



# SESAR Showcase

A Conference & Exhibition of SESAR 1 Results

Amsterdam, 14-16 June 2016





# Improving traffic predictions and aligning trajectories with the **Extended Flight Plan**

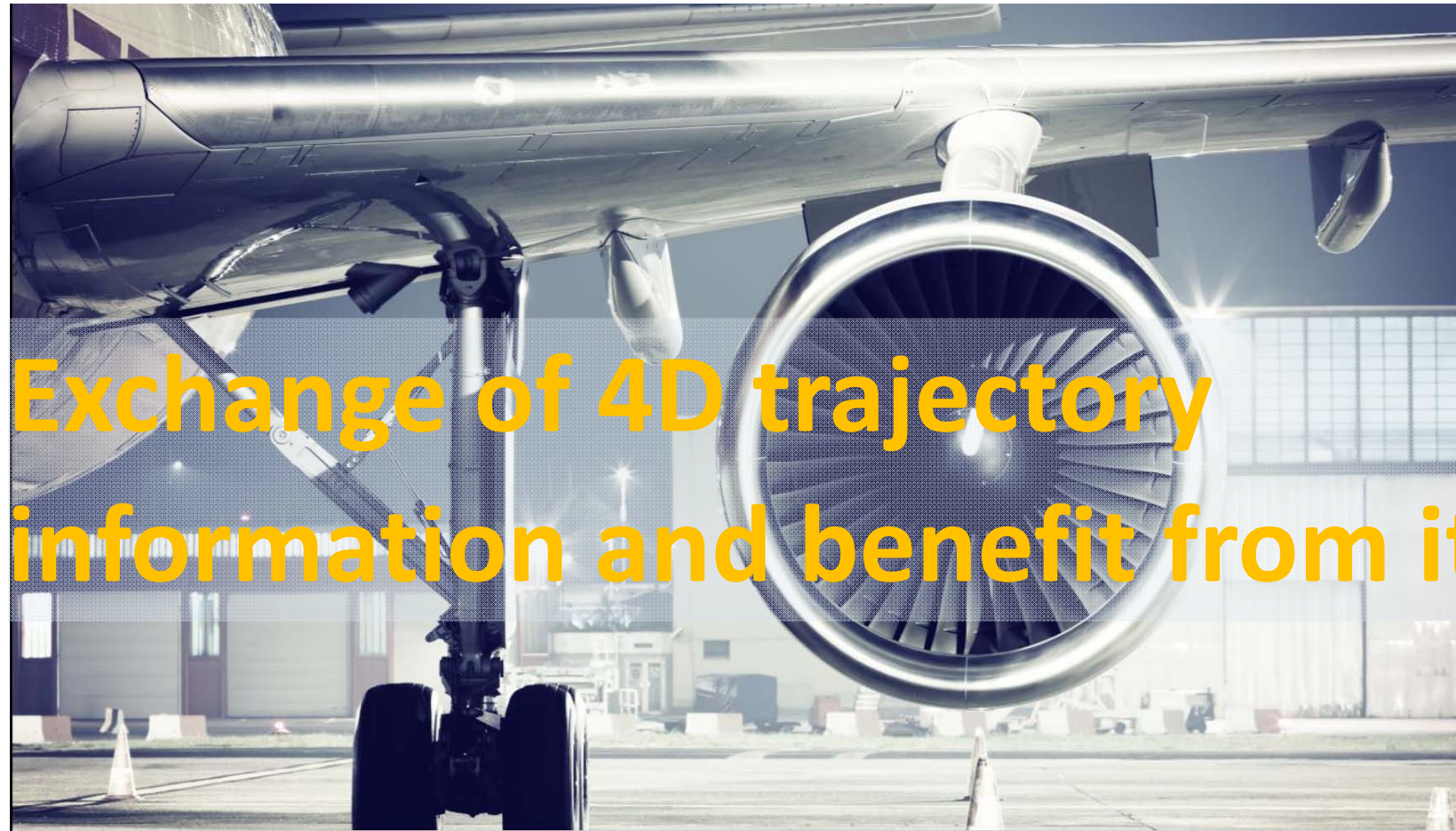
Gérard Mavoian (EUROCONTROL)

