

Legal and Regulatory Framework for Operation of UAS

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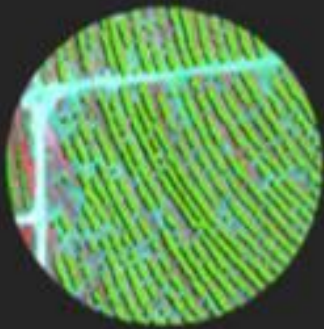
PrecisionHawk

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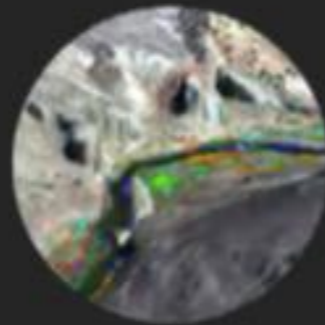


The promises of commercial UAS across industries



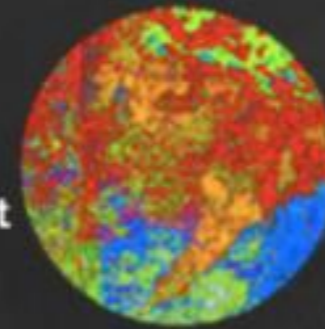
AGRICULTURE

- + Crop health indices
- + Plant height
- + Canopy cover
- + Weed detection
- + Season monitoring



