

Autonomy Workshop

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Warm Welcome!

Embracing innovation in aviation while respecting its safety tradition

Outline

- Economic importance
- Not as easy as animations show
- Mixed equipage
- Workshop Instructions

Autonomy: (of a vehicle) navigated and maneuvered by a computer without a need for human control or intervention under range of driving situations and conditions

High Economic Impact Potential

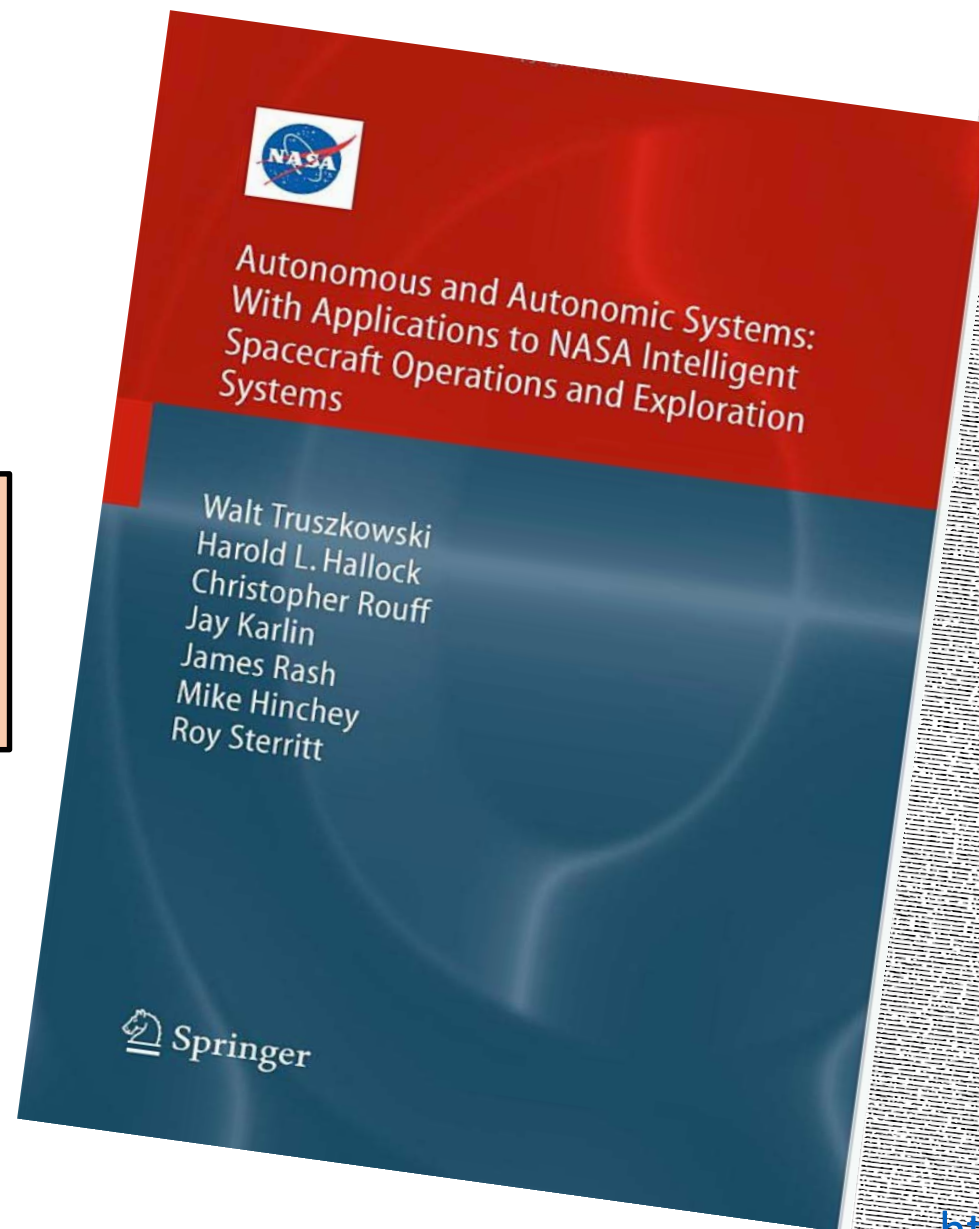
- Pilot shortage across the world
- International competitiveness
- Longer stage length flights
- Ease of crew scheduling

“Long-haul commercial flights could see reduced cockpit crews from 2023, shorter after cargo planes,” analysts at UBS Group AG wrote in an extensive July report. They estimated a profit potential of \$15B for flying with single pilot and \$25B if planes were able to fly themselves

Complex Issue

- Technology readiness
- Safety
- Human-autonomy teaming
- Certification
- Acceptance

