easily be included in the planning process, the earth is continuously changing. Temporary changes, such as cranes, are just as important as permanent obstacles (e.g., buildings). Besides, non-static objects, such as other drones or birds, should also be recognizable.

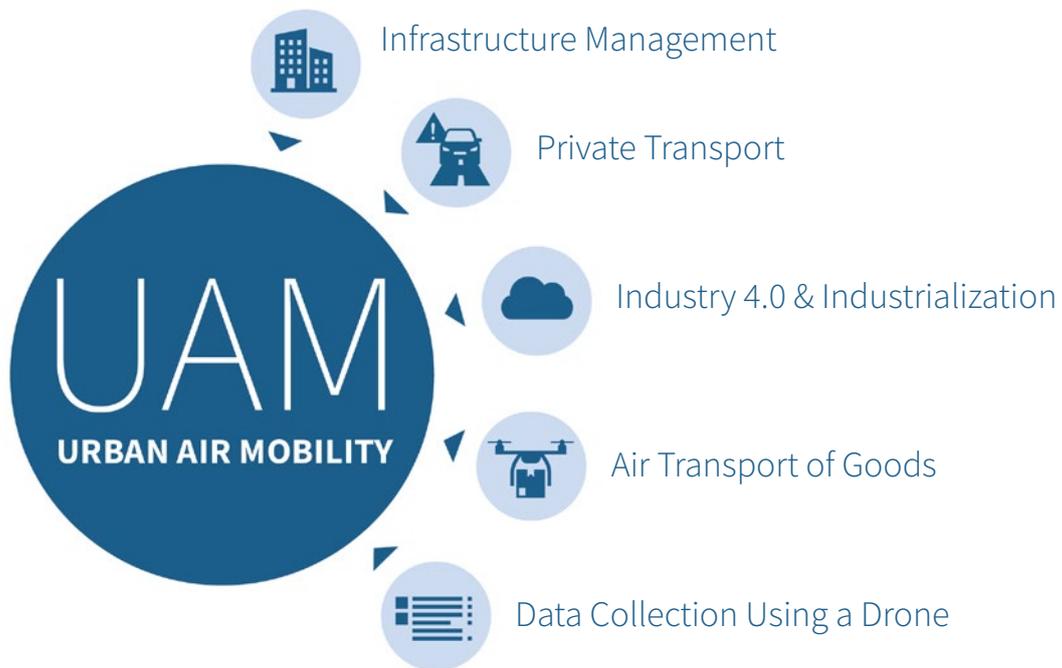
A drone, which can avoid collisions on its own, is, therefore, not only able to analyze a problem but can, as the definition of artificial intelligence describes, solve the problem on its own. An alternative route is calculated and flown in the shortest possible time.



3. URBAN AIR MOBILITY THE FUTURE OF UAV

URBAN AIR MOBILITY REFERS TO THE EXTENSION OF URBAN TRANSPORTATION SYSTEMS INTO THE AIR.

UAVs will play a major role in the future, though it's less about the devices themselves. Rather, it is the wide range of applications and usage concepts for important infrastructure tasks that make them a smart alternative. A city can benefit from this in several ways. This is why people often talk about **“smart cities”** in connection with UAM.



For one, certain work can be made safer through drone use. For example, inspections of buildings, bridges and roads, solar panels, wind turbines or power lines.

For another, they are the cleaner and more sustainable alternative to helicopters, from which many inspection jobs are currently performed.

In addition, thanks to the technical enhancements to drones (camera technologies, sensors), many jobs can be automated and smarter. Especially when combined with AI. Examples can be found in **urban planning, construction planning, infrastructure planning, forestry, agriculture and medicine.**

DRONES ARE ALREADY MAKING A SIGNIFICANT CONTRIBUTION IN VARIOUS INDUSTRIES TODAY TO PERFORM WORK AND TASKS MORE SAFELY, CLEANLY AND QUICKLY.

Air cabs and delivery drones are not even the most important ideas for the future from FlyNex' perspective. However, they must of course also be considered under the term UAM. The aviation cluster, Hamburg Aviation, vividly describes the advantages of a UAM for the Hamburg metropolitan region.



The “Urban Air Mobility” Initiative is funded by the European Commission and is part of the European Innovation Partnership for “Smart Cities”, which aims to develop innovative and citizen-oriented application scenarios for promising technologies. Behind this is the economic damage caused by traffic jams, which is estimated at over 100 billion euros across Europe per year – and rising.



