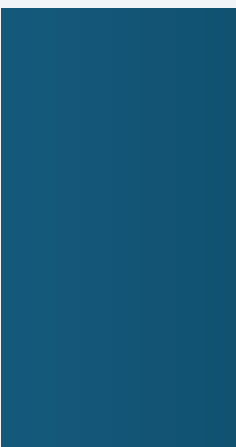
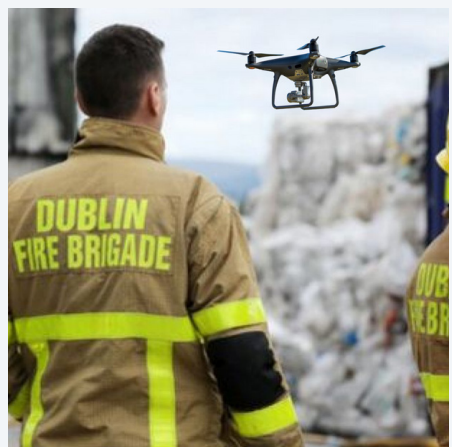


# ACCELERATING THE POTENTIAL OF DRONES FOR LOCAL GOVERNMENT

## INTERNATIONAL BEST AND EMERGING PRACTICE REPORT



### SUMMARY REPORT

# Background

This summary report is part of the “Accelerating the potential of drones for local government” project led by Dublin City Council and Smart Dublin, and co-funded by the Department of Public Expenditure and Reform (DPER) through the Public Service Innovation Fund (PSIF). The overall aim of this report is to:

- Collate research on international best practice in public sector drone usage, identifying the benefits and challenges now and in the future.
- Provide an overview of the international and Irish drones market, highlighting opportunities and to accelerate the potential and build the ecosystem to support growth.

The full version of this report with detailed appendices is available here:  
<https://bit.ly/3QbSiB5>



# Acknowledgements

The “Accelerating the potential of drones for local government” - International Best and Emerging Practice Report has been drafted by Philip Butterworth-Hayes of PMI Media Limited and Professor Tim McCarthy of Maynooth University and Principal Investigator of the U-Flyte initiative.

A contribution by U-Flyte emanates from research supported by a Strategic Partnership Programme Grant from Science Foundation Ireland, in association with Airbus and Irelandia Aviation, under Grant number 17/SPP/3460.

While every care has been taken in the compilation of this report to ensure its accuracy at the time of publication, the publisher cannot be held responsible for any error or omission or any loss arising there from May 2022.



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# 1. Executive summary and recommendations

## 1.1 Overview of report

Around the world, cities have started to deploy drones in a variety of missions – saving lives, reducing costs, delivering better services and generating efficiencies. The technology has evolved at a breath-taking pace over the past decade with a significant growth in the number of drones using our airspace. However, public sector and local government drone operations are at an early stage of their journey, with the next decade expected to bring about dramatic changes. Key benefits of drones adoption were identified across a number of public sector services, including:



**Public Safety:** fire services, such as site mapping, aerial view and support on firebreaks; rescue missions and flood risk maps.



**Health and Environment:** delivery of defibrillators, medical supplies and transplant organs, sanitation of urban areas, pollution control and monitoring critical infrastructure. Drones can make operations more efficient, save time and lives.



**Planning and Development:** site inspections at reduced cost assisting planning decisions and enforcement. In the construction and development of buildings, real time data from drones can reduce costs and gain efficiencies while reducing risks and improving data quality.



**Transport and Logistics:** road maintenance monitoring with reduced costs per inspection, traffic surveillance with more accurate data on congestion and accidents, assisting ports operations, and for postal and package deliveries.



**Energy:** monitoring energy storage and transmission systems can result in significant time savings and a safer operating environment.

## Strategic approaches to using drones

While public sector is already gaining significant benefits from deploying drones, one characteristic of the current situation is that they are using them infrequently. According to a 2020 global survey<sup>1</sup> of drone use by public safety organisations, 50% of current local government drone operators are only flying between one and five drone missions a month. Our research indicates a similar experience for the Irish context. This poses a difficult choice for local government as to which services to develop in-house and which to outsource.

***In developing a drone use strategy, local government have two clear roles: as drone operator and as drone eco system developer, in alliance with the national aviation regulator.***

Accelerating the industry from its current, exploratory state and moving it through the “crawl, walk, run” phases require a coordinated approach by all stakeholders and the development of a clear business plan with cost-benefit analysis for each drone operation sector. This should involve developing a roll-out plan based on introducing priority services first based on public need and support, but with a clear strategic “end-state” view in mind so services can be introduced in a modular fashion rather than haphazardly.

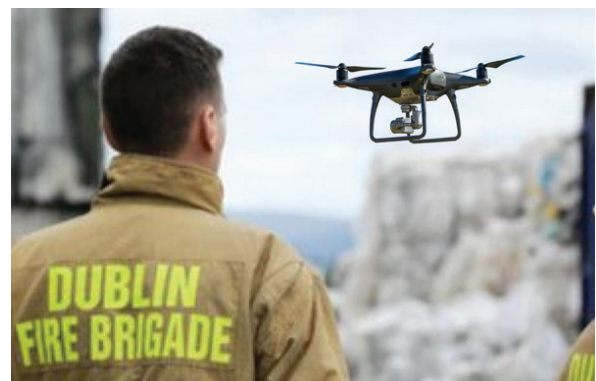
In terms of priorities and urgency, it is suggested that local government and public sector continue with a focus on developing and promoting key services such as public safety, health & environmental monitoring, infrastructure management and surveying. These are services where the benefits to citizens are most clearly visible. Other opportunity areas identified include planning and development, transport and logistics and energy management.

## Roles and responsibilities

Based on the latest research, it will be around 2024 before the most relevant regulations, standards and technology maturity levels are in place, allowing the sector to begin a major phase of industrial scale expansion. This should be facilitated by stakeholder engagement to balance restrictions while also allowing innovation and supporting services that deliver most benefits for citizens and communities. The year 2024 will also be the year, probably, when the first passenger-carrying air taxis will start commercial operations in Europe, with Paris currently scheduled to be first city for these operations.

In Ireland, there are ongoing discussions happening to establish roles and responsibilities between the different regulatory stakeholders (especially local government, national aviation regulator, national departments and the police force). The aviation regulators have developed rules for flying drones safely, but they are still relatively high level.

A national advisory group has been established by the Irish Aviation Authority (IAA) while local government is also actively collaborating to help navigate this dynamic environment, learn and share best practices. The IAA has also shown a leadership role in establishing a dedicated drones co-ordinator role to help better co-ordinate and grow the sector.



<sup>1</sup> <https://www.droneresponders.org/2020-spring-public-safety-uas-survey>

## Public engagement and trust

Flying a single drone within the pilot's visual line of sight (VLOS) is a regular occurrence in most parts of the world. Scaling up operations over cities and towns to encompass many drones flying many different autonomous missions in a shared airspace above people and beyond visual line of sight (BVLOS) will require an extraordinary acceleration of technology, research, standards development and regulatory approvals.

***It is envisaged that by 2024 a well-established commercial urban drone eco system will be in place, at least in Europe, with potential for thousands flights per hour in a city like Dublin by 2030s.***<sup>2</sup>

Public trust will be key to the acceptance of scaling drone operations. All involved stakeholders should ensure they understand the technology, develop clear and good legislation, implement means of transparency and address public concerns. Standards and best practices should be developed in relation to early engagement with communities, clear policies and enforcement in relation to privacy, safe operations and any other identified concerns that need to be assessed and updated.

While the technology evolves and expands, some operations might need to be prioritised based on those services most supported by perceived need and public opinion, for example: emergency response, medical deliveries and public services.

