

Daniela Paddeu

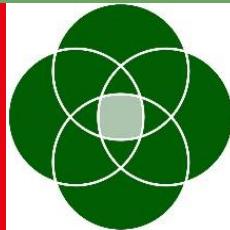
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# Understanding uncertainties for the future of drone deliveries through stakeholder engagement and co-design

**UWE  
Bristol**

University  
of the  
West of  
England



Centre for  
Transport &  
Society

# Background

Why an appropriate governance for drone last mile deliveries is needed

# 70%

carbon emissions comes from urban areas (Ribeiro et al., 2019).

UK 3<sup>rd</sup> in the global online retail market, just behind China and the US (Statista, 2021).

# 14%

of urban transport emissions (globally) are from freight (ITF, 2019).

with quantities expected to significantly increase due to increasing demand for goods and freight transport's reliance on fossil fuels.

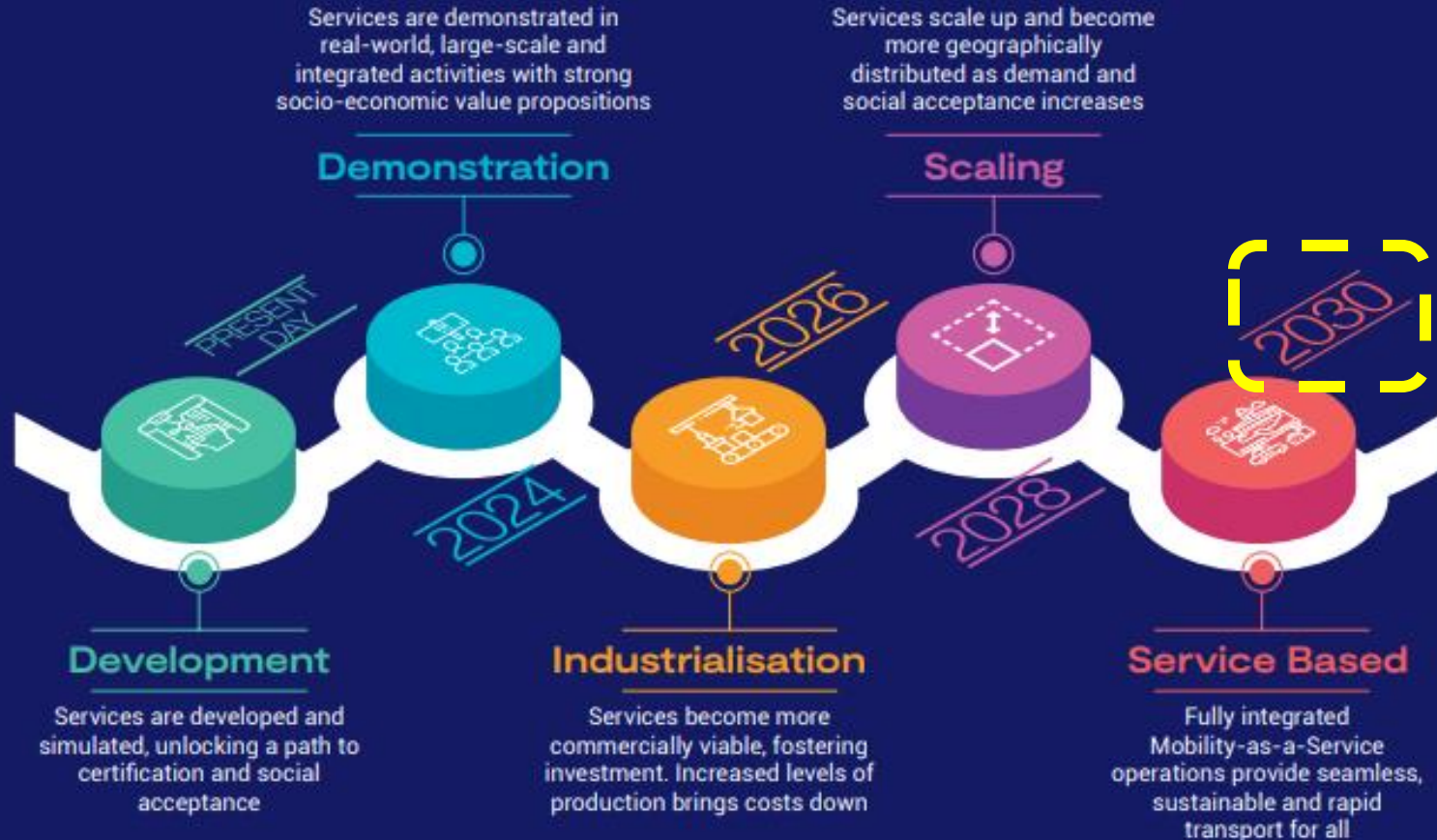
Playing such a key role in society, freight transport is one of the hardest sectors to decarbonise (McKinnon, 2018).

