



# Info-Centric NAS Tech Talk

ATCA 2022

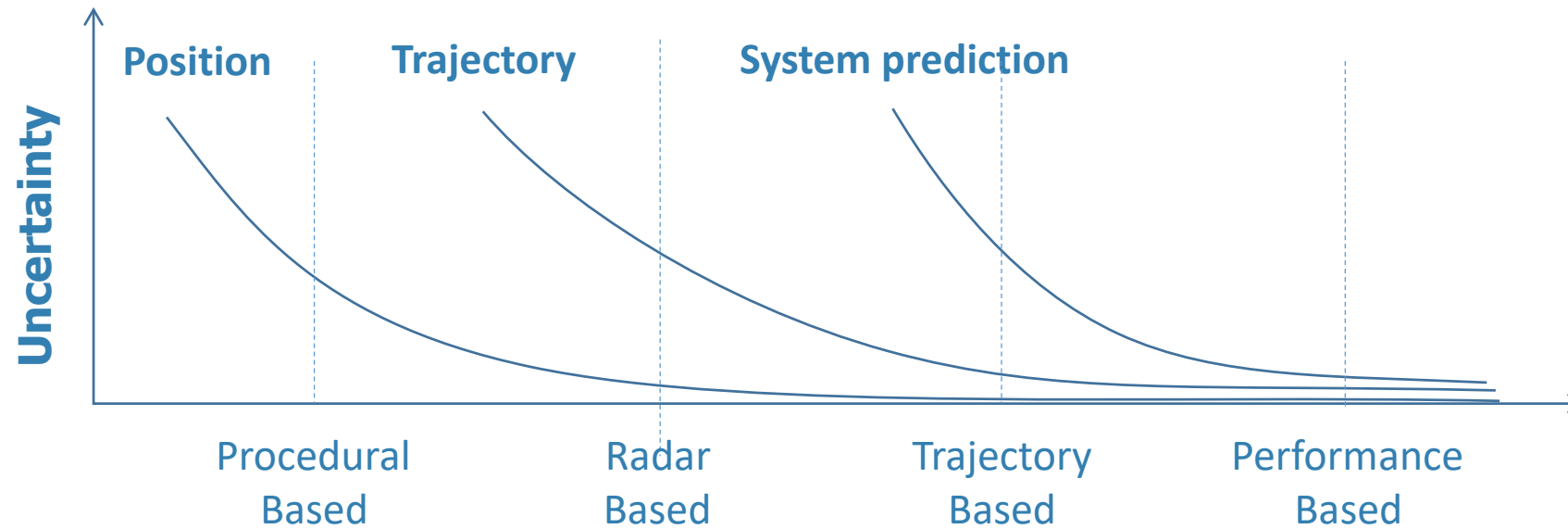
# Agenda

- What is ICN
- Leveraging NextGen
- Opportunities
- Principles
- Pillars
  - Diverse Ops
  - Infrastructure
  - In-Time Safety
- Next Steps

# The Future of the NAS

- Operationalizing NextGen
  - NextGen Foundational Infrastructure is in place to support the path to Trajectory Based Operations the ability to manage aircraft based on time and future location
  - Moving from NextGen as *the future* to NextGen as the new *status quo*
- Path to NAS 2035 (Advancing the NAS beyond NextGen)
  - Will build on the NextGen foundational infrastructure
  - Will leverage NextGen and industry investments to provide additional capabilities to users beyond the Core-30
  - Will address the key drivers of change in a manner that respects our principles of aviation while taking advantage of opportunities brought on by innovation and societal change.
  - Will provide real-time safety analytics across all operations means safer skies for everyone
  - Users will be more connected and information is readily available to support decision making.
    - Information is made available based on each participant's needs and access level

