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Unique Challenges of Unmanned Air Systems (UASs) Test and Evaluation

Presented By:

RDML David Dunaway

Assistant Commander, Test and Evaluation, Naval Air Systems Command

Commander, Naval Air Warfare Center Weapons Division

david.dunaway@navy.mil

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Naval Air Systems Command

The Landscape

If we can find the target, we can kill the target

Increased cost = less stuff

Timely, multi-source , fused Intelligence is the key

Prolific demand and use Increased cost

Unmanned Air Systems are a key enabler

Unique solutions Decreased interoperability Increased cost

Commercial supply and operational demand outpaced technical standards

No standards equates to unique solutions

Actionable information needs consistency and trust

Multiple additional requirements

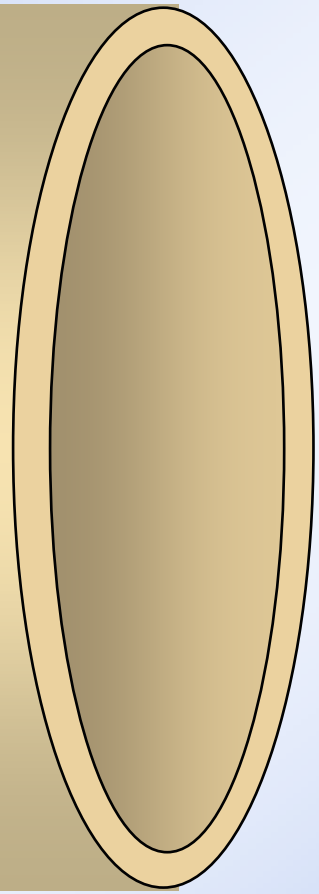
Creates a huge spectrum of solutions

Why is it hard for UASs to fit in the Manned Aircraft T&E Community?

Manned Aircraft

100 years of refining processes and thinking

- Set communities
  - Strike
  - Rotary wing
  - Etc
- Standard Testing areas
  - Flying qualities
  - Mission systems
  - Propulsion
  - Etc



UASs

~15 years of rushing to field

- Components
  - Air Vehicles
  - Control Stations
  - Links
  - Sensors
- Types
  - Micro
  - Mini
  - Small
  - Tactical
  - Strategic

Lets make sure we don't try to fit a square peg in a round hole

UAS T&E Requirements

Manned aircraft T&E requirements well known

Frequencies | **Performance** | **Support Systems** | **Safety**

? ? ? ?

