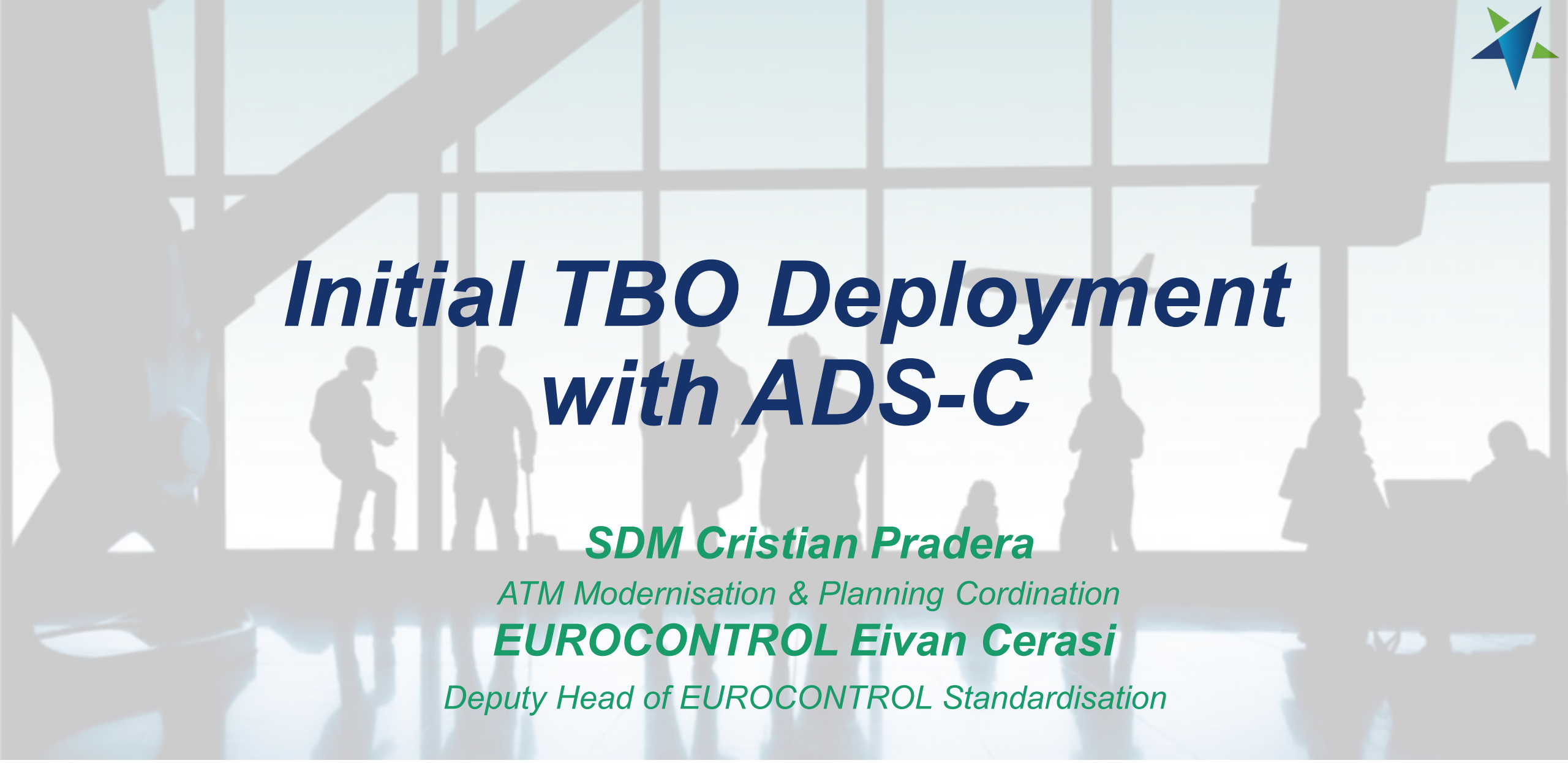


Initial TBO Deployment with ADS-C

SDM Cristian Pradera

ATM Modernisation & Planning Cordination

EUROCONTROL Eivan Cerasi

Deputy Head of EUROCONTROL Standardisation

sesar DEPLOYMENT MANAGER

EUROCONTROL

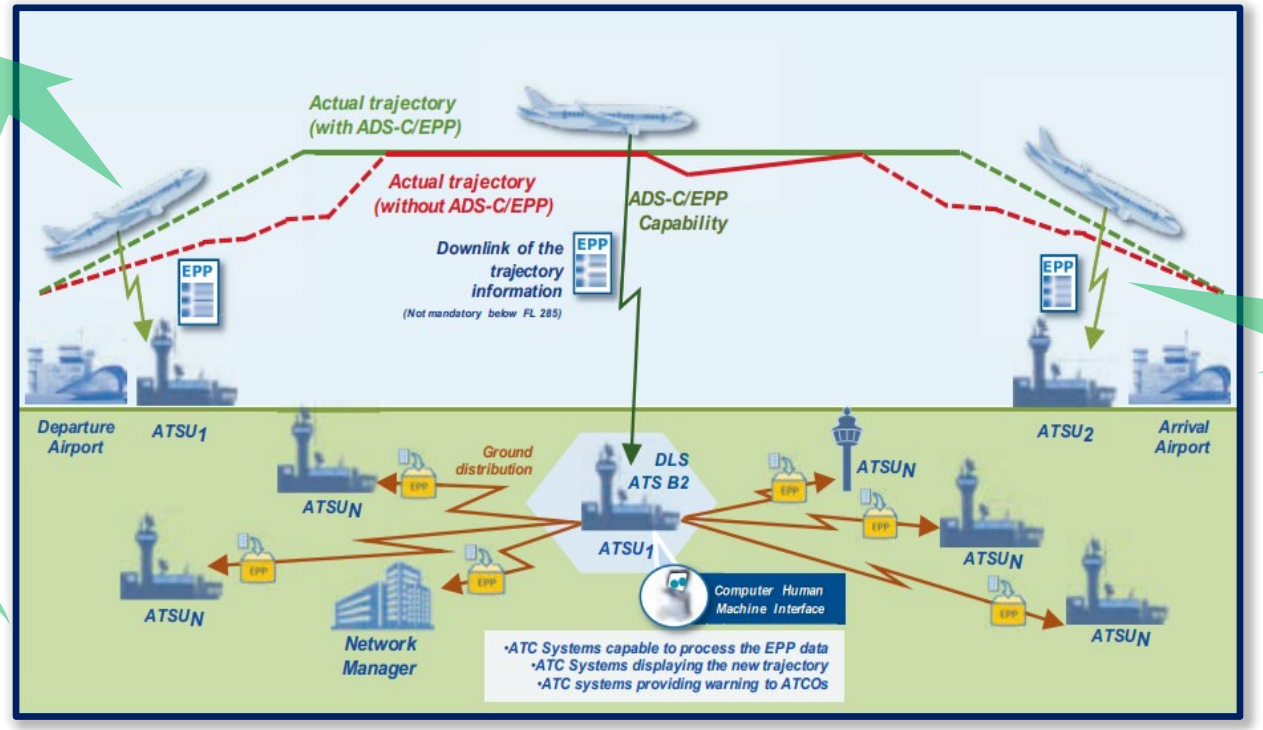
Agenda

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.