OIL & GAS

- + Oil spill tracking
- + Pipeline monitoring
- + Environmental assessment



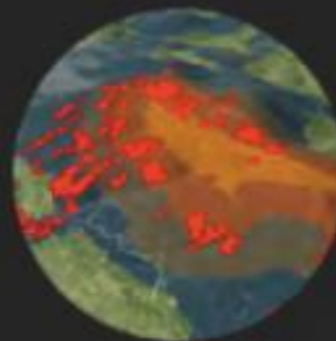
ENVIRONMENT & CLIMATE

- + Land cover mapping
- + Carbon capping
- + Renewable energy



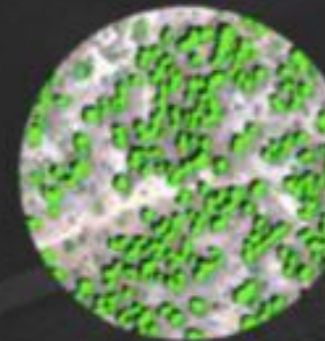
WATER

- + Irrigated land mapping
- + Impervious surface mapping
- + Watershed planning



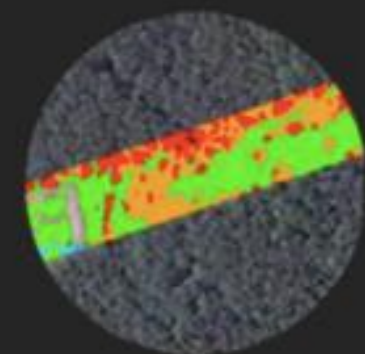
DISASTER RESPONSE

- + Wildfire
- + Flooding
- + Damage assessment
- + Rapid response



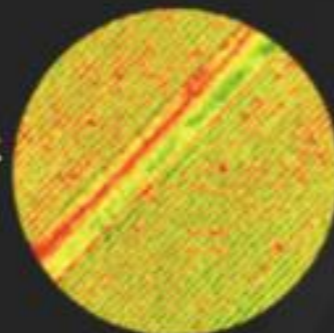
FORESTRY

- + Biomass
- + Forest health
- + Disease detection



UTILITIES

- + Vegetation management
- + NERC ROW monitoring
- + Asset verification

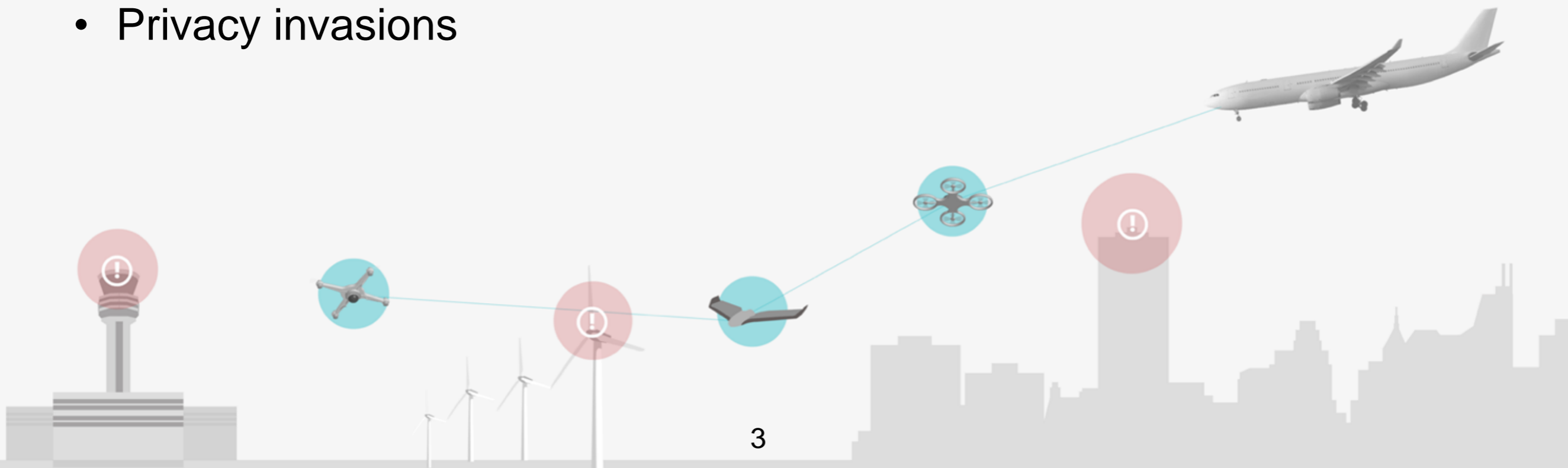


INSURANCE

- + Crop claims assessment
- + Structural damage assessment
- + Underwriting and reinsurance validation

...come with concerns

- Property damage
- Safety concerns:
 - Personal injury
 - Interference with first responders
 - Aircraft collisions
- National security threats
- Privacy invasions



There are solutions

Goal of legal and regulatory framework: Address legitimate public concerns while promoting innovation