Largely Unknown

Across broad spectrum of UAS T&E

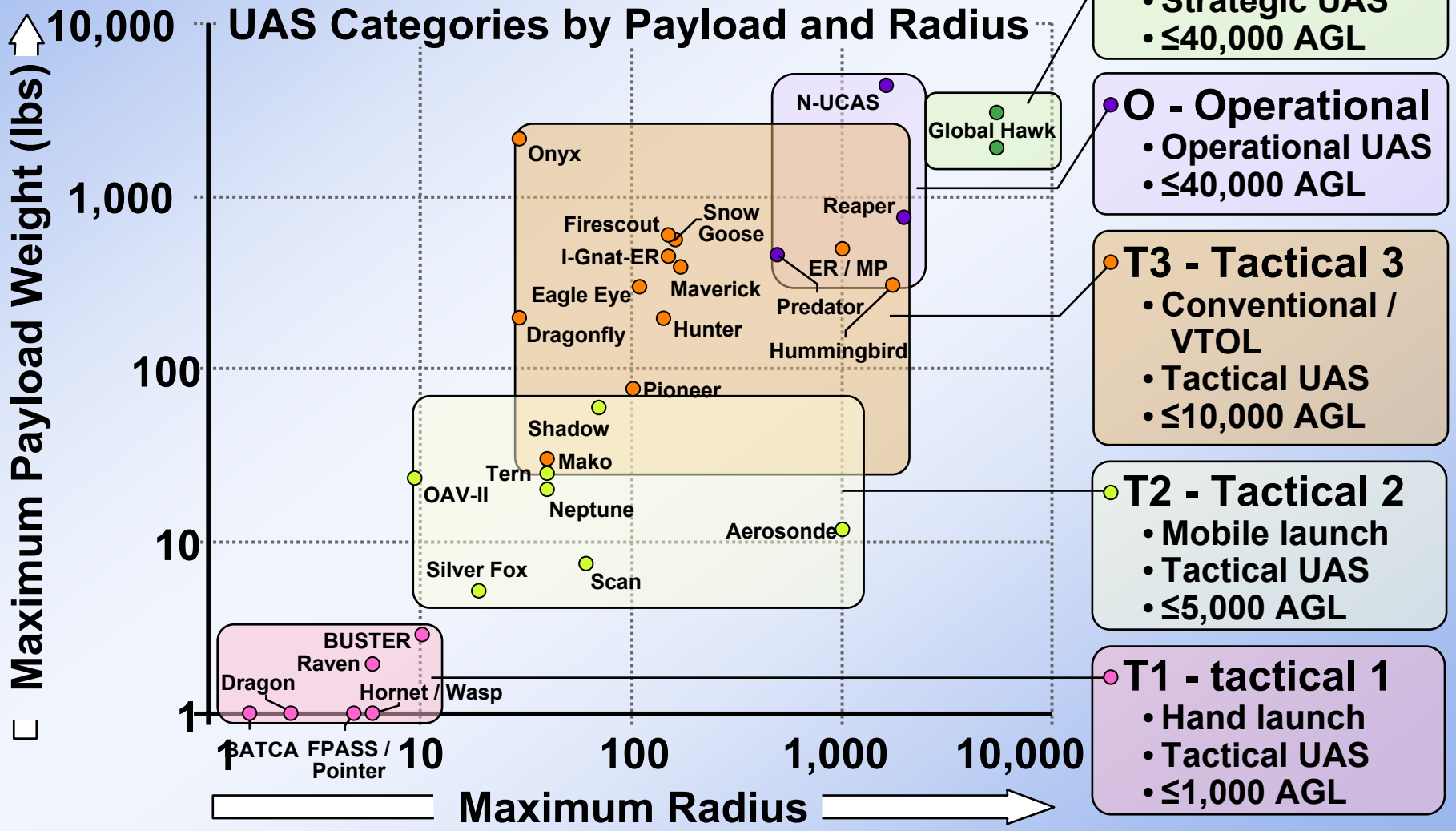
Raven
4-ft Wingspan

All Sizes, Capabilities, & Costs

Global Hawk
131-ft Wingspan

Broad Spectrum of Designs, Capabilities, & Missions

Wide variety of capabilities



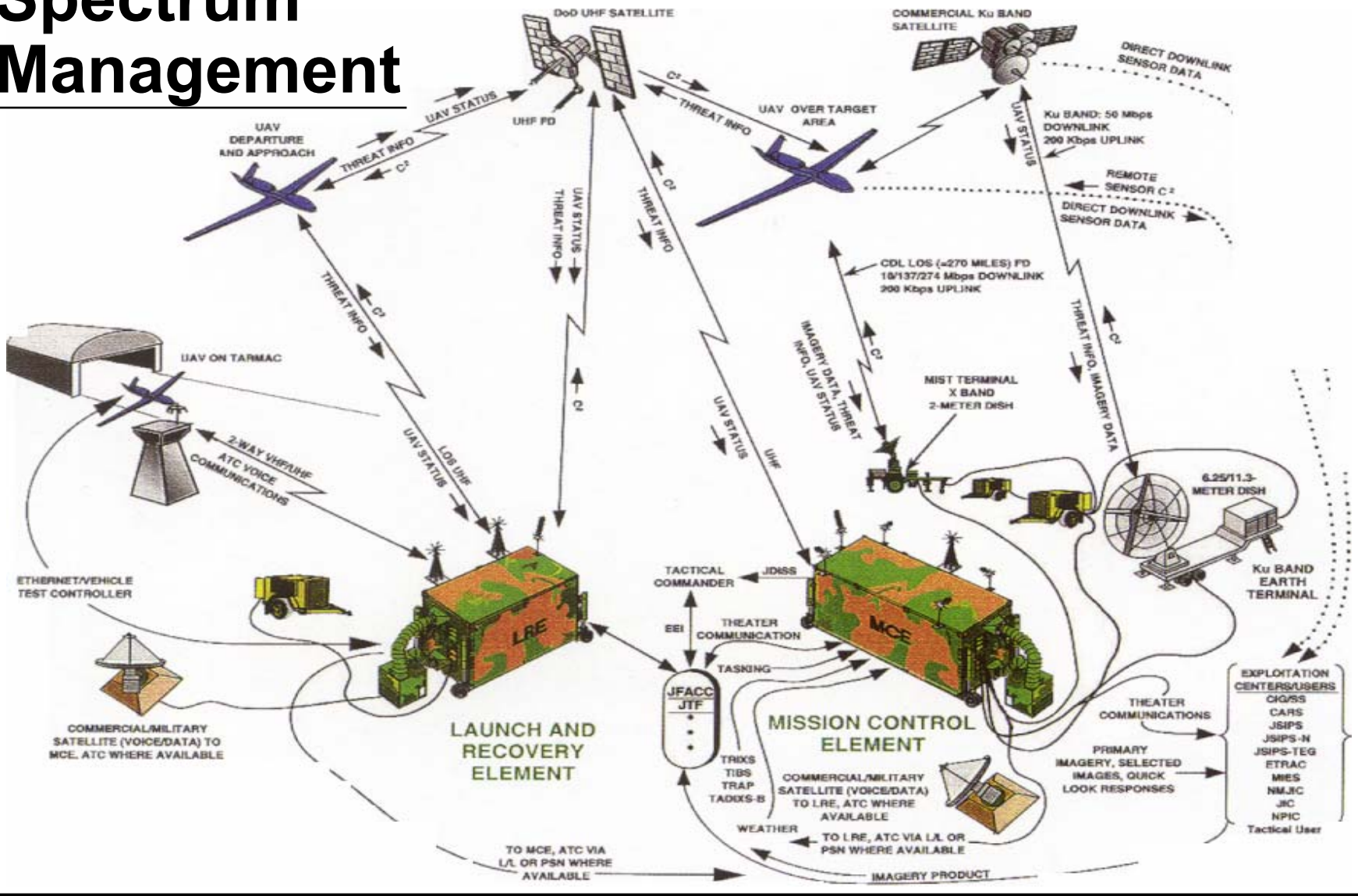
Note: BAMS is not shown as final threshold max payload and mission radius are still TBD