In addition, there are other annoyances, such as when bridges have to be fully closed for maintenance work, or even risks – for example, when important medical treatments are delayed because blood reserves do not reach the hospital in time due to heavy traffic.

THE TARGETED USE OF UNMANNED AERIAL VEHICLES (DRONES), COULD NOT ONLY SAVE TIME AND MONEY HERE, BUT ALSO PROMOTE THE EMERGENCE OF NEW TYPES OF SERVICES IN METROPOLITAN REGIONS.

EXPERIENCE THE FUTURE IN HAMBURG IN 2021

In the future, Urban Air Mobility will increasingly come into focus, if it is not already happening. For example, the world's largest mobility exhibition, the ITS World Congress, will include and address UAM as a thematic area for the very first time in 2021.



ITS World Congress is the most important international industry event in the field of intelligent transportation systems and services (ITS). Each year, the ITS World Congress is held annually on a rotating basis in the regions Asia, Europe, or America. The last European edition was held in Copenhagen in 2018.

The next ITS World Congress will take place in Hamburg, Germany. **FlyNex** supports the ITS covering the topic “Urban Air Mobility”. For the first time, the topic of UAM will have its own area at the exhibition in Hamburg 2021. As part of the thematic field “New services from new technologies”, it revolves around innovations such as air taxis, industrial drone applications, goods transport by drone, or digital airspace management.

As an expert in drone technology and urban air mobility, FlyNex has now been commissioned by the ITS World Congress to organize the content until October 2021.

More information about the ITS World Congress can be found at <https://itsworldcongress.com/>



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4. FLIGHT TAXIS

FLIGHT TAXIS ARE AUTONOMOUS FLYING MULTICOPTERS INTENDED FOR PASSENGER TRANSPORT.

Several companies are currently developing a commercial solution. One of them is Volocopter with their VoloCity. According to the manufacturer, the VoloCity is particularly quiet and safe. In addition, the aircraft is electrically powered and is expected to have low operating and maintenance costs.

Europe's largest motoring association ADAC has tested the **VoloCity**, of course in the distinctive ADAC yellow, as an

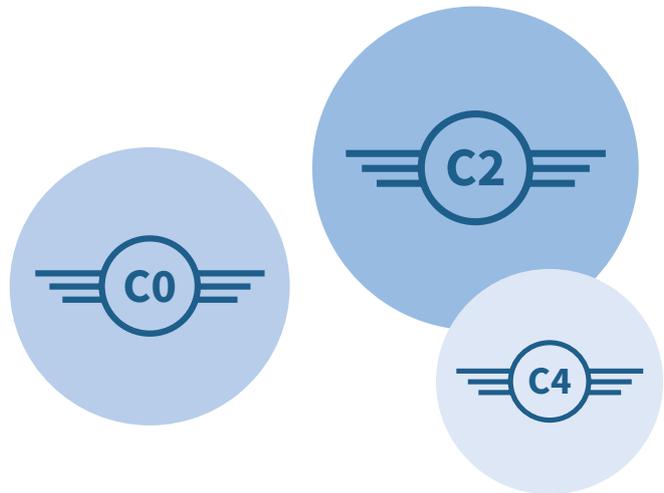


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emergency response vehicle. Study results show: The VoloCity is indeed quieter and produces fewer emissions than a rescue helicopter. However, the advantage is greater in rural areas than in cities. In 2023, test operations with the VoloCity are scheduled to begin in the regions of Ansbach-Dinkelsbühl (Bavaria) and Idar-Oberstein (Rhineland-Palatinate).

The VoloCity has also already been tested internationally, for example in Dubai. Most recently, Volocopter has brought in the Lufthansa subsidiary Industry Solutions. Together, they are working on a cloud platform solution called “VoloIQ.” It’s called the “Urban Air Mobility Software Platform” and is designed to map various aspects of the UAM ecosystem in real time.