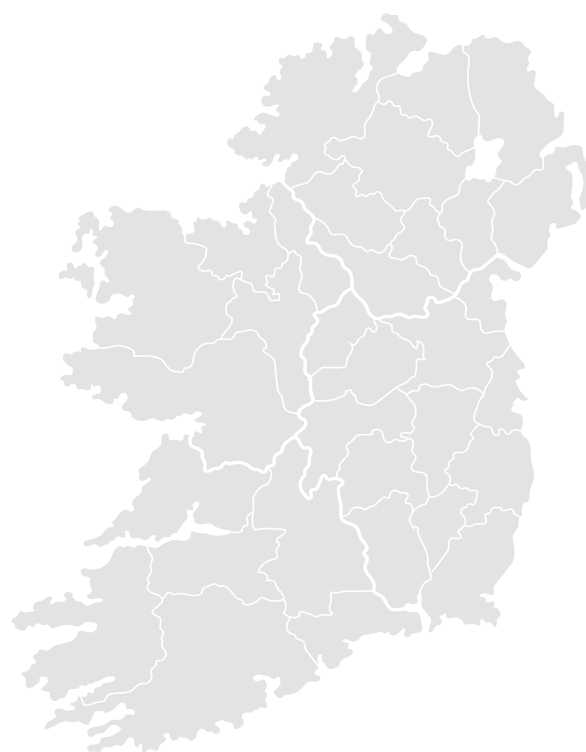
## Ireland's drone industry overview

The Small Unmanned Aircraft (Drones) and Rockets Order of December 2015 which, at the time, governed the use of drones, reported there were 5,000 drones registered for use in the country. By 2020, this had grown to over 22,000 registered drones.

Statista has posted the following high level data on the size of Ireland's drone sector:

- The market is expected to grow annually by 6.54% (CAGR 2021-2025).
- The drone segment is expected to show a volume growth of 25.8% in 2022.

In the European context, Ireland's drone sector is relatively small but dynamic. Areas of strengths and some weaknesses have been identified through a literature review and a survey with 11 of the most significant drone operators in Ireland (see Table 1).



<sup>2</sup> <https://www.easa.europa.eu/sites/default/files/dfu/Opinion%20No%2001-2020.pdf>

**Table 1 - Ireland's assessment of its strengths and weaknesses in relation to drones**

IRELAND'S STRENGTHS	IRELAND'S WEAKNESS
Advanced capabilities in financing	Commercial drone manufacturing
Drone delivery	Uncertainty over regulations coming from the EU
Regulatory / Industry cooperation	Airspace access restrictions
Urban Air mobility planning	Length of time to get permission to fly
Uncongested airspace and an Irish Aviation Authority (IAA) with a dedicated Drone Support Division and dedicated full-time drone champion	The cost of administration
Island nation with selection of drone test-site locations to support various drone services development	Poor weather
Regulatory agencies are readily accessible (IAA, ComReg, Data protection)	Problems with public perception & trust
Healthy economy e.g., one of the best performing economies in EU with supportive agencies (Enterprise Ireland) and Irish Development Authority for industries	Unauthorised drones
Strong technology/ICT investment from very large global companies	Lack of awareness
Access to Drone R&D expertise, regulatory specialists and licensed operators	
Supportive and proactive local government and public agencies	

Source: Authors - International literature review and compilation of survey of Irish drone operators (2022).



*“Ireland’s strengths - advanced capabilities in financing, drone delivery, regulatory / industry co-operation and urban air mobility planning - make it a potentially powerful future global player in this sector.”*

The identified weaknesses are by no means critical to the future prospects of the Irish drone industry. For example in commercial drone manufacturing 80% of the market is in China. However, the most important value element of the global drone industry lies not in hardware but in the software components for increased automation of flight control and airspace management operations along with data analysis, rogue drone detection and mitigation, network communications, navigation and surveillance.



Source: Manna Drones - Manna, an Irish success story has started drone deliveries in November 2021 in Balbriggan, County Dublin.

## 1.2 Next steps and key recommendations

The authors of this report believe that Ireland is well placed to become a centre of excellence for developing local authority drone services, given the industry activity already take place in the country, its aviation heritage, and the proactive nature of its aviation regulatory system. However, as with all new industries, there are a number of emerging challenges which will need to be overcome before the industry can reach a level of viable commercial maturity.

The following actions are recommended:

- To continue to monitor and evaluate **use cases** across the sector highlighting the **benefits and positive impacts**.
- To build **recognition and awareness** on the **critical role local government** will have in supporting and governing the evolution of the drone sector as we move into the next phase of **growth and development**.
- To ensure appropriate safeguards to address **privacy and safety** concerns.
- To **develop a road map of drone services** and support delivery of services that will generate higher levels of **public support and trust**.
- To consider the creation of a **dedicated drones development role for local government** to support the wider sector and liaise with IAA and other key Irish and EU drone stakeholders.
- To continue to engage with and support national initiatives that bring stakeholders together to develop a **road-map that will help grow the sector**.
- To **build trust** and bring along communities on the benefits of drones in enhancing their quality of life and supporting local services.
- To review the current status of **drones operation models** within local government and evaluate the benefits of **in-house versus outsourced** models. This may involve the consideration of **shared services** across the sector to ensure optimal use of equipment and resources.



- To commission a **strategic review of the Irish drone industry** to identify strengths and weaknesses, opportunities and threats - with a particular focus on how the sector can support services that benefit local government and its communities while also creating new **economic growth opportunities**.
- To support and **raise awareness & promotion** of drones and their benefits through the delivery of **events and showcases** which promote and highlight the industry's capabilities.
- Explore the development of further **drone testing zones** that complement other initiatives across the country and internationally. The object of these will be to test the **maturity of technologies and procedures** and to develop clear pathways for the adoption of drone services.
- To work with the sector to **create regulatory “sandbox” testbed zones**, which operators and developers of new technologies such as 5G communications and autonomous drone operations can hold trials in partnership with the Irish Aviation Authority and others to determine suitability for deployment.
- Support longer term development of **air mobility services of the future**. Start initial planning for passenger electric vertical take-off and landing aircraft (eVTOL) operations by re-visiting strategic city transport plans and consider inserting urban air mobility (UAM) infrastructure requirements in both public and private areas, so UAM concepts can be integrated into future electric vehicle strategies.
- Ireland should also **monitor progress** under way in other **European cities** such as Aeroports de Paris' Pointoise<sup>3</sup> operational concept (from November 2021) and Coventry vertiport.



Source: Urban Air-Port - Urban Air Port's Vertiport in Coventry, UK.

<sup>3</sup> <https://presse.groupeadp.fr/experimentation-volocopter-pontoise-airfield/?lang=en>



## 2. Introduction

### 2.1 Local government drone programmes

This study has divided the local government and public sector drone usage sector into five sub-markets (public safety; health and environment; planning and development; transport and logistics; energy) and examined the potential benefits and challenges for accelerating a local government drone strategy based on these five sectors.

Broadly, local government is involved in drone programmes in three ways:

Class 1	Class 2	Class 3
Strategic initiatives in which local governments are the prime movers in developing a drone/ urban air mobility (UAM) ecosystem for their communities – with fire services to the fore.	Programmes in which local government has announced partnerships with private industry to develop services, with private industry taking the lead.	Programmes in which local government is part of a wider programme of stakeholders trialling new technologies, procedures and operational concepts.

Invariably, the lines between these different types of programmes are not always clear. In developing a drone use strategy local government has two clear roles: drone operator, and drone ecosystem developer, in alliance with the national aviation

regulator. Each local government will take the lead in deciding which services it will manage in house and which will be outsourced and how best to engage drones-as-a-service partnerships. But in all these areas there are major challenges to be overcome.

## Considerations for drone programmes

**Class one** programmes will require a cohort of aviation skilled local government personnel to lead the projects, developing these skills takes time and resources.

**Class two** programmes, local governments will need to be extremely careful not to let well-funded, technically advanced drone companies impose their own solutions on a city which may not be appropriate for the community's needs.

At the heart of the global drone industry is a clash between two very different types of engineering cultures in the introduction of this new technology the slow but steady, “crawl, walk, run” approach of traditional aviation regulators and airspace users on the one hand and the Silicon Valley “Agile Engineering” approach which relies on early technology adoption supported by continual, regular software updates.

**Class three** programmes often deliver general research results which do not feed directly into the city's own prioritised, niche requirements but require local government support to test new concepts and technologies for wider operational deployment.

All types of drones programmes will need to confront a set of major hurdles such as:

- There are growing concerns among many people about the use of drones by public entities, especially in areas of privacy and civil liberties.

- The regulations on drone use are often restrictive and complex preventing operators from flying beyond visual line of sight (BVLOS) and missions over people.
- The timelines for implementing drone services tend to be much longer than their proponents wish.

