

Washington Internships for Students of Engineering

Domestic Use of Unmanned Aircraft Systems: Policy Constraints and the Role of Consensus Standards

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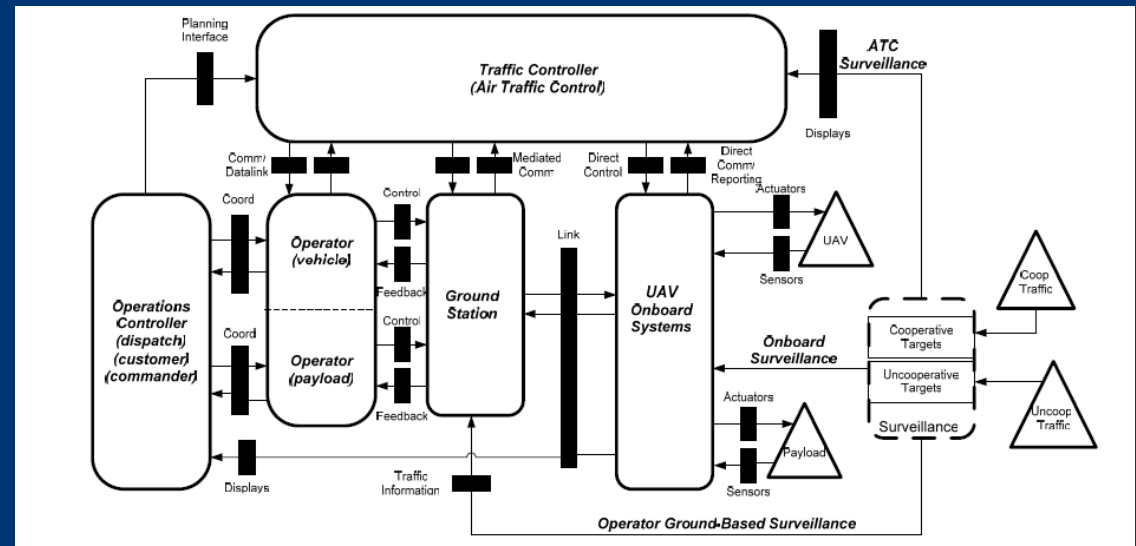
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What are UASs?

Not just aircraft, but systems





- Communications Relay
- Ground Operator
- Autonomous System



Source: Weibel & Hansman

What are UASs?

- Range from under a few ounces to size of 737

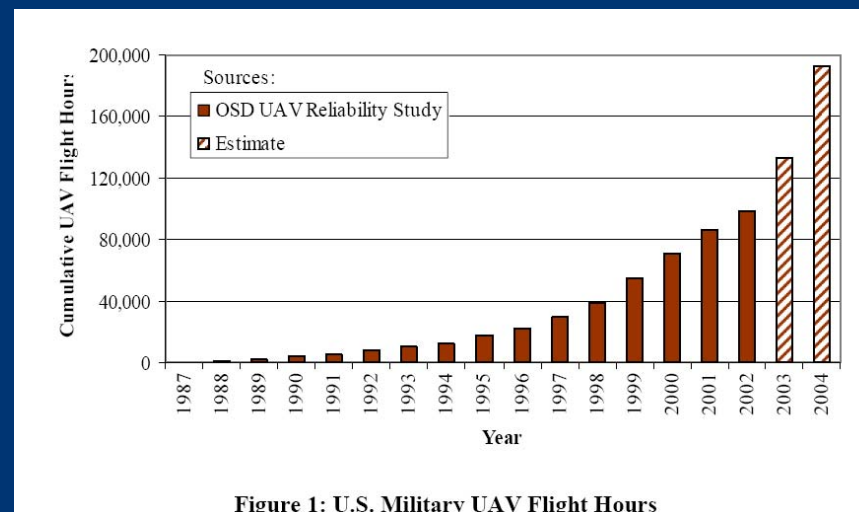
| | | | |
|--------------------|----------|--|---|
| | |  |  |
| <u>Application</u> | Civil | Lockheed-Martin <i>APV-3</i> [8] | NASA <i>Helios</i> [9] |
| | | Aerovironment <i>Desert Hawk</i> [10] | Northrop-Grumman <i>Global Hawk</i> [11] |
| | Military |  |  |
| | | Small | Large |
| | | | <u>Size</u> |

