How to deal with Innovation and innovative concepts from an Regulator point of view- General approach

ARISE + Activity 4.3
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Additive manufacturing

Data, predictive maintenance and product development

Autonomous platforms and intelligent networks

Single pilot and pilotless planes

Use of blockchain in the industry

Towards a new **aviation world**

Development of new platforms worldwide

Bertini

Venturi

Vahana

Hepard

Hornisse

ZeroG

Cartercopter

Sora-e

CityAirbus

EPOS+

Droxi

What are challenges of present ATM system?

- Non-optimal organisation of airspace
- Limited use of data communications
- Limited availability of VHF frequencies
- Urban air mobility increase
- Increase of traffic, traffic complexity and new air vehicles
- Limited information sharing and interoperability
- Limited flexibility in the use of ATCO and lack of resources
- Limited predictability
- Limited automation support for ATCOs

What are regulators challenges?

- Lack of regulatory approach
- Lack of performance based environment
- Lack of competence
- Reactivity and early involvement
- Approval scheme
- Risk (e.g. safety, environment) assessment
- Citizens safety, security and acceptance
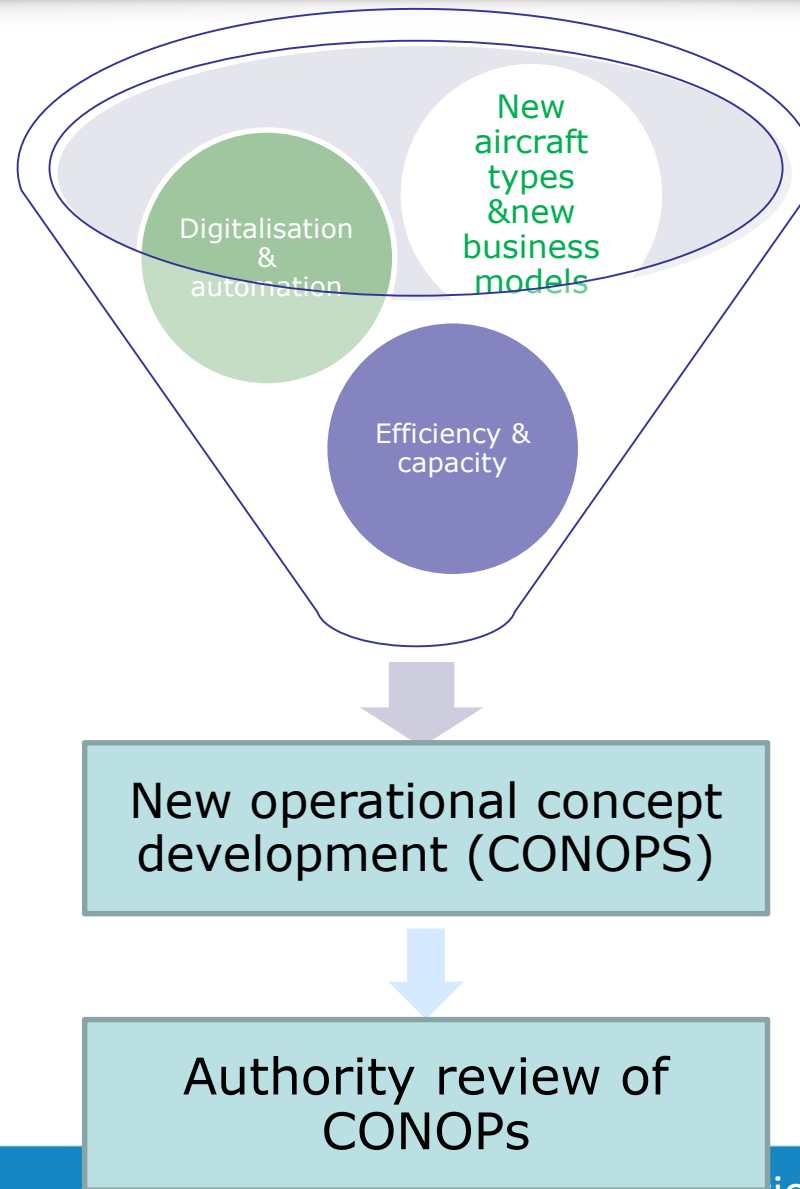- Fair competition
- Promote industry

What can regulators do?