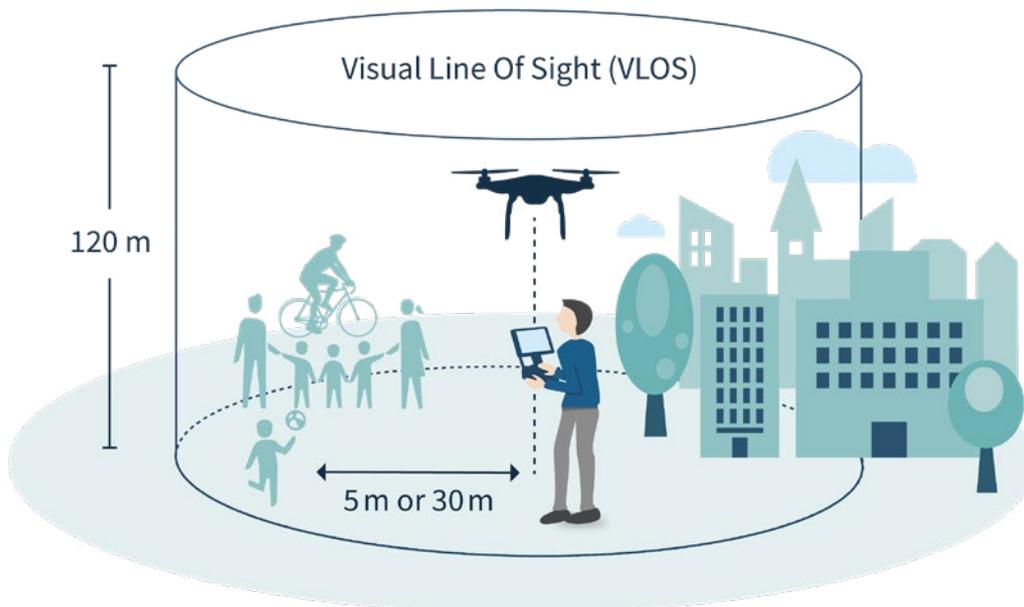
In addition to Volocopter, Lilium (Germany) and Airbus, among others, are currently playing in the market with the CityAirbus project (Germany) and Vahana (USA).



5. NEW EU DRONE REGULATIONS

After a postponement due to the Covid-19 pandemic, the new EU drone regulation came into force on 01.01.2021. It defines new rules for UAS manufacturers as well as new regulations to standardize the use of UAS on a European level. In a nutshell:

DRONE MANUFACTURERS MUST COMPLY WITH NEW REGULATIONS AND MUST ASSIGN THEIR DEVICES TO A CLASS (C0 TO C4). THE CLASS PROVIDES INFORMATION ABOUT THE TECHNICAL CHARACTERISTICS AND IN WHICH FLIGHT CATEGORY MAY BE FLOWN.



Open Category A2

- The flight categories are defined by the flight maneuvers, the purpose, and the proximity to people (crowds). The three categories are **open**, **specific**, and **certified**. Open is subdivided into **A1**, **A2** and **A3**. Flights in the “open” category have the lowest risk value and flights in the “certified” category have the highest risk value.
- A distinction is made between drone pilot and drone operator. Different duties and responsibilities are defined for both roles.

Detailed information on the new rules can be found online on the portal of the European Aviation Safety Agency, www.easa.europa.eu.



6. SWITZERLAND

BEST CASE EXAMPLE FOR DEVELOPMENT OF A DRONE MARKET

In recent years, drones have become tools for professional applications all over the world. For this reason, there is an increasing international demand for uniform rules and laws to make the implementation of unmanned aerial vehicles as easy as possible for companies.

Although “unmanned” aircraft have been around for a long time, they are more likely to be used for private purposes. In contrast to flying models, drones are both technically more complex and much more versatile.

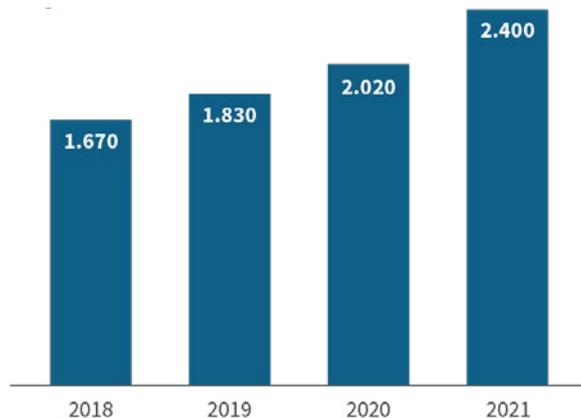


The Swiss Federal Office of Civil Aviation (BAZL) describes the difference between flying models and drones precisely:

“UAVs are unmanned, remote-controlled aircraft that serve specific purposes such as image acquisition, surveying, transportation, scientific research, etc. It makes no difference whether the mission is commercial, private, professional, or scientific. In contrast to this are model aircraft such as model planes, model helicopters, etc. used for leisure activities. Here the execution of the flight and the pleasure of it is the main focus.”

SWITZERLAND AS A DRONE CAPITAL

The comprehensive knowledge that has been built up in research and industry on microtechnology and robotics pays off particularly well in the drone industry. Switzerland is at the forefront of this field in Europe and plays a pioneering role in drone technology.