# Towards Performance-Based (NAS 4.0)



NextGEN



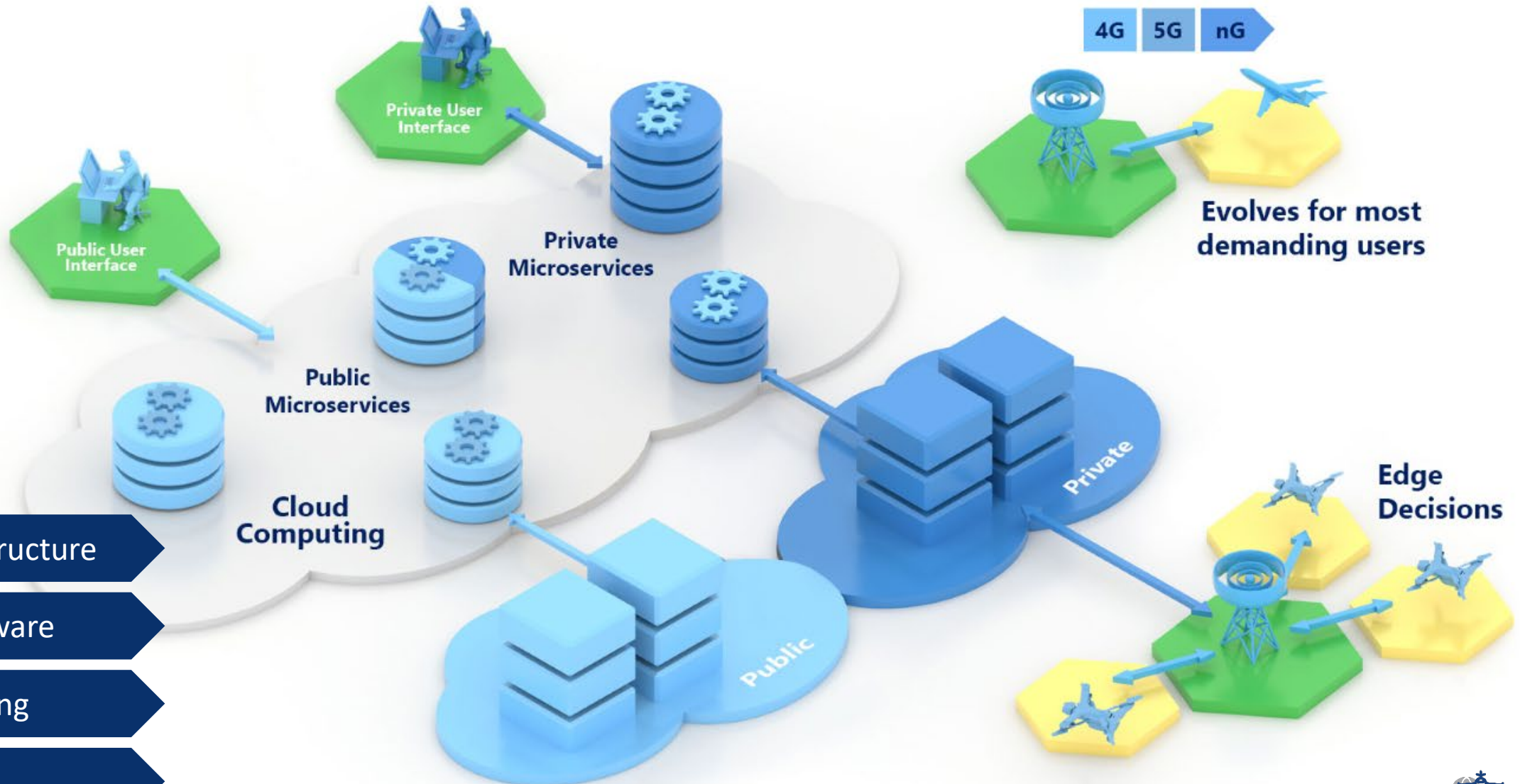
# Motivation and Opportunities

- New airborne including environmental friendly vehicles are emerging, which perform new missions and operate in new ways to execute those missions.
- While their safe operation and accommodation within current Air Traffic Service can be provided today, current service accommodation will not scale to meet the expected growth in these operations.
- New traffic management services, tailored to new entrant characteristics, will be developed and able to coexist with traditional Air Traffic Service





