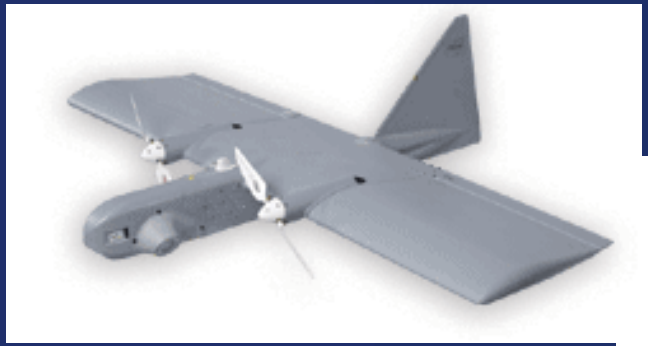
UAS Human Factors Efforts at the FAA: Aircraft Certification Perspective

Federal Aviation Administration



Bill Kaliardos, AIR-130
FAA Aircraft Certification
Avionic Systems Branch, AIR-130
Human Factors Specialist

Human Factors of UAVs 2006 Workshop
May 25, 2006

Overview

- FAA Goals, Challenges
- UAS Background
  - Physical vs. Functional
- Key Aircraft Certification HF Challenges
  - Control Station
  - Automation
- RTCA SC-203 HF Analysis Method (in-progress)
- Recommendations

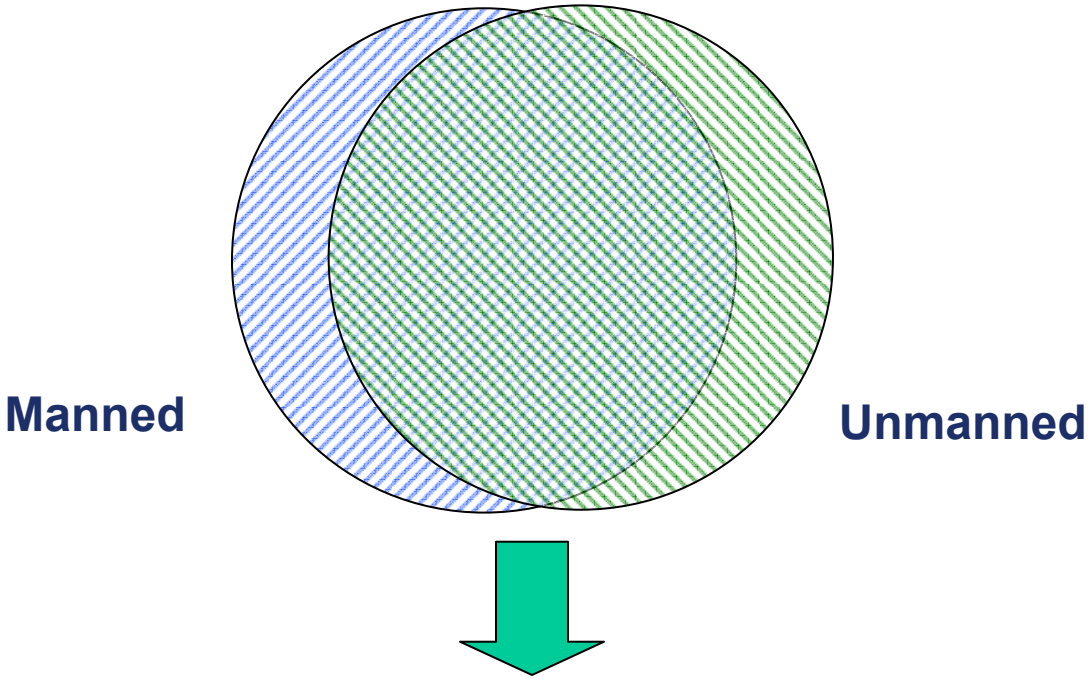
Definitions

- UAS – Unmanned Aircraft System
- UA – Unmanned Aircraft
- RCS – Remote Control Station
- NAS – National Airspace System