- Reactive:
  - Wait for industry to propose and demonstrate
  - Establish regulations when concept is mature
- Proactive:
  - Walk the way with industry
  - Establish 'partnership collaboration'
  - Establish the preliminary conditions for industry to safely develop and implement the new concept
  - Learn in parallel while developing competences
  - Develop performance based regulations

THE SAME OLD THINKING

THE SAME OLD RESULTS

New operational concept development (I)

Digitalisation & automation

New aircraft types &new business models

Efficiency & capacity

New operational concept development (CONOPS)

Authority review of CONOPs

New operational concept development (II)

- To be developed by industry

- Content:
  - <u>Scope and goals</u>: problem statement and reasons for changing such as traffic and complexity increase

  - <u>Description of present airspace operations</u>: airspace class, routes, CNS requirements, infrastructure, ATM system

  - <u>Description of future airspace operations</u>: airspace design and class, routes or FRA, CNS requirements

  - <u>Description of technical system/functional architecture</u>: foreseen ATM system, new functional architecture

  - <u>Definition of use cases</u>: phase of flights, flight levels, urban vs non-populate areas, phase of projects, accommodation of traffic types

  - <u>Operational/risk assessment of uses cases:</u> method is important, assess how the foreseen operations should work within the uses cases, identify the risk, evaluate them and assess the robustness of proposed mitigating measures

  - <u>Regulatory compliance assessment & identification of regulatory gaps/show-stoppers</u>

New operational concept development (III) –leyered approach for analysis

Regulatory Layer

ANS Service Layer

Airspace Layer

Ops & Tech application Layer

Infra & data service Layer

FRAMEWORK LAYERS

Services are **enabled by airspace and technology** and **dependent on the infrastructure & data services**

TECHNICAL LAYERS

**Stronger coupling** and **measurement of the impact** through simulations factoring in known deployments and roadmaps from the Master Plan

New operational concept development (IV)

- Industry and authority to have a partnership collaboration:
  - Allow for authority review of CONOPS
  - Provide feedback in early stage
- Authority to review the CONOPS:
  - Review of new operational concept
  - Review and agree with risk assessment
  - Review and agree with regulatory impact assessment

