



Innovation – Notes from the US

SESAR Innovation Days 2022

The Future of the NAS

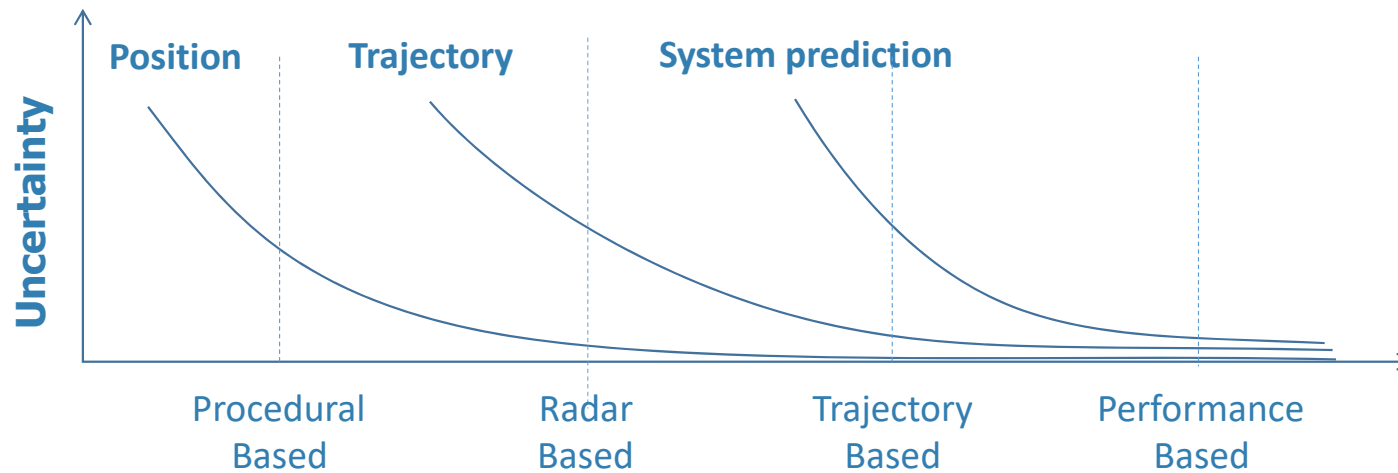
- **Operationalizing NextGen**

- ✓ 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.



ICN Diverse Operations

Transit to Space

Higher Airspace Services

Air Traffic Separation Services

Urban Air Traffic Services

Unmanned Traffic Services



Tailored Operations and Flight Rules

TAILORED SERVICES

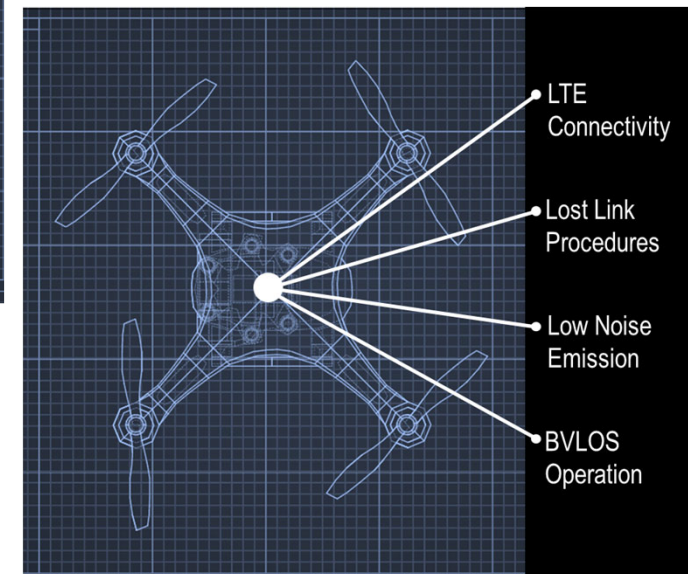
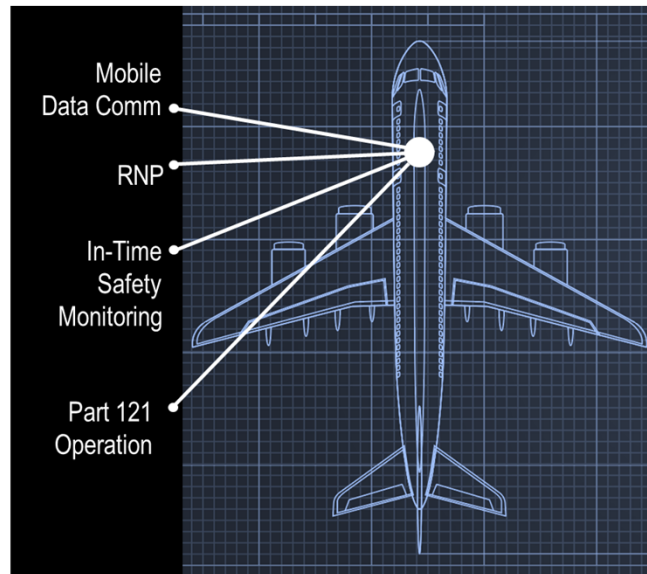
MEET THE NEEDS OF
OPERATIONS IN ALL
AIRSPACE