Safety concerns can be addressed through regulation and technological solutions

Adopt risk-based regulations

Create a “micro” rule for UAS < 2kg

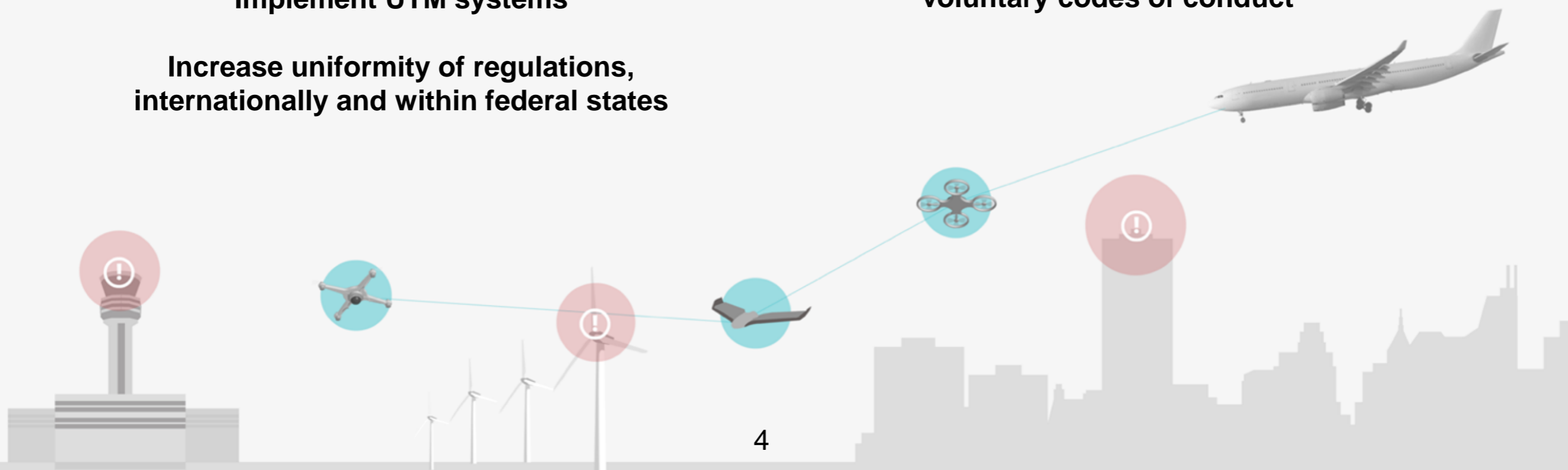
Implement UTM systems

Increase uniformity of regulations, internationally and within federal states

Privacy concerns can be addressed through the application of existing laws

Apply existing property, tort, and related criminal laws to UAS operator conduct

Encourage industry self-regulation through voluntary codes of conduct



Safety: Adopt risk-based regulations

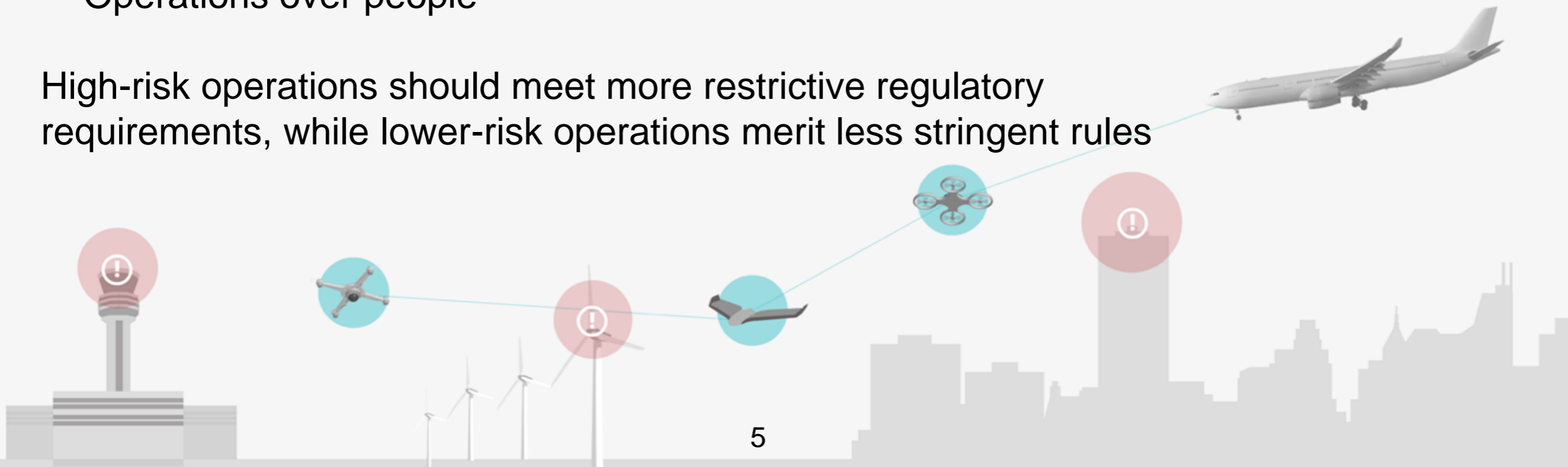
Rules that are unnecessarily broad or stringent will limit innovation, reduce the number of industry players, and increase compliance costs for everyone

Goal: Tailor regulations to the risk profile and avoid high barriers for low risk operations

Not all UAS operations create the same safety risks:

- Variation in weight of UAV, payload, sense and avoid capabilities
- Public vs. private property
- Proximity to airports vs. rural locations
- Daytime vs. nighttime operations
- Operations over people