# Evolving Infrastructure



# Principles for a Future Vision





# Diverse Operations



# ICN Diverse Operations



Transit to Space

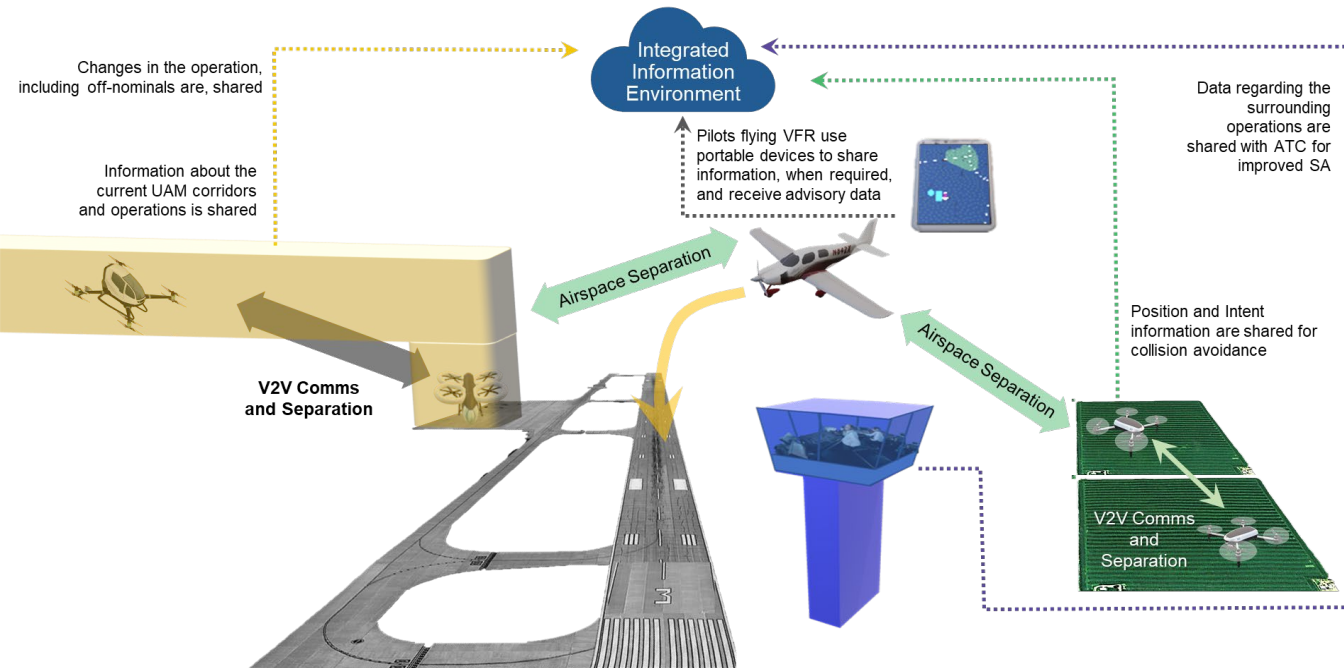
Higher Airspace Services

Air Traffic Separation Services

Urban Air Traffic Services

Unmanned Traffic Services

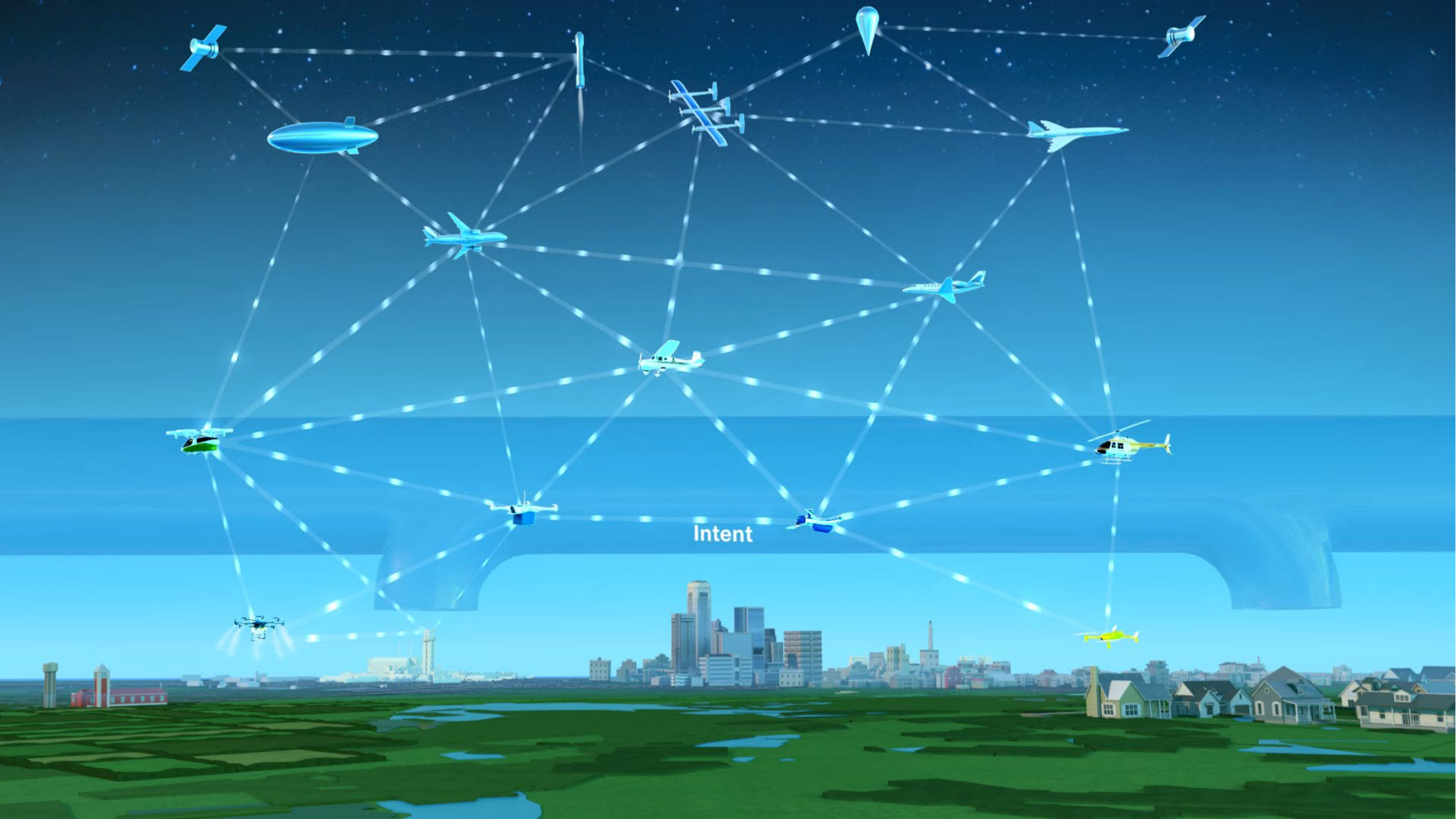
# Scenario: Interactions between VFR and xTM Aircraft at Lower-Level Altitudes



- A GA flight flying VFR and descending in the vicinity of UAM and sUAS operations that is planning to land at a small, towered airport.
- The GA pilot receive airspace, aircraft position, and intent data (e.g., via a portable device) and shares its intent and position data, when required, with the integrated information environment.
- Simultaneously, a UAM operation is taking place near the airport. The UAM service supplier automation interacts with operators using the integrated information environment to obtain position, intent, and current and planned use of these UAM corridors.
- Concurrently, a flock of sUAS is dusting crops. The operation volume in which the sUAS are flying is shared with all participants via the integrated information environment.