FLIGHT RULES

ACCEPTABLE RISK TO
ALL PARTIES

JOINT USE AIRSPACE

WHERE POSSIBLE



Ubiquitous Infrastructure

Commercial providers

Aviation-specific spectrum

Commercial spectrum

Diversity of infrastructure
(Ground & Air)

Commercially-provided
services

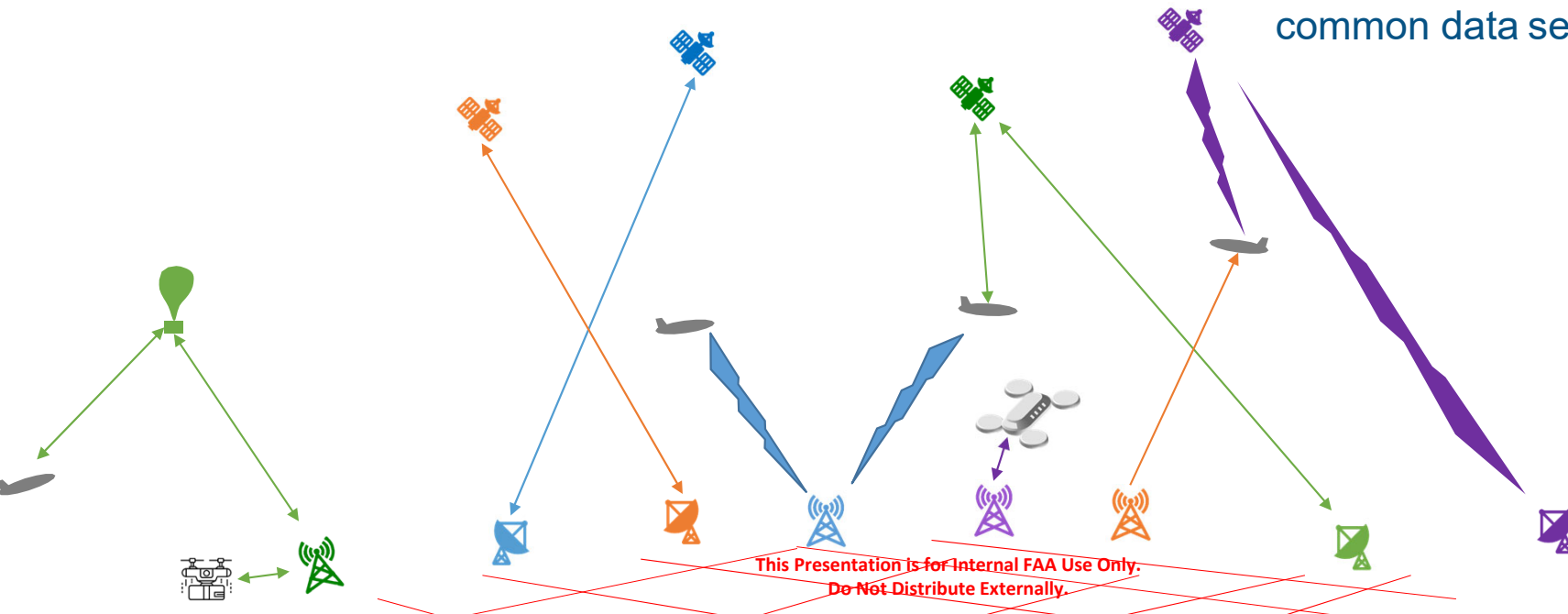
Performance-based

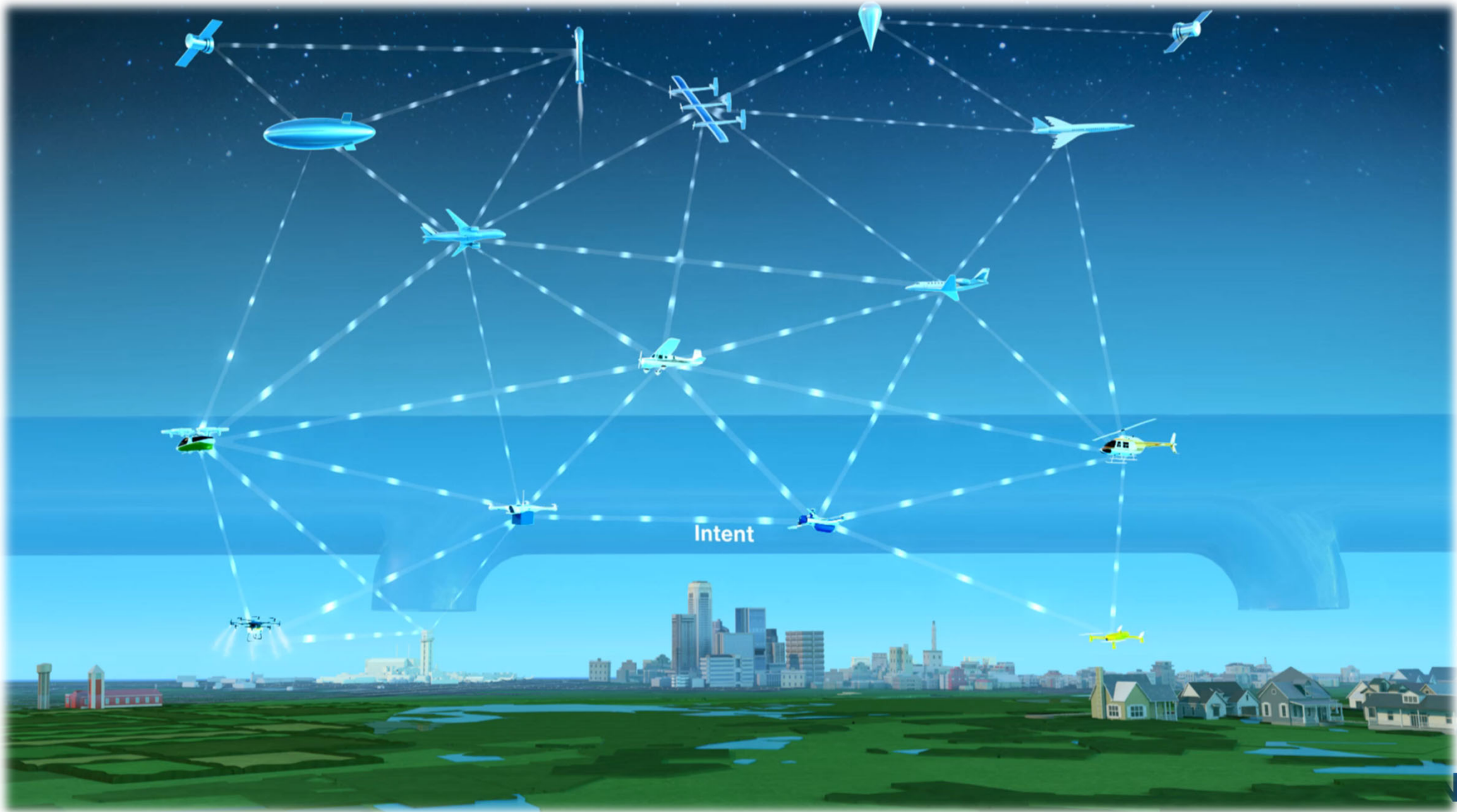