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.

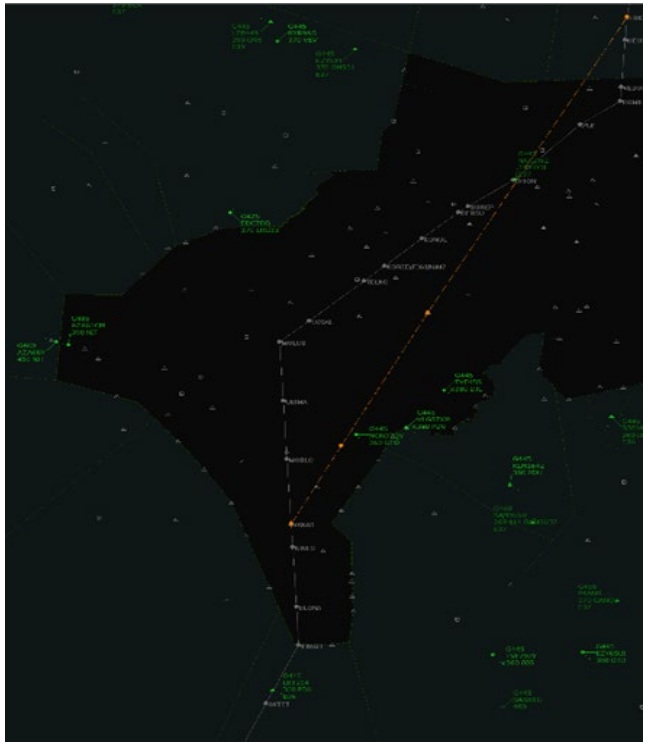
This information **is automatically downlinked via ADS-C** to the ground Air Traffic Service Units (ATSUs) and available to air traffic controllers.

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)



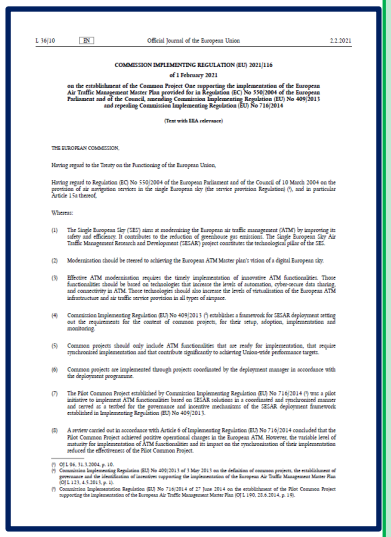
EPP

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)