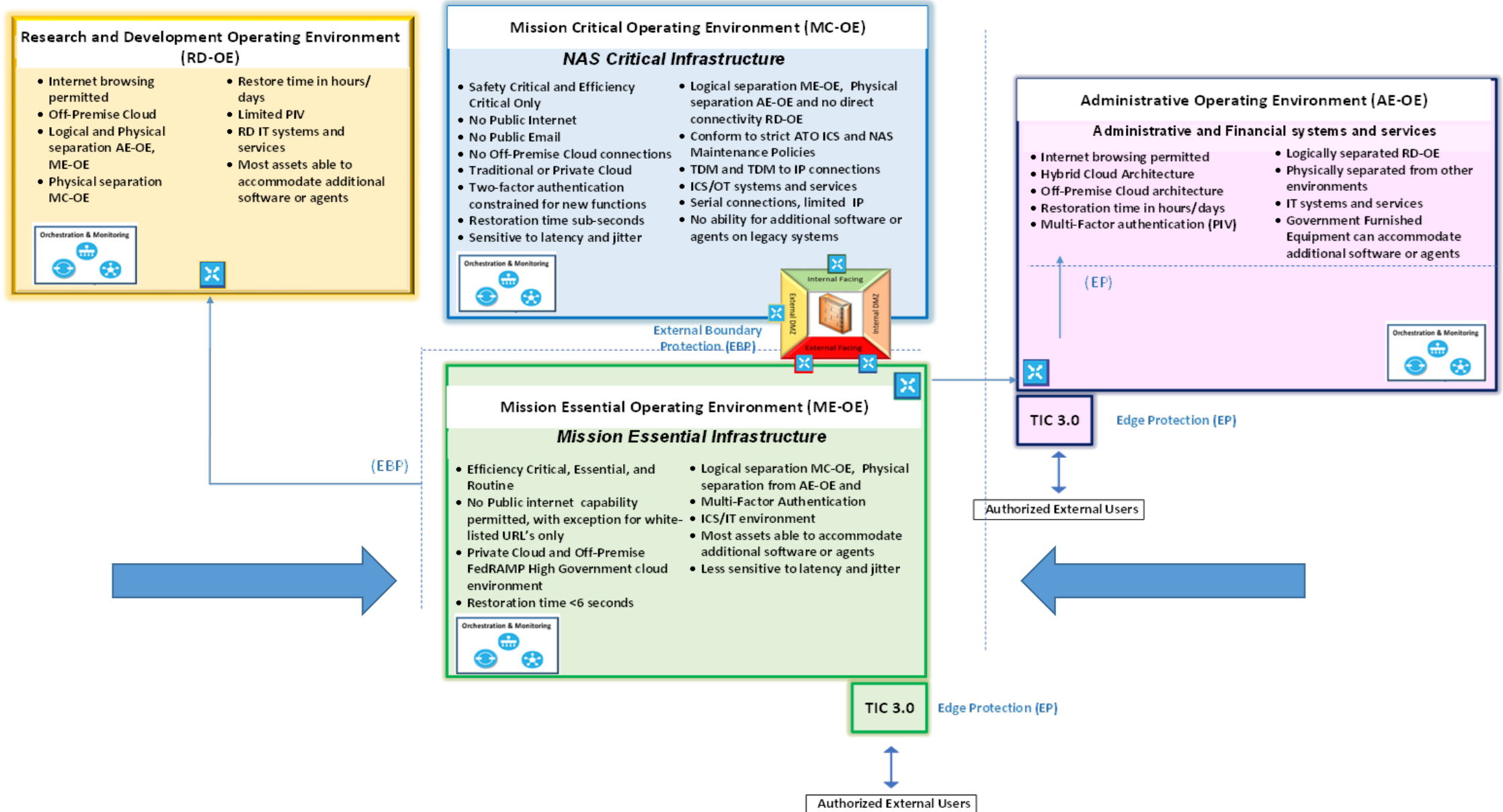


# Infrastructure



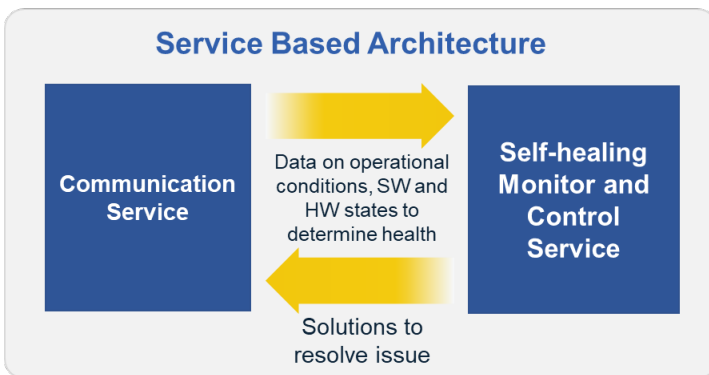


# Operating Environments





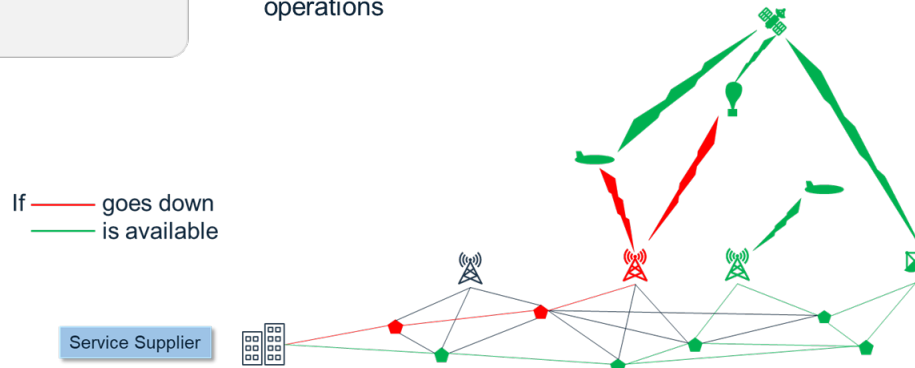
# Scenario: Agile and Evolving Services with Self-Healing Systems and Resiliency



A self-healing monitor and control service provides capabilities that will

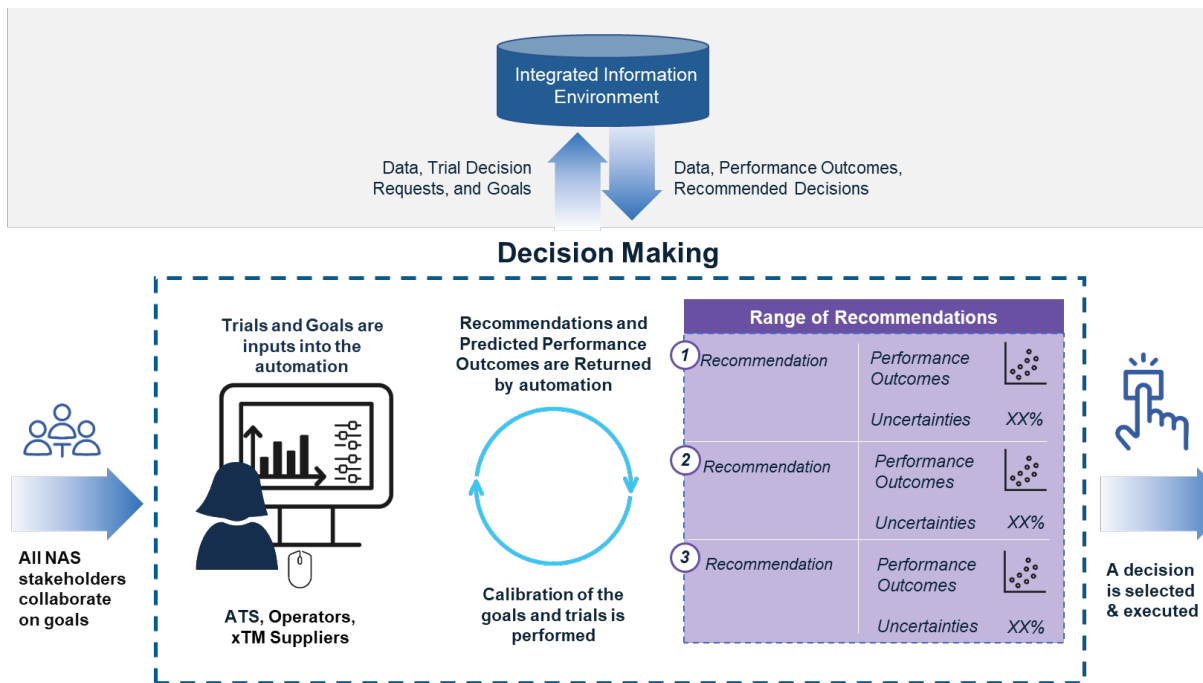
- Detect failures
- Quickly predict failures and/or degraded service levels
- Proactively identify solutions (recommendations)
- Alert or resolve the failure in a timely manner

Resolution of failures are data driven, where alternatives include changes to the infrastructure and/or changes to operations



- The self-healing service continuously evaluates the communication service's status, integrating this data with the health status of other communication services to create a broader picture of all NAS communication services.
- A communication pathway goes down - the self-healing service automatically reconfigures the communication network to bypass the offline node.
- If the network cannot be successfully automatically reconfigured, the service may determine the need to scale up current available communication services, which can be provided by different private entities, to ensure adequate communication coverage during this outage.