### UK LocalGov Drone Survey

A January 2020 report from LocalGov<sup>4</sup>, has surveyed 350 local governments across the UK to understand the current landscape of drone technology within their sector. The findings were as follows:

- Drones can provide immediate benefits and cost savings across a wide number of services at local government.
- But only 4% of local government have a policy and/or strategy to benefit from drone based services.
- A number of local governments have used drones in a way which may break the law and a number have policies based on legislation which has been superseded and is out of date.
- 17% of local governments have a lead officer with responsibility for policy and strategy relating to the Council's use of drones.
- 36% of local government have procured external drone services.

*“Whilst the benefits are real, so are the risks of a poorly implemented strategy,” says the LocalGov report.*

<sup>4</sup> <https://www.localgov.co.uk/Making-drones-work-in-local-government/49804>

## 2.2 An industry which is evolving rapidly



*Local government drone operations are at the very start of their global journey but around the world cities have started to deploy drones in a variety of missions – saving lives, reducing costs, delivering better services and generating efficiencies.*

But the start of this journey has been the easy part. Flying a single drone over an uninhabited area within the pilot’s visual line of sight (VLOS) is a regular occurrence in most parts of the world. Scaling this up to encompass many drones flying many different autonomous missions in a shared airspace above people and beyond visual line of sight (BVLOS) will require an extraordinary acceleration of technology research, standards development and regulatory approvals.

It is envisaged that by 2024 a well-established commercial urban drone ecosystem will be in place, at least in Europe, with potential for thousands flights per hour in a city like Dublin by 2030s.<sup>5</sup>

For local government, the benefits of employing drones are becoming clear (see Figure 1). The Table 2 records in some detail some of these benefits.

### Reasons for adopting drones

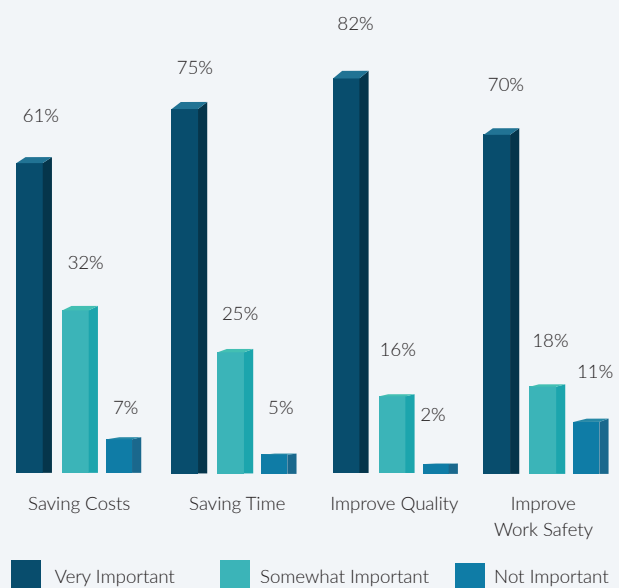
Drone Industry Insights surveyed 44 Business Internal Services (BIS) operators in 2021 to discover their main reasons for adopting drones.

The key findings were:

“ Improving result quality ranks first with 82% which speaks a lot for the work that drones carry out and their capacity to deliver better results than other alternatives.

Using drones to improve overall safety by bringing workers out of harm’s way (70%) is even more important than directly saving costs (61%).”

Figure 1 - Main reasons for adopting drones



Source: Drone Industry Insights

<sup>5</sup> <https://www.easa.europa.eu/sites/default/files/dfu/Opinion%20No%20001-2020.pdf>

## Local government drone use cases & benefits

Table 2 - Benefits to local governments (summary of international best practice review)



### 1. PUBLIC SAFETY

#### Fire Services Site Mapping

Drones can help fire teams get an early view of the fire site, identifying hazardous materials and plotting exit and entry points.

Drones can conduct volume calculations following a building collapse or provide up-to-date maps to facilitate effective HazMat response.

Drone mapping data can be quickly collected and rendered and re-edited as an incident progresses.

Drones equipped with thermal-imaging cameras can inform firefighters of pockets that are still smoldering underneath areas they had previously extinguished.

Drones can be programmed to record operations. These recordings can be used for after-action assessments, identifying future training needs, or even to provide detailed information to local media so the community has an accurate perspective of the emergency.

#### Fire Services High Rise Emergency Air Support

Drones can assist in high-rise firefighting and emergency rescues – the next generation will be equipped with smart emergency rescue and aerial firefighting technologies.

#### Fire Services Creating Firebreaks

By carrying a payload of ping-pong size chemical spheres injected with glycol, firefighters can use the drone to drop these spheres precisely where they want them to start a chemical reaction and generate flames.

#### Improving Flood Risk Maps

Drones equipped with high resolution LiDAR can enable accurate mapping of the floodplain to inform a critical update to the flood modeling undertaken in the catchment.



## 2. HEALTH AND ENVIRONMENT

### Defibrillator Delivery (AEDs)

AEDs can be carried by drones to real-life cases. Research shows a successful AED delivery rate of 92% and a potentially critical time benefit compared to traditional emergency medical services.

### Delivering Medical Supplies

Drones can help increase efficiency and decrease transportation time and reduce costs for medical supplies in the regions serving primarily the urgent needs of elderly and other vulnerable social groups with limited access to mobility services.

The ability to use a temperature monitoring device for a COVID-19 vaccine drone delivery program also opens the door to transport additional items which require maintenance of the cold chain.

### Sanitising Urban Areas

Dubai is employing drones to sanitize large areas of the metropolis. Drones designed initially for spraying pesticides in agriculture are now being re-purposed for the task. The municipality is sterilizing 129 sites across the city and 23 public areas. The operation is part of a national sterilization program aimed at curbing the spread of COVID.

### Delivering Transplant Organs

U.S tests conducted in Maryland during 2019 showed that a drone could successfully deliver a kidney that surgeons immediately transplanted to a waiting patient.

### Pollution Control

Enhanced enforcement with aerial monitoring could avoid 55 deaths due to air pollution each year in the port communities of Wilmington, Carson, West Long Beach and San Pedro. There would also be about \$600 million savings in medical costs.

### Monitoring Critical Infrastructure

Drones can provide predictive structural integrity and volume analysis. They can save lives by replacing humans in dangerous high altitude inspection roles.





### 3. PLANNING AND DEVELOPMENT

#### Site Inspection and Enforcement

A recent case study carried out with a housing association for a routine roof inspection in the UK saved £8,500 on scaffolding costs, lessened the disruption for the resident and revealed other problems that would have also cost more to fix in the medium term.

Drones are used in development management for larger-scale site inspections and to aid officers and elected members when making decisions. For enforcement purposes, drones “provide a clear record of both the operational development and use of a site.

Planning data collected by drones can offer value not just to enforcement officers but to their strategic planning colleagues and other local government departments such as conservation, education and ecology. Councils should ensure they retain ownership of any data collected.

Drones can be used for a range of enforcement activities including inspecting poor roofing work by rogue traders, flying over open land to look for livestock carcasses or inspecting sites in relation to breaches of planning controls.

Oxford Direct Services is replacing in-person roof inspections with drone surveys. This will pay for itself within a year and can become an additional revenue stream as operators offer local businesses and residents surveying, mapping, photography and filming services.

#### Construction and Development of Local Government Buildings

Cost savings: Real-time drone data yielded 75% cost savings for Chasco Constructors on a USD29 million project.

Efficiency gains: “Using drones, we can take weeks out of the schedule” – Brasfield and Gorrie,

Quality data: One survey showed 56% of people use drones in construction for improved data quality.

Reduced risk: “Drone help with safety, taking people out of dangerous situations” – Balfour Beatty.



## 4 . TRANSPORT AND LOGISTICS

### Drones Used in Road Maintenance Monitoring

An American Association of State Highway and Transportation Official survey estimated approximately USD3,400 in savings per drone inspection as compared to manual examination.

### Improving Traffic Surveillance

Drones can provide state-of-the-art intelligent traffic monitoring system by transmitting accurate information about traffic flow and road accidents to reduce traffic congestion.

The drones currently used by Spain's Guardia Civile are equipped with powerful cameras capable of viewing the number plate from a long distance away as well as easily spotting minor traffic infractions such as speeding, not wearing a seatbelt, or tailgating.

