



Initial TBO Deployment with ADS-C

EUROCONTROL

Cristian Pradera

*ATM Modernisation & Planning Cordination, **SESAR Deployment Manager***

Eivan Cerasi

*Deputy Head of **EUROCONTROL** Standardisation, **EUROCONTROL***



Agenda

1. ADS-C / EPP
2. Regulation. Common Project 1 (CP1) & SESAR Deployment Programme
3. Operational Excellence Programme and standardisation work



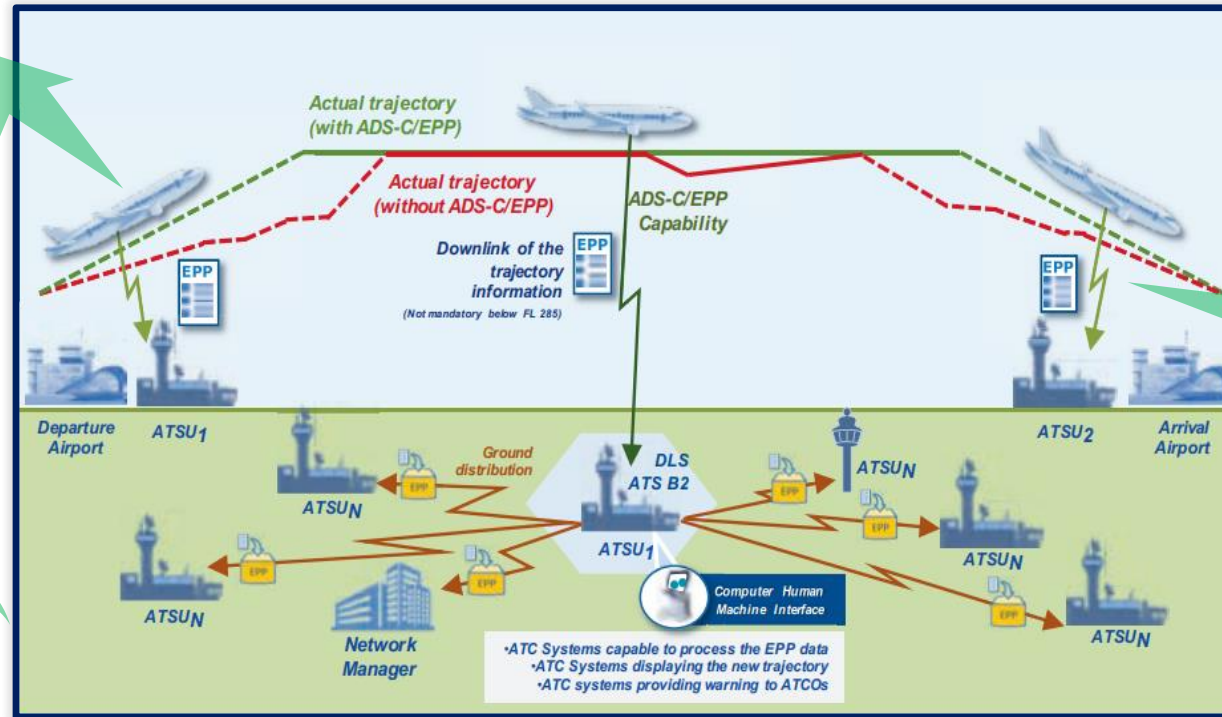
ADS-C / EPP





ADS-C / EPP Overview

EPP (Extended Projected Profile) availability on ground is key towards a full air-ground trajectory synchronization required for the implementation of the targeted TBO.



This information is automatically downlinked via ADS-C to the ground Air Traffic Service Units (ATSUs) and available to air traffic controllers.

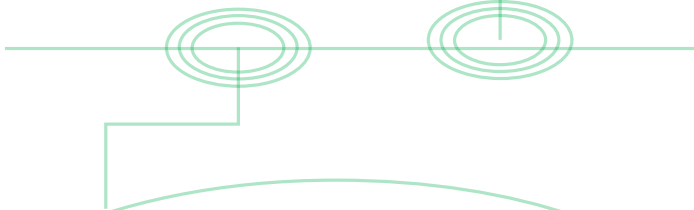
It allows ground systems to receive the aircraft FMS trajectory, including 4D data (consisting of the three spatial dimensions plus time as a fourth dimension) at each waypoint of the flight plan.



