



Unmanned, under-regulated, and unbound

The future of commercial UAS

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Why should you be excited about Commercial UAS



NASA drone assists relief efforts post-Hurricane Harvey



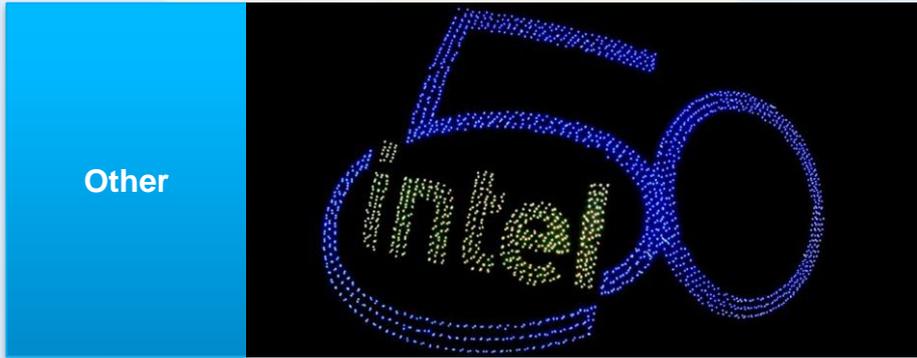
Zipline drone delivers blood and vaccines in Rwanda



Flirtey drone delivers life-saving defibrillator

Commercial UAVs are more than just on-demand burritos and Olympic light shows... They are highly capable tools that can change the way we approach core business operations, increase access to life-saving products and services, and make our critical public safety missions safer and more effective

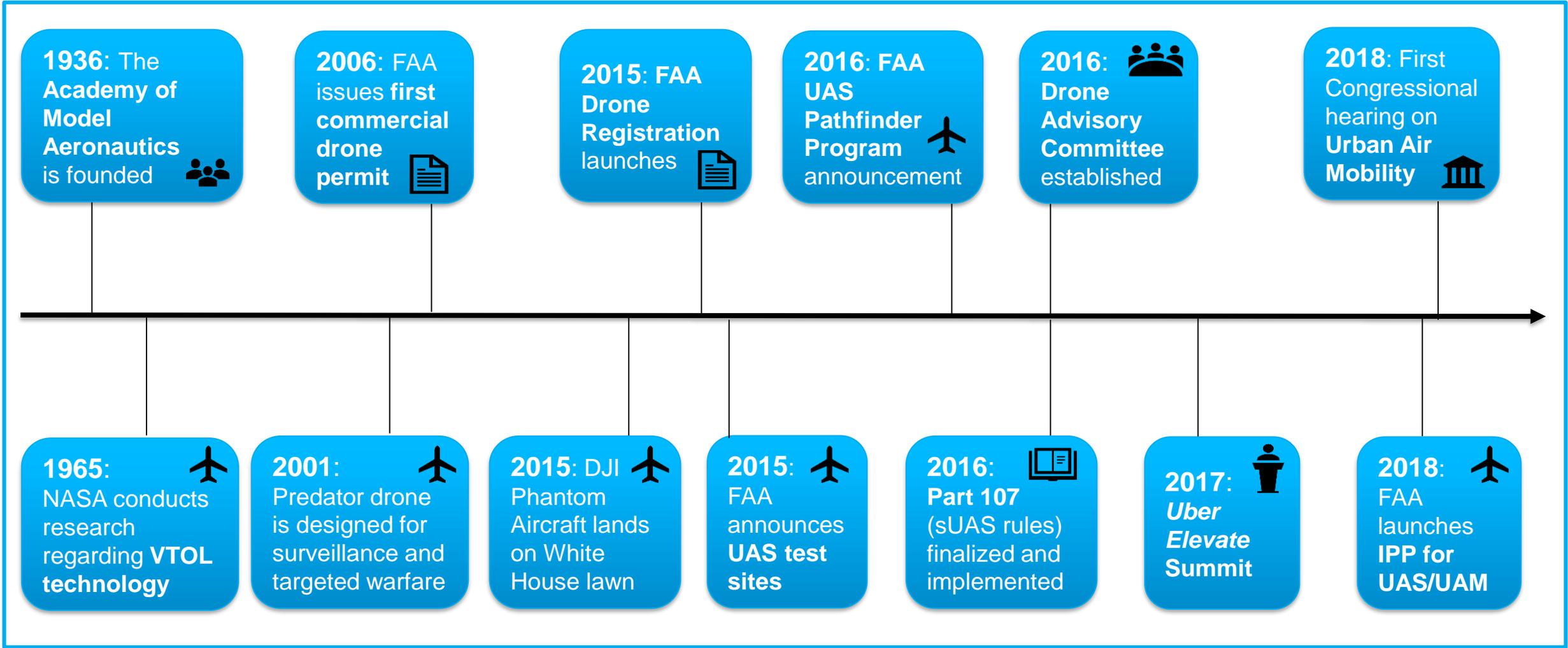
UAS serve a wide range of industries across six core categories