Key FAA Goals and Challenges

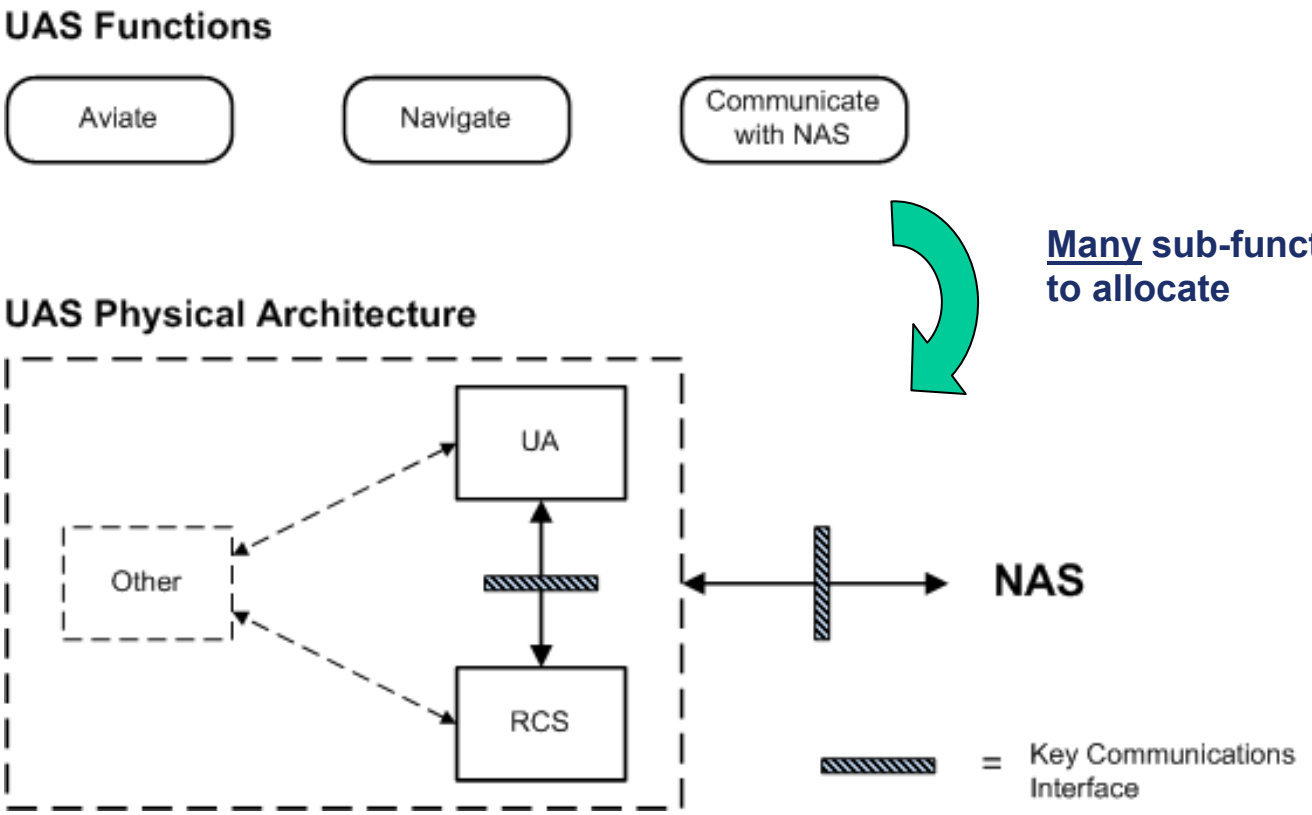
- Goal
  - (“Seamlessly”) Integrate UAS in NAS
  - Equivalent Level of Safety as manned aircraft
- Challenges
  - UAS Classification not yet determined
  - No “Type Certified” UAS yet
  - Many changes in regulations/standards likely needed

Operational Functions – Manned and Unmanned



Many high-level functions are the same !