Technical Challenges

- Wide variety of sizes, performance, capabilities, and costs
- Most hardware and software proprietary
  - Non-standard
  - Inhibits interoperability
  - Increases costs
- Airspace integration
  - Not designed to operate in National Airspace System (NAS)
  - Difficult to obtain Certificate of Airworthiness and FAA and DOD flight clearances
  - Lack of Identify Friend or Foe (IFF) and other standard equipment

Technical Challenges

Spectrum Management



Range Challenges

Each System Has Different Scope of Requirements

Different:

- Concepts of Operations for interoperability and airspace integration
- Frequency de-confliction
- Encroachment
- Vast array of physical problems

Safety is a major driver

Social Challenges

- Different perceptions
  - Pilot off-board vs. onboard
  - Risk and consequences of UAS mishaps
  - Manned vs. unmanned testing standards
- Risk management
  - Commercial, Range, and Military operations differ
  - Attritable systems still have risk and impact
  - Trade-space differs from manned testing
  - Lost-link procedures

Successes

- H.R. 2881 FAA Reauthorization Act
- Integrated frequency de-confliction system
- Reallocation of 1400 MHz of new UAS flight test bands
- Adapting processes, facilities, and procedures
  - Updating Range Safety and Air Operations manuals
  - Better review and analysis of UAS technologies and capabilities
  - Increasing Use of M&S/ground test facilities