Source: BRANCHENRADAR.com Marktanalyse GmbH, ID 802964

It is not for nothing that the Swiss Federal Institute of Technology in Zurich and the École Polytechnique Fédérale in Lausanne are known as a Drone-Valley. Large software and hardware companies and the approx. 80 drone start-ups that have emerged in recent years have a positive influence on the commercial use of drones.

According to a 2018 study on the “size of the commercial UAV market”, Switzerland ranks fourth in a European comparison (absolute market size). Sales are also rising steadily. For the year 2021, sales are forecast to reach 2400 units.

IN RELATION TO “MARKET SIZE PER EMPLOYEE”, SWITZERLAND WAS NUMBER ONE. THIS DOES NOT CHANGE IN INTERNATIONAL COMPARISON. SWITZERLAND CAME FIRST, FOLLOWED BY NORWAY, THE USA, AND AUSTRALIA.

A significant factor in this development:

INCREASING COSTS AND WORKLOAD IN INSPECTION AND MAINTENANCE MAKE DRONES AN EFFICIENT ALTERNATIVE.

The flexible use in construction, energy, agriculture, and real estate maintenance is a central argument for drones as tools.

MINIMIZE COSTS OF OPERATIONS THROUGH DIGITAL CENTRALIZATION

From planning, to flying, to the evaluation of the collected measurement and image data, drone missions can be easily managed centrally. FlyNex has built up a digital solution for companies and professional applications over the last few years, which has been expanded by its own management platform and interfaces.

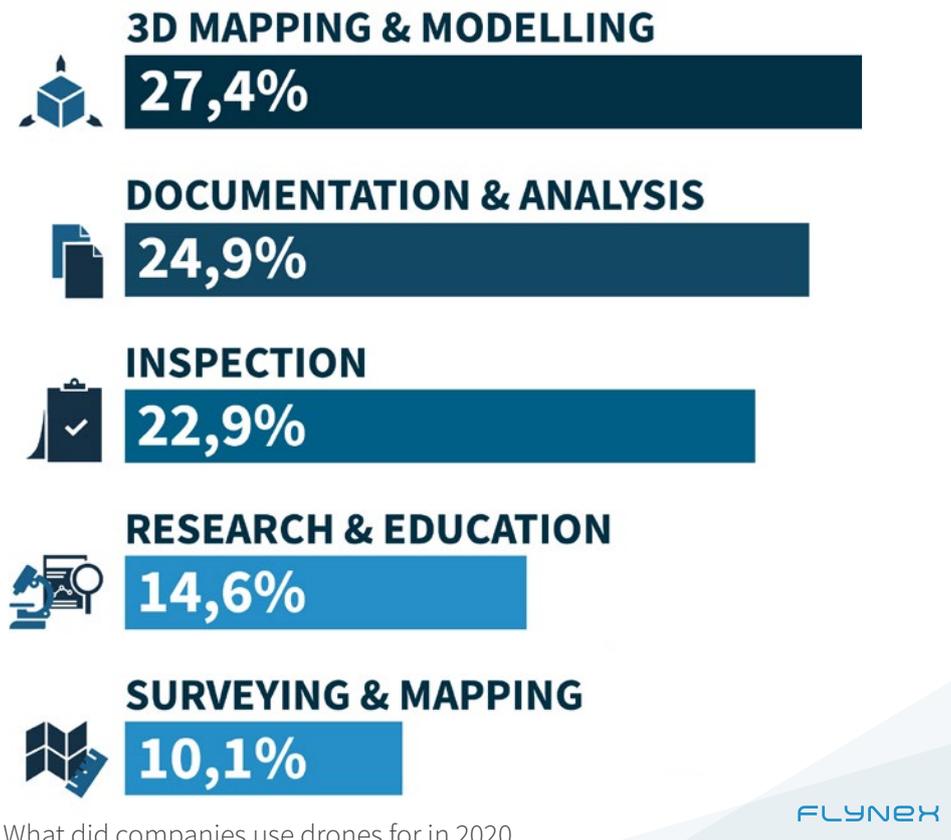


7. 2021 WHAT AWAITS US IN THE DRONE MARKET?

TECHNOLOGIES AND INNOVATIONS ARE DESTINED FOR 2021! THE MARKET FOR UNMANNED AERIAL VEHICLES WILL GAIN CONSIDERABLE MOMENTUM THIS YEAR.

On the one hand, drone manufacturers, service providers, and pilots will have to adjust to the new EU regulations, and on the other hand, the (economic) interest in drones is booming.