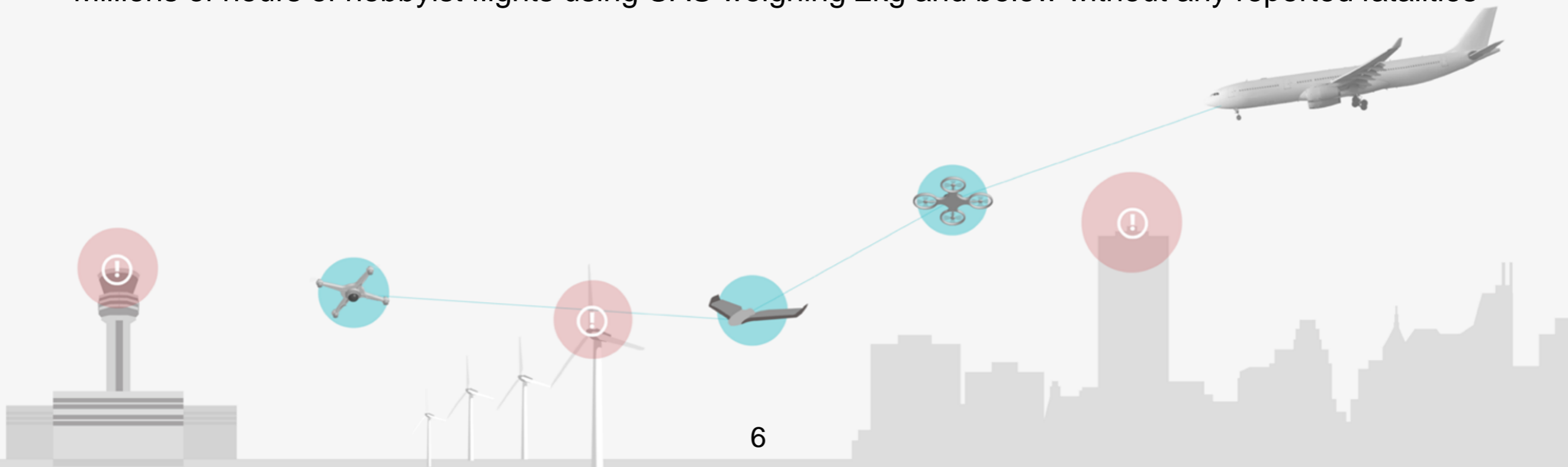
High-risk operations should meet more restrictive regulatory requirements, while lower-risk operations merit less stringent rules



Safety: Implement a “micro” rule

Nations including Australia, Canada and Mexico have recognized that UAS weighing 2kg and below pose a lower safety risk and merit less stringent regulations i.e. time of day restrictions, airworthiness, registration, and pilot certification.

- UAS weighing 2kg and below have a low kinetic energy, pose less risk to aviation and have a low potential to destroy property or to harm people on the ground or other airspace users
- US FAA: ‘There has never been a fatal aircraft bird-strike involving a bird weighing around 2kg, more than 5 miles from an airport during daylight’ (Petition of UAS America Fund, LLC to Adopt 14 C.F.R. Part 107 to Implement operational Requirements for Micro Unmanned Aircraft Systems, 2014).
- Millions of hours of hobbyist flights using UAS weighing 2kg and below without any reported fatalities



Safety: Implement UTM systems

Goal: Bring order to low altitude UAS operations to facilitate safe widespread integration of UAS into the NAS

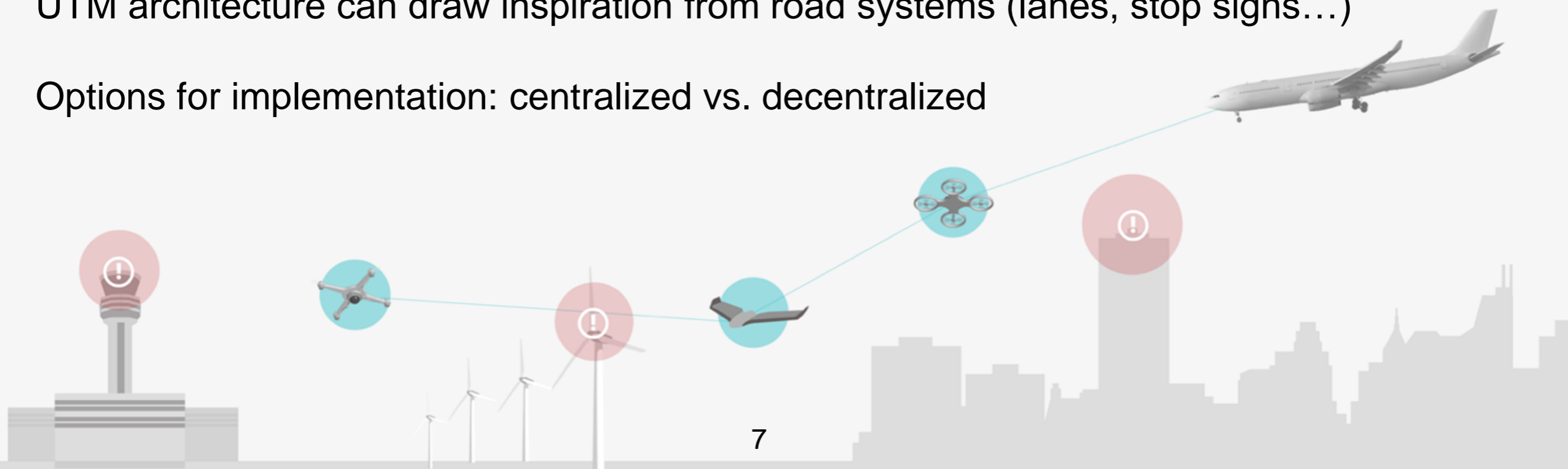
Lessons from history of the FAA and development of current air traffic management framework

UAS Traffic Management (UTM) systems enable low-altitude UAS operations via airspace design, dynamic geofencing (i.e. wildfires), corridors, obstacle avoidance, route planning, sequencing and spacing...