Total system approach-holistic view
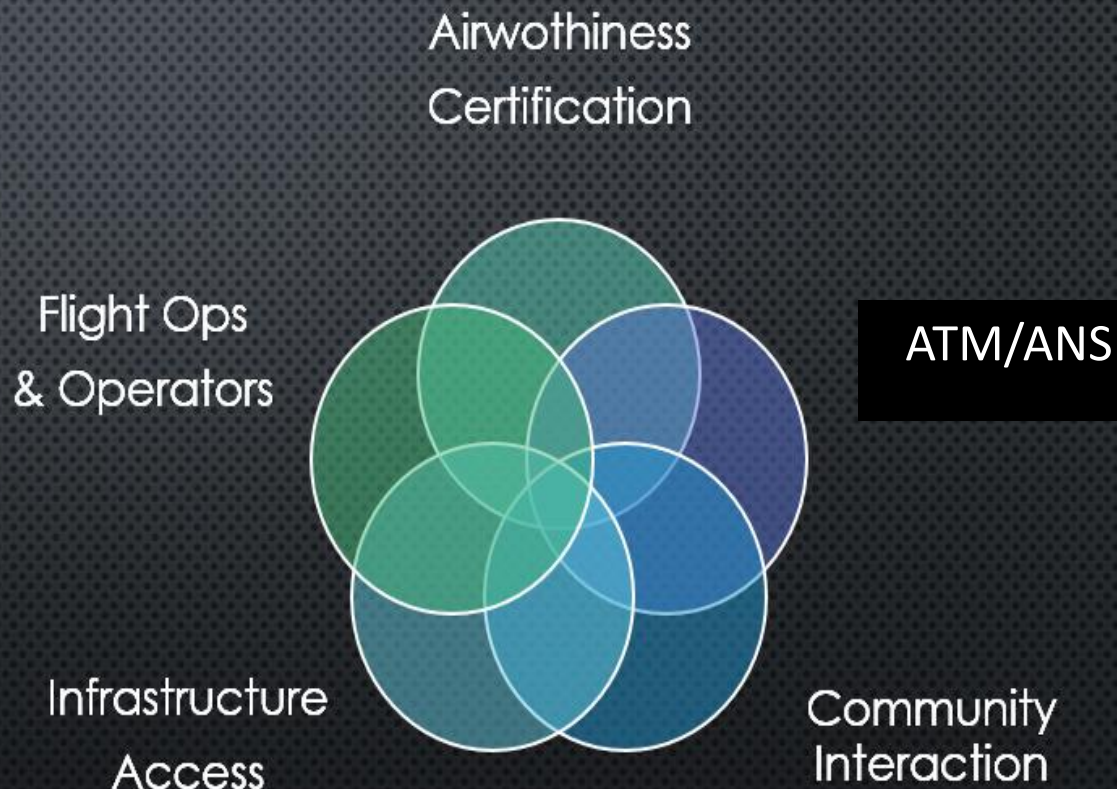
Aviation domain

- Initial Airworthiness of the Type design

- Environment (noise and emissions)

- Individual Certificate of Airworthiness
- Air Crew
- Air Operations
- Continued Airworthiness
- ANS Common Requirement
- ATM/ANS safety oversight
- Airspace Usage Req.
- SERA
- Aerodromes

Performance based approach –as facilitator to innovation

Regulations to identify the _what_:

- Performance of the system
- Performance of the services

The _how_ should be included in standards and low level material such as guidance

- How to achieve the performance set in the regulations

**Regulations should contain risk mitigation measures that are necessary to ensure safety**

- A risk assessment needs to be done by the regulator when developing the regulation

Performance of services are the ones demonstrated to be necessary to ensure safe and efficiency traffic

- These performance can be in terms of integrity, continuity, availability, timings etc

# Proposed regulators' involvement
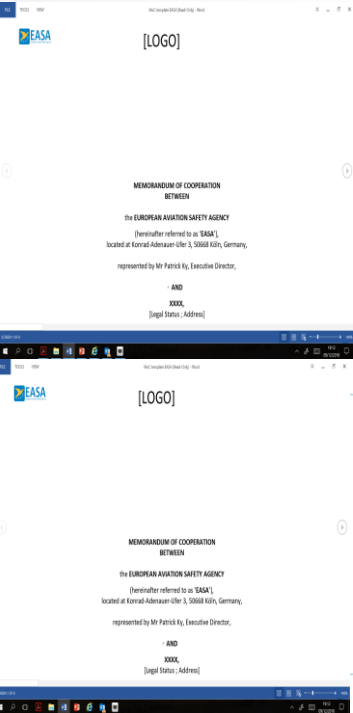
High level Memorandum of cooperation on innovation → willingness to cooperate and facilitate innovative development

Specific partnership collaboration prior to certification → specific to a particular project. It could include discussion on certification approach and regulatory assessment. Short duration

Establishment of specific requirements for the demonstration of concept while developing rules and procedures → allows for airspace demonstrations. Short-medium duration
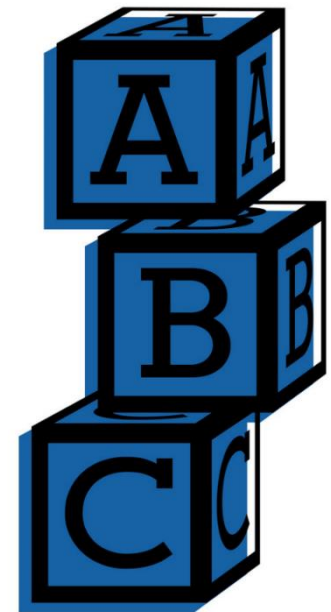
Examples from EASA