### Drones in Port

The Port of Antwerp is using drones for inspecting infrastructure, surveillance and monitoring, incident management, berth management and the detection of oil spills or floating waste.

### Drone Deliveries of Non-Medical Items and Post

Japan Post Group believes such a delivery system will be especially useful for mountainous areas and remote islands. Japan's postal service faces the challenge of an aging population which has made it difficult to hire workers. The company hopes the use of delivery drones will help alleviate this problem..



## 5. ENERGY

### Monitoring Energy Storage and Transmission Systems

Energy consultancy Halff has used drones and other data collection sources to reportedly rack up 75% time savings, shaving total costs by 30 per cent on a single job.

By using a drone instead of a person, inspectors are not placed in dangerous situations, and the flare, power line or turbine being inspected usually does not have to be shut down for human safety-meaning they can continue to operate and generate revenue.

Source: Authors - Summary of best practice drone use cases overview, 2022.

## *Collaboration is key to success*

Delivering the types of benefits promised by drones as highlighted in table 2 on a wider scale is multifaceted requiring a high degree of collaboration.

Consultation with communities to identify priority services, contracting specialist private operators of specialised drone operations to prepare traffic management services for new future operations/applications, and liaison with aviation organisations – including regulators – are just some of the tasks which will need to be undertaken as part of building an urban drone ecosystem.

It is clear from early examples of cities developing such a system that local government cannot do this on their own. They will need partnerships which will have to be scalable and dynamic, with drone operators, drone industry infrastructure providers, academic organisations and regulatory authorities.

## *Drones operational models*

Another challenge public services are facing is to identify optimal drone fleet management programmes. Around 45% of all public sector drone operations worldwide are conducted by police and security forces and managed in-house. Some questions raised for future discussion are:

***Should local government develop a combined drone fleet ownership model so fire and police services operate a single fleet and undergo common training courses? When and how should local government operations be contracted out to private operators?***

But whatever the challenges and difficulties, it is certain that drone operations are already delivering substantial benefits to local government around the world in terms of life-saving operations, reduced expenditure and more efficient management of resources. In the USA, more than 4,000 U.S. public safety agencies are fielding drone programmes<sup>6</sup> and globally, according to the 2020 Global UAS Ops survey EU-funded AW Drones project, 5.5% of all commercial drone operations were carried out on behalf of public services and safety organisations.

## *Learning from other cities*



A typical early example of how a local-government-led consortium might work is a pilot programme of extensive drone package deliveries launched in August 2021 in Tel Aviv area, Israel. The consortium comprises logistics company SkylinX, airspace management system company AirwayZ, drone operator Flytech, the Tel Aviv-Yafo municipality, Tel Aviv University and CityZone, a “living lab” established as a cooperative venture between the Tel Aviv municipality, Tel Aviv University and Park Atidim Tel Aviv.

From their experience to date, Gaby Kaminsky, CityZone’s Managing Director, has argued:

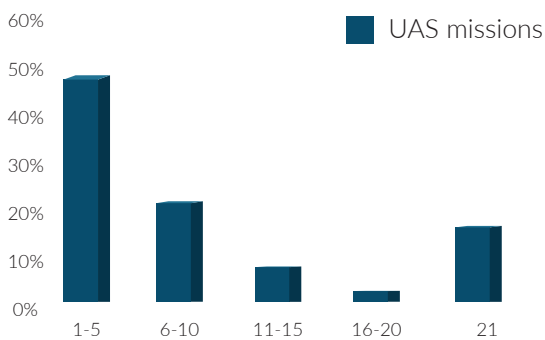
**“Local governments should be focusing on aspects related to local regulation, preferably before drones become widely used over our cities’ airspace. The rules of this new game should be defined proactively by municipalities.”**

<sup>6</sup> <https://insideunmannedsystems.com/opportunity-spotlight-drones-are-critical-to-infrastructure/>

## 2.3 Public service drones operations

Currently, local government and police agencies around the world employing drones are using them infrequently. According to a 2020 global survey<sup>7</sup> of drone use by public safety organisations, 50% of current public sector drone operators are only flying between one and five drone missions a month.

Figure 2 - Public safety related drone missions



Source: DroneResponders, 2020.

The International Emergency Drone Organisation Best Drone Practices 2020<sup>8</sup> manual says that in many ways the standard work of first responders around the world is changing fast:

**“The technology around the field of the drone is evolving at an increasing speed. Developments and revolutions are cyclical, innovations disrupt the drone market every 6 months. The technological expectations of rescue and firefighting services are both basic and sharp. The basic needs are focused on an evolution, an improvement of the systems used today. More flight autonomy, more waterproofing, more performance on optical and thermal sensors, more interconnections to share, but also an upgrade of drones on lighting and sound broadcasting capacities.”**

Frost & Sullivan market analysis from April 2020 suggests the industry is transitioning from a nascent to a growth stage:

**“Advanced technologies such as artificial intelligence (AI) for both autonomous flight and data processing, as well as platforms that have unique capabilities such as long endurance flights and conducting indoor/confined spaces inspections, are key trends inflating market growth.”**

Mapping and surveying is the most popular drone operation by public administrations, healthcare, social assistance organisations and waste management organisations, according to the recent Drone Industry Insights analysis of drone usage. Training missions account for 80% of all public safety (non police) drone missions, according to DroneResponder organisation’s 2020 survey<sup>9</sup>. A sample of other popular public sector drone use cases across the world can be seen in Table 2 which highlights local government drone services and benefits.

### *Ports are pioneering multiple drone operations in a single airspace*

Ports offer an important incubator for more advanced drone operations, with many port areas around the world now implementing varying drone operations, from environmental monitoring to perimeter security and shore-to-ship deliveries supported by complex unmanned aircraft system traffic management (UTM). In ports such as Hamburg and Antwerp these operations are being pioneered by port and local government with a view to more widespread implementation in other parts of the city when the regulations, standards and commercial use-cases allow.

<sup>7</sup> <https://www.droneresponders.org/2020-spring-public-safety-uas-surve>

<sup>8</sup> <https://www.iedo-drone.org/archives/4799>

<sup>9</sup> <https://www.droneresponders.org/2020-spring-public-safety-uas-surve>



Source: Skyports (partner of Future Mobility Campus Ireland, Irish testbed space)  
Skyports operations in Singapore Port.

## 2.4 Public acceptance of drones

Critical to the success of any large-scale drone development programme is the acceptance by the public. Many hundreds of surveys have been conducted to identify key areas of public concern and each survey produces different and contradictory results, suggesting each community has different expectations and fears.

What is clear, however, from all these surveys is that the public is more receptive to drone operations once they have had some experience of them, that transparency is vital (so they know what the drone overhead is doing and who is operating it) and that drones engaged on life saving missions are like urban helicopter operations, more welcome than drones carrying burritos or wealthy travelers.

At the moment the drone industry is in a technology-push mode (“we have developed this great new technology, now sit back and enjoy it”), rather than a community-pull mode (“we really want drone services in our city”).