# Scenario: Continuous Planning with Smart Systems



- In the future, all NAS stakeholders collaborate to achieve operational goals for a specific timeframe or operation.
- After the NAS stakeholders have decided on the level of goals they want to attain, the goals are shared among ATS, Operators, xTM Suppliers, or any party responsible for the safe and efficient management of traffic in the NAS.
- Later, these parties submit the performance goals to smart systems that process the information by running models and simulations.
- The automation then returns a range of recommendations and predicted performance outcomes each one with a probability of success. The operators can then study the range of recommendations, make calibrations, and select a path forward that best supports their mission objectives while remaining in line with NAS performance goals.



# In-Time Safety

# Tailored Operations and Flight Rules

## **TAILORED SERVICES**

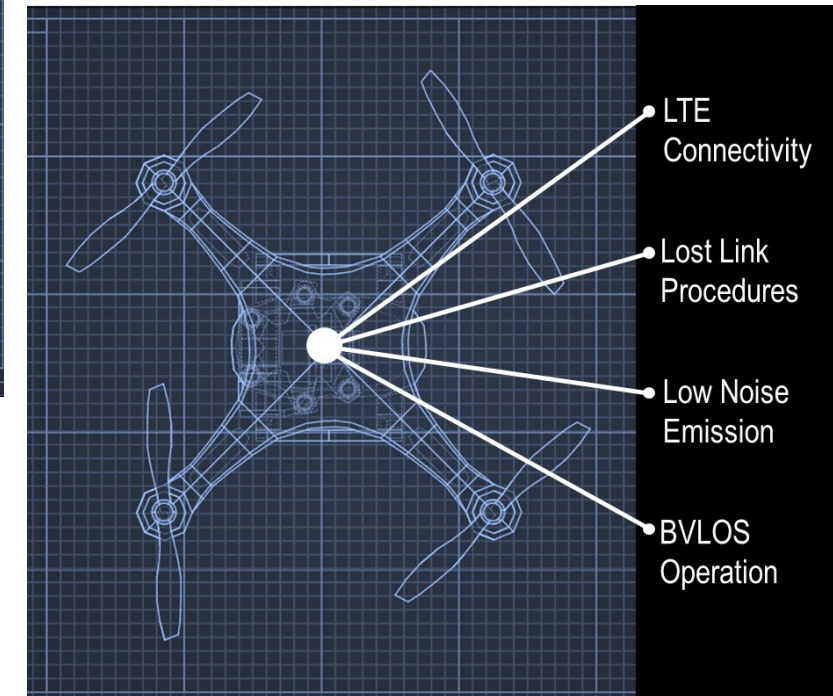
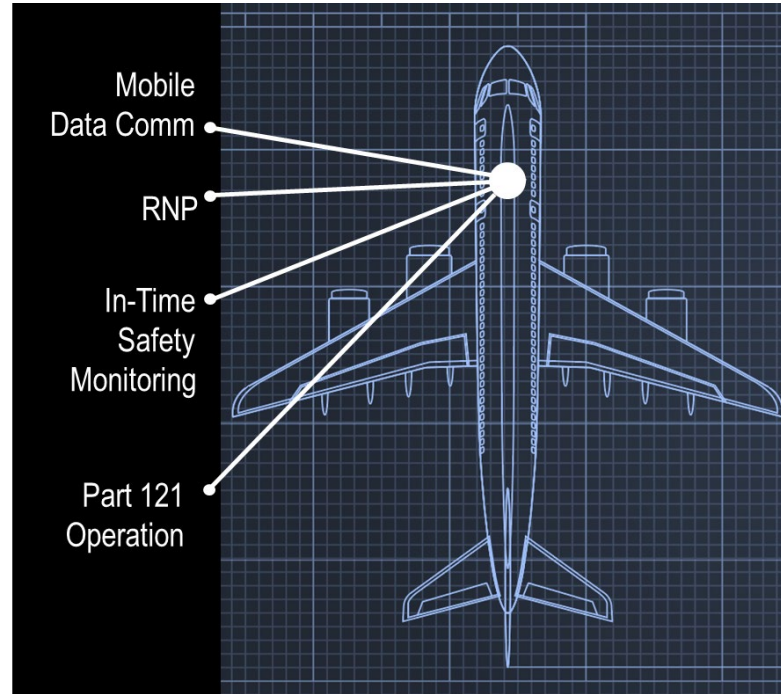
MEET THE NEEDS OF  
OPERATIONS IN ALL  
AIRSPACE