Regulation. CP1 & SDP

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



L 36/10 EN Official Journal of the European Union 2.2.2021

COMMISSION IMPLEMENTING REGULATION (EU) 2021/116
of 1 February 2021
on the establishment of the Common Project One supporting the implementation of the European Air Traffic Management Master Plan provided for in Regulation (EC) No 550/2004 of the European Parliament and of the Council, amending Commission Implementing Regulation (EU) No 409/2013 and repealing Commission Implementing Regulation (EU) No 716/2014
(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EC) No 550/2004 of the European Parliament and of the Council of 10 March 2004 on the provision of air navigation services in the single European sky (the service provision Regulation) (1), and in particular Article 15a thereof,

Whereas:

(1) The Single European Sky (SES) aims at modernising the European air traffic management (ATM) by improving its safety and efficiency. It contributes to the reduction of greenhouse gas emissions. The Single European Sky Air Traffic Management Research and Development (SESAR) project constitutes the technological pillar of the SES.

(2) Modernisation should be steered to achieving the European ATM Master plan's vision of a digital European sky.

(3) Effective ATM modernisation requires the timely implementation of innovative ATM functionalities. Those functionalities should be based on technologies that increase the levels of automation, cyber-secure data sharing and connectivity in ATM. Those technologies should also increase the levels of virtualisation of the European ATM infrastructure and air traffic service provision in all types of airspace.

(4) Commission Implementing Regulation (EU) No 409/2013 (2) establishes a framework for SESAR deployment setting out the requirements for the content of common projects, for their setup, adoption, implementation and monitoring.

(5) Common projects should only include ATM functionalities that are ready for implementation, that require synchronised implementation and that contribute significantly to achieving Union-wide performance targets.

(6) Common projects are implemented through projects coordinated by the deployment manager in accordance with the deployment programme.

(7) The Pilot Common Project established by Commission Implementing Regulation (EU) No 716/2014 (3) was a pilot initiative to implement ATM functionalities based on SESAR solutions in a coordinated and synchronised manner and served as a testbed for the governance and incentive mechanisms of the SESAR deployment framework established in Implementing Regulation (EU) No 409/2013.

(8) A review carried out in accordance with Article 6 of Implementing Regulation (EU) No 716/2014 concluded that the Pilot Common Project achieved positive operational changes in the European ATM. However, the variable level of maturity for implementation of ATM functionalities and its impact on the synchronisation of their implementation reduced the effectiveness of the Pilot Common Project.

(1) OJ L 96, 31.3.2004, p. 10.
(2) Commission Implementing Regulation (EU) No 409/2013 of 1 May 2013 on the definition of common projects, the establishment of governance and the implementation of incentives supporting the implementation of the European Air Traffic Management Master Plan (OJ L 123, 4.5.2013, p. 1).
(3) Commission Implementing Regulation (EU) No 716/2014 of 27 June 2014 on the establishment of the Pilot Common Project supporting the implementation of the European Air Traffic Management Master Plan (OJ L 190, 28.6.2014, p. 19).

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*

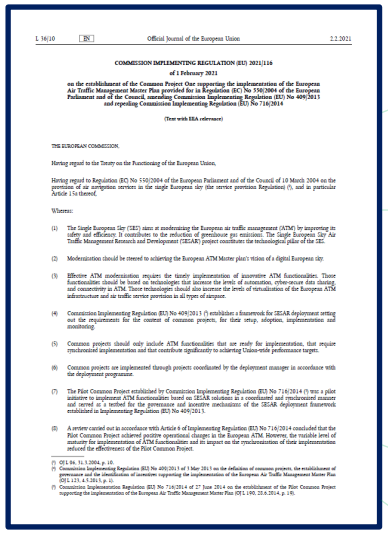
6.1.2 - ATM sub-functionality on Network Manager trajectory information enhancement

- *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



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(1) OJ L 96, 31.3.2004, p. 10.
(2) Commission Implementing Regulation (EU) No 409/2013 of 3 May 2013 on the definition of common projects, the establishment of governance and the identification of incentives supporting the implementation of the European Air Traffic Management Master Plan (OJ L 123, 4.5.2013, p. 1).
(3) Commission Implementation Regulation (EU) No 716/2014 of 27 June 2014 on the establishment of the Pilot Common Project supporting the implementation of the European Air Traffic Management Master Plan (OJ L 195, 25.6.2014, p. 15).

