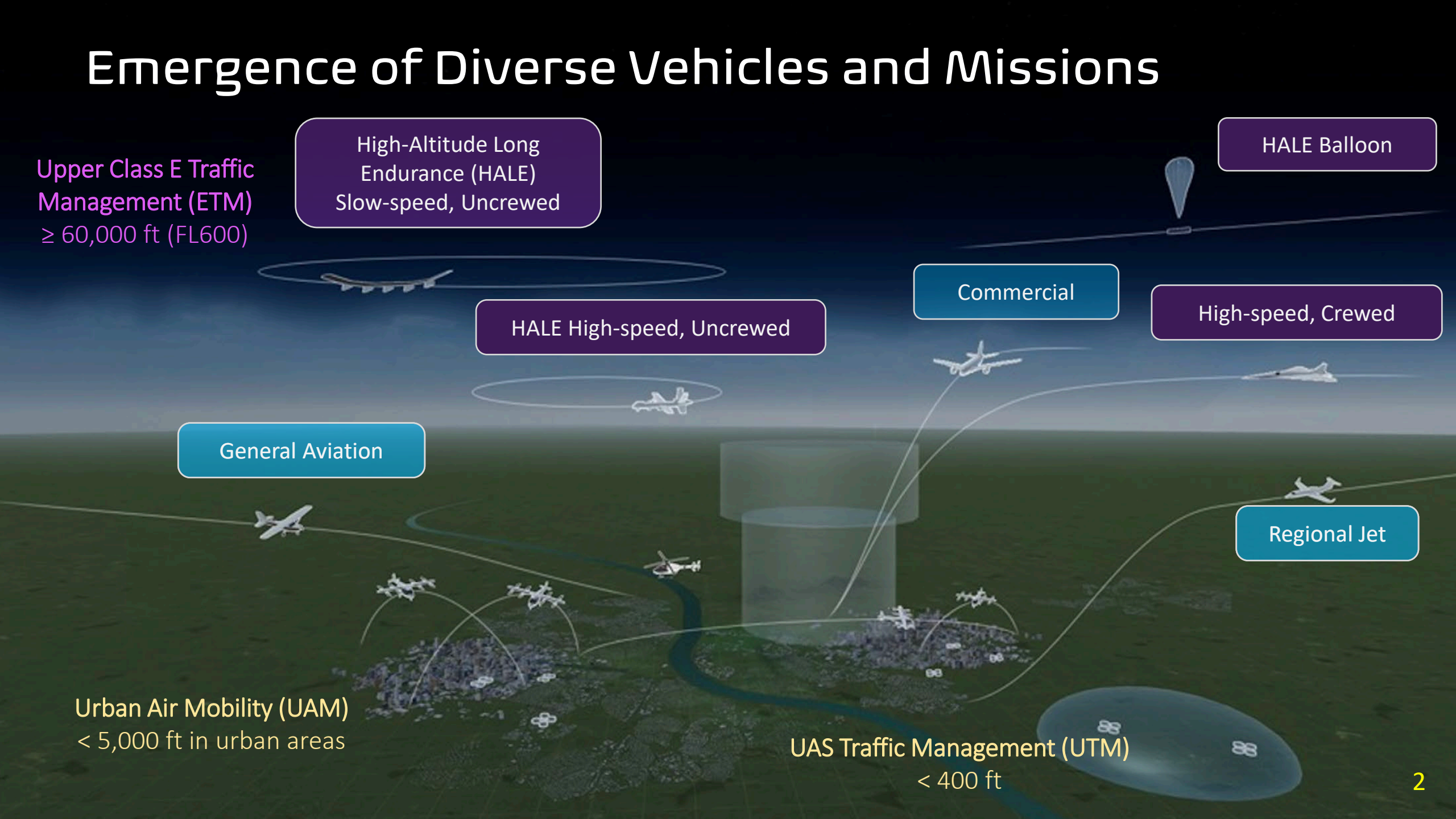
Cybersecurity Challenges for Advanced Air Mobility