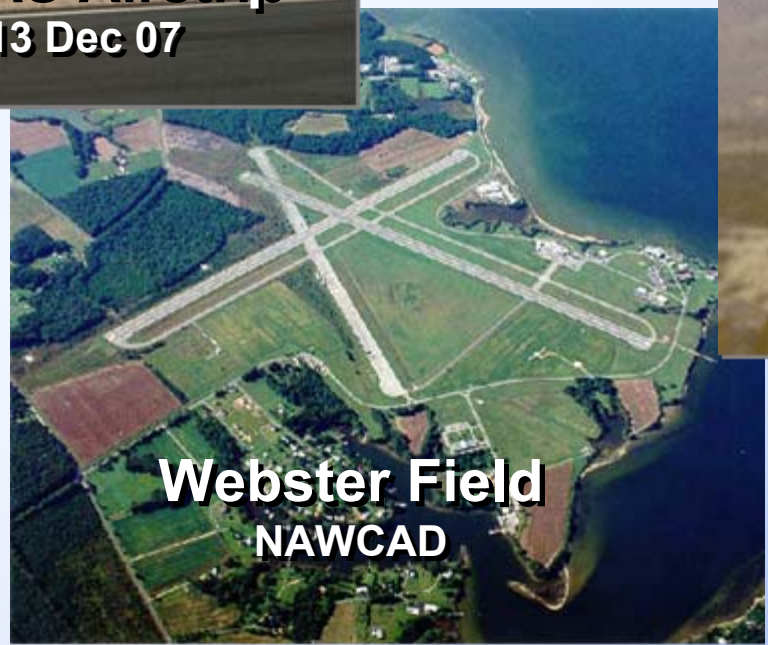
Successes

Mission Plan within R-4005/6/7/8 complex Patuxent River

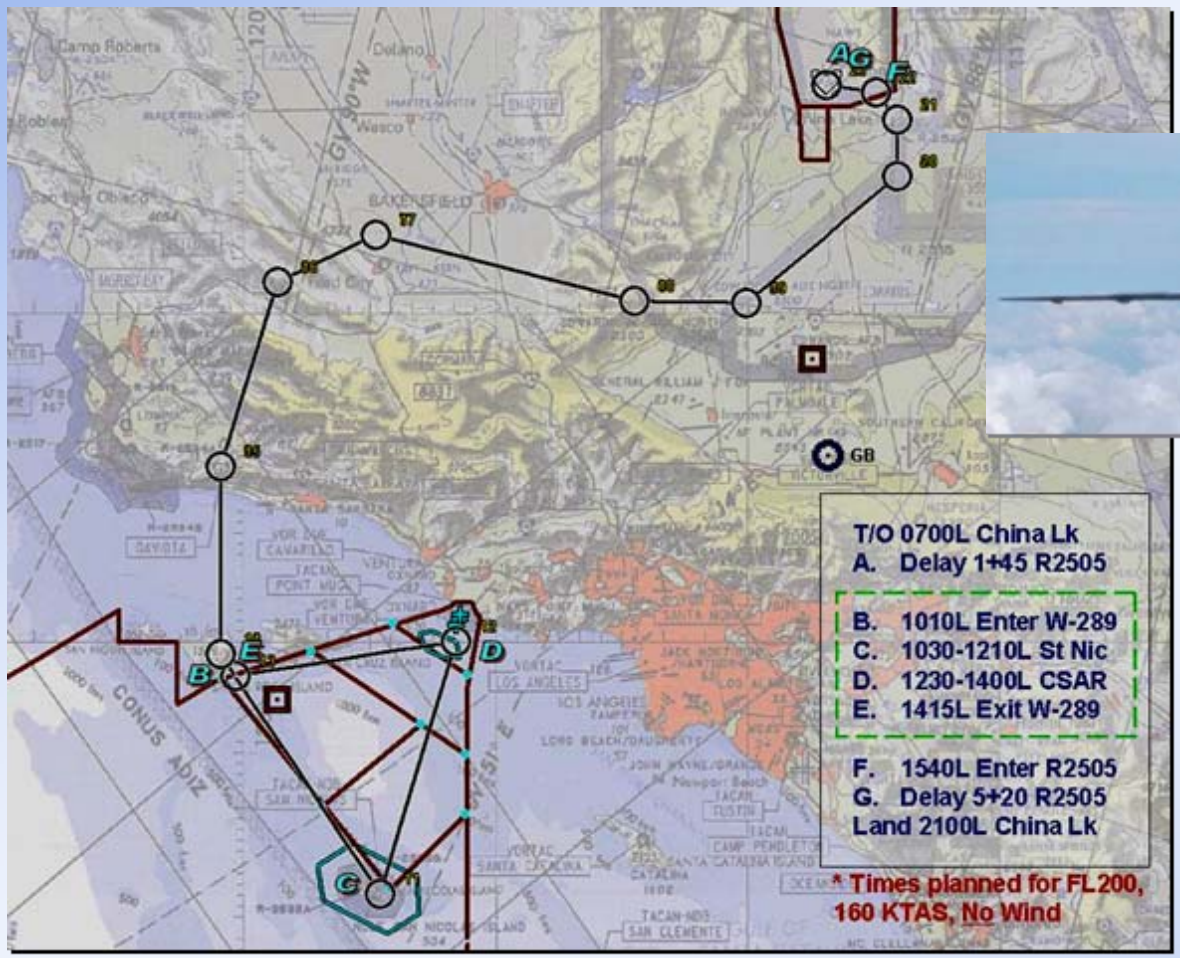
Successfully and safely integrated Global Hawk and manned aircraft operations

Successes

Expanded use of outlying airfields and Range Facilities



Successes



Air routes are being established and exploited today

Flight Routing
China Lake to San Nicolas Island

Conclusions

- Broad spectrum of systems
  - Unique set of Technical, Range, and Social Challenges
- UAS Test & Operation not standardized
  - Doesn't always fit manned aviation construct
- Processes and infrastructure need to catch up
  - AirOps, Range Safety, airspace, communications, runways, hangars
- UASs represent great new potential
  - Many successes starting to leverage these capabilities

UASs are revolutionizing the way we prepare for and fight wars in the 21st Century