➤ Innovation partnership with industry on:

- ✓ Single pilot operations
- ✓ Tools to support Virtualisation/digitalisation in ATM
- ✓ New innovative approach for avionics
- ✓ UTM applications
- ✓ Innovative use of drones

DO WE HAVE WHAT IT TAKES TO JUMP?
EASA'S INNOVATION NETWORK
pages 3-8

+	-
Competence building on innovative projects	Short timescales requiring different resources
Allows fast and safe implementation	Could results in complex set up
Allows fast development of regulations	Careful attention to avoid conflict of interest
Industry and operational stakeholders hand in hand with authorities creates positive environment	Careful attention to avoid being co-designers
Towards building a healthy and trustful and innovation aviation system	Lack of expertise in some cases

EASA role in SESAR

Governance-SESAR deployment

Reporting and advice to EC on deployment plan

EU Regulator

European Commission

EASA
European Aviation Safety Agency

Reg.

Regulations (e.g. PCP, CPs)

Soft Law, coordination of approvals (TBD)/ Standardisation

•Member States/Competent Authorities

Establish and manage the deployment plan

Soft Law, end-to-end certification and oversight, review of the overall safety cases

Certification and oversight locally, review of application safety cases

SESAR
JOINT UNDERTAKING

SESAR
DEPLOYMENT MANAGER

•Regulated entities (ANSPs, Industry (incl. aircraft manufacturers), aircraft/aerodrome operators)

Regulators involvement in Innovation

Objectives of EASA's involvement

- **EASA and SJU Signed a MoC to ensure:**
  - **Objectives for Regulatory activities:**
    - Alignment of ATM Master Planning activities with EASA's programmes and activities. Development of regulatory means and industry standards to support SESAR solution implementation.
    - Alignment of international cooperation activities.
  - **Objectives for the Technical support:**
    - Support and advice: Reviewing final technical deliverables (safety cases, safety assessments, safety performance requirements (SPR), risk assessments, interoperability and technical files) with a particular focus on essential operational changes; and
    - Providing support/advice for very large scale demonstration and validation exercises

ASBU implementation in EU: ATM Master plan and common projects

GANP vs ATM MP & ASBU vs SESAR Operational changes, PCP and CPs

ICAO

SJU

➤ Considerations:

➤ Traffic growth and complexity vs capacity

➤ Performance areas (KPAs), KPIs and targets (safety capacity, cost, environment)

➤ Regional goals, needs and constrains vs local goals constrains and needs
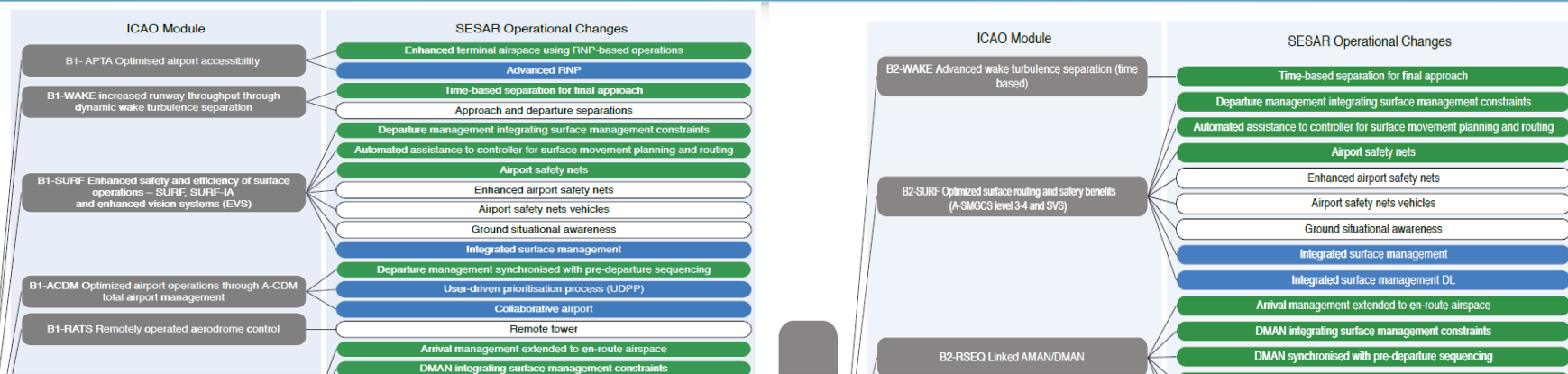
➤ Political goals