- **"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

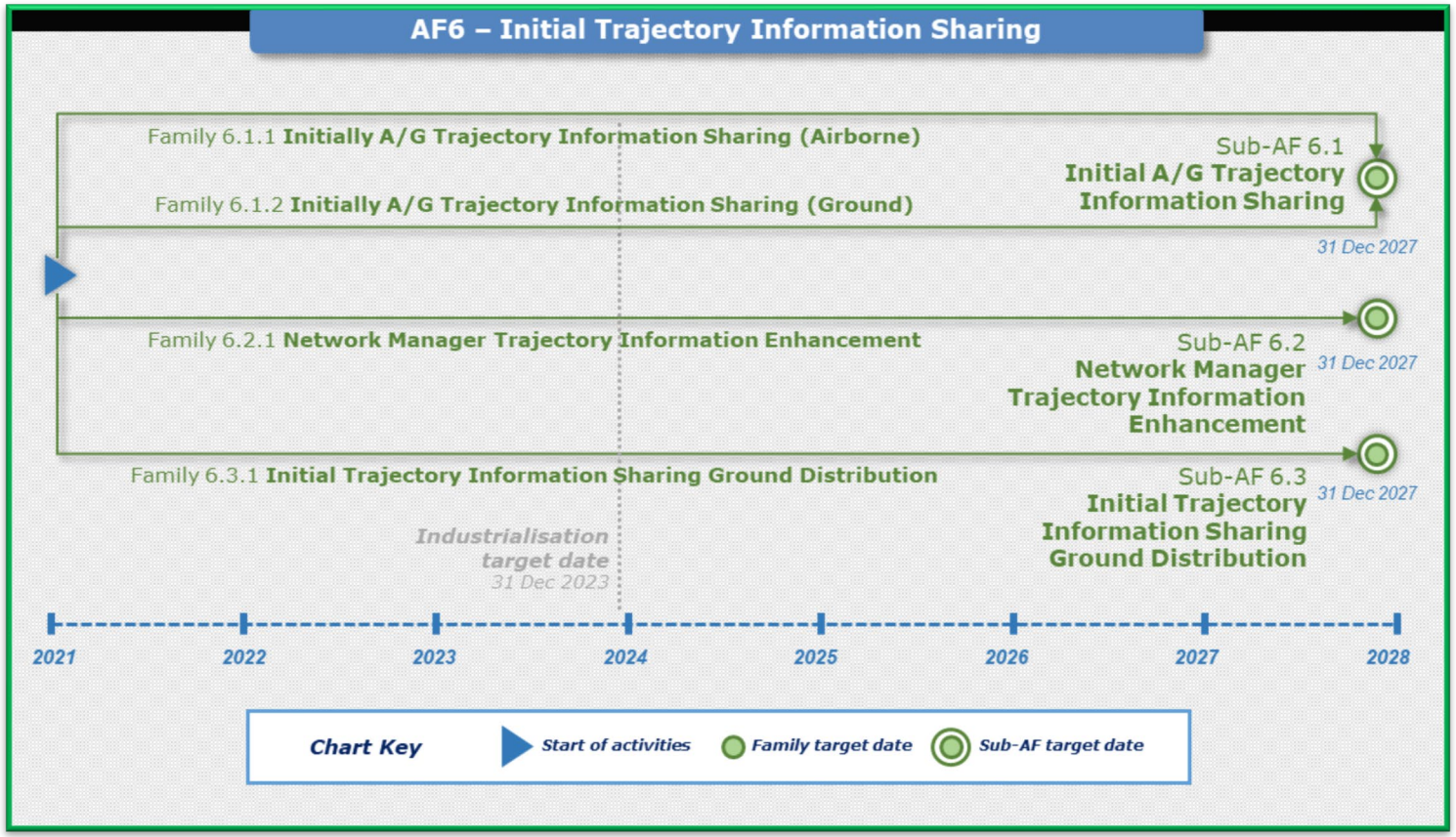
- "Common projects may also include **ATM functionalities or sub- functionalities that are not ready for implementation but that constitute an essential component of the common project** concerned and provided that their industrialisation is deemed to be finalised within three years from the adoption 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

EUROCONTROL

Initial TBO Deployment with ADS-C

Operational Excellence Programme and standardisation work

sesar DEPLOYMENT MANAGER

FOUNDING MEMBER OF sesar JOINT UNDERTAKING

NETWORK MANAGER

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

Goal
to further improve the **Network performance**..

Objective 1
identification of best-in-class operational and technical **evolutions**

Objective 2
establishment of harmonised **implementation plans** integrated in the Network Operations Plan (NOP)

Principle 1
partnership among operational stakeholders

Principle 2
sharing operational and technical evolutions

Principle 3
harmonisation & implementation of agreed evolutions

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

Joint CNS Stakeholder Platform

Action Paper - JCSP6/7 / AP01

WRITTEN CONSULTATION 2021-1

Date: 17-12-2021

Refined ATS B2 tasking scenarios to support NDTECH proposal for OEP WST 12.2

Submitted by EUROCONTROL NM, SDM and SJU

This subject requires a Joint CNS Stakeholder Platform action

EXECUTIVE SUMMARY

This paper is prepared for members of the EASA-EUROCONTROL Joint CNS Stakeholder Platform (JCSP) and has been prepared by experts of EUROCONTROL, SESAR Deployment Manager (SDM) and SESAR Joint Undertaking (SJU) documenting the outcome of the JCSP/5 action to refine the presented ATS B2 tasking scenarios.

The development of these tasking scenarios is intended to define the scope of activities associated to the Operational Excellence Programme (OEP) workstream 12.2 (ATS B2) which has been assigned to JCSP by NDOP/NDTECH.