Initial EPP Applications

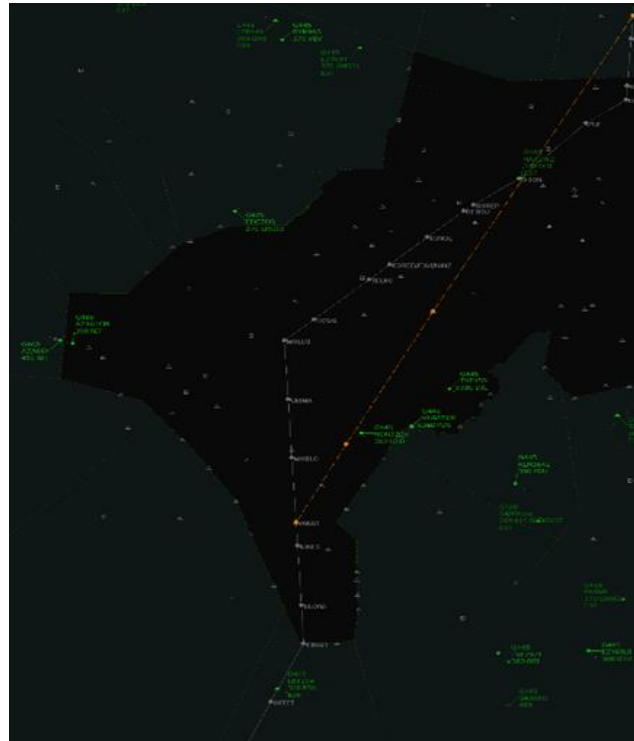
SESAR initial trajectory information sharing

Comparison of FMS 2D trajectory with ground trajectory (SESAR solution 115)
— CP1 mandate
(Implementation ongoing, more info later)



Vertical profile improvement thanks to visibility of FMS Top-of-descent (TOD) by ATC:

- Early descent is a key cause for inefficient descent
- Potential for improvement studied by PJ31
- Work continues in SESAR PJ38 (2021-2022)



EPP



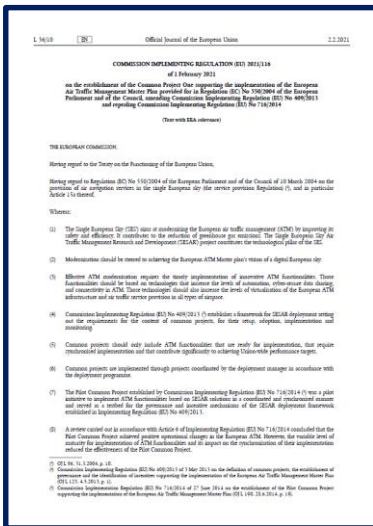


Regulation. CP1 & SDP



CP1 AF6 requirements

Extract from IR (EU) No 116/2021 (CP1 regulation)



AF6 extract from
IR (EU) No 116/2021
(CP1 regulation)



6.1.1 - ATM sub-functionality on initial air-ground trajectory information sharing

- Aircraft must be equipped with the capability to automatically down-link trajectory information using **ADS-C EPP as part of the ATS B2 services**. The trajectory data automatically down-linked from the airborne system must update the ATM system in accordance with the terms of the contract.
- Data link communications ground systems must support ADS-C (downlink of aircraft trajectory using EPP) as part of the ATS B2 services **while keeping compatibility with controller - pilot data link communications ('CPDLC') services as required by Commission Regulation (EC) No 29/2009**, including provision of service to flights equipped only with the Aeronautical Telecommunication Network Baseline 1 ('ATN-B1').
- All ATS providers referred to in point 6.3 and the related ATC systems must be able to **receive and process trajectory information** from equipped aircraft.
- The ATC systems must enable controllers to display the route of the downlinked trajectory.**
- ATC systems must provide a warning to controllers in case of a discrepancy between the downlinked aircraft trajectory and the ground system trajectory elaborated using the filed flight plan route.**

*ADS-C EPP: Automatic Dependent Surveillance- Contract Extended Projected Profile



6.1.2 - ATM sub-functionality on Network Manager trajectory information enhancement

- The Network Manager systems must use elements of the downlinked trajectories to enhance their information of trajectories flown by aircrafts.

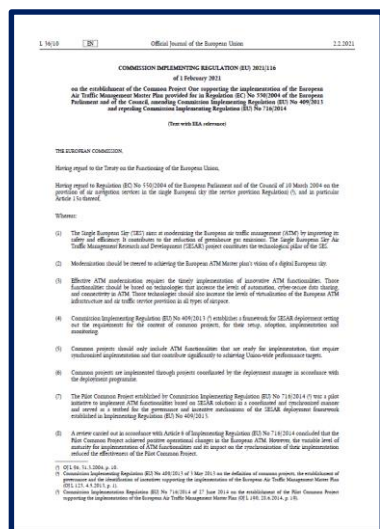


6.1.3 - ATM sub-functionality on initial trajectory information sharing ground distribution

- Ground systems must ensure that trajectory data downlinked from the aircraft is distributed between ATS units and between ATS units and the Network Manager systems.
- The data link capability referred to in **Regulation (EC) No 29/2009 is an essential prerequisite for the AF6.**
- A reliable, fast and efficient air/ground communication infrastructure must support initial trajectory information sharing



CP1 provisions related to Industrialisation/Implementation target date



● **“Implementation target date”** means a date by when the implementation of the ATM functionality or sub- functionality is to be completed



● **“Industrialisation target date”** means a date by when the standards and specifications are to be available for the ATM functionality or sub-functionality to enable its implementation

● **“Common projects may also include ATM functionalities or sub- functionalities that are not ready for implementation but that constitute an essential component of the common project concerned and provided that their industrialisation is deemed to be finalised within three years from the adoption of the concerned common project. For that purpose, an industrialisation target date for those ATM functionalities or sub-functionalities shall also be defined in the common project.”**