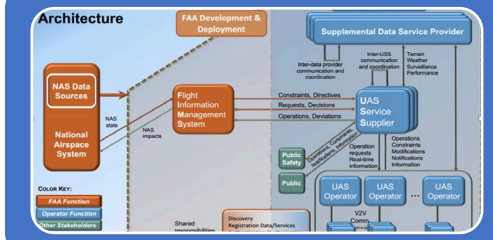
Kenneth Freeman
Air Traffic Management eXploration Project

Emergence of Diverse Vehicles and Missions

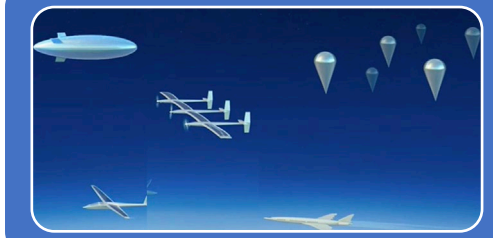


Extensible Traffic Management (xTM)

xTM: The overarching term for traffic management approaches and/or associated services that address the operation of select new entrants within flexibly allocated, designated airspace.



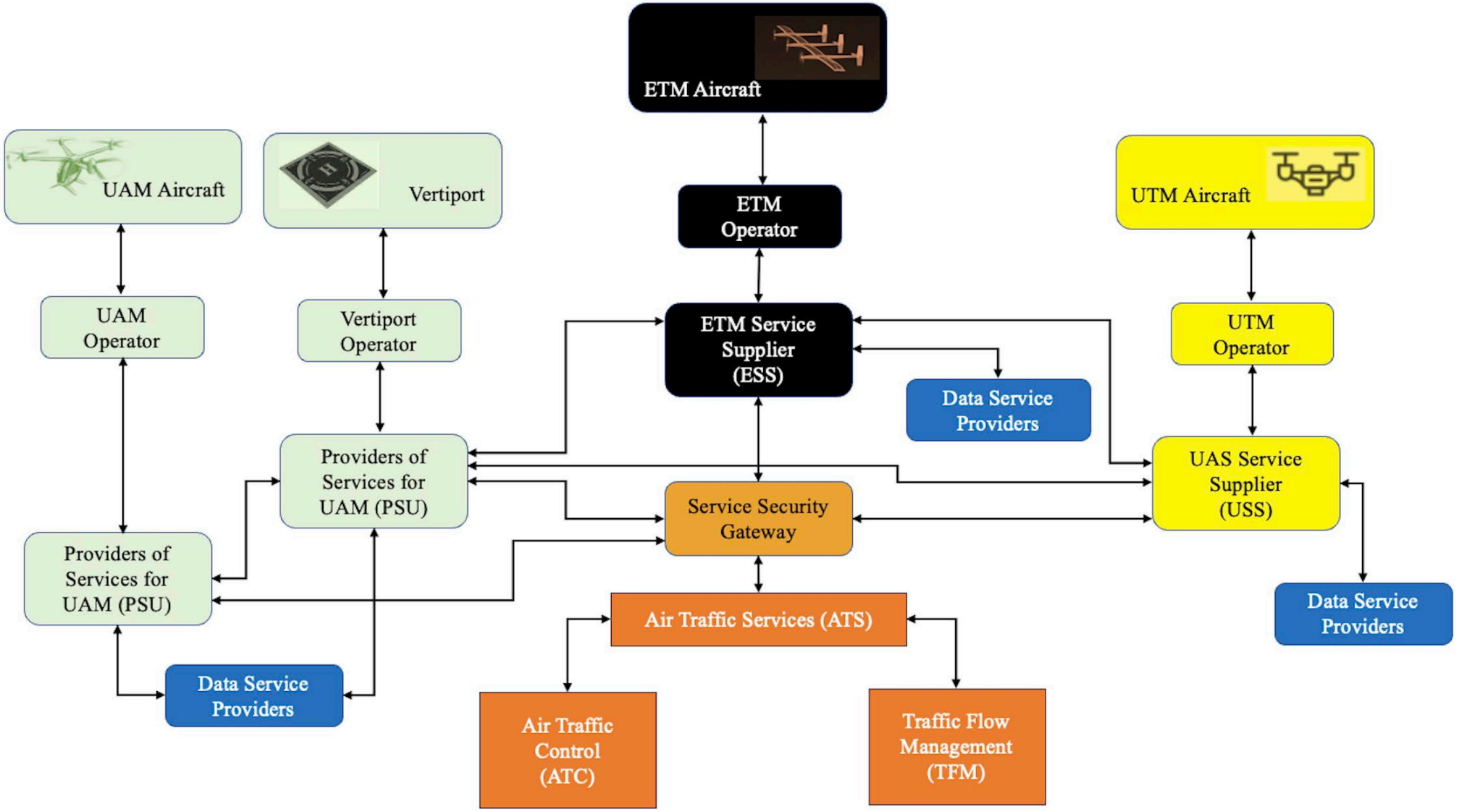
Unmanned Aircraft System Traffic Management (UTM)