➤ Safety and security

• **Local implementation plans** based on:

➤ EASA's GM/AMC and regulations (if needed);

➤ Functionality certified by EASA or CA

➤ Regional / local implementation of ASBU:

➤ Through mandatory implementation of

➤ ATM functionalities

➤ Through voluntary implementation of SESAR solutions in a harmonised manner
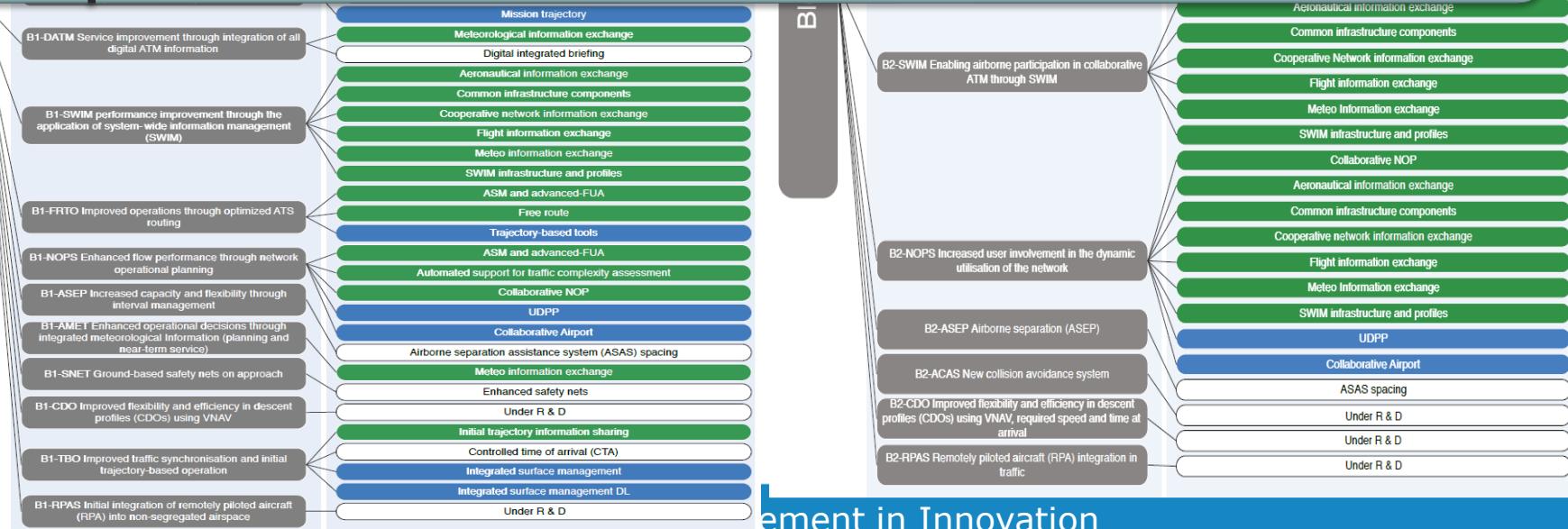
Regulators involvement in Innovation