## **FLIGHT RULES**

ACCEPTABLE RISK TO  
ALL PARTIES

## **JOINT USE AIRSPACE**

WHERE POSSIBLE



# In-Time Safety Risk Management



**CONTINUOUS  
DATA  
EXCHANGE**



**MACHINE  
LEARNING**



**AUTOMATED  
MONITORING**



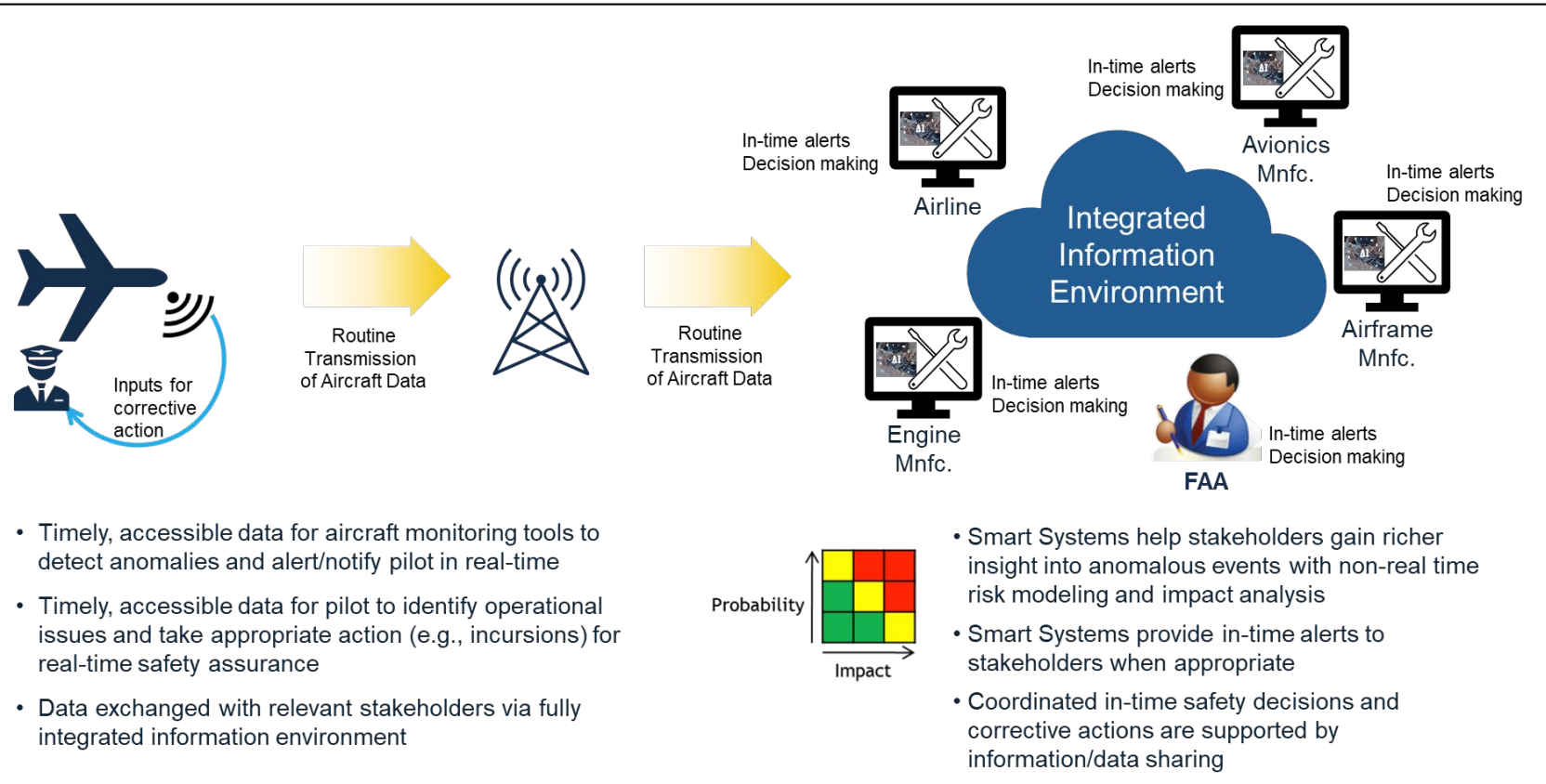
**PROGNOSTIC  
RISK  
MODELING**



**ALERTING  
AND  
RESPONSE**



# Scenario: Safety Risk Management with Connected Aircraft and Smart Systems

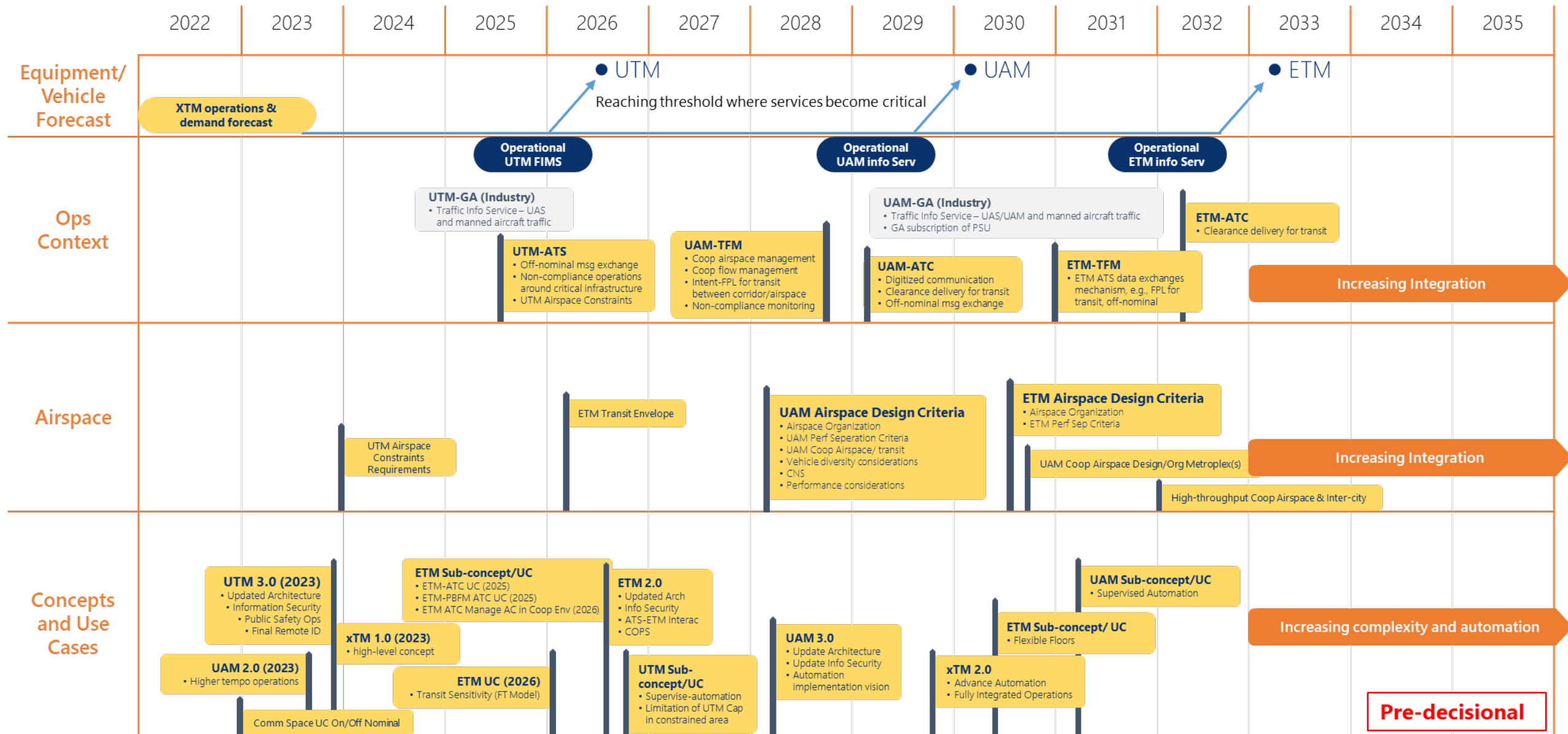


- In-time safety assurance relies on the real-time monitoring and collecting of performance data.
- Vehicles share position, intent, and status data via connected aircraft using commercial communications technology for information exchange with ground systems.
- Smart capabilities/systems identify negative behaviors or tendencies, notify them of what corrective action is necessary, and provide additional insight, such as the consequence of inaction, needed for in-time decision making.