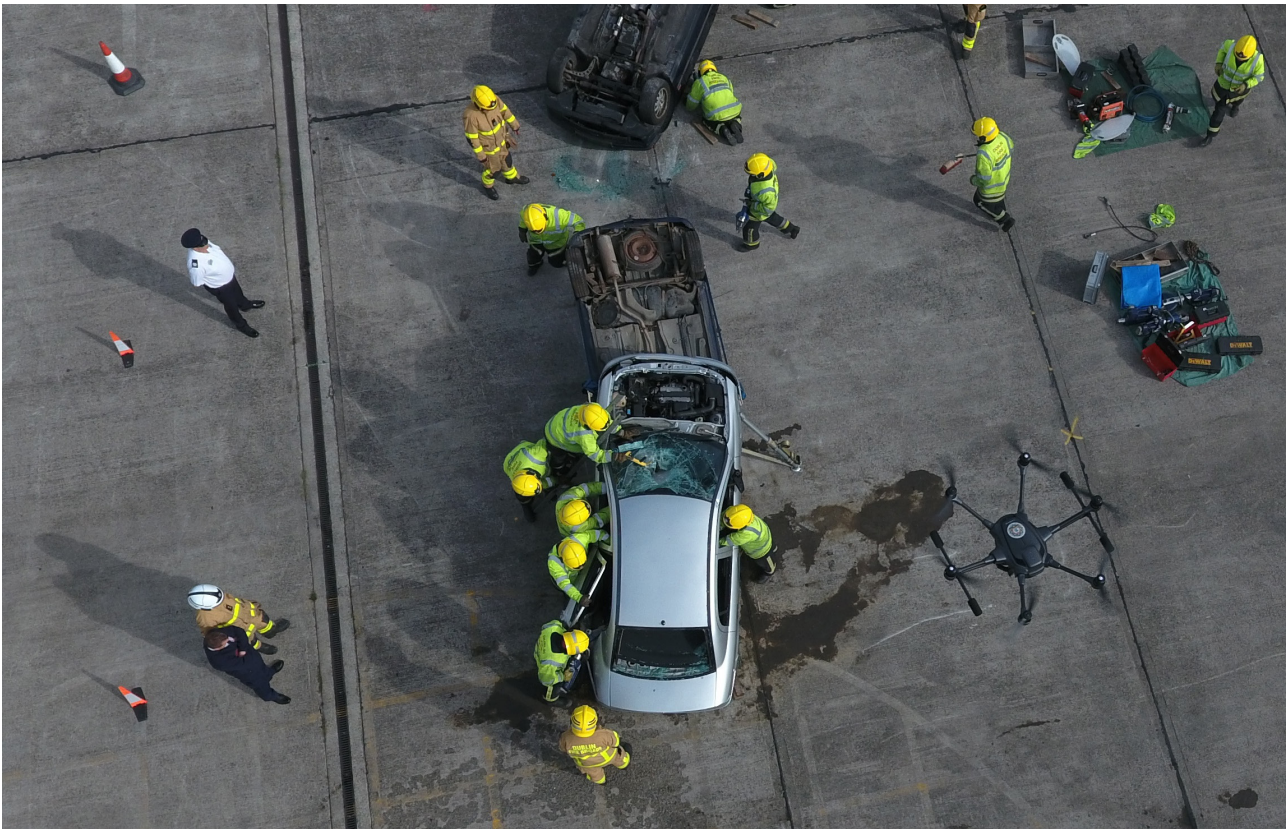
***Any long-term drone strategy must be based not just on public acceptance but public involvement, so all sectors of the community feel they have a stake in the industry, even if it is just to understand who is flying drones in their neighborhood and why.***

This will mean prioritising safety-of-life services, in the initial stages of drone ecosystem development, or launching services in industrial and port areas where there are immediate commercial benefits with few of the risks involved in flying overpopulated areas.

## National Drone Survey Results

In the Irish context, Dublin City Council has commissioned a National Public Sentiment Survey that was carried out between September and October 2021. There were 902 responses across all demographics. Some of the key findings were:

- In Ireland, 50% of respondents were aware of drone technology and all of its applications while a further 46% were aware but not fully familiar.
- 84% of respondents feel positive about the technology.
- There is an expectation of having drone delivery (mail, takeaway and online shopping) by 2025 with air taxi service expected to come on stream a few years later.
- The public is highly supportive of drones being used for public services such as: emergency service (97%), planning (96%), environmental monitoring (95%), waste management (94%), traffic management (92%) and policing (81%), showing great opportunity and support.
- However, the main general concerns around drones operations are about privacy (75%), misuse or illegal operations / data hacking (54%) and safety operations concerns (50%).
- Only 11% of respondents felt that it is easy to find out about the purpose or ownership of a drone, with 60% feeling it would be essential for any member of the public to get that information openly.
- Less than 20% of people knew who Irish drone regulator is.



Source: Dublin Fire Brigade, 2022.



### 3. Best practices and guidance material for developing a drone strategy for Local Government

A policy on rolling-out a local government integrated drone programme beyond first responders should identify “easy wins” – such as drone services which will save lives, reduce costs, increase local government operational effectiveness and which will more easily be able to gather support of the community.

From this analysis, we recommend developing a clear business plan with cost-benefit analysis for each drone operation sector. This means developing a roll-out plan based on introducing priority services first.

For a reference guide to high level principles of practice, the CORUS X-UAM<sup>10</sup> early principles guide, the Drone responder’s Five C principles<sup>11</sup> of operation, the International Transport Forum’s “Ready for Take-Off? Integrating Drones into the Transport System”<sup>12</sup> and the International Emergency Drone Organisation’s Best Drone Practices 2020<sup>13</sup> guide currently offer the most comprehensive and relevant operating principles for urban drone ecosystem developers.

#### 3.1 Policy

The regulatory environment is undergoing a lot of change, and there is much more to come as technology evolves and scales. It is essential to start building policies to provide clarity, ensure safety, build trust and address concerns, while allowing industry and use cases to be developed.

<sup>10</sup> <https://corus-xuam.eu/>

<sup>11</sup> [https://www.droneresponders.org/\\_files/ugd/e60acc\\_b8b5e91b307f42319ebb92212d051672.pdf](https://www.droneresponders.org/_files/ugd/e60acc_b8b5e91b307f42319ebb92212d051672.pdf)

<sup>12</sup> <https://www.itf-oecd.org/sites/default/files/docs/take-off-integrating-drones-transport-system.pdf>

<sup>13</sup> <https://www.iedo-drone.org/archives/4799>

Some recommendations should already be in place, while others should be discussed now in order to be implemented in the future months and years:

- All local government drone management operations should abide by the appropriate GDPR laws and the European Convention on Human Rights, with clear limits on the use of drone data collection, retention, and dissemination.
- A Data Protection Impact Assessment (DPIA) should be put in place which sets rules for how the unmanned aircraft system (UAS), remote pilot and airspace observer crew should work.
- There is a need for clear rules and insurance to cover potential damage from urban air mobility (UAM) to third parties, infrastructure and wildlife.
- Modern drones are more than simple flying machines. Drones have become network-connected devices that should be subject to cybersecurity reviews.
- Each local government should create a public website for the identification and monitoring of public concerns and public access to information in a transparent way.
- Each local government should conduct early community engagement campaigns to gain public acceptance or reduce public opposition. Services should be introduced along the prioritised list identified by the public.
- Each local government should regulate/limit the time and volume of flights to manage traffic, safety and noise challenges.
- Each local government might want to consider how drone operations can be integrated into their strategic decarbonisation plans, including the provision of proper maintenance processes and controls for batteries and ensure that the most eco friendly drones (including re-cycling of parts) are used. They may also promote the use of renewable energy sources to recharge batteries and the use of sustainable aviation fuel for hybrid drones
- In developing an eco system where different operators fly multiple drone missions in the same airspace, public sector agencies should start thinking how to provide a U-Space information service to operators and citizens.





### 3.2 Operations & Roles

The primary requirement is to understand where the roles and responsibilities for safe operations are divided between national aviation safety regulator, the local government and other relevant public sector agencies.

- The local government should identify and employ best practice principles for community engagement – based on transparency and two-way communications.
- The local government should identify appropriate levels of engagement with the private sector, including developing draft service level agreements.
- All local government drone operations must use qualified unmanned aerial systems and competent remote pilots (RP) to fly drones. Each RP will need to have passed theory and practical assessments with an approved organisation. The RP has overall responsibility for making sure every flight takes place within the law and its amendments, ensure all drone recordings are stored securely and any recording not relevant to the purpose of the flight will be securely destroyed.
- All local government drone flights must be conducted in accordance to a detailed Operations Manual, which includes strict safety procedures that are followed at all times, including: pre-flight site visits, weather checks, risk assessments and having support staff and airspace observers on the ground.
- Each local government should build a registry with all RP certificates, drones and maintenance services carried out, manual of operations and flight information and permission form requests approving flights.
- The local government should identify the key operational areas in which it has a clear competency for drone programmes beyond those operations under its direct control and management. These include, but are not limited to, deciding the location of take-off and landing areas, supporting design of airspace architecture - air corridors and aeronautical information - licensing operators, managing operations in and above local government owned land, integration within existing transport networks and smart city infrastructures, protection of wildlife and environmental sensitive areas.
- The local government should have a responsible person to manage and support the drone eco system within its organisation with appropriate skills and decision-making capabilities.
- A forum with all local government would be beneficial to share knowledge, centralise information and develop standards and policies, as well as potentially do a joint framework procurement for drone purchase, maintenance services and consultant services. There could also be the space for collaboration on projects and knowledge share.