● **“If the industrialisation processes are not successfully finalised by the industrialisation target date, those functionalities should be withdrawn from the common project and considered for future ones”**



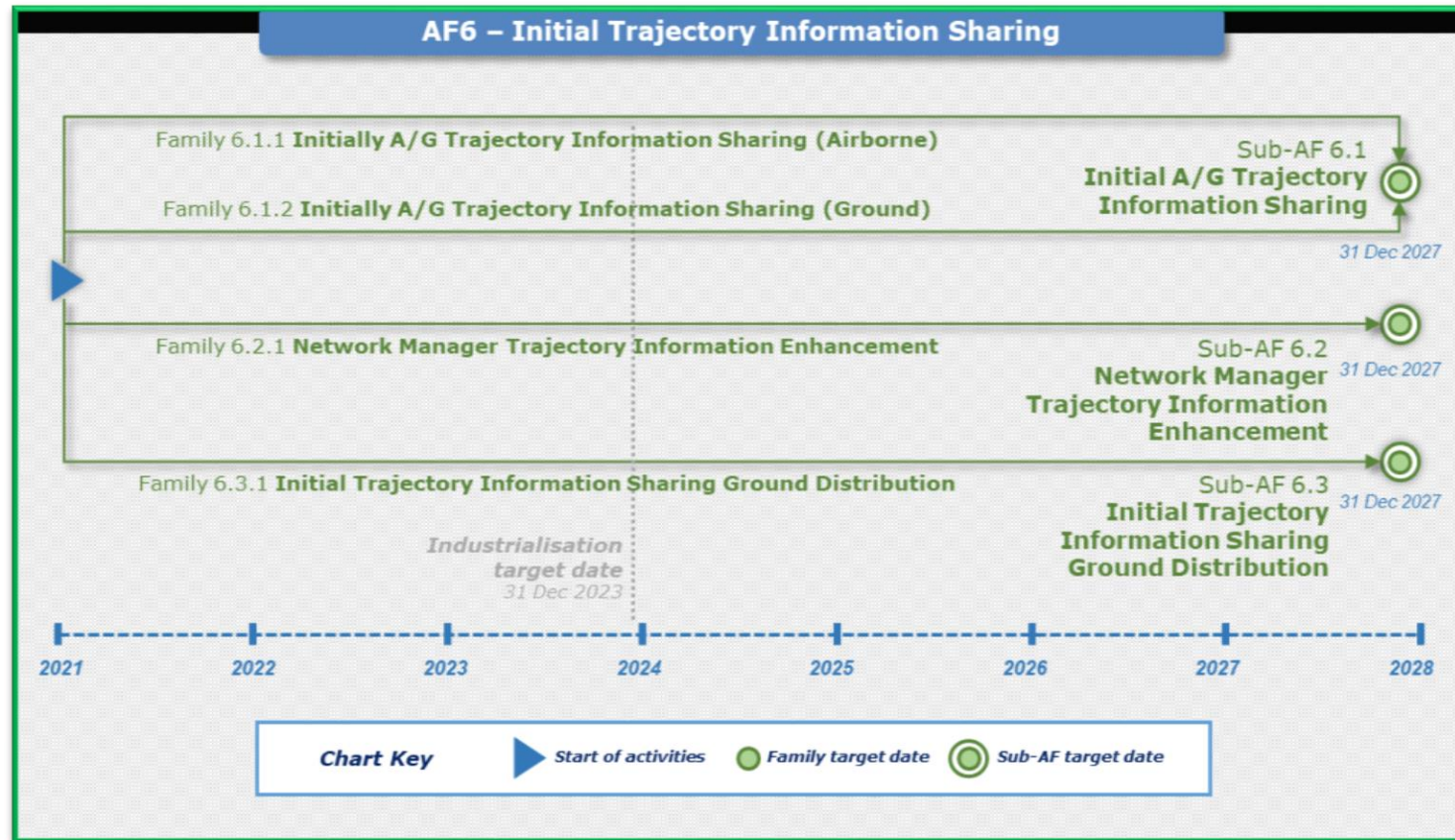
● The deployment manager, the SESAR Joint Undertaking, the European standardisation organisations, Eurocae and the relevant manufacturing industry shall cooperate under the **coordination of the European Union Aviation Safety Agency to ensure that the industrialisation target date is met**





SDP Deployment Programme

In the SESAR Deployment Programme 2021, the AF6/CP1 requirements have been taken in duly consideration in the milestones of the following families:



Supporting
European
Aviation



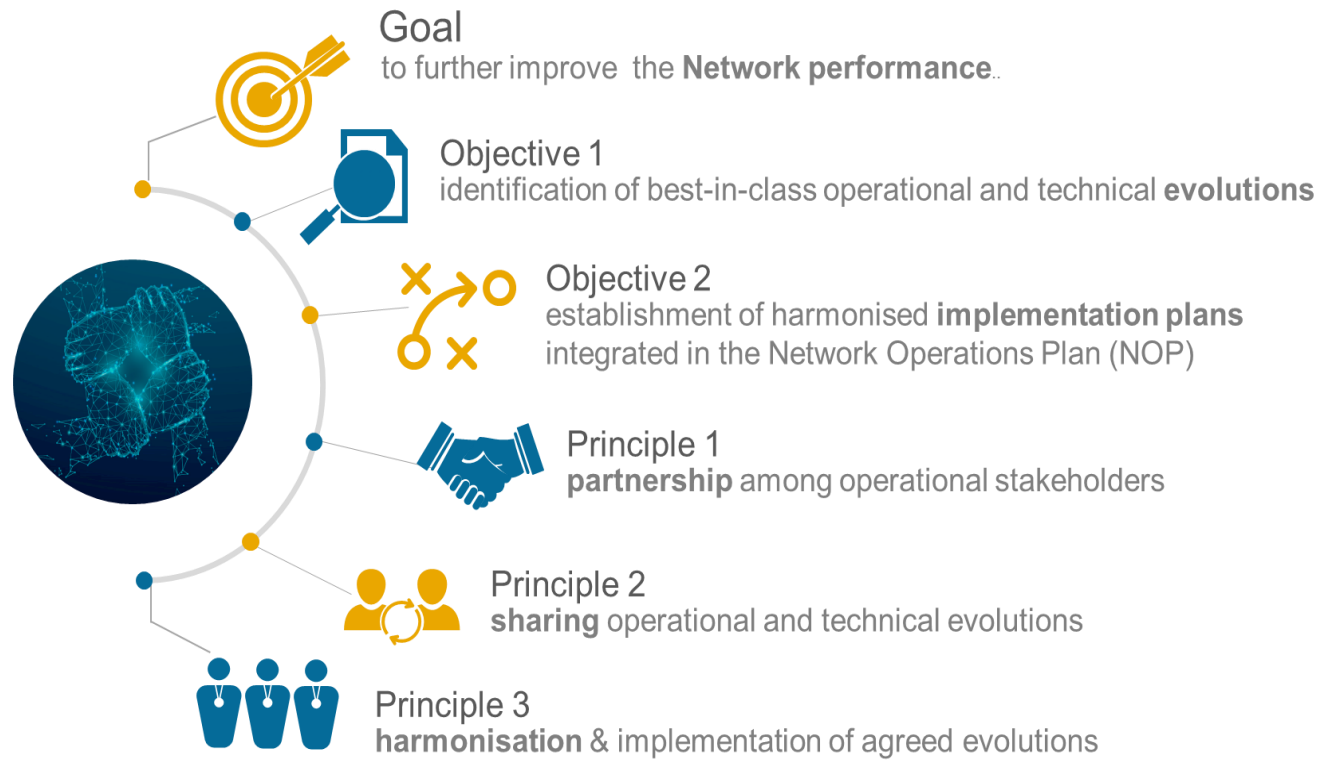
Initial TBO Deployment with ADS-C Operational Excellence Programme and standardisation work



Initial TBO with ADS-C: “Turning on” Initial Trajectory Information Sharing by Downlinking ADS-C/EPP data

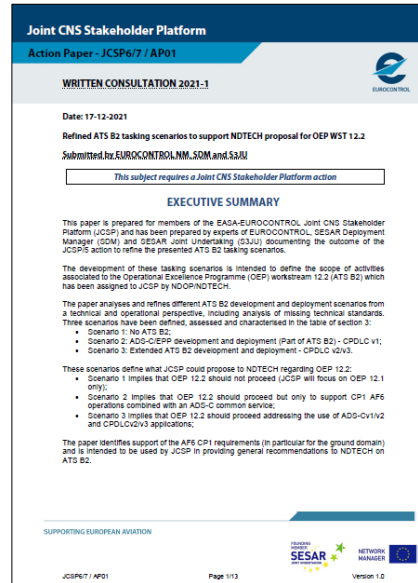


Making Use of the Operational Excellence Programme to Support Standardisation and Deployment



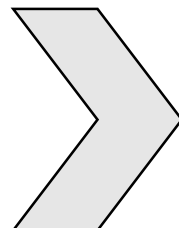
WST Number	Work Stream Name	Number of Topics
WST 01	ATS procedures	9
WST 02	Application of A-FUA	5
WST 03	Application of ATFCM	18
WST 04	Flight Planning Evolution	7
WST 05	Enhancing sectors throughput, including occupancies	4
WST 06	Operational Utilisation of Human Resources	5
WST 07	ANSP/ANSP and ANSP/NM system connectivity and interoperability	5
WST 08	Airport operational improvements, including RWY throughput	10
WST 09	Harmonised operational requirements supporting system connectivity, interoperability and implementation	3
WST 10	AIM data provision harmonisation and digitalisation	7
WST 11	Post Operational Analysis	2
WST 12	Support operational priorities through the harmonised implementation of DataLink	4
WST 13	Harmonisation of infrastructure, systems connectivity and interoperability	9
WST 14	Network Resilience / Infrastructure risks	7