The paper analyses and refines different ATS B2 development and deployment scenarios from a technical and operational perspective, including analysis of missing technical standards. Three scenarios have been defined, assessed and characterised in the table of section 3:

- Scenario 1: No ATS B2;
- Scenario 2: ADS-C/EPP development and deployment (Part of ATS B2) - CPDLC v1;
- Scenario 3: Extended ATS B2 development and deployment - CPDLC v2/v3.

These scenarios define what JCSP could propose to NDTECH regarding OEP 12.2:

- Scenario 1 implies that OEP 12.2 should not proceed (JCSP will focus on OEP 12.1 only);
- Scenario 2 implies that OEP 12.2 should proceed but only to support CP1 AF6 operations combined with an ADS-C common service;
- Scenario 3 implies that OEP 12.2 should proceed addressing the use of ADS-C v1/v2 and CPDLC v2/v3 applications;

The paper identifies support of the AF6 CP1 requirements (in particular for the ground domain) and is intended to be used by JCSP in providing general recommendations to NDTECH on ATS B2.

SUPPORTING EUROPEAN AVIATION

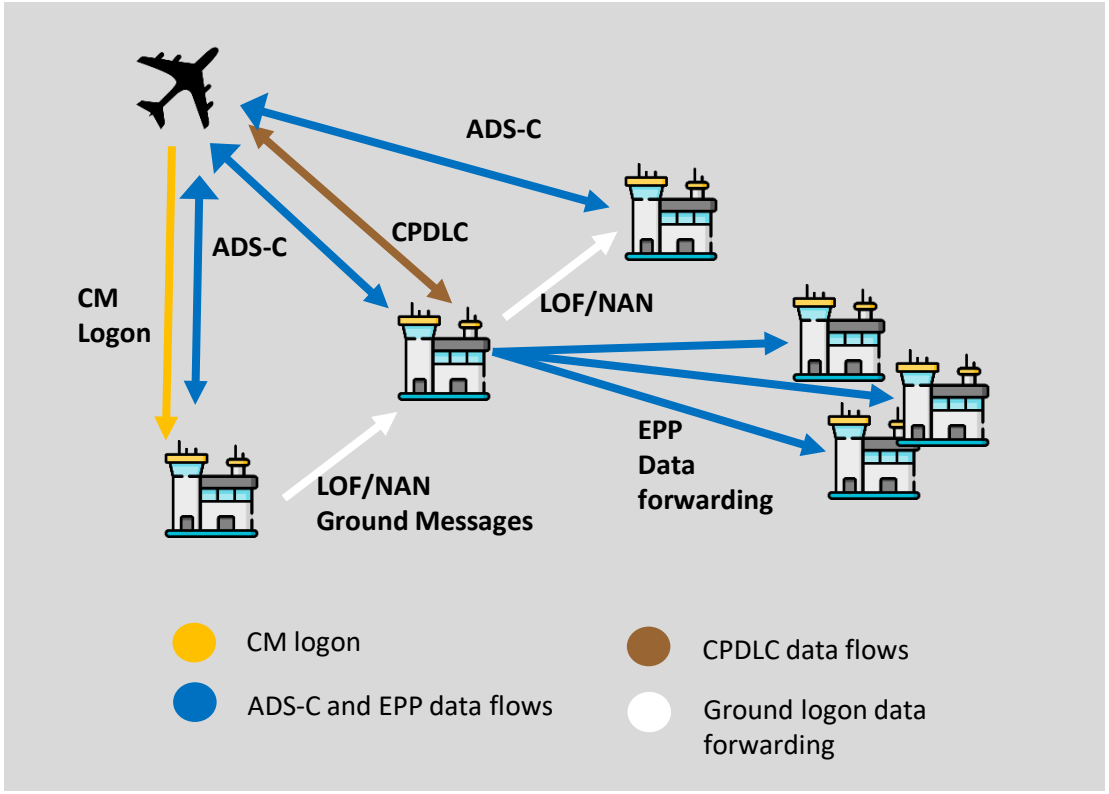
JCSP6/7 / AP01 Page 1/13 Version 1.0

- 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)