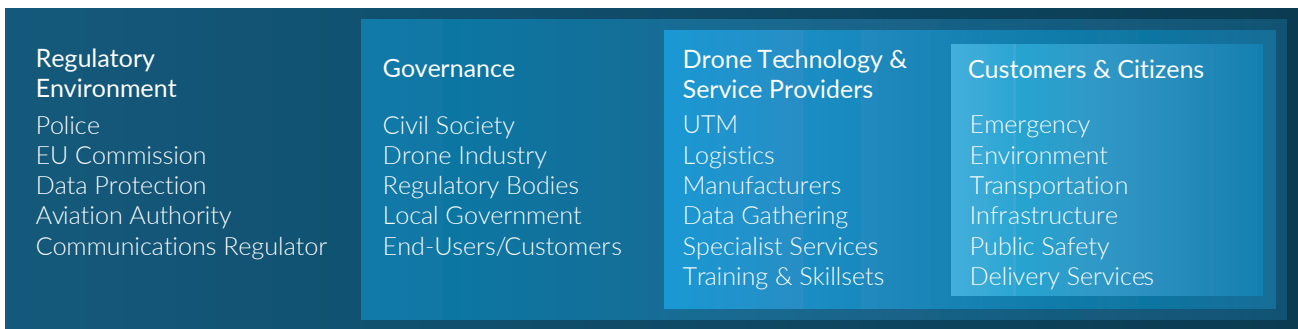
### 3.3 Governance models

The policy and regulatory landscape is struggling to keep up with the technology. In this early stage of drone applications there is still ongoing debates on the roles and responsibilities to each stakeholders, which everyone from the aviation regulator, industry, academia, government and citizens.

There is a need for a universally accepted Governance model to address this gap and provide

an over-arching blueprint, which can be adapted and scaled. This will ensure a safe, thriving, responsible yet fair commercial drone service grounded in relevant legislation. In such a set up, a vibrant, responsible, sustainable, drone service ecosystem can be facilitated across our towns, cities and communities. Due to the complexity and variety of stakeholders, a universal drone governance model could be set up, funded and operated under a public-private-partnership model displayed on Figure 3 and some roles and responsibilities on Table 3

Figure 3 - Simplified overview of drones governance model with stakeholders / activities



Source: Authors, 2022.

Table 3 - Key Stakeholders: Roles and Responsibilities

High level topics	Low level topics	Stakeholders
Policy & Strategy, Legislation & Enforcement	Safety, Certification, Licensing & Security	Irish Aviation Authority, Communications Authority, Local Government, Police
Privacy, Ethics & Trust	Transparency, GDPR, Nuisance,	Data Protection Commission, Legal Agencies, Civic Society
Drone Activities & Operations	UTM, Urban Air Mobility, Recreational	Irish Aviation Authority, ComReg, Local Government, Unmanned Aircraft System Traffic Management (UTM) Service Providers, Drone Service companies, Recreational Drone Associations
Innovation & Commercialisation	Products & Services	Commercial Companies, Drone Service Providers, Government (Central & Local), Enterprise Agencies
Public Engagement & Awareness	Discussion & Consensus	All stakeholders
Research & Education	All topics/areas	All stakeholders

Source: Authors, 2022.

## Drone acceptance

There are also other stakeholders who need to play a role in the drones ecosystem especially as we scale up operations across our cities, towns and communities. Merkert & Bushell (2020) noted in their review of emerging civilian drone issues that notwithstanding obvious safety aspects, concerns over the commercial use of drones have been, by and large, confined to security/privacy issues without any clear framework emerging to tackle uncontrolled chaos scenario that is likely to arise from increasing services such as drone deliveries in urban environments.

Their review found also that security, privacy and acceptance concerns, whilst significant and relevant, were not as dominant as they have been in the past. The issue of drone acceptance by the wider public remains an issue, although it was noted that different sectors of the community were more accepting than others. They reported on the emerging pattern of drones being developed to be accepted rather than forcing drones on communities – giving rise to the role of a ‘social license’ in this wider debate.

## 3.4 Engaging with communities

From the literature it’s clear that early, multifaceted and broad-based engagement with communities is the best approach. Each use case should be well communicated and the implementation or scalability should be prioritised based on public support. For example, in Germany, surveys suggested a low appetite for air passenger mobility services, however many of the same respondents would like to see drones being used for medical related deliveries. So they decided to prioritise these popular services while at the same time starting conversations on passenger transportation to start preparing the city and its citizens for future potential roll-out.

In Ireland there is strong support for drones being used by public services, but to keep that level of support, the public concerns in relation to data privacy, security and safety should be addressed and well communicated. People are enthusiastic about the technology and see it as something that can help improve quality of life, yet technology evolves at a rapid pace, making it difficult to keep up with or grasp everything that is going on.





## 4. The Future

### 4.1 Evolution of the drone and urban air mobility

The era of urban air mobility is just around the corner, transforming our cities and the lives of our communities. In Berlin, the usable air space could accommodate 1,200 cargo drones at any one time, enabling the possible delivery of up to 4 million parcels every year<sup>14</sup>. Small, electric vertical take-off and landing aircraft (eVTOLs) will allow for the rapid connectivity of passengers between places with fewer delays compared to ground-based transport networks.

By 2050, it is envisaged that over 100 cities worldwide will have implemented autonomous air vehicle passenger transport services, with on average 1,000 passenger drones in operation in each city<sup>15</sup>.

The European Union Aviation Safety Agency (EASA) plans to certify the first passenger carrying eVTOLs for commercial operations in 2024, by which time several major cities – among them Dubai and Singapore – will have eVTOLs flying.

But for the urban air mobility (UAM) market to reach its full potential it will need to be integrated within future ground transport systems and as part of wider Smart City development strategies. These will rely on a new generation of connectivity services which are being implemented today.



<sup>14</sup> <https://www.rolandberger.com/en/Insights/Publications/Cargo-drones-The-urban-parcel-delivery-network-of-tomorrow.htm>

<sup>15</sup> <https://www.rolandberger.com/en/Insights/Publications/Passenger-drones-ready-for-take-off.html>

There are three predicted evolutionary ages of urban air mobility services.

- **The current, first age, 2021-2024** - sees the development of regulations and standards for passenger-based urban air mobility (UAM) services while the first cargo small unmanned air service (UAS) operations – including medical, fast-food and package deliveries – are trialled and commercially tested. This stage will also see the formation of links between local government, regulators and UAS service operators which will provide the framework for future passenger operations.
- **The second age of UAM, 2025-2035** - will see the introduction of piloted electrical eVTOL services, charging premium prices to individual passengers for city-centre to airport landing site routes, inter-city services and airport-to-airport transfers.
- **The third age of UAM, 2035 and beyond** - will be the age of autonomy, quiet flight and mass transport. The route network will have expanded to city-centre to city-centre flights, connecting regions with metropolitan centres. Electrically powered regional aircraft will connect cities via existing suburban airports.

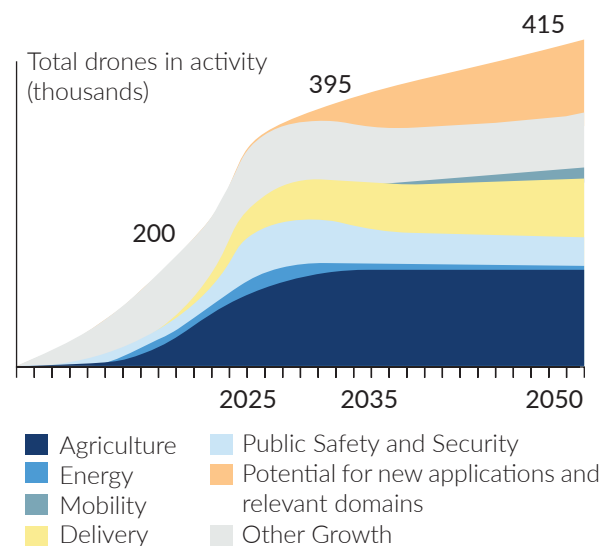
According to the seminal 2016 “European Drones Outlook Study” published by the European Union’s Single European Sky ATM Research programme<sup>16</sup>:

“The growing drone marketplace shows significant potential, with European demand suggestive of a valuation in excess of €10 billion annually, in nominal terms, by 2035 and over €15 billion annually by 2050.