How We Defined an Approach for ATS B2

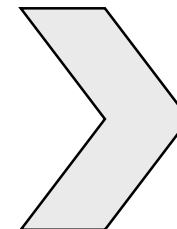


- Launch the **Operational Excellence Programme ATS B2** workstream topic 12.2
- **Prioritise support for the CP1 AF6 industrial target date**
- CP1 AF6 enhanced with:
 - **ADS-C Common Service** for efficient A/G communications and G/G distribution
 - **Additional Standards** including **CONOPS** covering logon and B1/B2 compatibility (B1 standards do not support ADS-C)

Scenario Development



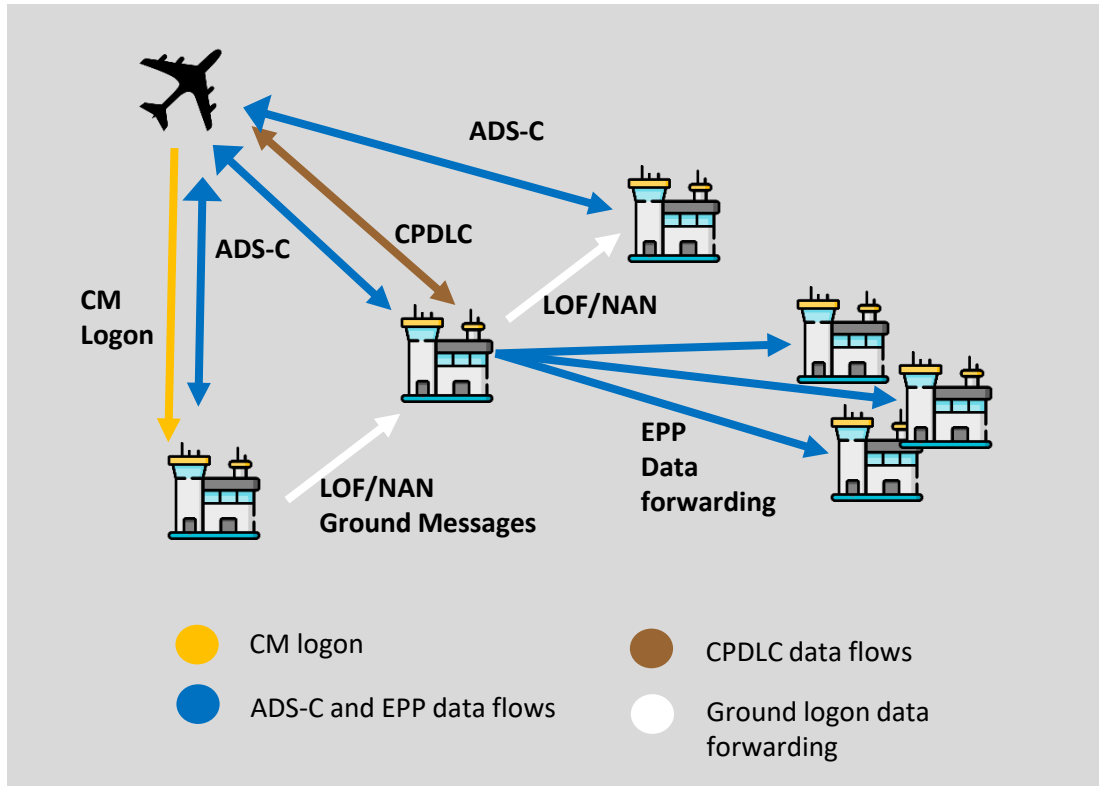