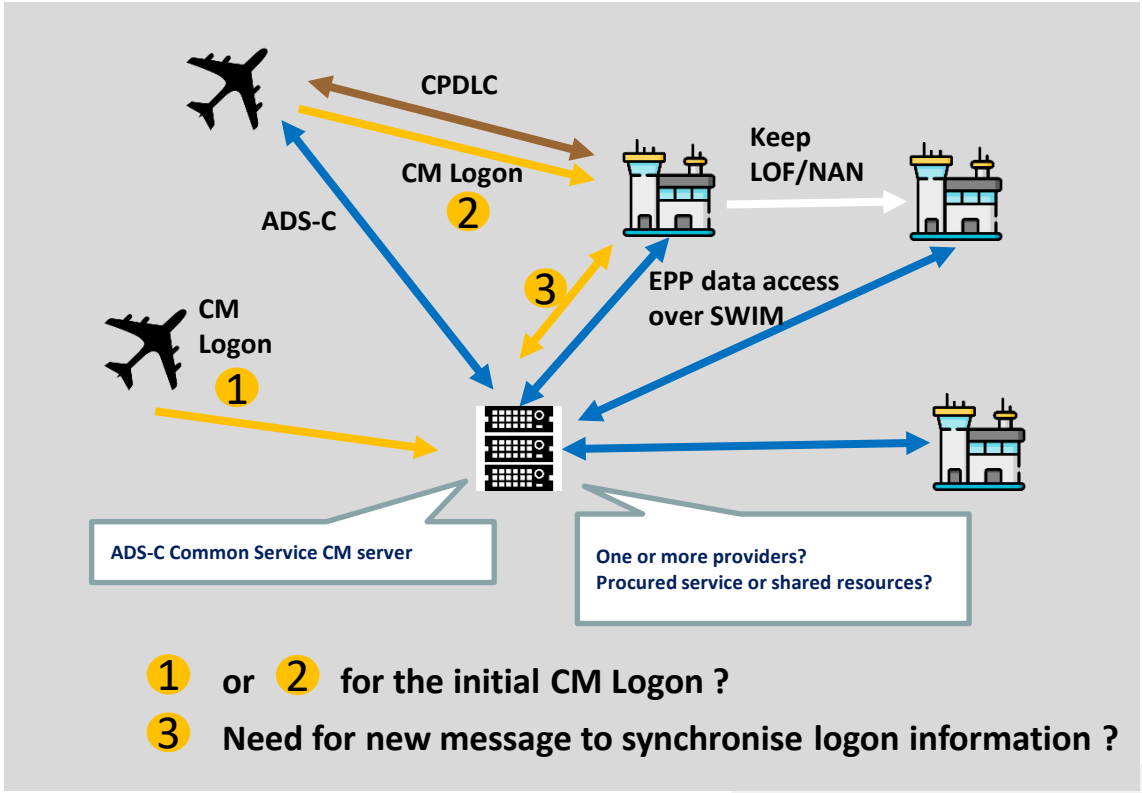
Scenario Development → Consultation Workshops → NDTECH Launch Decision

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

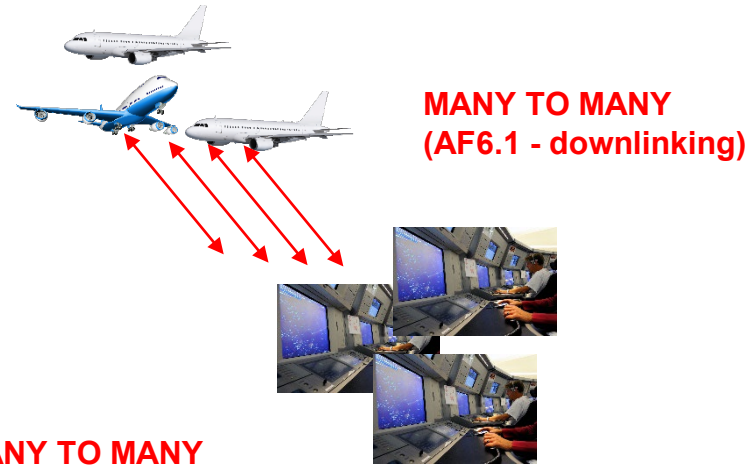


- ADS-C Common Service can manage the ADS-C contract(s) and common logon service
  - Scalable, efficient, SESAR PJ38 demonstrators
  - Service resilience?
  - ATS procedures?

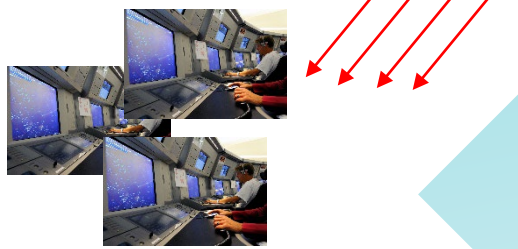


Data Sharing Framework (EPP Data Protection)