Upper Class E Traffic Management (ETM)

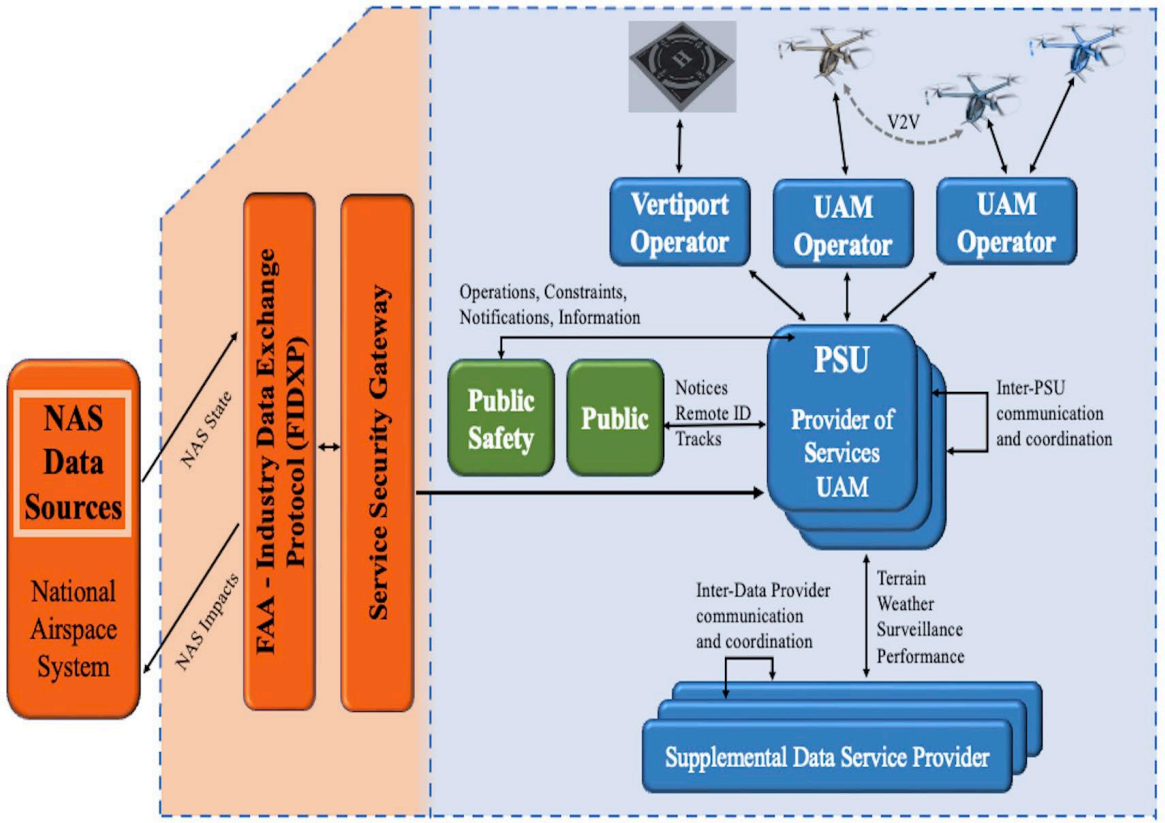
Urban Air Mobility (UAM)

Notional xTM Architecture



UAM Environment

The UAM environment has a service-oriented architecture where UAM operators and service providers work independently to mange aerial vehicles in the urban environment.