Consultation Workshops



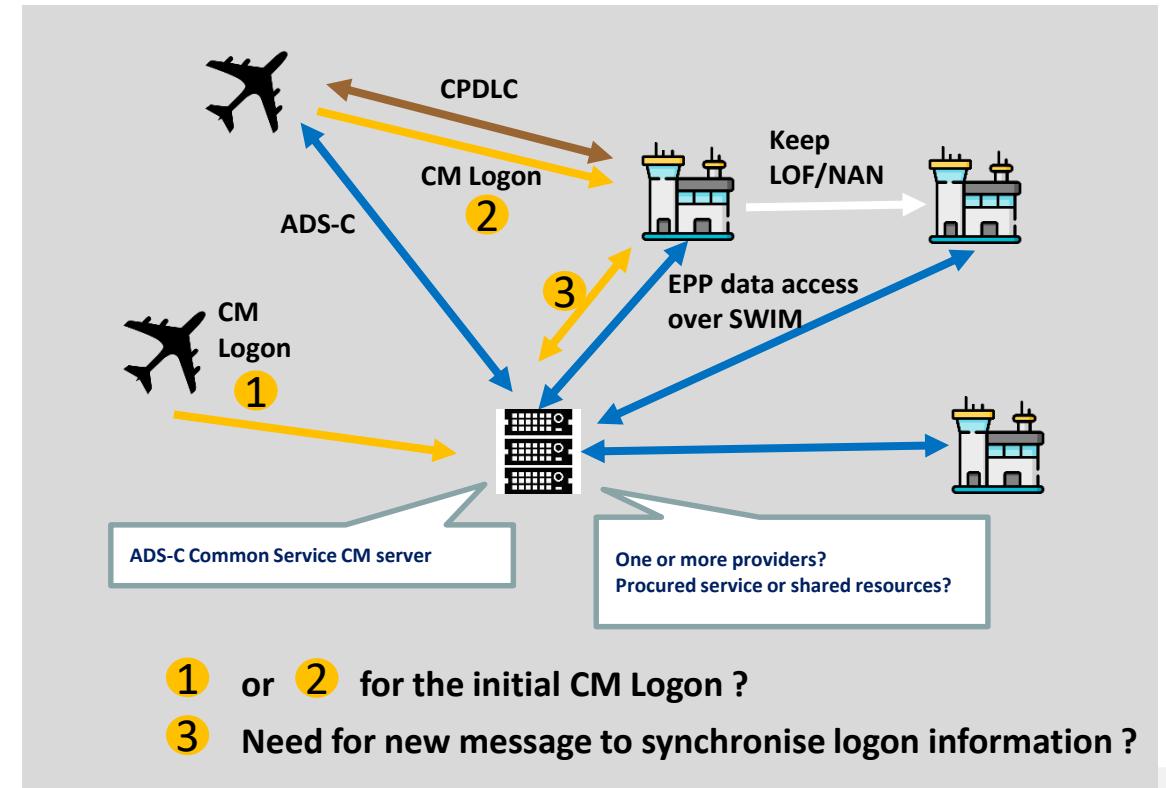
NDTECH Launch Decision

Impact of adding the ADS-C Common Service

- Inefficiencies without an ADS-C Common Service
 - A/G inefficient (multiple contracts)
 - Inefficient distribution of data
 - Dependent of efficiency of the 'chain'
 - Data protection

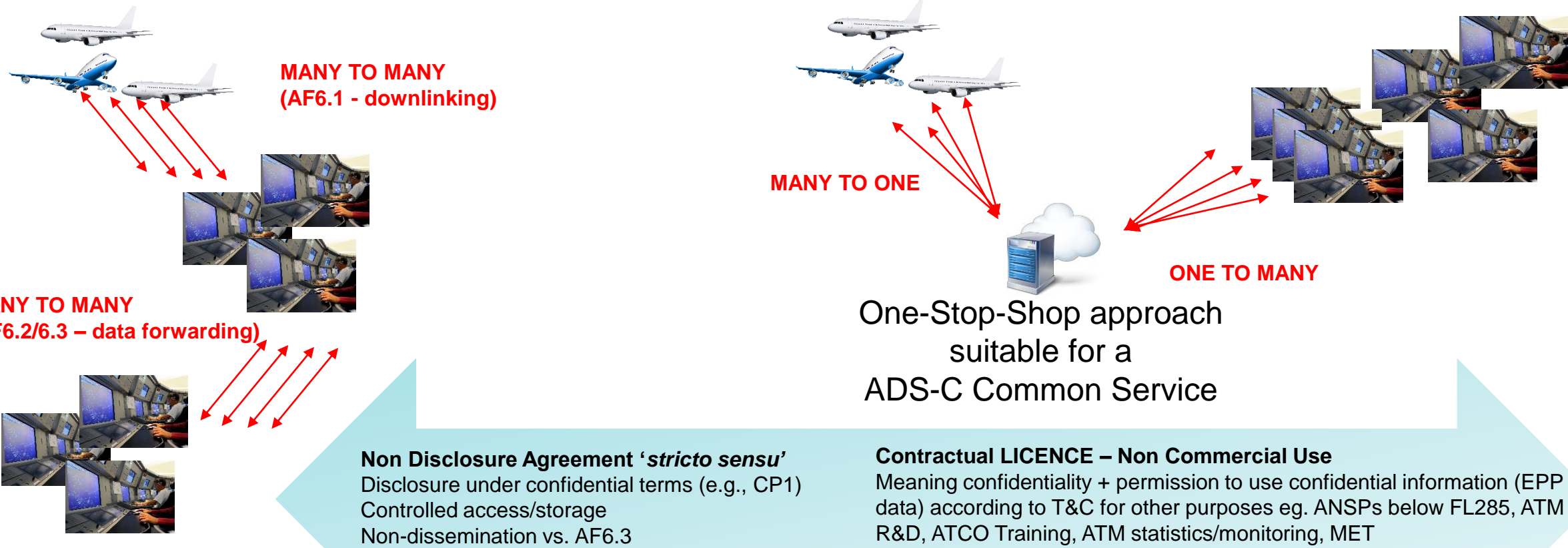


- ADS-C Common Service can manage the ADS-C contract(s) and common logon service
 - Scalable, efficient, SESAR PJ38 demonstrators
 - Service resilience?
 - ATS procedures?