Applications of UASs



■ Military/Defense

- Surveillance, air-strikes, support, search and rescue
- Benefits: low cost, expendable, low risk to humans, high endurance, versatile



Source:
Weibel & Hansman

Figure 1: U.S. Military UAV Flight Hours

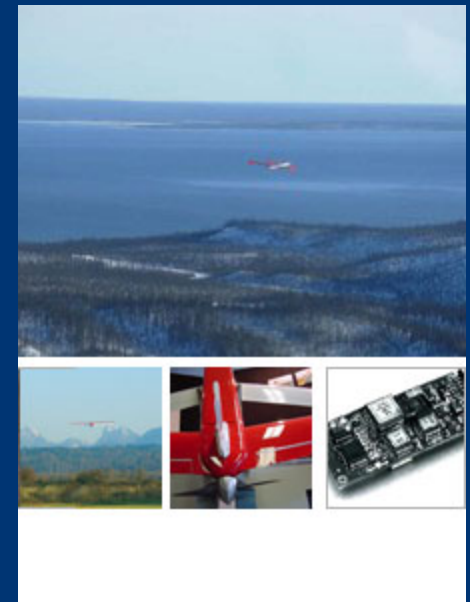
Applications of UASs

■ Commercial

- Security, advertising, imagery, surveillance

■ Example: mineral deposits in Canada

- No airport required
- High endurance, w/autopilot
- Low cost & fuel requirements



Applications of UASs

Public

- Research, search and rescue, disaster response, fire fighting, pollution monitoring, law enforcement, border patrol



Source: NSF



Source: BBC

National Airspace System (NAS)

- Shared by general aviation, commercial aviation, light sport aircraft, RC aircraft
- Regulated by the Federal Aviation Administration (FAA), Title 14 CFR
- Air Traffic Control (ATC) participation
- Problems:
 - UASs pose additional risk to NAS operations
 - UASs are unmanned – exception to the rule requires different process

Why Integrate UASs?

■ Defense Operational Limits

- Pilot training, emergency response, inflated use of manned aircraft

■ Public

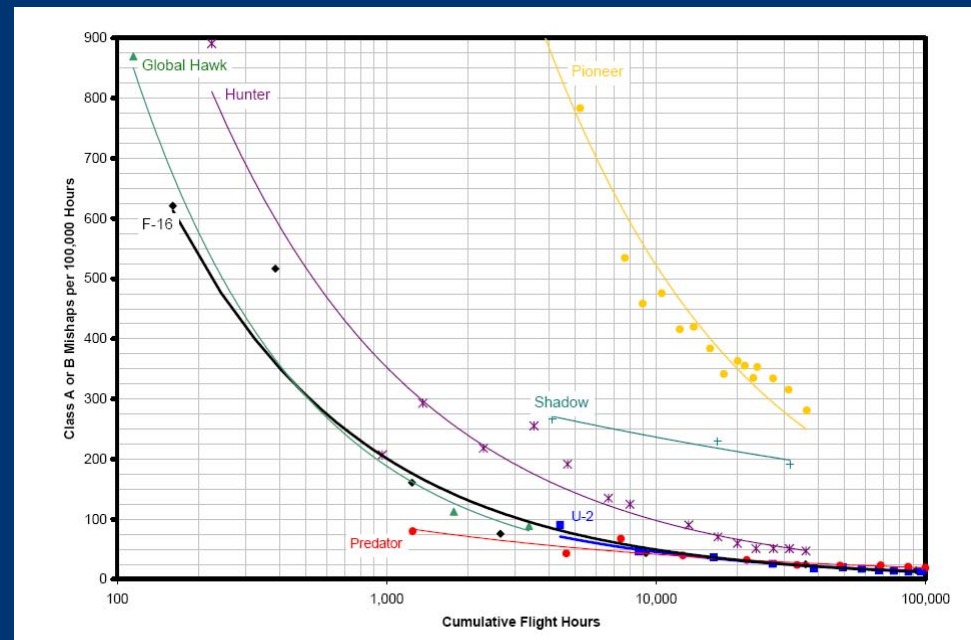
- Unnecessary use of riskier/more expensive methods
- Unavailable services
- Control illegal use of UASs, establish minimum design standards

■ Industry Investment

- Added investment risk, losses

Why Integrate UASs?