UAS are already being integrated into industries and businesses around the world, working to:

- Reduce risk and cost
- Replace guesswork with precision
- Increase access and mobility
- Enable preventative maintenance
- Open new business models
- Provide life-saving support to remote communities

The idea of unmanned aerial systems has a long history, but due to recent technological advancements, ideas surrounding unmanned flight are coming to fruition



The future is vertical: industry is starting to make moves to leverage air mobility platforms to take our cities and transport systems from two dimensions to three



Airbus A³ Vahana, Altiscope, and UAM projects



Uber Elevate Summits, Partnerships and Pilot Plans

Amazon future of delivery vision



Zipline's life-saving medical delivery system in Rwanda



UPS UAS-integrated delivery van testing



Wing's food delivery pilot in Canberra

Urban Air Mobility: am I finally getting the Jetsons future I was promised?

Urban Air Mobility: at a glance

- UAM is broadly defined as a safe and efficient **system for air passenger and cargo transportation** within an urban area
- This system supports a **mix of piloted, remotely-piloted and increasingly autonomous** operations
- UAM is part of a broader airspace evolution being driven by the proliferation of sUAS and related technologies; UAM **focuses specifically on mobility applications** of these technologies



Core UAM use cases



Passenger transport: systems of “air taxis” or “air metros” that transport people throughout urban areas



Movement of goods: package and cargo delivery in an urban area; the most popular of these today is last-mile small package delivery



Public safety: there are a range of often-overlooked critical public safety applications that can meaningfully impact the safety and security of our communities (e.g., medivac operations)

Why Urban Air Mobility?

The world is becoming increasingly urban...

- **2.5 billion net new population** expected to live in cities by 2050, placing pressure on services and resources
- **There are 76 “large” cities in North America** with populations greater than 500,000, and **1,368 cities in the US with over 30,000 residents**
- **54% of global population living in cities**
– For the first time in history, over half of the world population lives in cities
- **80% of global GDP** contributed by cities, and 60% of global GDP growth by 2025 will be driven by 600 large cities

... Which is creating new challenges for how we organize our communities

-  **Congestion:** By 2030, annual passenger traffic is expected to be up 50% from 2015 doubling the number of cars on the road
-  **Productivity:** In 2013, congestion cost the United States economy \$124 billion in lost productivity, and that number is projected to increase 50% by 2030
-  **Emissions:** Transport is the largest energy consuming sector in 40% of countries; energy-related emissions are projected to increase 40% by 2040
-  **Public safety:** In England, around 2,500 annual deaths occur due to inadequate ambulance response times

The Urban Air Mobility end-to-end value chain

Value chain	Regulators							
	Vehicles		Physical infrastructure & airspace management			Operations		Communities
	Components & subsystems	OEMs	Physical infrastructure	UAS mitigation & security	Airspace systems & services	Fleet operators	Support services	Local integration efforts
Description	<p>Major components and subsystems used on UAM vehicles:</p> <ul style="list-style-type: none"> Batteries Avionics Aerostructures Motors Sensors 	<p>Full platform manufacturing and/or integration:</p> <ul style="list-style-type: none"> Full platform integration (e.g., sUAS or eVTOL manufacturing or integration) 	<p>Infrastructure required to support key UAM operations:</p> <ul style="list-style-type: none"> Vertiports Receiving vessels Charge stations Distro hubs 	<p>Infrastructure, systems and services to secure urban environments:</p> <ul style="list-style-type: none"> C-UAS Remote ID and tracking Cybersecurity 	<p>Airspace management and integration:</p> <ul style="list-style-type: none"> UTM systems Traffic and navigation services Airspace integration 	<p>Fleet management and operations:</p> <ul style="list-style-type: none"> Fleet operators Consumer interface providers Fleet management 	<p>Services supporting the ecosystem:</p> <ul style="list-style-type: none"> Insurance Data management and analytics O&M services Training 	<p>Local community authorities and groups:</p> <ul style="list-style-type: none"> Interest groups Local authorities Community engagement programs and pilots
Example companies								