- The UAM environment is derived from the Unmanned Traffic Management (UTM) concept of operations.
- Providers of Services for UAM (PSU)operators, and Supplemental Data Service Providers (SDSP) provide services to support flight operations within the UAM environment.
- The FAA can coordinate flight information between the FAA controlled National Airspace System (NAS) and the UAM environments through the Flight Industry Data Exchange Protocol (FIDXP) and the associated Service Security Gateway

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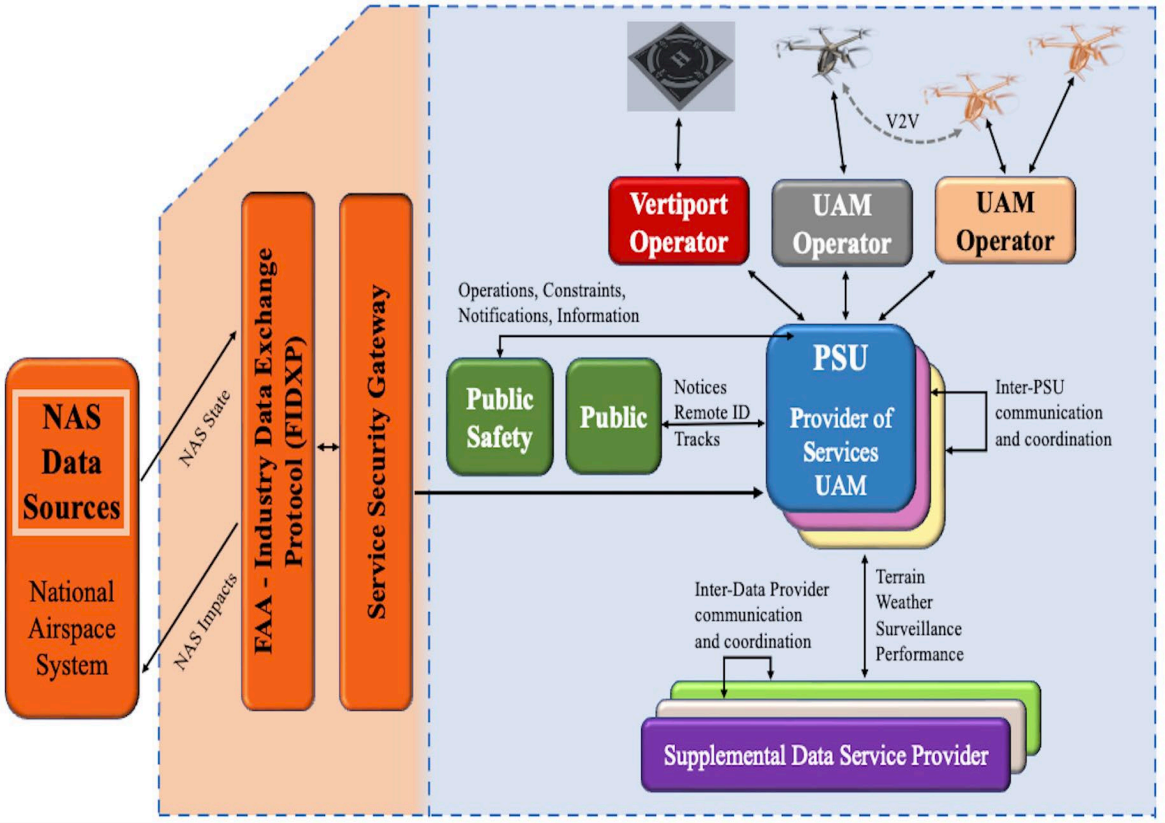

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- The service-oriented architecture creates a distributed and decentralized environment

Laying the ground: Some Definitions

Threat	Vulnerability	Risk
• A potential cause of an unwanted incident that may result in harm to a system or organization	• A weakness in a system that can be exploited by a threat to cause damage or perform unauthorized actions	• The potential for loss or damage when a threat exploits a vulnerability, evaluated in terms of likelihood and impact

Selected xTM Cybersecurity Challenges

Distributed	Flight operations and services will be distributed across multiple locations leading to potential network or comms-based vulnerabilities
Decentralization	Flight operations and service delivery will be managed by multiple entities leading to uncertainties in cyber security protection methods
Cross-Domain Identity Management	Identity Access Management (IAM) will require a solution across multiple entities