- Military UASs have comparable mishap rates to manned military aircraft
- Civil enterprises have safety advantages



Source: OSD Roadmap

Challenges: Industry

- Slow and limited access to NAS
 - No regulation governing design
 - Costs
 - Testing
 - Insurance
- Public Mistrust
 - Terrorism
 - Opposition from pilot associations
 - “Haywire” robots



Challenges: FAA

- Increasing number of CoA and experimental certificate applications
- Illegal use of UASs
- Timeline pressures
 - FAA using RTCA, a Federal Advisory Committee for long-term standards development – does not satisfy short-term needs
- Accessing and involving all available resources
 - Engineering societies, ASTM International, Dept of Defense

Case Study: Light Sport Aircraft (LSA)



- Category established in 2004 by FAA
 - Includes light sport planes, gliders and lighter-than-air devices
- Top down regulation: called out necessary industry standards
 - Allowed fast and safe access to NAS
 - Special licenses allow only visual flight rules operation
- Industry self-certification
 - Continues to save taxpayer money with a good safety record

Solutions: Regulators & Policy Makers

■ Can use aspects of LSA model

- Perhaps more cautious because technology is relatively different from general aviation
- Begin by imposing operation restrictions to ease access to NAS in a safe manner
- Later expand access and review possibility of limited industry self-certification

Solutions: Regulators & Policy Makers

- Establish regulations for small civil UASs in visual range operations
 - Comparable risks to radio controlled aircraft
 - Eases standards development process
 - Allows majority of near term investors access to NAS
 - Reduces FAA workload

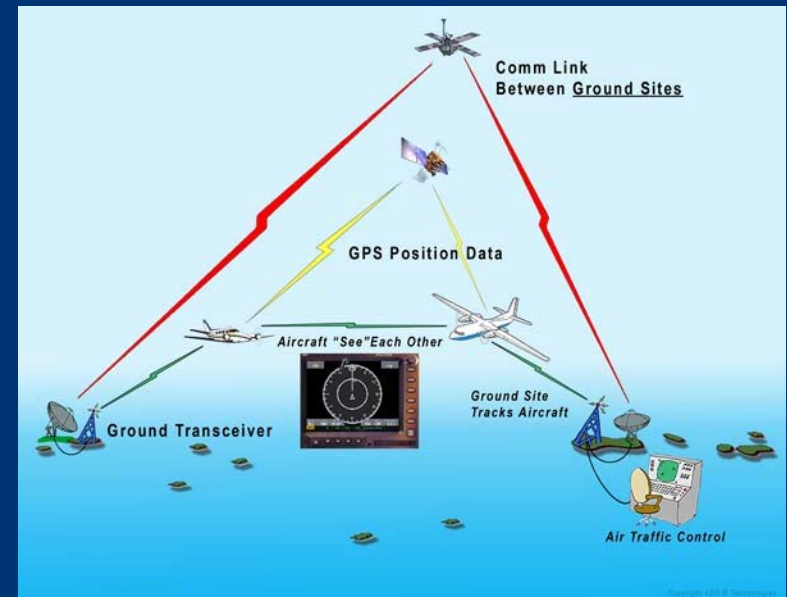
Solutions: Regulators & Policy Makers

- Establish test centers for non-visual range testing
 - Give outside body (i.e. select universities) authority to grant experimental certificates
 - Allows faster access to the NAS at low risk and cost
 - Reduces burden on FAA
 - Allows research for long-term UAS technologies

Solutions: Regulators & Policy Makers

■ UASs in NextGen

- Multi-billion dollar initiative to upgrade NAS
- May involve the increased use of avoidance technologies such as ADS-B
- UASs can be forerunners of advanced technologies and help increase use of ADS-B
- Regulators can incrementally mandate increased use of ADS-B



Source: Dynavtech.com

Solutions: Regulators & Policy Makers

■ Increase funding for FAA regulation activities

- FAA can reduce workload with short-term regulation, but UAS technology is fundamentally different than general aviation
- FAA may need to tweak some core documents

Solutions: Industry

■ Continue research activities

- Already have tested sensor technologies
- Enhance avoidance techniques, communication relays
- Keep focus on safety, and approach FAA with application specific UAS platforms

■ Participate in standards development

- RTCA and ASTM International have active UAS committees

Thank You

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Questions?

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Paper will be available at

www.wise-intern.org

on August 15th.



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