Where is my Air Taxi?: The five forces that will determine the viability and timeline of this market

Forces	Description
<p>1 Business cases </p>	<ul style="list-style-type: none">▪ Building and validating robust business cases that take into account end-to-end value chain economics and potential business models for each segment will be critical in enabling UAS markets▪ Given the uncertainty around regulatory timelines, robust business cases that take into account a range of ROI scenarios and include interim funding or monetization strategies will be important
<p>2 Technological progress </p>	<ul style="list-style-type: none">▪ Technological progress is still required in many areas in order to enable core use cases and facilitate safe and reliable operations (e.g., UTM, airspace integration technologies, detect-and-avoid, batteries, navigation for GPS-denied environments, distributed electric propulsion, etc.)
<p>3 Regulation </p>	<ul style="list-style-type: none">▪ Current regulations will require significant adaptation and maturation in order to enable fully-autonomous, scalable UAS operations (e.g., flight over people, vehicle certification, BVLOS)▪ Regulation acts as a gatekeeper for the UAS market and uncertainty over its timeline impacts investment and development patterns in industry
<p>4 Infrastructure </p>	<ul style="list-style-type: none">▪ UAS will require significant infrastructure investment and development in the form of vertiports, vertistops, receiving vessels, UTM, counter-UAS, and distribution hubs▪ Market timeline uncertainty complicates ROI calculations, shaping investment patterns and may suggest the need for innovative public-private-partnership engagement and investment▪ Regulations surrounding ownership, standardization, and use (time, manner, and place restrictions) of infrastructure can impact on the make-up and character of the UAS market
<p>5 Public acceptance </p>	<ul style="list-style-type: none">▪ UAS represents a whole new face of aviation: one that operates much closer to our homes and communities than ever before and will face a host of community concerns related to safety, noise, access, privacy, and economic / employment impacts▪ Addressing these concerns through effective and proactive public engagement will be critical in generating demand for services and helping foster acceptance of these operations in their communities

So what does this mean for you?

Stakeholder	Recommendations
<p data-bbox="161 347 456 428">Manufacturers & operators</p> 	<ul style="list-style-type: none"> ▪ Clarify your business cases and develop scenario-based strategies that account for monetization challenges that may result from uncertainty in market timelines ▪ Assess business model adaptations that will need to be made in order to play in a UAM or UAS market (e.g., transitioning from high-tech low-volume to high-tech high-volume production) ▪ Engage early and often with regulators, legislators, and state and local authorities ▪ Clarify where your organization will play in the value chain, but engage throughout the ecosystem to help identify and tackle system-wide issues
<p data-bbox="161 621 398 702">Regulators & government</p> 	<ul style="list-style-type: none"> ▪ Consider opportunities to structure innovative public-private-partnerships with industry counterparts on a range of issues, including: pilots & testing, co-investment, standard-setting, and public engagement ▪ Include UAM and UAS infrastructure requirements in capital investment and smart cities planning ▪ Develop robust community engagement strategies to begin to understand and address local concerns
<p data-bbox="161 827 405 908">Public safety organizations</p> 	<ul style="list-style-type: none"> ▪ Identify use cases that could potentially make a difference to your teams or mission (e.g., medivac transportation, search & rescue missions, defibrillator delivery to remote teams and locations) ▪ Outline clear benefits cases and strategies for procuring and adopting technologies ▪ Engage with regulators and industry partners to gain sufficient authority and systems for implementation
<p data-bbox="161 1033 330 1069">Investors</p> 	<ul style="list-style-type: none"> ▪ Analyze and clarify which part(s) of the value chain you want to invest in and why ▪ Consider innovative investment or partnership models (e.g., PPPs or consortia investment) ▪ Anticipate uncertainty in timelines and unique ROI/monetization models
<p data-bbox="161 1181 405 1262">Infrastructure owners</p> 	<ul style="list-style-type: none"> ▪ Assess likely threats and risks associated with large-scale sUAS and passenger transport operations at low altitudes over your assets ▪ Develop mitigation strategies and acquire appropriate technologies and systems to protect your assets

Questions?

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The logo for Ascension Global features the word "ASCENSION" in a large, bold, black sans-serif font. A thick black curved line arches over the letters "CENSIO". Below this, the word "GLOBAL" is written in a smaller, black, spaced-out sans-serif font. The background of the slide is a blue sky with a drone flying in the upper center and several drones carrying cardboard boxes in the lower left and right.