Block 0, 1 and 2 → already implemented in EU

Pilot Common Projects portfolio

AF 1 — Extended Arrival Management (AMAN) & Performance Based Navigation (PBN) in high density TMAs

AF 2 — Airport Integration & Throughput Functionalities

AF 3 — Flexible Airspace Management & Free Route
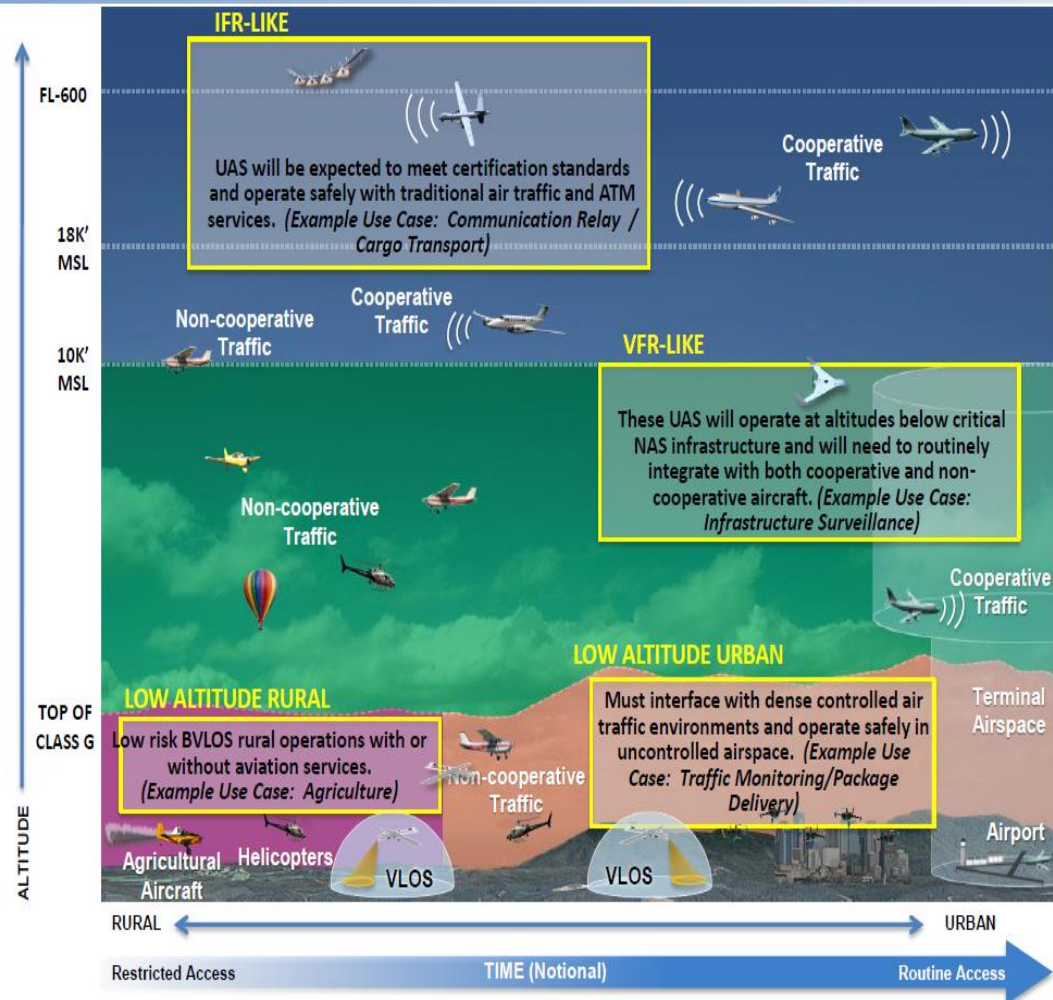
AF 4 — Network Collaborative Management

AF 5 — Initial System Wide Information Management (i SWIM)