# The vision

in the UK

# Future Flight timeline

*Future flight roadmap and vision to position the UK as a global leader in advanced aviation solutions.*



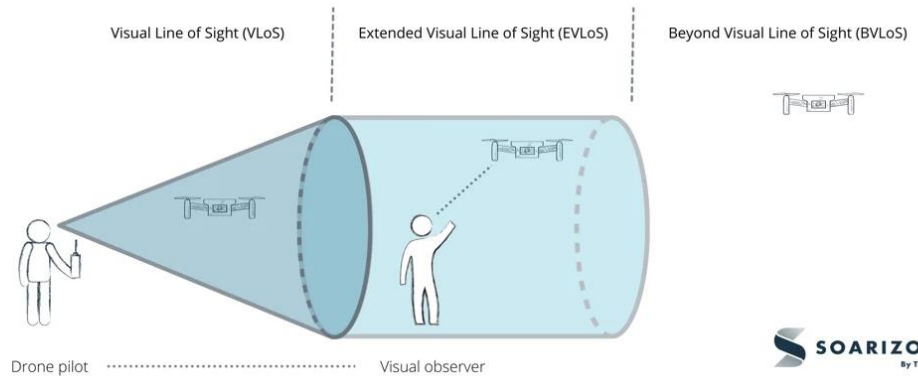
# UK Future of Flight Action Plan

UK Future of Flight Action Plan

## 5 Delivering the Vision

### Strategic Outcomes

Achieving our vision of unlocking and benefits offered by Future of collaborating to deliver key Strategic Outcomes (SO).



*\*BVLOS = Beyond Visual Line of Sight*

### Airspace

At the core of the Airspace Modernisation Strategy (AMS) is the safe integration of all future airspace users alongside existing users. We will continue to work closely with the delivery of the AMS to ensure the requirements of new owners and operators are fairly considered and supported to meet the timescales sought by industry



### UAS

For UAS, our SOs relate to achieving routine operations beyond the pilot's visual line of sight (BVLOS). These operations are currently only carried out in segregated airspace, due to unmitigated risk of mid-air collision resulting from the lack of approved solutions for UAS to see, be seen by and avoid other aircraft in the absence of an onboard pilot. Enabling BVLOS operations at scale by mitigating this risk will broaden the range of potential uses and deliver the significant benefits of UAS.

**SO 1 Demonstration**

**BVLOS UAS operations in non-segregated airspace**

UAS operating BVLOS will move away from segregation from other airspace users to accommodation alongside them in new airspace structure and existing ones supported by new services, expanding UAS potential applications and uses.

**SO 3 Routine**

**BVLOS UAS operations in integrated airspace at scale**

BVLOS operations will be routine across the country, using significant blocks of controlled, uncontrolled and service supported airspace, providing UAS' full potential range of applications including inspections, surveillance, critical health care and emergency response.

2024

2025

2026

2027

2028

2030



### eVTOL

For eVTOL, our SOs are focused on delivering initial, and then routine operations carrying passengers or cargo and achieving demonstrations of autonomous operations – during which the aircraft is operating without pilot intervention in the management of the flight. These SOs set out a clear pathway from the current innovation phase to an industry delivering services at scale.

**SO 2 In Operation**

**Piloted eVTOL flight**

The UK will see cargo and passenger operations by eVTOL aircraft for the first time, capitalising on new infrastructure, regulation and technology supported by existing airspace operating and aerodrome rules.

**SO 4 Routine**

**Piloted eVTOL flight operations**

Commercial cargo and passenger operations by eVTOL aircraft will occur at scale from nationwide networks comprising adapted existing aerodromes and new vertiports.

**SO 5 Demonstration**

**Autonomous eVTOL flight**

These operations will offer a path to scaled commercial activity and longer-term sustainable operations.

**Routine** - \*BVLOS operations will be **routine across the country**, using significant blocks of controlled, uncontrolled and service supported airspace, providing UAS' **full potential range of applications** including inspections, surveillance, critical health care and emergency response.

# This all sounds great, but...

1. Thinking of **large-scale applications**, how will these drone movements **be regulated**? New standards and regulations?
2. **Who** is going to use them? To deliver **what? When? How?**
3. How are these going to be **integrated within the transport system**?
4. What **policies** need to be in place to enable drones to be used **safely** and **efficiently** (and **sustainably**)?
5. Who holds the **power** to enable the uptake?

# The GATES project

How can we design an *appropriate governance* to make drones a viable (e.g., operations, policy, planning, regulation) option for last-mile deliveries?