UTM systems can lower the risk profile of an operation

UTM architecture can draw inspiration from road systems (lanes, stop signs...)

Options for implementation: centralized vs. decentralized



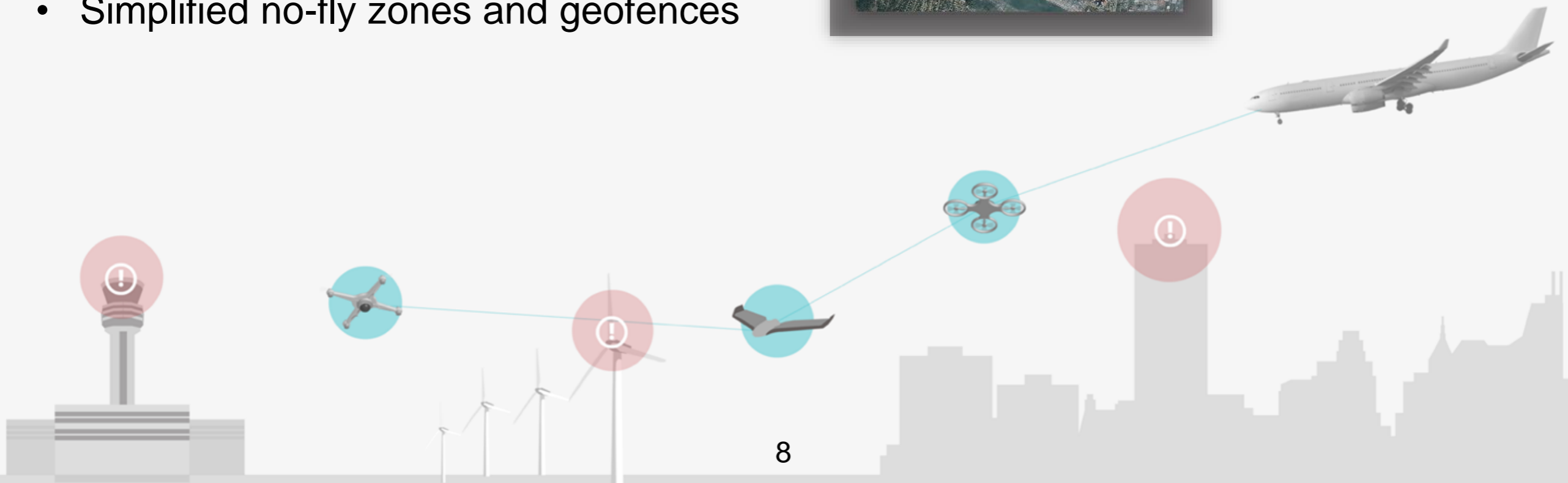
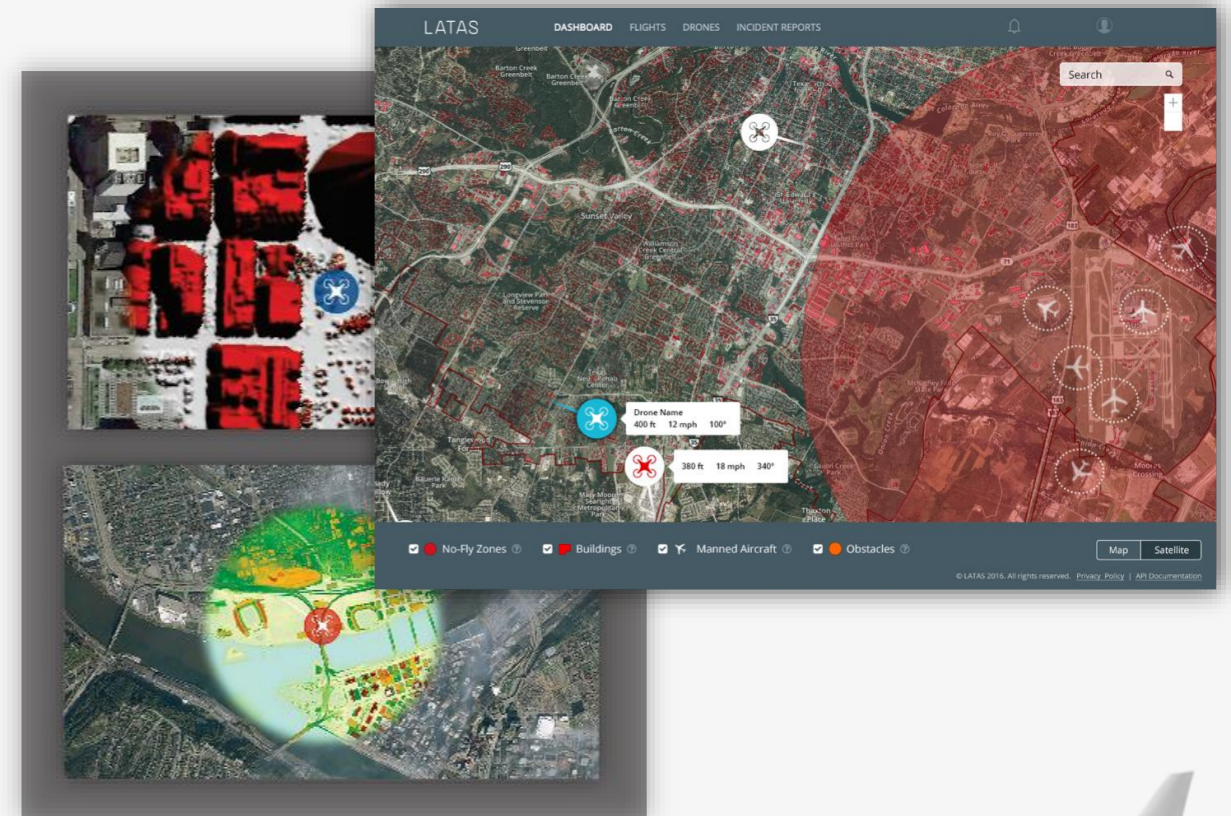
Safety: Implement UTM systems