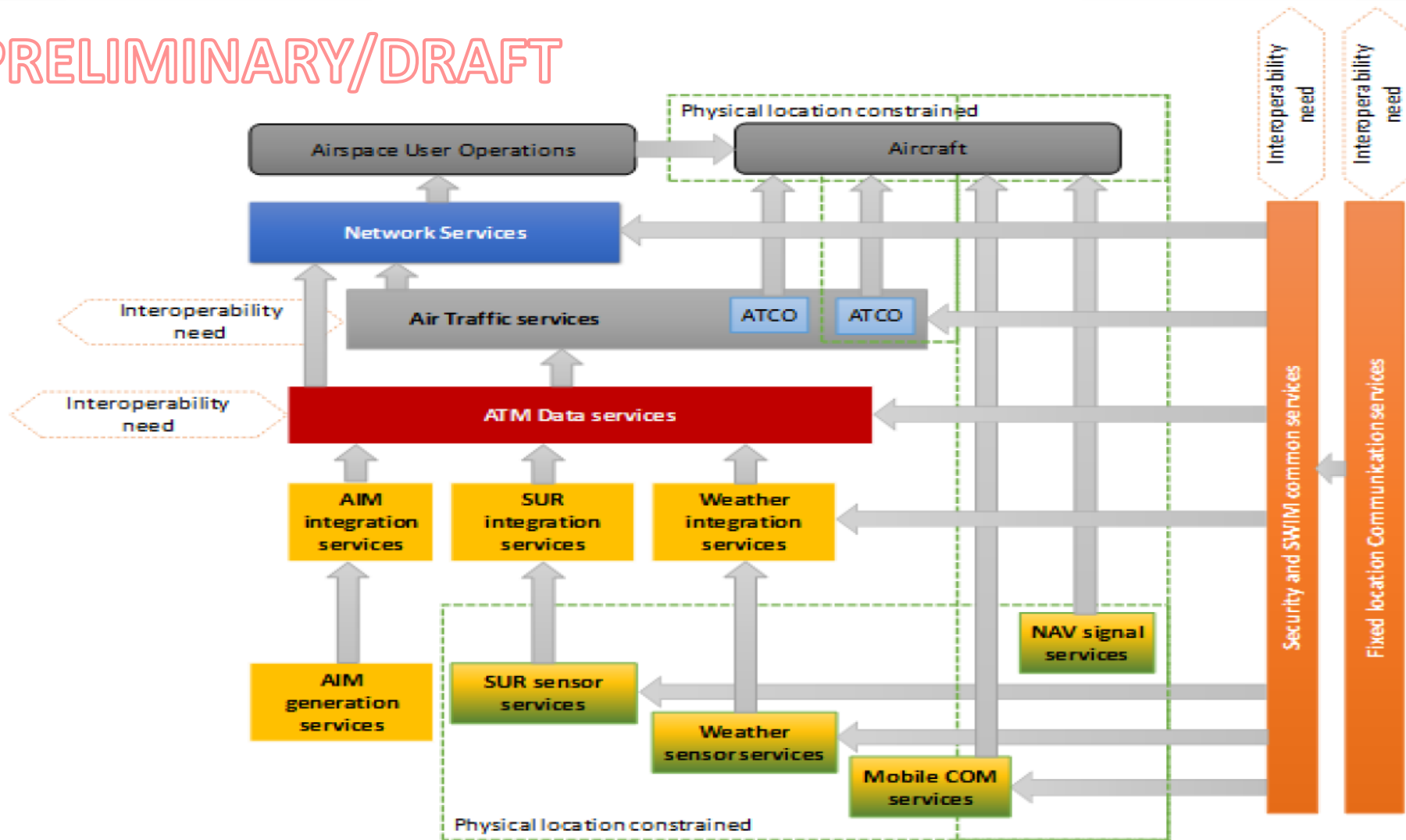**AF 6** — Initial Trajectory Information Sharing (i4D)

Future operational concepts – example

Preliminary proposed Service Oriented Architecture

PRELIMINARY/DRAFT