We expect 2021 to be not only another record year for hobby drones but also a record year for commercial drone projects! An analysis of our 2020 data confirms: The number of commercial drone flights is on the rise. Compared to the same period last year, the more technologically sophisticated applications, in particular, have gained in importance.



What did companies use drones for in 2020

For example, more than a quarter (27.4%) of all commercial drone applications were used for 3D surveying and modeling purposes. Drone data documentation and analysis tasks have also gained. As a result, the 2019 front-runner, performing inspections using drones, has slipped down to No. 3.

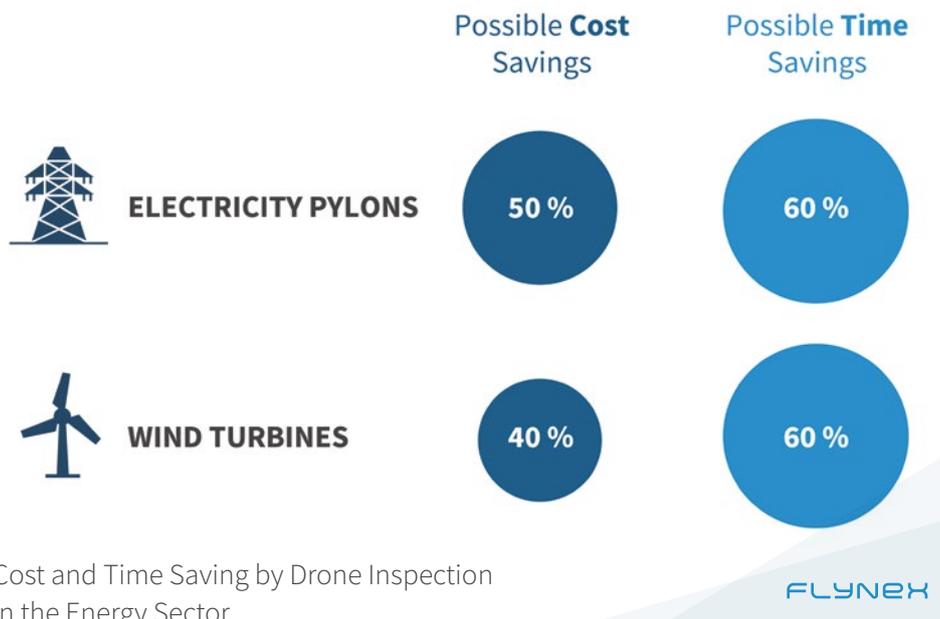
To conclude: It is precisely the use cases that play an important role in digitization and place higher demands on both process and software technology that have increased. The graphic illustrates the five most frequent applications and fields of use.



IN 2021, WE CAN THEREFORE EXPECT TO SEE FURTHER STRONG GROWTH IN MORE COMPLEX AND MORE PRECISE USE CASES.

In the construction and real estate sector particularly, more and more companies are integrating unmanned aerial vehicles into their work processes. Whether for construction site documentation, construction site planning, or damage detection. This gives them an early competitive advantage over their non-flying (ground-based) competitors.

An analysis by US-based Levitate Capital of the development of the drone industry over the next ten years also shows a clear picture. The global market volume will increase fivefold by 2030. One of the main drivers of these developments will be the increasing automation of data collection by drone. Here, integrated drone management, workflow solutions, and software tools for planning, aerial flight, and analysis in a central platform are the key success factors for implementation.



IN PARTICULAR, COMPANIES IN THE ENERGY, OIL, AND GAS INDUSTRIES WILL BE LOOKING TO USE DRONES FOR MAINTENANCE WORK OR INSPECTIONS IN THE FUTURE.

We are curious to see whether the first projects will be realized in these industries this year.

FLYING TAXIS OVER GERMANY?

Technology is steadily getting closer to the future. The first trial flights of air taxis have already been successful. At the end of 2021, the ITS World Congress in Hamburg will offer the public, politicians as well as investors insights into the world of urban air mobility. Everything to do with drones, transportation, and urban mobility will be on display at the exhibition in October.

Based in **Leipzig, Hamburg,** and **San Francisco**, FlyNex is the leading solution provider for commercial drone projects. With its software solution, FlyNex covers the entire commercial area of application for unmanned aerial systems.

FlyNex has extensive experience in industrial and commercial project management with drones and cooperates with the German Institute for Standardization (DIN e. V.) and the German Aerospace Center (DLR) to develop standards and guidelines for a sustainable use of drones.

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