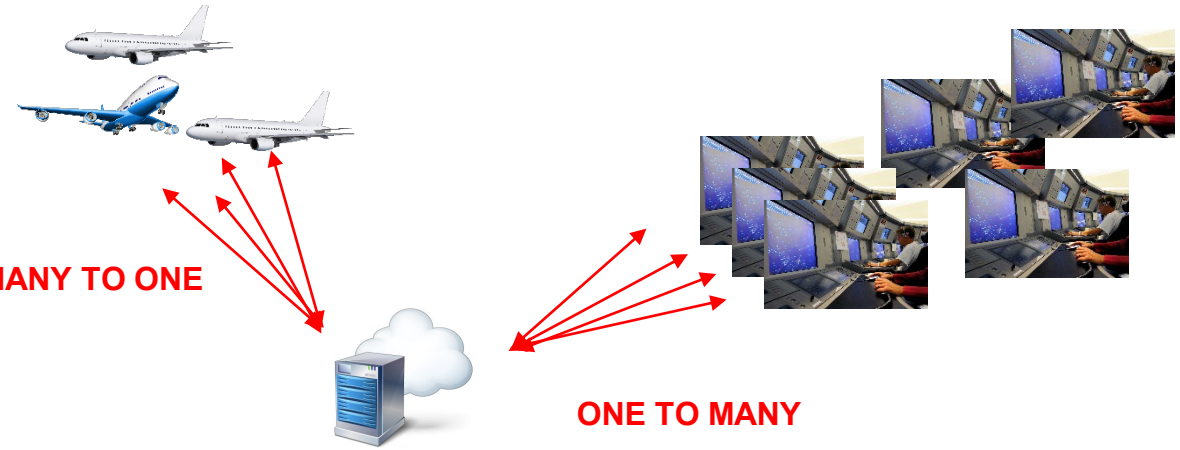
- Obligation to transmit EPP data but there's a need to protect the confidentiality of the data
- Path of data transmission can affect the type and number of arrangements



MANY TO MANY
(AF6.1 - downlinking)



MANY TO MANY
(AF6.2/6.3 – data forwarding)



MANY TO ONE

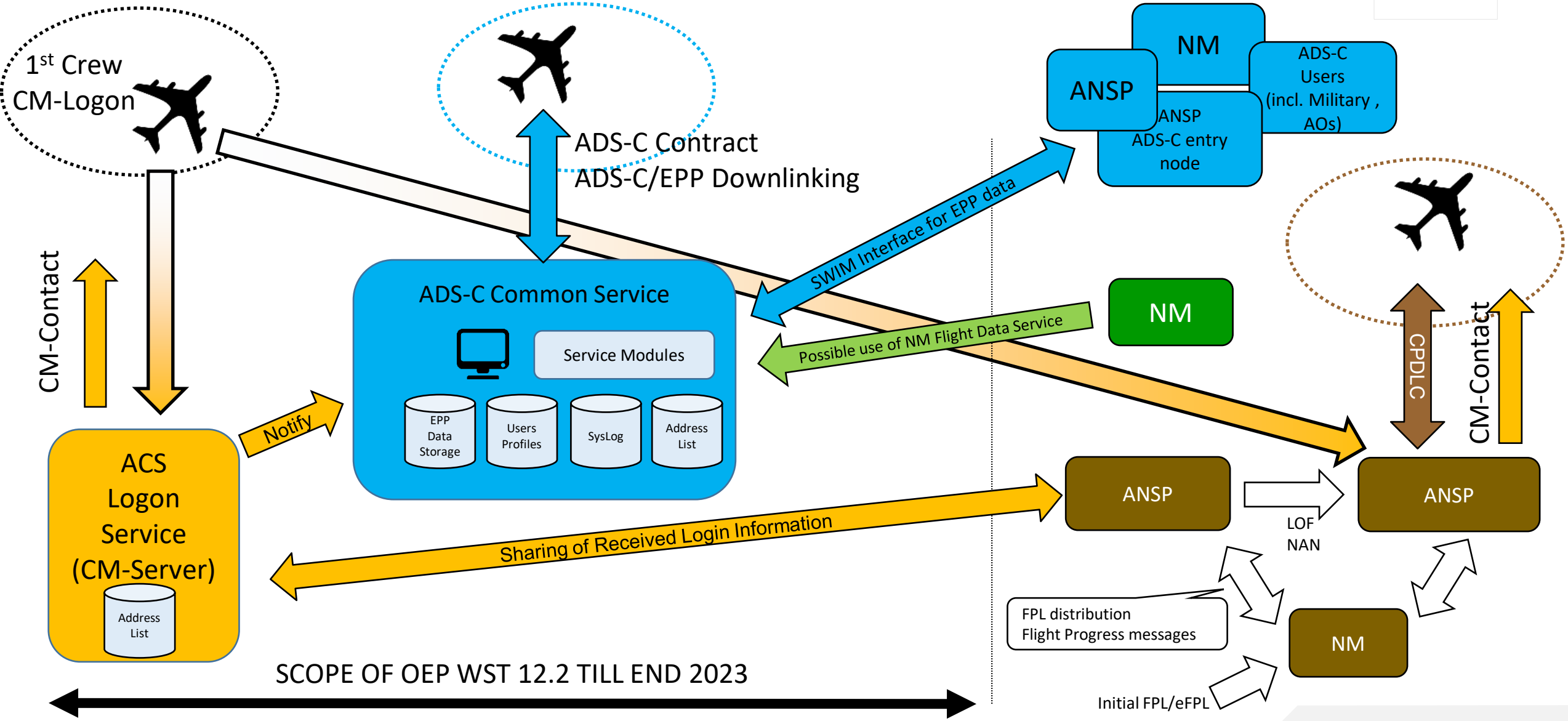
ONE TO MANY

One-Stop-Shop approach
suitable for a
ADS-C Common Service

Non Disclosure Agreement '*stricto sensu*'
Disclosure under confidential terms (e.g., CP1)
Controlled access/storage
Non-dissemination vs. AF6.3