The impact of civil missions (either for governments or for commercial businesses) is expected to generate the majority of this value as related services are anticipated to represent more than EUR 5 billion of annual value by 2035, highlighting their importance within the marketplace.”

“The development of the civil drone industry is dependent on the ability of drones to operate in various areas of the airspace, especially at very low levels that today are generally defined as being below 150 metres.”

**Figure 4: Drone Market Demand Growth in Europe**



Source: Modified from European drone outlook study, 2016.<sup>16</sup>

Figure 4 shows predictions for the European drones sector up to 2050. However, there are considerable obstacles to meeting this timeline. Most experts agree that it will be 2024, at the earliest, before sufficient regulations, standards and completed technology maturity proofing trials will be in place to allow several drones flying beyond visual line of sight (BVLOS) missions from different operators to share an urban airspace. There will be two key technology challenges to overcome: ensuring automatic deconfliction of drones and the development of a robust communications system.

<sup>16</sup> [https://www.sesarju.eu/sites/default/files/documents/reports/European\\_Drones\\_Outlook\\_Study\\_2016.pdf](https://www.sesarju.eu/sites/default/files/documents/reports/European_Drones_Outlook_Study_2016.pdf)

## 4.2 U-Space roadmap development in Europe

SESAR Joint Undertaking is the technological pillar of the EU’s Single European Sky policy and a key enabler of the European Commission’s Sustainable and Smart Mobility Strategy. They have developed a blueprint and road map alongside a definition of U-space.

This blueprint proposes the implementation of 4 sets of services to support the EU aviation strategy and regulatory framework on drones (See Figure 5).<sup>17</sup>

*U-space is a set of new services relying on a high level of digitalisation and automation of functions and specific procedures designed to support safe, efficient and secure access to airspace for large numbers of drones. The four main building blocks of U-space are: network identification, geo-awareness, air traffic information and flight authorization for drones.*

2019	2021	2025	2030+
<b>U1</b>	<b>U2</b>	<b>U3</b>	<b>U4</b>
<b>U-space Foundation Services</b>  U-space foundation services: <ul style="list-style-type: none"> <li>• e-registration</li> <li>• e-identification</li> <li>• geofencing</li> </ul>	<b>U-space Initial Services</b>  U-space initial services for drone operations management <ul style="list-style-type: none"> <li>• flight planning</li> <li>• flight approval</li> <li>• Tracking</li> <li>• Interacting with conventional air traffic control</li> </ul>	<b>U-space Advances Services</b>  U-space advance services supporting more complex operations in dense areas <ul style="list-style-type: none"> <li>• assistance for conflict detection</li> <li>• automated detect and avoid functionalities</li> </ul>	<b>U-space Full Services</b>  U-space full services - high levels of: <ul style="list-style-type: none"> <li>• automation</li> <li>• connectivity</li> <li>• digitalisation for both the drone and the U-space system</li> </ul>

Source: Figure modified from León, Capitán, Capitán, Rodríguez Castaño, & Ollero, 2021. <sup>18</sup>



<sup>17</sup> <https://www.sesarju.eu/U-space#:~:text=U%2Dspace%20is%20a%20set,for%20large%20numbers%20of%20drones>

<sup>18</sup> [https://www.researchgate.net/figure/The-implementation-roadmap-for-the-U-space-initiative-13-consisting-of-4-deployment\\_fig1\\_351174535](https://www.researchgate.net/figure/The-implementation-roadmap-for-the-U-space-initiative-13-consisting-of-4-deployment_fig1_351174535)



## 5. Ireland's Drone Industry

### 5.1 Introduction

In the European context, Ireland's drone sector is relatively small but dynamic, with clear areas of strengths and advanced capabilities in financing, research drone delivery, regulatory/industry cooperation and urban air mobility planning. However, it also has weaknesses, most notably in the drone platform and infrastructure manufacturing. Thanks to the close working relationship between the Irish Aviation Authority (IAA), central government, the financial community and drone operators, the Irish drone industry is at the start of a transformative era.

The European Union Aviation Safety Agency (EASA) regulations adopted in January 2021 put the emphasis on the need for the operator or pilot to be registered and not individual drones. Therefore identifying the split between numbers of commercially operated and privately owned drones at the bottom end of the market is somewhat complicated.

Statista has posted the following high-level data on the size of Ireland's drone sector:

- The market is expected to grow annually by 6.54% (CAGR 2021-2025).
- The drone segment is expected to show a volume growth of 25.8% in 2022.

Ireland's drone sector has a broad base encompassing software development, production, reselling, training, leasing etc. Although the size of the Irish drone market is comparatively small compared to European leaders Switzerland and Germany, a per capita comparison suggests it is one of the continent's most prolific. From Drone Industry Insights (see Figure 5), Ireland is 4th and 7th, respectively in the European and Global commercial market per capita.

Figure 5 - Ireland Position on the Drone Commercial Market Per Capita

Commercial Market Europe per Capita

Position	Country	Flag
1.	Switzerland	
2.	Norway	
3.	Denmark	
4.	Ireland	
5.	Finland	
6.	Belgium	
7.	Netherlands	
8.	United Kingdom	
9.	Germany	
10.	France	

Global Commercial Market per Capita

Position	Country	Flag
1.	Switzerland	
2.	Norway	
3.	Denmark	
4.	Australia	
5.	New Zealand	
6.	Singapore	
7.	Ireland	
8.	USA	
9.	Israel	
10.	Finland	

Source: Drone Industry Insights, 2021.

Commercial drones are used in many sectors of the Irish economy - industry, agriculture, infrastructure, insurance, transport, utilities, film and TV, sports events etc.

Other fields like public safety, traffic-monitoring, archaeology and history, the environment, marine mapping, etc, have all embraced the advantages that unmanned aircraft system (UAS) can provide.

One of the principal drivers of the drone operating sector globally and nationally is constant advances in technology. Drones with improved stability, speed, flight-time, weather and environment protection are entering the market constantly. Sensors are improving all the time to give increased and higher quality data. These sensors range from visual, thermal and LiDAR to multispectral and hyperspectral. In addition, operators have an increasing choice of constantly-evolving software options available for mapping, image processing, photogrammetry, geospatial analysis.

Artificial intelligence and machine learning now play a significant role in object checking, counting and segmentation, infrastructure damage reporting in real-time and public safety. In Ireland, as in all developed countries, this has led to more drone operations replacing traditional methods of inspection, surveying and film-work. Also, due to the size of the Irish coastline, more operators are taking on projects involving inspection of off-shore wind farms, assessing fish stocks, hard-to-reach geological areas and undersea mapping.





Table 4 - Irish Main Obstacle and Benefits Identified

Main Obstacles	Main Benefits / Rewards
Uncertainty over regulations coming from the EU Airspace access restrictions Length of time to get permission to fly The costs of administration Poor weather Problems with public perception Unauthorised drones	Time saving Cost saving Better quality of data Human safety Automation of processes / reducing human input

Source: Results from 11 polled drone operators in Ireland to ascertain their views on current and future use of drones. Authors, 2021.

As part of the research for this report Dublin Fire Brigade and An Garda Síochána were surveyed to better understand how Dublin based local government and public sector organisations are using drones and planning for the future. Their responses were very much in line with global public authority drone responder organisations and the wider drone operator community in Ireland where operators see themselves very much at an initial stage in the industry development and there are some fundamental uncertainties around the speed and direction of future evolution.

The survey found that Dublin Fire Brigade has less than 10 people professionally prepared to operate a drone while An Garda Síochána has around 20. The operations are ad-hoc as required with most being related to training and exploration. Both public organisations are clear in their preference for developing in-house capabilities rather than outsourcing. It was highlighted the need for greater stakeholder engagement and buy-in, addressing concerns on safety and privacy while also working alongside the wider stakeholder ecosystem to better understand sustainable business models to support scale up of services.

## 5.2 Irish examples: innovation into the next generation

New solutions in drone operations and drone delivery services have been pioneered in Ireland. There is a collaborative ecosystem of research institutions, private companies, public funding institutions, regulating bodies (IAA) and other stakeholders which support and drive development of drone technology through test beds and dedicated spaces to accelerate innovation.