Selected xTM Cybersecurity Challenges

Spoofing	Critical systems can be spoofed, leading to the potential of inaccurate data
Malicious Code	Network exposed system are always susceptible to malicious code compromise leading to the loss of data confidentiality or integrity
Jamming	The is a risk of jamming of communications links, that is not common in most cyber systems

Mitigation Controls

Authentication (of entity's identity that is communicating)

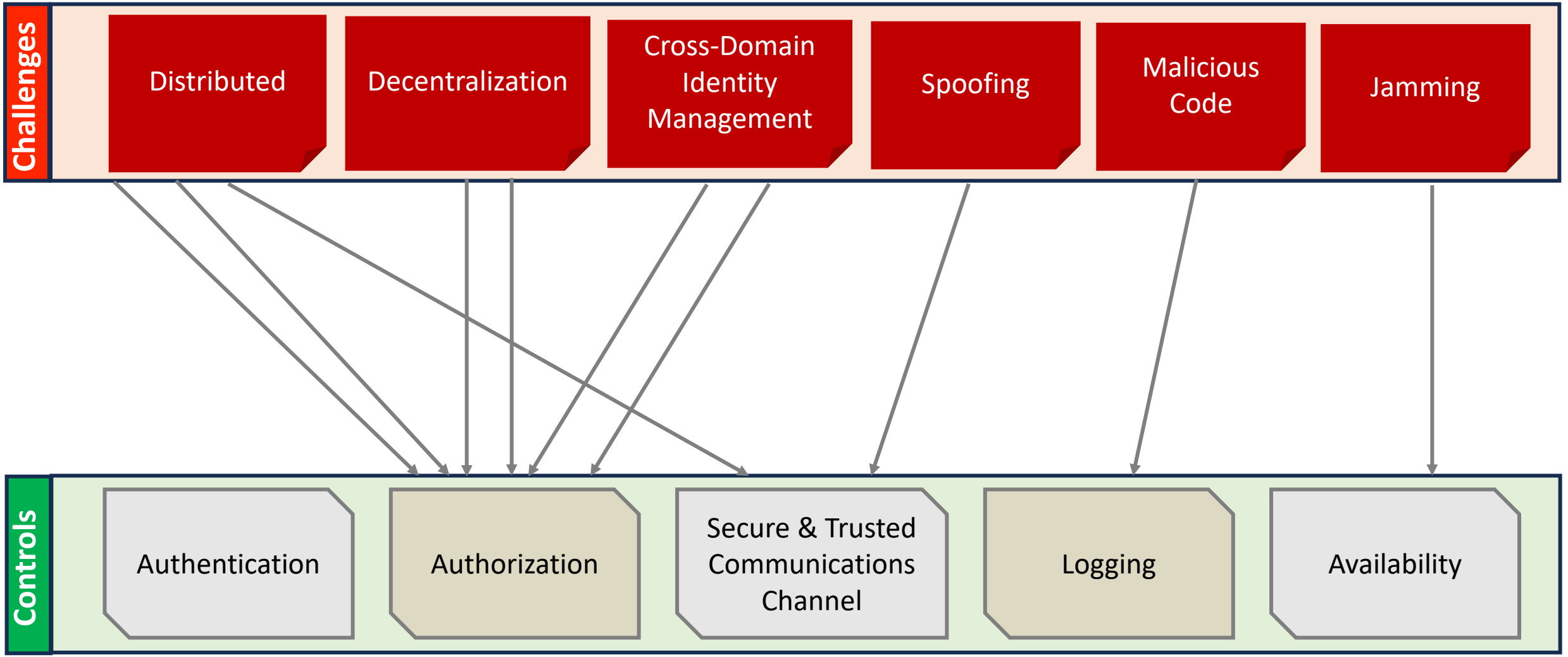
Authorization (of entity sending a 'privileged' request)

Secure & Trusted Communications Channel (Integrity/Security of communications channel to send requests)

Logging (of events in a secure immutable system)

Availability (of service to receive events)