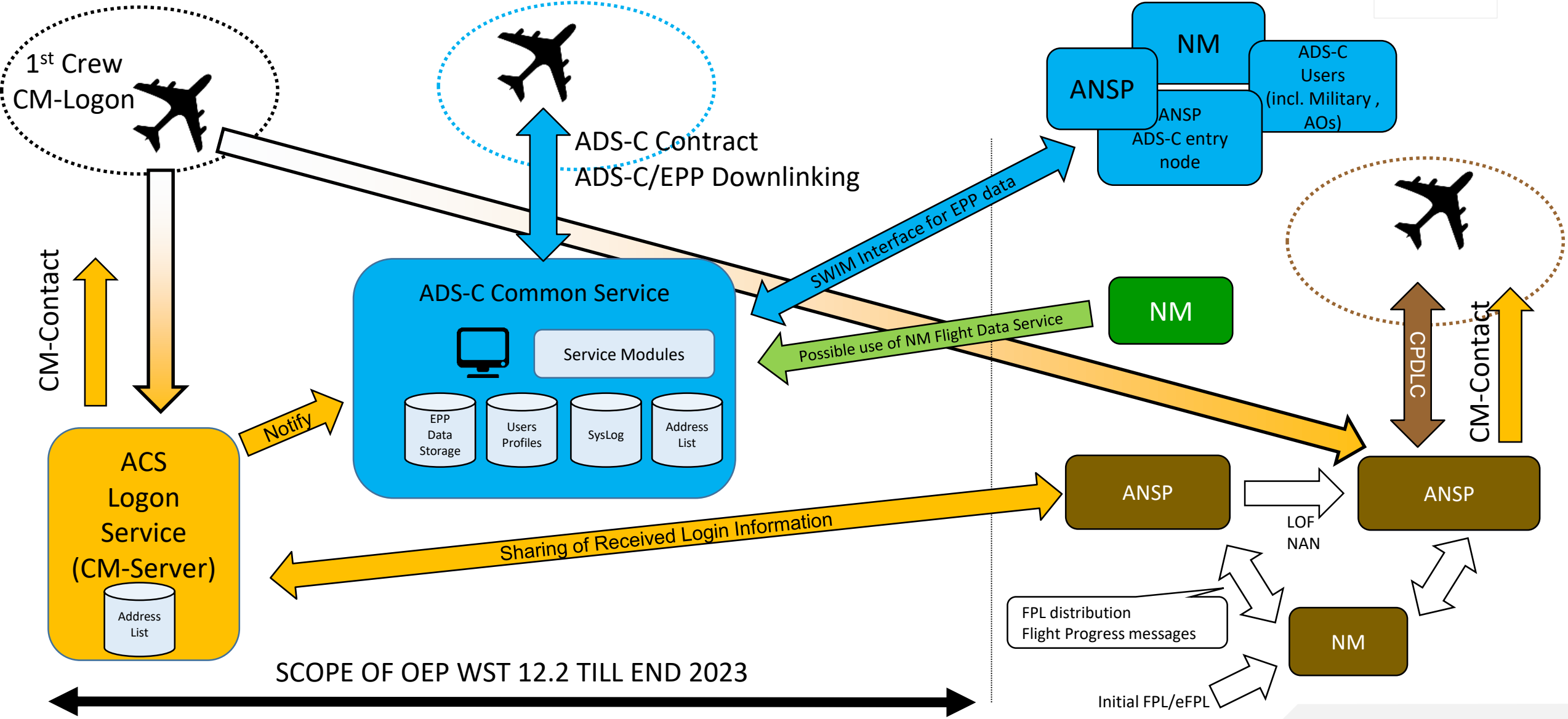


Data Sharing Framework (EPP Data Protection)

- Obligation to transmit EPP data but there's a need to protect the confidentiality of the data
- Path of data transmission can affect the type and number of arrangements



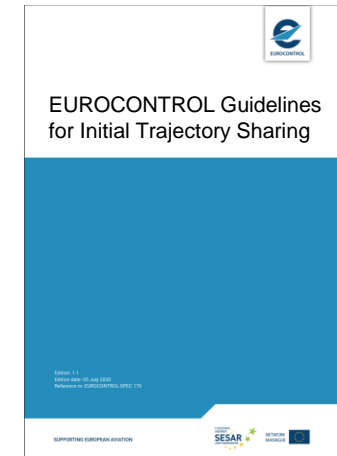
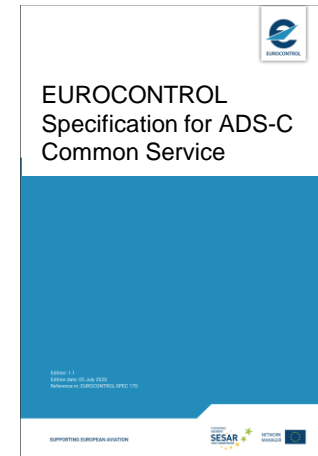
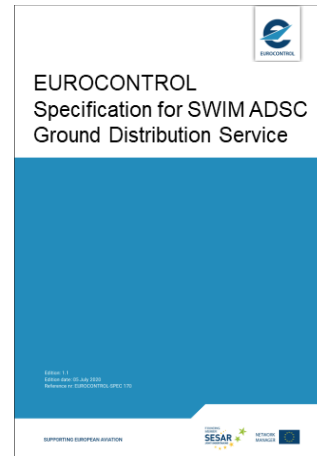
A CONOPS for the Common Service



Standardisation of ADS-C/EPP Data Distribution for CP1 AF6

Based on PJ38 and addressing the gaps for SWIM Service Standardisation

A CONOPS is a pre-requisite for this specification, based on PJ31 validation and PJ38 deliverables & demonstrations