PrecisionHawk's LATAS

- Tested under the FAA Pathfinder Program and through NASA UTM

Features include:

- 3D ground obstacle database
- Real-time manned aircraft tracking in 128 countries
- Simplified no-fly zones and geofences



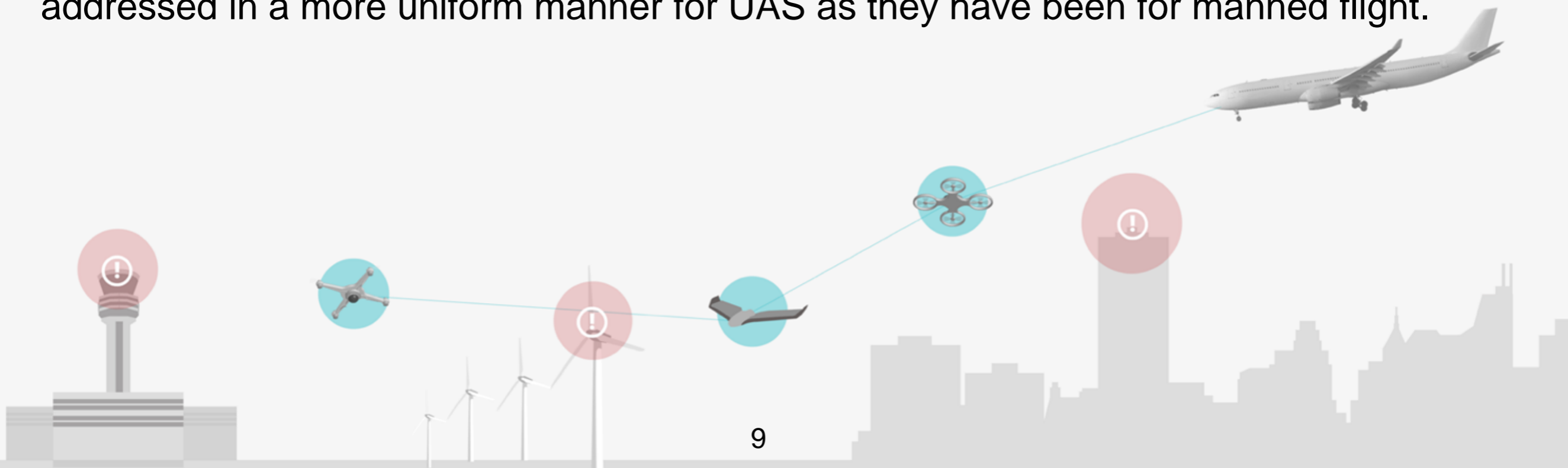
Safety: Increase regulatory uniformity

Uniform laws and regulations facilitate industry compliance by creating a broad and well-known standard of conduct

A patchwork of different laws and regulations between nations and within federal systems creates many challenges for UAS operators:

- High information costs to research regulations
- Conflicting licensing and registration requirements
- Varying software and hardware compliance measures

States have the same basic regulatory concerns for flight safety. These can be addressed in a more uniform manner for UAS as they have been for manned flight.

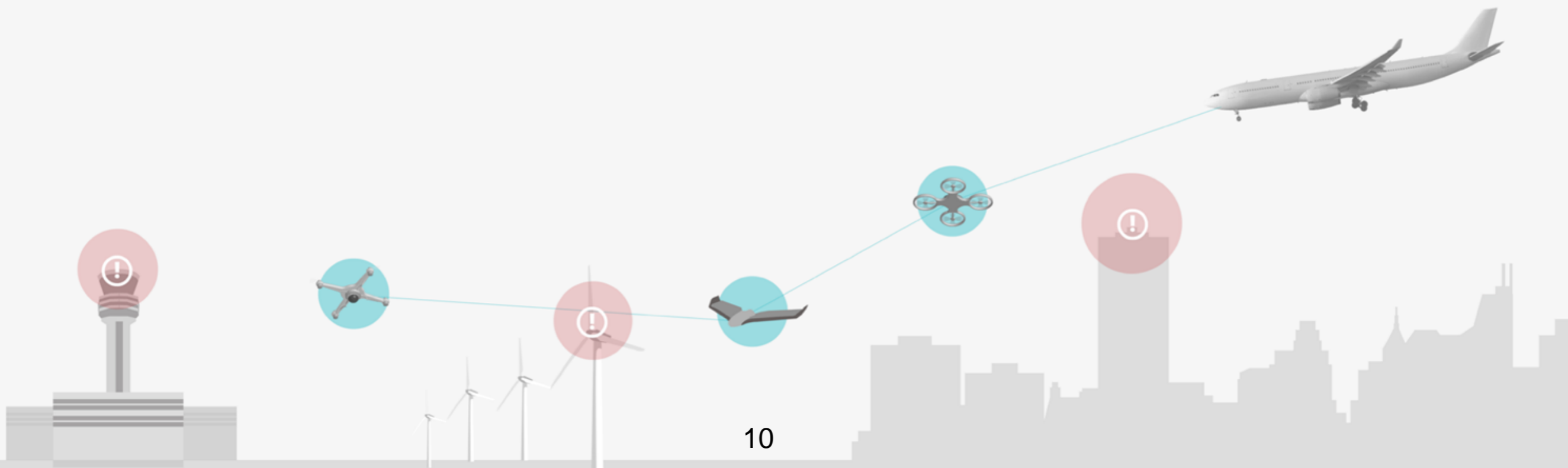


Privacy: Apply existing law to UAS

Privacy concerns created by UAS are not unique. Any regulation of UAS should fall within or mirror existing law governing images and information.

Existing laws in both common law and civil law jurisdictions are already sufficient to address concerns concerning UAS operator conduct:

- **Property:** Trespass
- **Tort:** Intrusion upon Seclusion, False Light, Defamation
- **Criminal:** “Peeping Tom” laws, Eavesdropping and Surveillance, Stalking, Harassment, Assault, Indecent Photography



Privacy: Develop codes of conduct

Voluntary codes of conduct are an important self-regulatory tool that have been successful in the model aviation community

The NTIA Voluntary Best Practices recently implemented in the US provide an example solution supported by both industry and regulators. Provisions encourage operators to:

- **Inform** people of UAS operations where practicable
- **Avoid** collecting personal information where possible and avoid certain uses
- Publish a **privacy policy** describing data collection, use, and storage
- Provide a **complaint or opt-out** mechanism
- Manage **security** risks