# Governance And Trust in Emerging Systems (GATES)

## Research Team



PI: Prof. **Michael Lewis** (Bath, Management) – operations, logistics and applied technology research, public and private sector, case study research

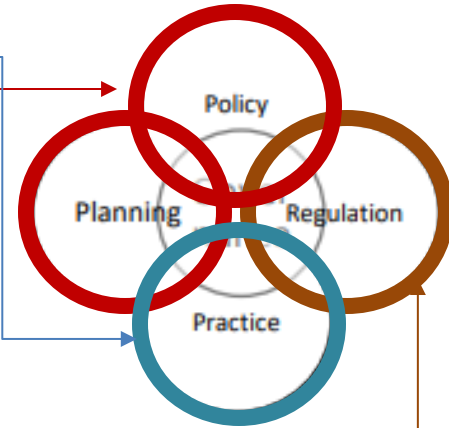


Co-I: Dr. **Daniela Paddeu** (UWE, Transport) - sustainable freight and stakeholder engagement, policy

RF: Dr. **Eda Beyazit** (UWE, Transport) - sustainable urban mobility planning, stakeholder engagement.



Co-I: Dr. **Mariela de Amstalden** (Exeter, Law) - innovation law and legal theoretical analysis



# Research questions

1. What are the **critical uncertainties** towards the future of drone deliveries?
2. Who has the **interest/power** in shaping an appropriate governance?
3. How does a **vision** for drone deliveries **respond and adapt** to future uncertainty?

# Methodology: our approach

- **Structured workshops** using participatory research methods, including Foresight methods.
- Engaging with **representatives** from the four domains of governance.

- **Methodological approach:**

- (i) identification of **critical uncertainties** for the future of drone governance with stakeholders from public and private organisations;
- (ii) design of a set of **plausible scenarios** to explore what the future might look like;
- (iii) Identification of **key stakeholders** with influence and interest in drone governance;
- (iv) **stress-test** of results **with stakeholders** from 2 case studies;

**Next:**

- (v) **stress-test** results **with key academics** to understand potential gaps between research and practice.

# Methodology: who have we engaged?

- **Significant difficulties with recruitment** – not interested, feeling “*I don’t know anything about drones*” so they couldn’t contribute to discussion.



## **Workshop participant’s profiles (6 workshops):**

### **Public sector**

Communication & Health & Research and Development

### **Private companies**

Communication/Navigation, Infrastructure & Drone services

### **Local governments**

Local authorities, Sub-national transport bodies & Pan-regional partnerships

### **Aerospace clusters**

### **Academics**

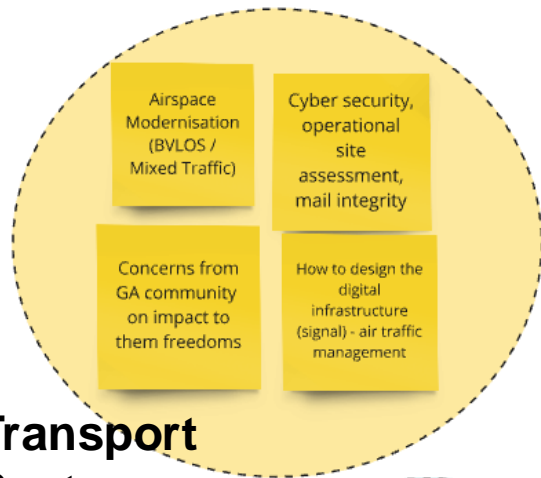
# Results from the workshops

What have we learned so far from stakeholders?