UAS Defined by Physical, Not Functional

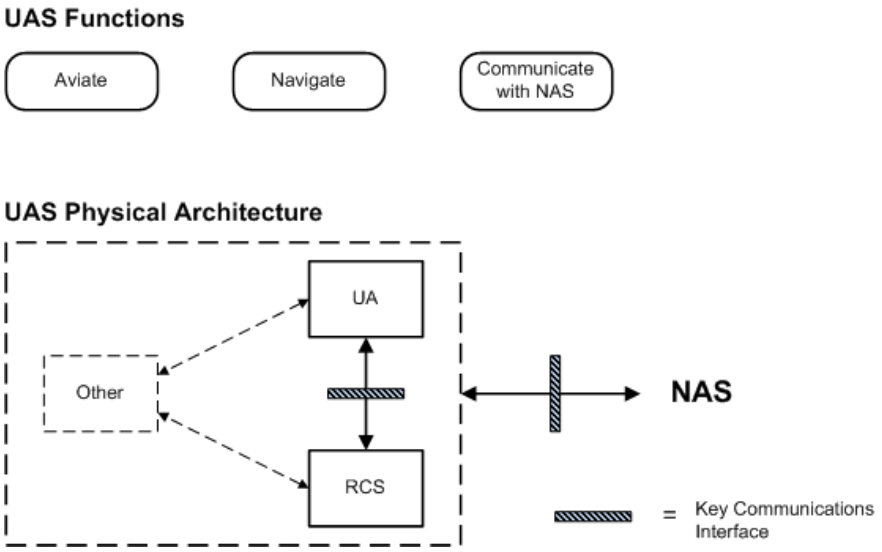


Key Aircraft Certification HF Challenges (UAS-specific)

- Remote Control Station (RCS)
  - No direct sensing by human
    - Of aircraft, environment
    - No vestibular, aural, visual…
  - Link effects
    - E.g., latency
- UA Automation
  - Defining performance requirements
    - E.g., equiv. level of safety for traffic sense-and-avoid?
  - Replacing human decision-making
    - E.g., perception, adaptive, survival instinct, experience, handling uncertainty, understanding context

RTCA SC-203 Human Factors Analysis Method (work in-progress)

1. Define function
2. Determine info requirements and decision process
3. Analyze HF challenges through function allocation
   - To human (at RCS)
   - To UA Automation*



* *"Automation" used for a specific function (not entire aircraft)*

RTCA SC-203 – Current Example Problem for HF Analysis (Traffic Detect, Sense & Avoid)

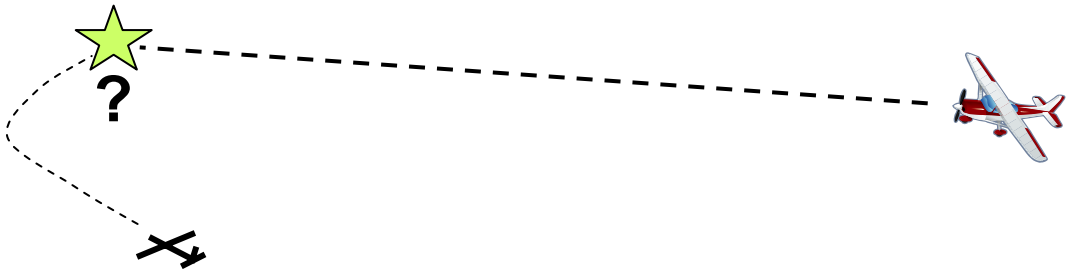


Table for brainstorming

	UAS Function Allocation		
Subfunction	**To Human (at RCS)**	**To UA Automation**	**To Both**
Detect All Traffic			
Determine Threat Aircraft			
Determine Conflict Resolution			

Summary

- This presentation did not address UAS Operations
- Key HF Challenges (for FAA Aircraft Certification)
  - RCS…
    - No direct human sensing of aircraft/environment
    - C3 Latencies
  - Automation…
    - Difficult to replace human
    - Difficult to generate function performance requirements
- RTCA SC-203 HF Process (in progress)
    - Use function allocation analysis to determine HF gaps in regulations/standards

Recommendations – Addressing UAS HF for NAS-Integration

1. Use “automated” to describe *specific* functions only
   - Use care when describing entire aircraft (e.g., “semi-autonomous”)
2. Simplify HF problem
   - RCS/Automation categories
   - (*Solution* not simple)
3. For new guidance, consider the many function allocation strategies
4. Use manned aircraft as baseline…
   - …and consider how UAS is different

Questions?