Mitigation Controls

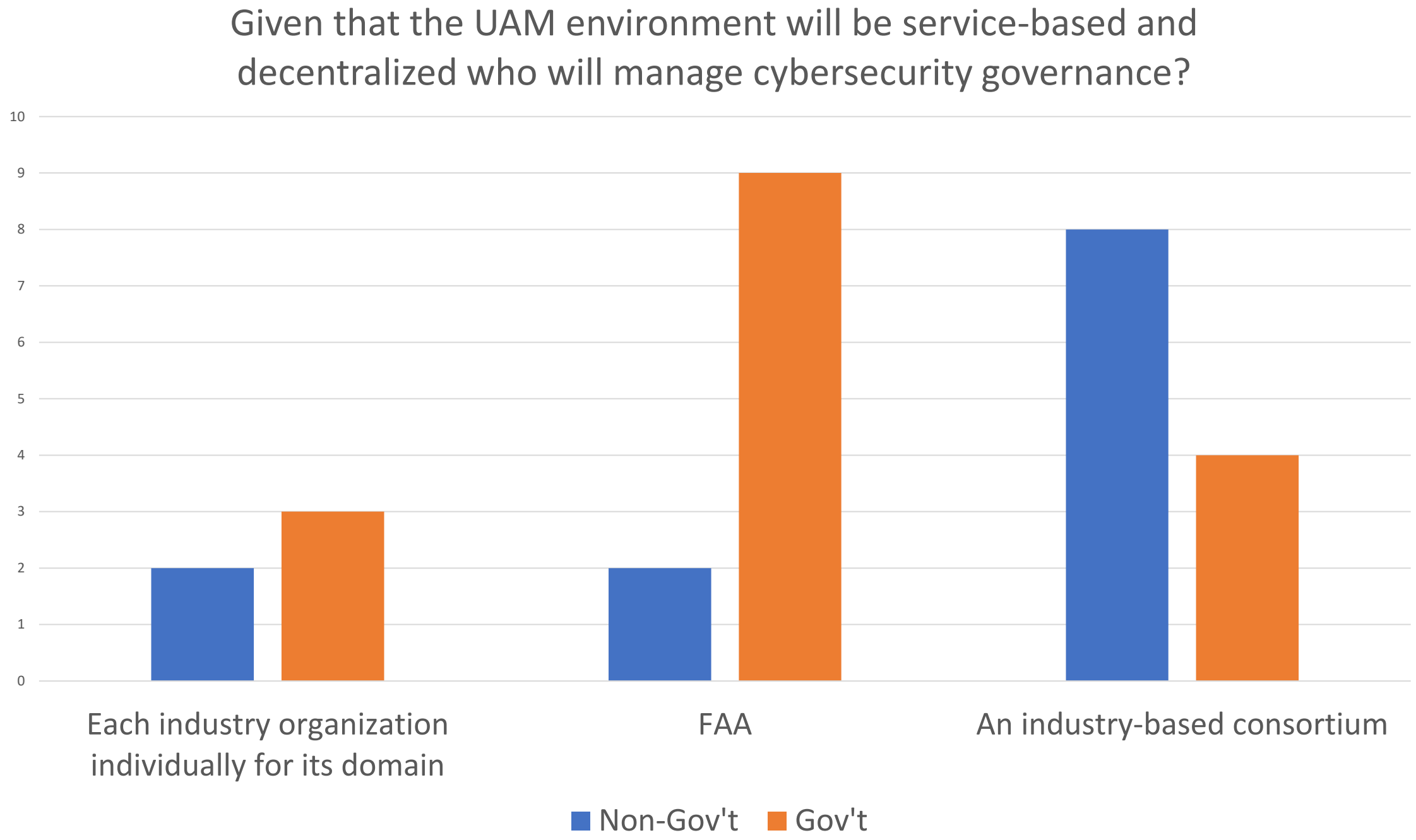


Given that the UAM environment will be service-based and decentralized who will manage cybersecurity governance ?

A) Each industry organization individually for its domain

B) FAA

C) An industry-based consortium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9
8
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Each industry organization individually for its domain
FAA
An industry-based consortium
Non-Gov't
Gov't

Questions ?