Fully Converged on IP w/ IPS

IoT across operations

Access-managed
common data services

- Scalable
- Robust
- Resilient







AIRBUS



Future Connectivity for Aviation – FCAV

Task Force White Paper **DRAFT DOCUMENT**

Airbus

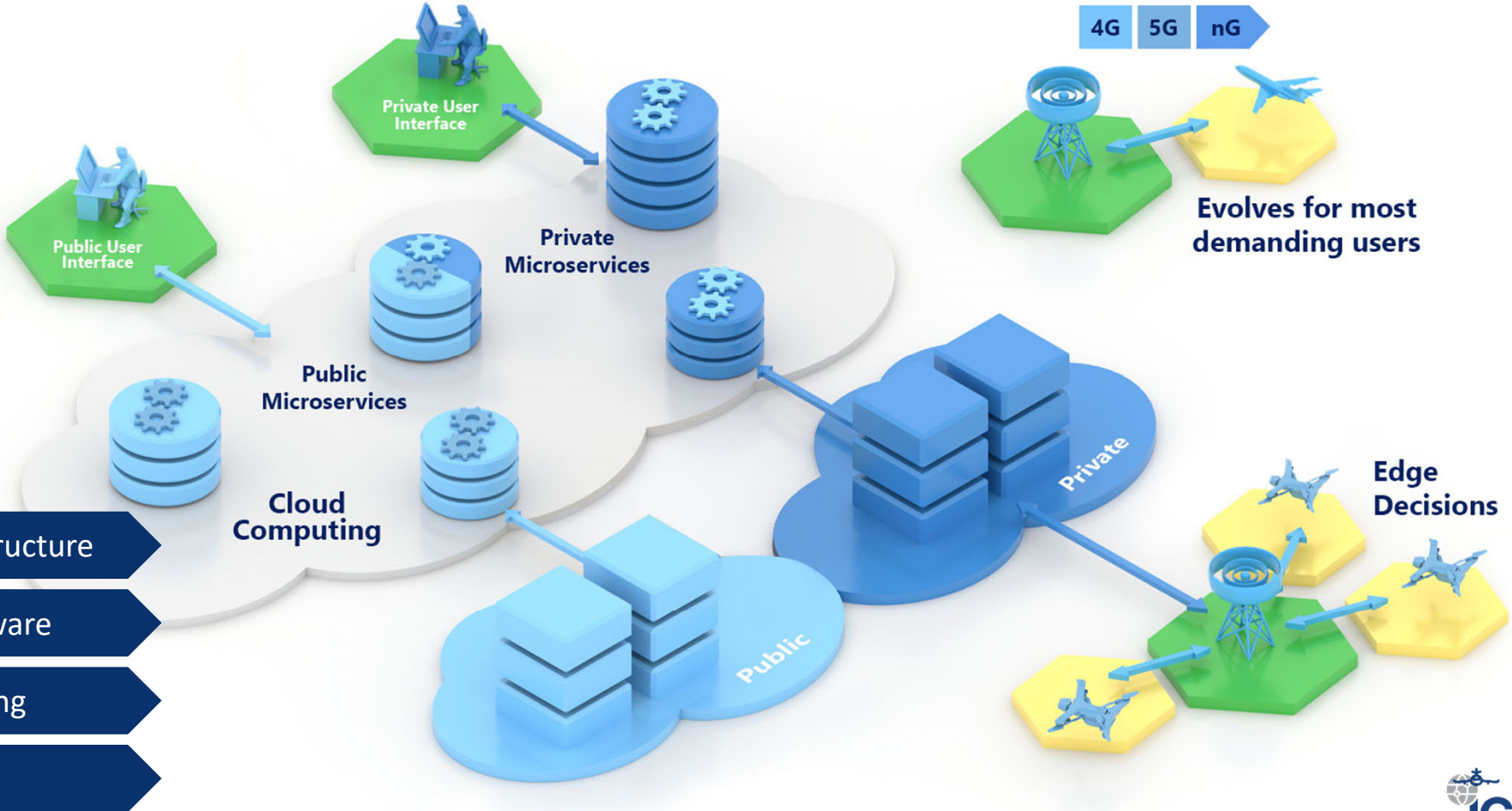
Boeing

EASA

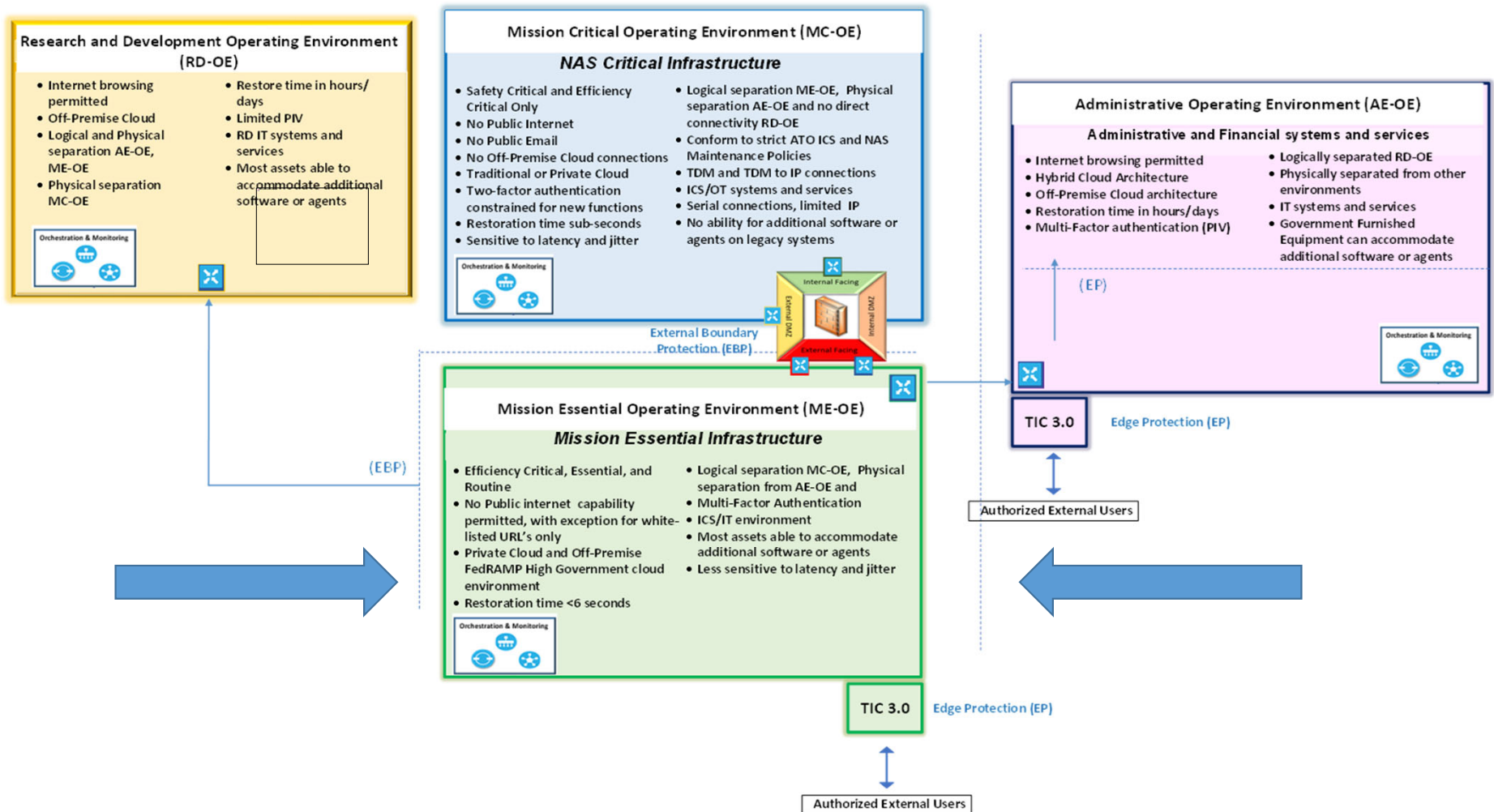
FAA

Reference **XXXX** Revision 1.0 – **XX/12/2022**