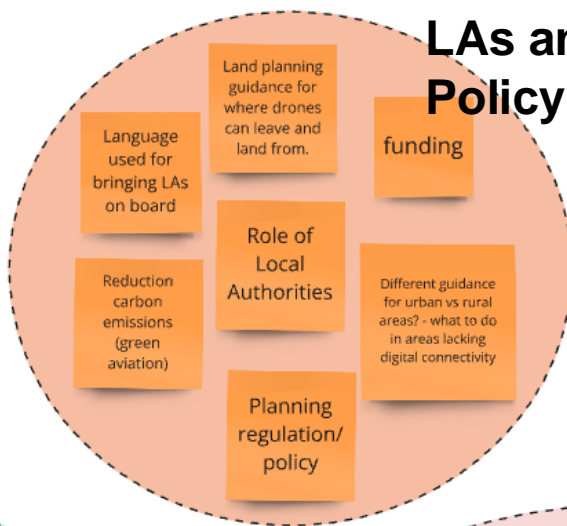


# Key uncertainties

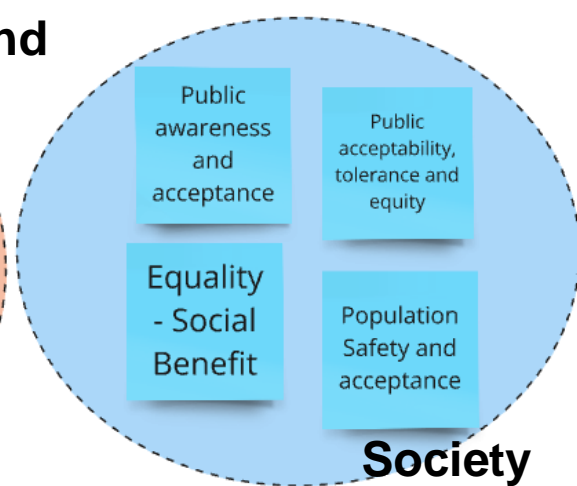
## Transport System



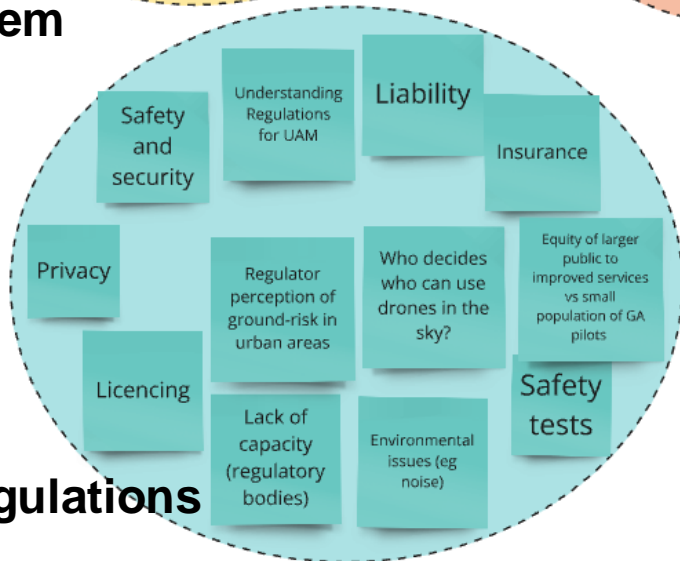
## LAs and Policy



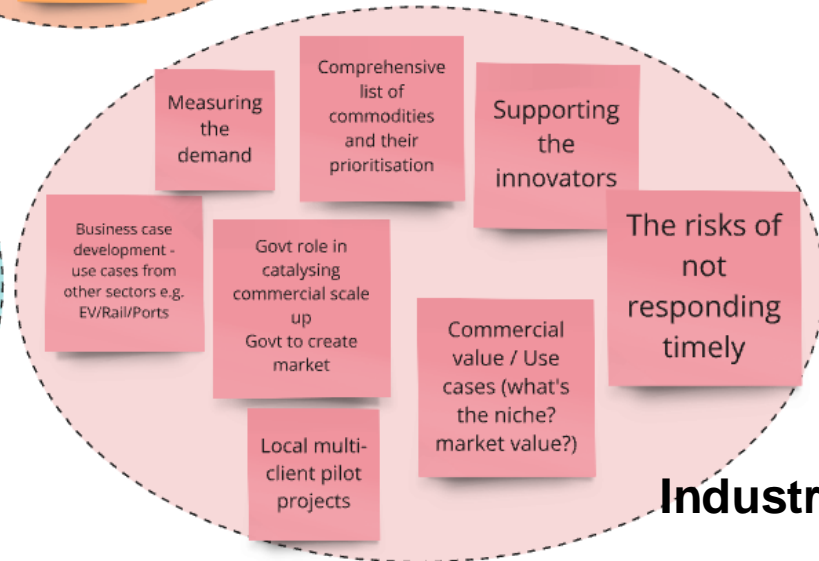
## Society



## Regulations



## Industry





# Integration of FF into local planning

## What do LAs need?

### Enablers

- **Business models**
- Believers in positions of power
- **Political** leadership/buy-in to the concept and opportunity
- Public/business **demand** for the service
- Updating **national planning framework** to inform local planning
- Regulation through DfT
- More evidence to support regulation/ planning

### Barriers

- Lack of **knowledge/ skills**
- Lack of **capacity, resources** and clarity on **responsibilities** at local level
- **Lack of revenue** and capital funding
- Lack of evidence
- **Speaking NOT to the right people**
- **Myths** about drone safety, use cases, security, privacy (disinformation)
- Public concern
- **Lack of clarity** on the ownership of the airspace
- **Environmental bureaucracy**
- **Habitat regulation** assessment (protected areas)

# Thank you!

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