Contractual LICENCE – Non Commercial Use
Meaning confidentiality + permission to use confidential information (EPP data) according to T&C for other purposes eg. ANSPs below FL285, ATM R&D, ATCO Training, ATM statistics/monitoring, MET

A CONOPS for the Common Service

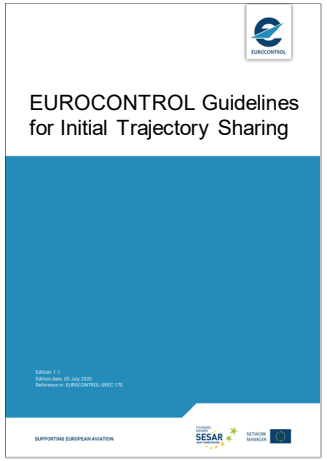


Standardisation of ADS-C/EPP Data Distribution for CP1 AF6

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

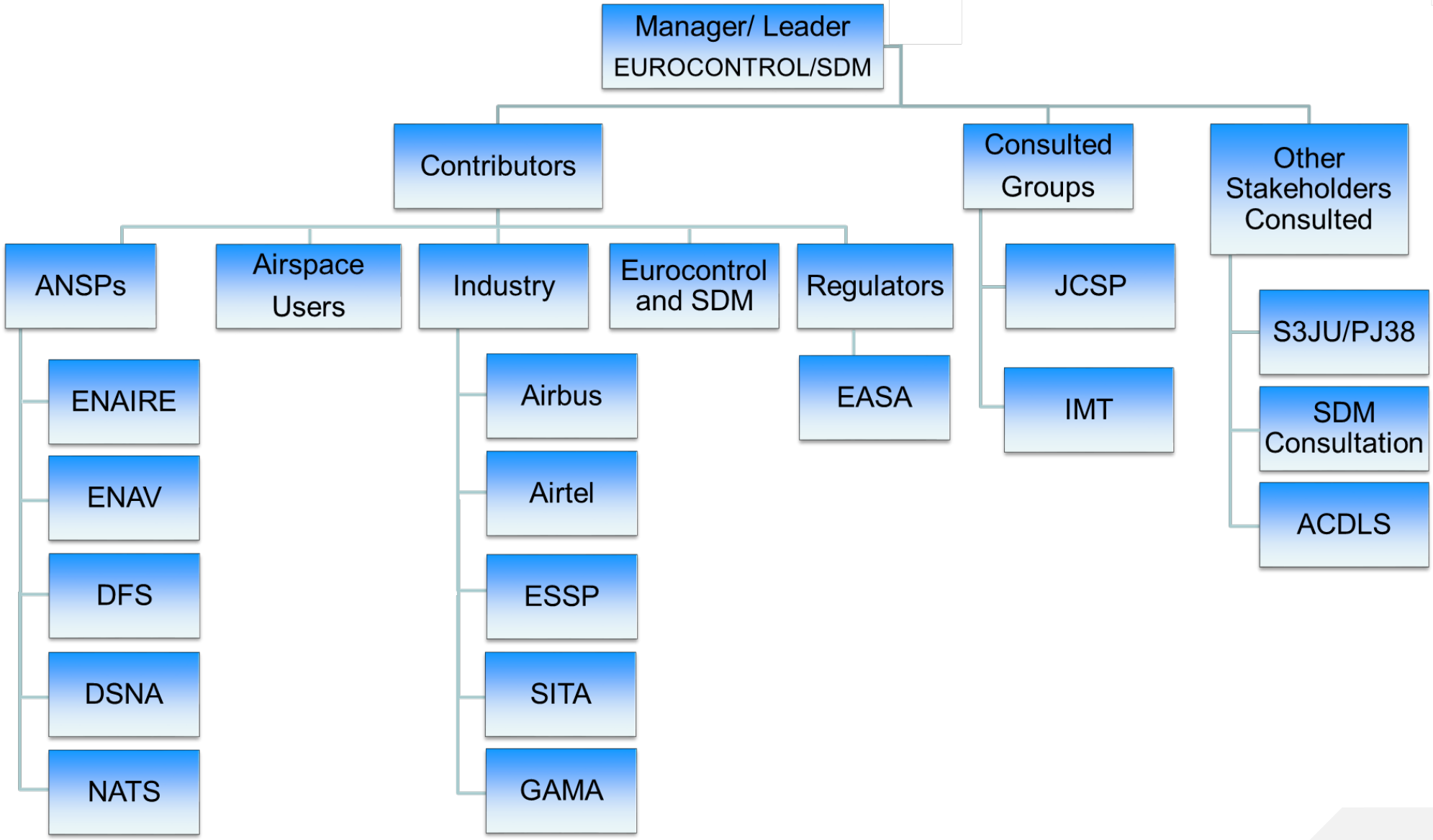
+



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	What will happen from 2024 onwards
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	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