Evolving Infrastructure



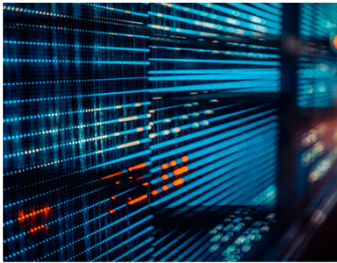
Operating Environments



Principles for a Future Vision



In-Time Safety Risk Management



**CONTINUOUS
DATA
EXCHANGE**



**MACHINE
LEARNING**



**AUTOMATED
MONITORING**

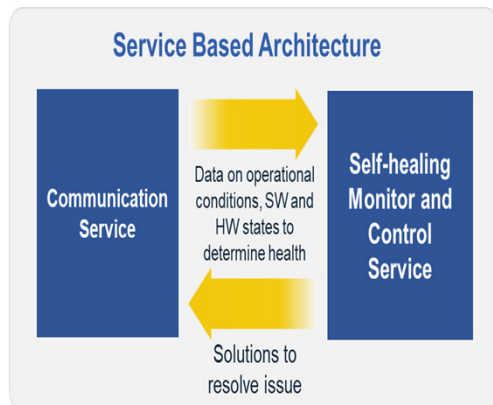


**PROGNOSTIC
RISK
MODELING**



**ALERTING
AND
RESPONSE**

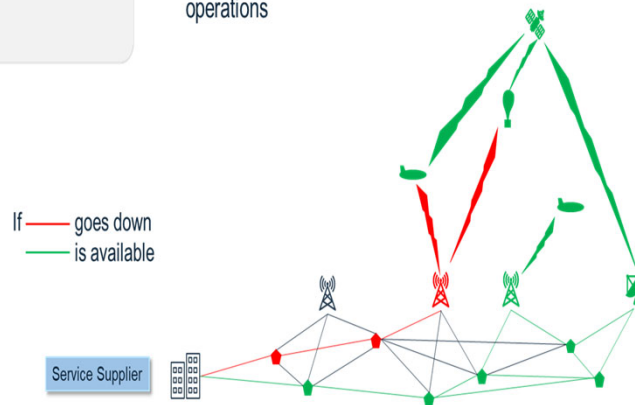