A few examples of drone technology innovative projects and collaborations are briefly described below.

- a) The world's first beyond visual line of sight (BVLOS) drone delivery of medical supplies took place in 2019 in Ireland. A successful operation from land to an island carried insulin and glucagon and returned with a patient's blood sample. The National University of Ireland in Galway led the project and other partners included Vodafone Ireland, which used its internet of things (IOT) network to support the drone's communications, Skytango, Survey Drones Ireland and Novo Nordisk, which supplied the medication.



Source: Advanced Aerial Mobility Hub, Future Mobility Campus Ireland (FMCI).

This operation is just one of a number of pioneering operational programmes in which Irish drone operators are providing early-adopter lessons for the rest of the continent.

The last few months have also seen an acceleration of planning for passenger electric vertical take-off and landing aircraft (eVTOL) services.

b) Future Mobility Campus Ireland (FMCI) is Ireland's first testbed for future mobility located next to Shannon Airport. The space allows technology companies, software developers and researchers the opportunity to test their innovations. For example, in May 2021, FMCI, Skyports, Avtrain and Shannon Group announced a collaboration to establish Ireland's first passenger and cargo vertiport to be constructed by 2022. According to a consortium statement:

***“The partnership will work towards launching an operational vertiport at Shannon’s FMCI campus in 2022, thereby encouraging participation and investment in Ireland’s Advanced Aerial Mobility (AAM) industry.*”**

***The long-term goal is the establishment of Ireland’s first air taxi service and routine beyond visual line of sight (BVLOS) drone operations.”***

c) Manna is an Irish company pioneering last-mile drone delivery. In 2021, Manna Drone started trialling its drone delivery service in Oranmore town, and in November 2021 it has expanded their operations to Balbriggan, a suburban area in North County Dublin. Manna's next goals are to test its service in the US, and expand to other localities across Ireland and other European countries.

As part of its development of the technology for safe drone delivery, Manna collaborated with the Irish research organisation U-Flyte . They have released a fully functional pop-up unmanned aircraft system traffic management (UTM) system comprising airspace architecture and automated drone traffic management for Manna's drone delivery test-site. The pop-up UTM enables safe and responsible drone path finding to be computed in milliseconds and provides both strategic and tactical deconfliction as well as emergency event handling capabilities. This UTM sandbox allows key safety metrics including capacity and conflict rates to be computed as well as engaging with all stakeholders to ensure that any concerns regarding privacy and nuisance can be addressed.

### 5.3 Commercial Irish Drone Sector

The commercial drone sector in Ireland is currently growing and transformative in all sectors, aside from delivery and eVTOL. These areas range from software and app development to specialist operators using the latest developments in mapping, 3D modelling and topology, LiDAR, thermal imaging sensors and more.

Other economic sectors growing their drone usage over the last 10 years to now become commonplace are: infrastructure and building surveying, environment and agriculture mapping, transport monitoring and utility inspection. Traditional usage for video and photography still shows signs of growth for corporate, sport and entertainment needs. Niche sectors, such as archaeological and historic surveys and offshore wind farm inspections have also embraced unmanned aircraft system (UAS) technology.

#### Drone and component manufacturing

One of the risks for the drones sector is the nature of the market and the dominance of commercial drone sales by certain Chinese producers, for example DJI. Other players include French corporate Parrot and its subsidiary SenseFly, US company Freefly and Swiss-based Flyability. There is, however, a design and manufacturing base in Ireland, although - as expected - to be successful in this low volume market it is essentially niche and specialised.

There follow a few Irish companies involved in the manufacturing, specialised and customised drones, systems and payloads:

- **A-techSYN** produces two specialised wing drones and also a flight controller.
- **Versadrones** designs and manufactures quadcopter, hexacopter and octacopter drones.
- **EireComposites** alongside NUI Galway (NUIG) were contracted to design and develop an aerospace - grade carbon fibre airframe for Manna's drones. In July 2021, Manna announced. The partnership with EireComposites after receiving EUR2.44 million as part of the MI-DRONE project from the Department of Enterprise, Trade and Employment under the Disruptive Technologies Innovation Fund (DTIF).
- **WAZP** has expertise in 3D printing capabilities and is based in Tralee. In 2019 it raised €2 million in private funding to help grow the business and in 2021 were part of the consortium sharing €5.1 million funding from the DTIF to help develop the Project GUARD.
- **Drone Consultants Ireland** won the 2018 European Satellite Navigation Competition with their 'Jack in the Box' concept - a self-sustaining, aircraft deployable drone system that can be parachuted to remote and inaccessible locations, supplying flight bursts of 10 continuous hours for up to 500 expedition hours.

## Pilot and operator training

One of the requirements to support the wider growth of drones across public services is the availability of skills and training to support the sector. Ireland has a well served pilot and operator training school community with five companies registered on the Irish Aviation Authority (IAA) website.

Dublin City Council as part of the “Accelerating the Potential of Drones for Local Government” project, has published a Drones User Handbook<sup>19</sup> along with a tutorial video giving an overview of drone Regulations and how they have and are impacting Ireland. A particular focus is on the new European legislation implemented in January 2022.



## 5.4 Irish funding and research

In order to grow the sector across Ireland there is a requirement to support R&D opportunities. The principal government backed public funding bodies are:

- **Science Foundation Ireland (SFI)** is an agency of the Department of Further and Higher Education, Research, Innovation and Science which acts as the national foundation for investment in scientific and engineering research. U-Flyte, launched in 2018, is the example of strategic research partnership in the development and deployment of drone technology funded by SFI and industry (€6.3 million).
- **Enterprise Ireland (EI)** responsible for the Disruptive Technologies Innovation Programme, a €500m Fund that is part of the Government’s National Development Plan. Examples of funding awarded by the programme includes the projects [GUARD](#) (€5.1 million) and [MI-DRONE](#) (€2.44 million).
- **Industrial Development Agency (IDA)** is an agency with the main objective of encouraging investment into Ireland by foreign-owned companies. The agency operates under the Minister for Business, Enterprise and Innovation. They are also keeping an eye on opportunities for Ireland to attract companies and investments in the drone sector.

Additionally, Irish companies have benefited from other European funds coming from the European Space Agency (ESA), for example funding the ProvEve and CeADAR with a total of €250,000 and in 2017 DroneSAR with €50,000.

<sup>19</sup> <https://smartdublin.ie/regulations-drones-user-handbook-and-tutorial-video/>

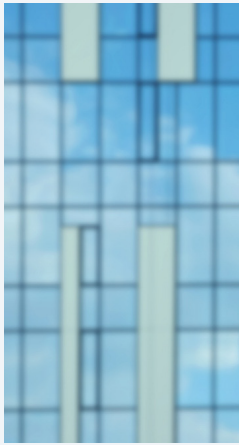
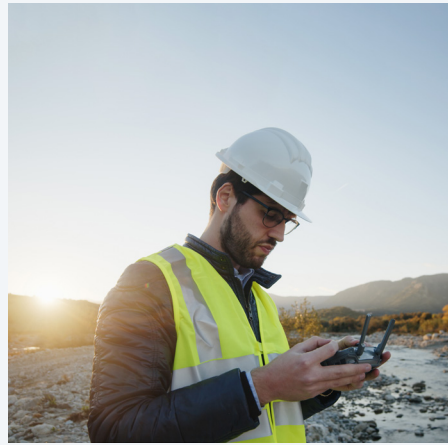


## 6. Final Considerations

It is clear that the potential of drones for local government is significant and that the market will continue to grow in the coming years, while the technology and software will keep evolving to unlock its full potential. There are opportunities for public sector services to be enhanced, as well as supporting private sector growth and the creation of new services and job opportunities.

The Irish environment presents itself with great potential if the government and regulatory bodies keep developing the right supports to ensure the benefit of drones (UAVs) operations. However, to ensure opportunities will be met, the development of a governance aligned with stakeholder and ecosystem building will be essential, alongside with policies and activities to address concerns, ensure safety and trust.

It will be important to create an environment that is supportive of being able to test and operate drones. Proactive talks with stakeholders is the way to go, and should include policy makers and regulators, citizens, industry and academia to help shape the future in a way that can benefit everyone.



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