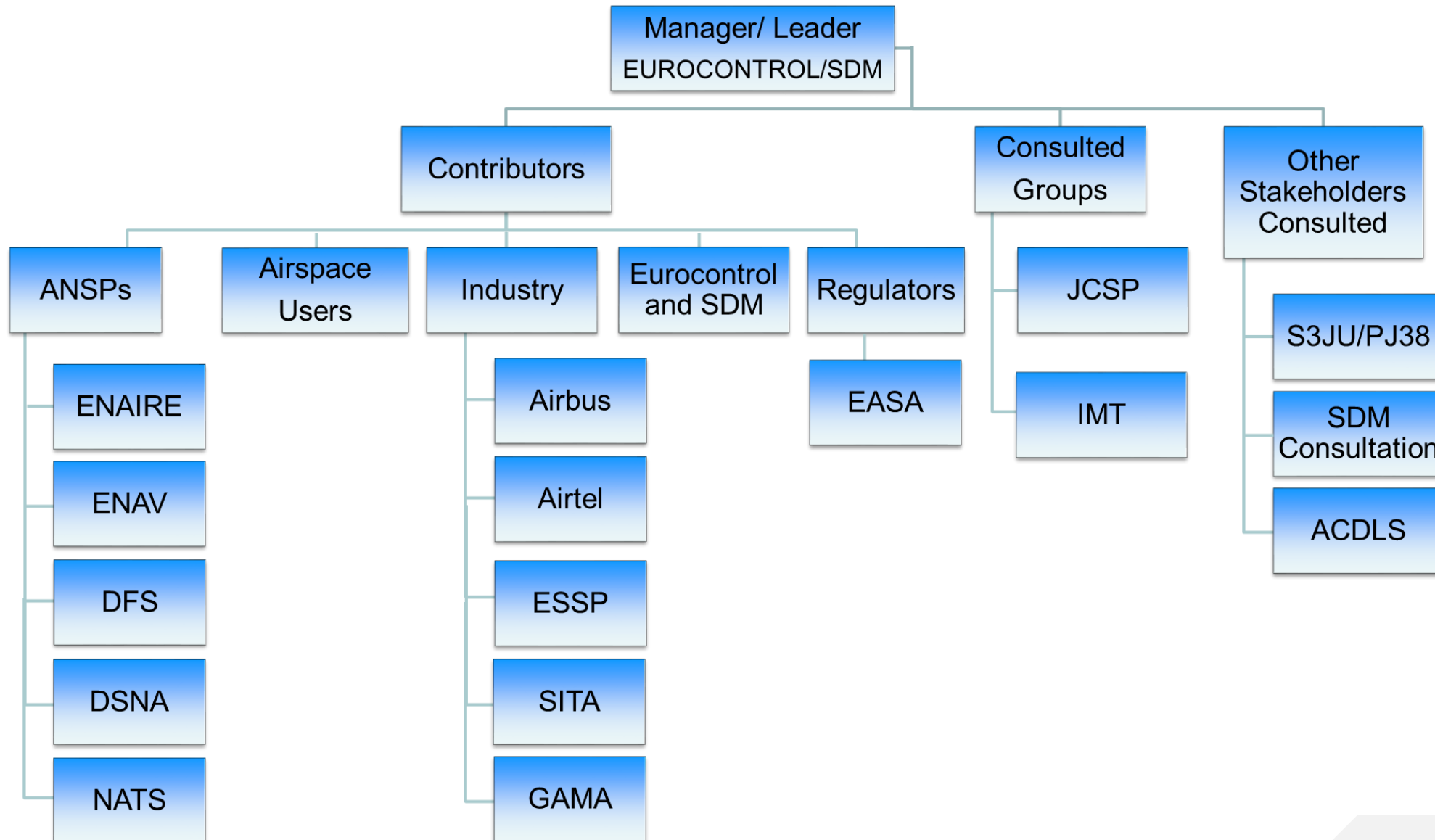


Available and referenced by SESAR Deployment Programme for Initial Trajectory Sharing



To be delivered by end 2023

Stakeholder Engagement



Outlook for ATS B2 – beyond initial TBO

What will happen by end 2023

Prioritise on CP1 AF6 industrial target date:

Focus on supporting efficient deployment of ADS-C downlinking of EPP data and ground distribution:

- SWIM specification for ground distribution of EPP
- ADS-Common service specification
- Guidance material for airborne and ground

What will happen from 2024 onwards

Depending on NDTECH continue the Operational Excellence Programme Workstream 12.2:

Expand ATS B2 and benefit of new air-ground communication links incl:

- Harmonise the use of existing standards (eg CPDLC B2 message set)
- New radio link standards e.g. LDACS, SATCOM (multilink)
- Prepare for ATN/IPS (ED229 - ARINC658)
- Prepare new event contracts to be added to ED228 based on R&D (SESAR PJ31)

Ground accommodation of mixed fleet

Interaction with FF-ICE (Release 2)



Thank you for Attending

Questions and Answers

cristian.pradera@sesardeploymentmanager.eu

eivan.cerasi@eurocontrol.int