Scenario: Agile and Evolving Services with Self-Healing Systems and Resiliency



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

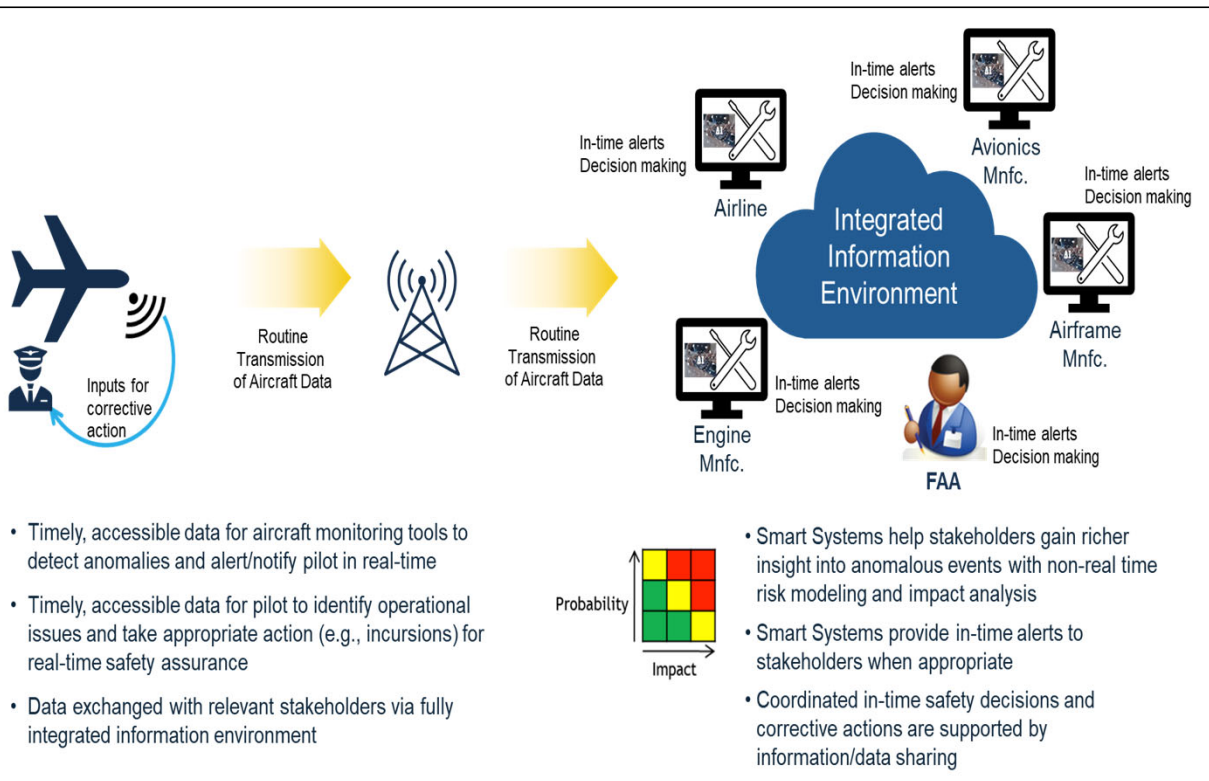
- Detect failures
- Quickly predict failures and/or degraded service levels
- Proactively identify solutions (recommendations)
- Alert or resolve the failure in a timely manner

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: 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.

Website/Email

- ICN link
 - https://www.faa.gov/about/office_org/headquarters_offices/ang/icn
- NAS EA link
 - <https://www.faa.gov/nextgen/nas-enterprise-architecture-infrastructure-roadmaps>
- ICN mailbox
 - Info-centric-nas@faa.gov

Q&A





Thank You!