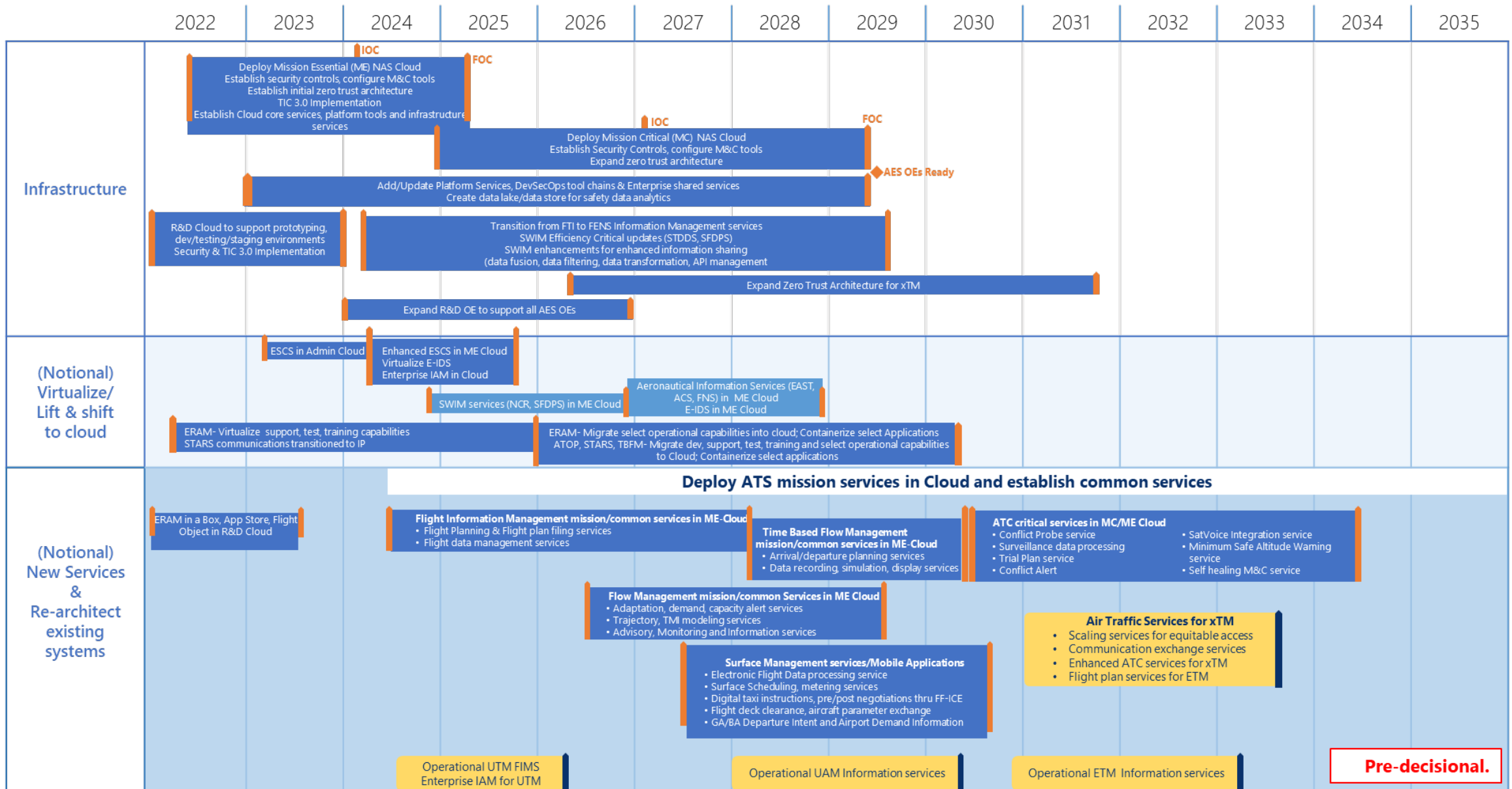


# Next Steps

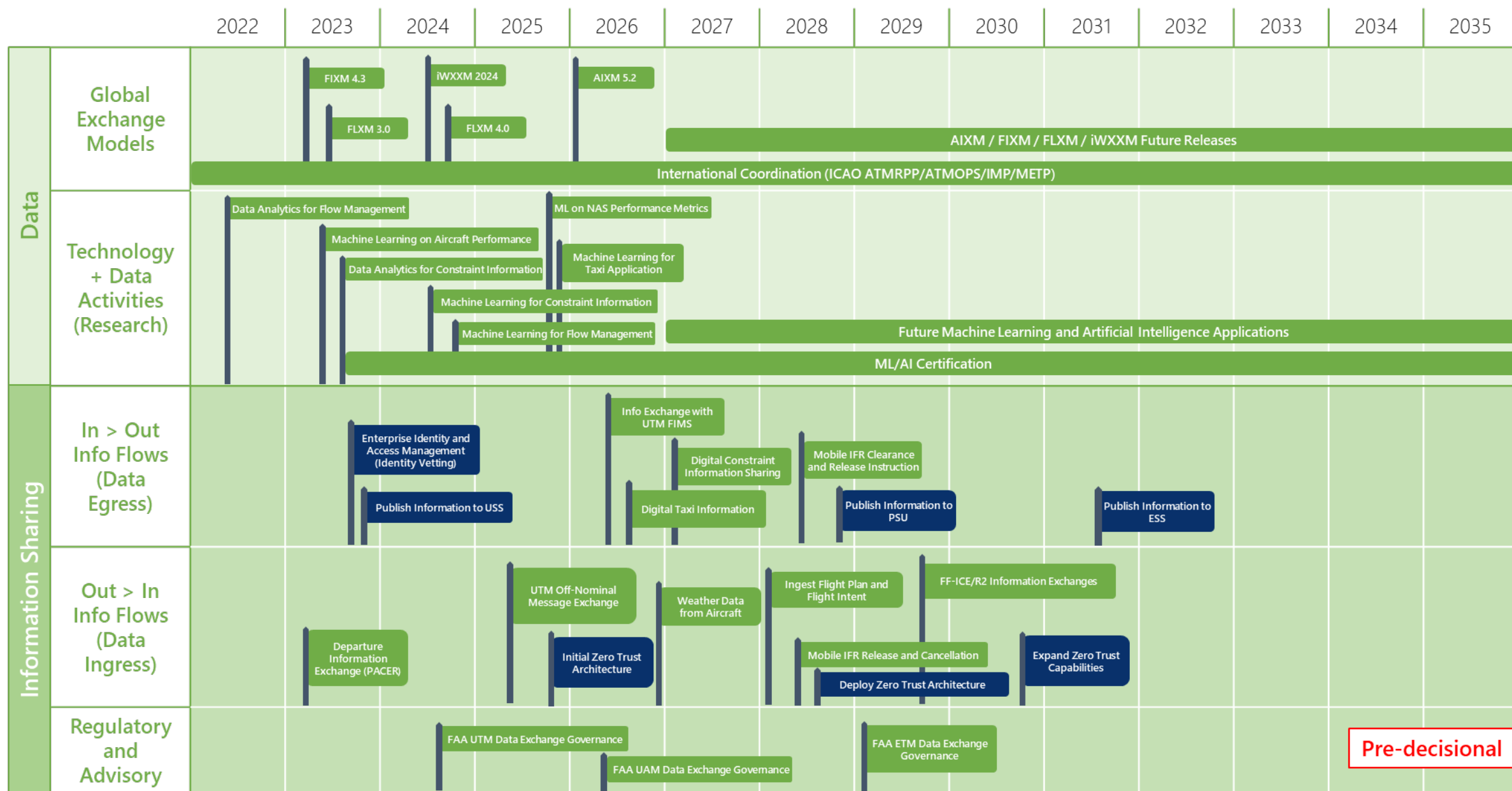
# Operational Landscape



# Technology Landscape

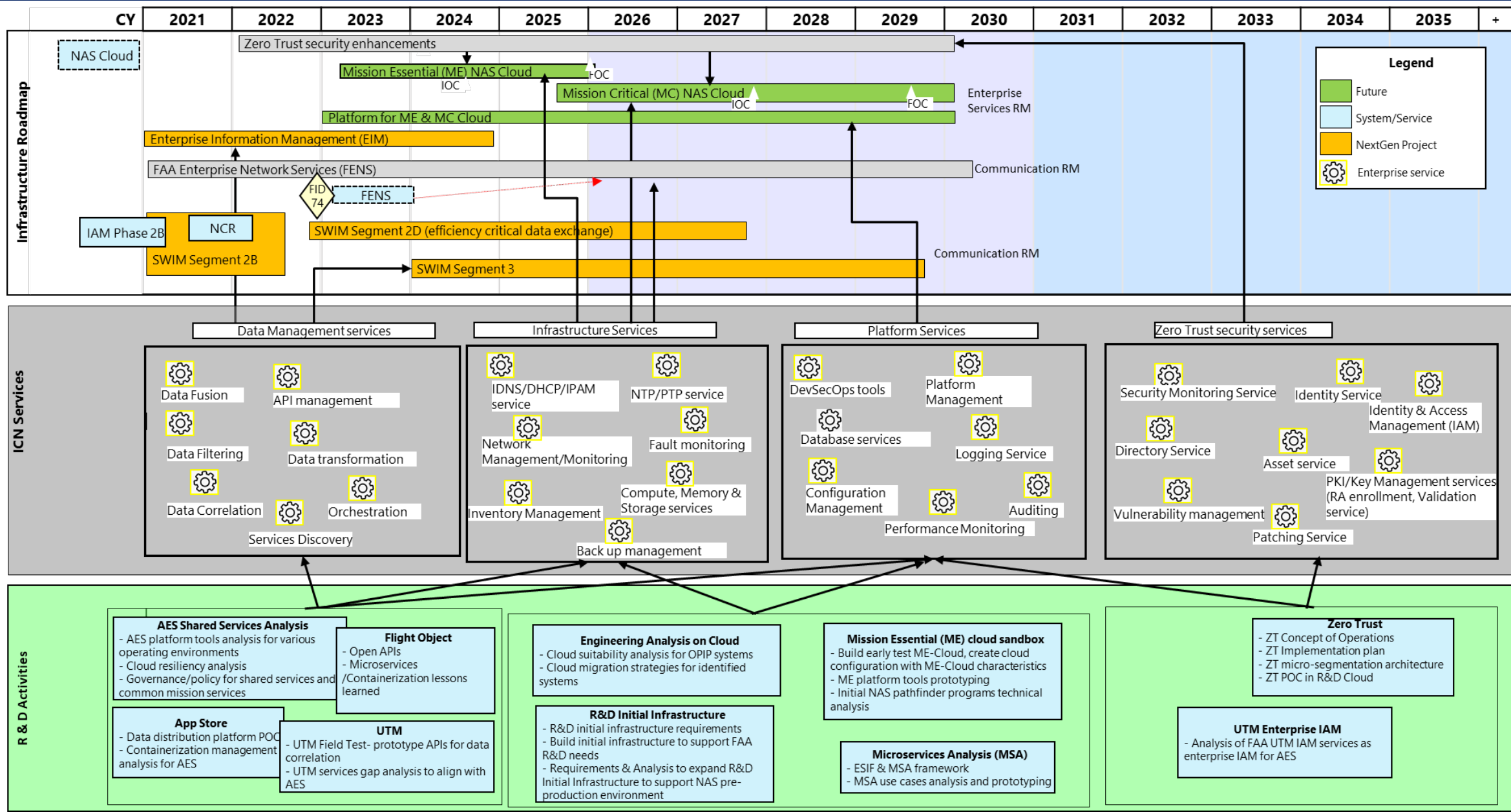


# Information Landscape





# Enterprise Cloud/Platform Services



# Website/Email

- ICN link
  - <https://www.faa.gov/icn>
- NAS EA link
  - Coming Soon!
- ICN mailbox
  - [Info-centric-nas@faa.gov](mailto:Info-centric-nas@faa.gov)

# Q&A



**Thank You!**



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