Prior Work



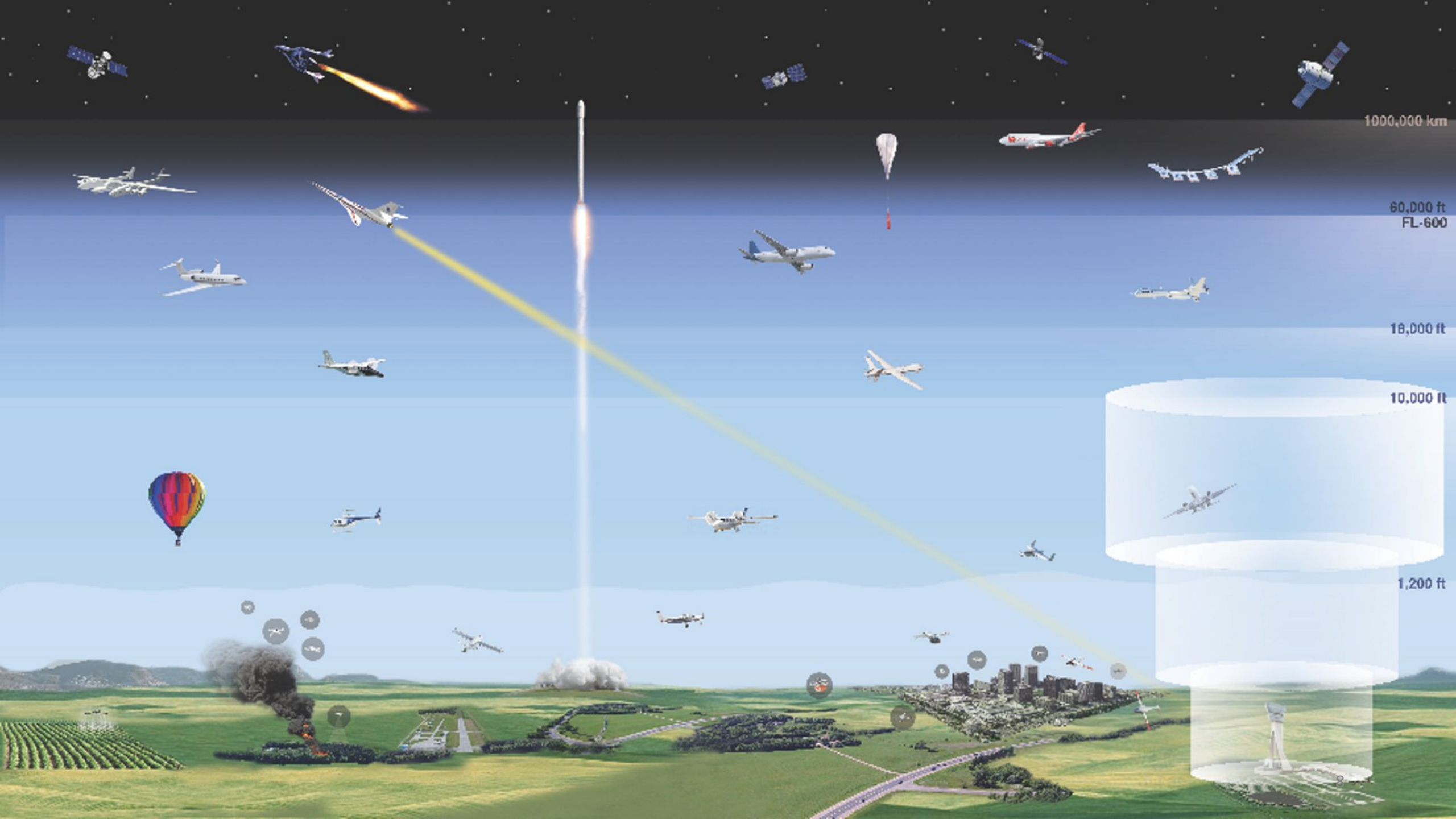
<https://ntrs.nasa.gov>

NASA Technical Reports Server

Mixed Equipage Challenge



Credit: Kamal Kishore/Reuters



Minimum Viable Strategy

Minimum Viable Product: a limited set of functions enough to get early adopters, extends to higher complexity later, and make a difference and unique

Minimum Viable Product

- Focus could be on entire system or could be a subsystem
- Amazon: started with book e-commerce
- Airspace: UAS Traffic Management (UTM): started with smaller airspace portion – FAA already implemented through LAANC
- Vehicle: Perception Engine, Contingency technologies, Dynamic Routing
- Path to reduced crew operations: only cruise portion, remotely operated, cargo only, long-haul flights
- Path to mid-size cargo: Low risk areas

Inter-island Autonomous Cargo Delivery (2025+)

Larger vehicle – single pilot, off-board manager, or fully autonomous depending on vehicle size



Transformation – Initial MVP Examples

Lowest risk – Grand Canyon or over water deliveries

Mail delivery by mule
into the Grand
Canyon



Mail delivery by boat
at Skaneateles Lake



To invent an airplane is nothing. To build one is something. But to fly is everything - Otto Lilienthal

To interoperate with many other types of aircraft in airspace is very complex!



Workshop Purpose

- Get to worthy candidate MVPs – moderators will help you
- Identify where (pre-competitive) collaboration is most effective
- Identify research gaps and technology demonstrations that are most productive as entire community of interest
- Progression from here to enabling autonomous flight and operations
- We have 3 break-out sessions. You stay in the same room to ensure balance of participants

Workshop Inputs

- Minimum viable products
- Collaboration topics (pre-competitive)
- Clarity on progression will help entire ecosystem towards operationlization

Points of Contacts

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Path Forward to Responsible Autonomy

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Back Up