Urban Weißhaar (Lufthansa Systems)

Workshop on Traffic Management

Amsterdam, 14-16 June 2016

# The challenge for an FPL in 21th century



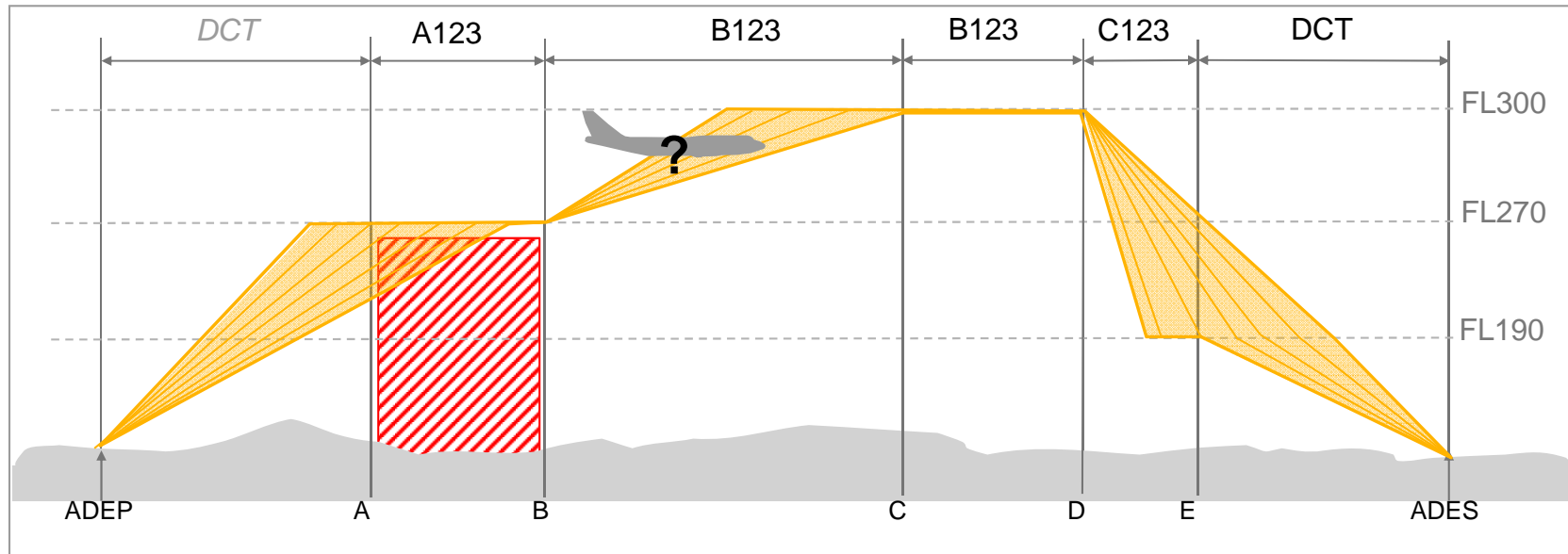
Exchange of 4D trajectory  
information and benefit from it



k] kYj &ϕ'† {y>}

Amsterdam, 14-16 June 2016

# The issue with today's FPL



- Airspace user's flight plan delivered through today's ICAO FPL 2012 include only "limited" information of the 4D trajectory
- Key parameters about exact position, altitude, time at an waypoint or flight specific performance data are missing



k] kYj &φ'† {y>}

Amsterdam, 14-16 June 2016

# Today's problems



**ATM predictions  
inaccuracy**

- Reduction of Demand Capacity Balancing and ATC processes efficiency
- Application of many buffers (e.g. declared capacity, medium-term conflict detection)



**Misaligned views  
of the trajectory**

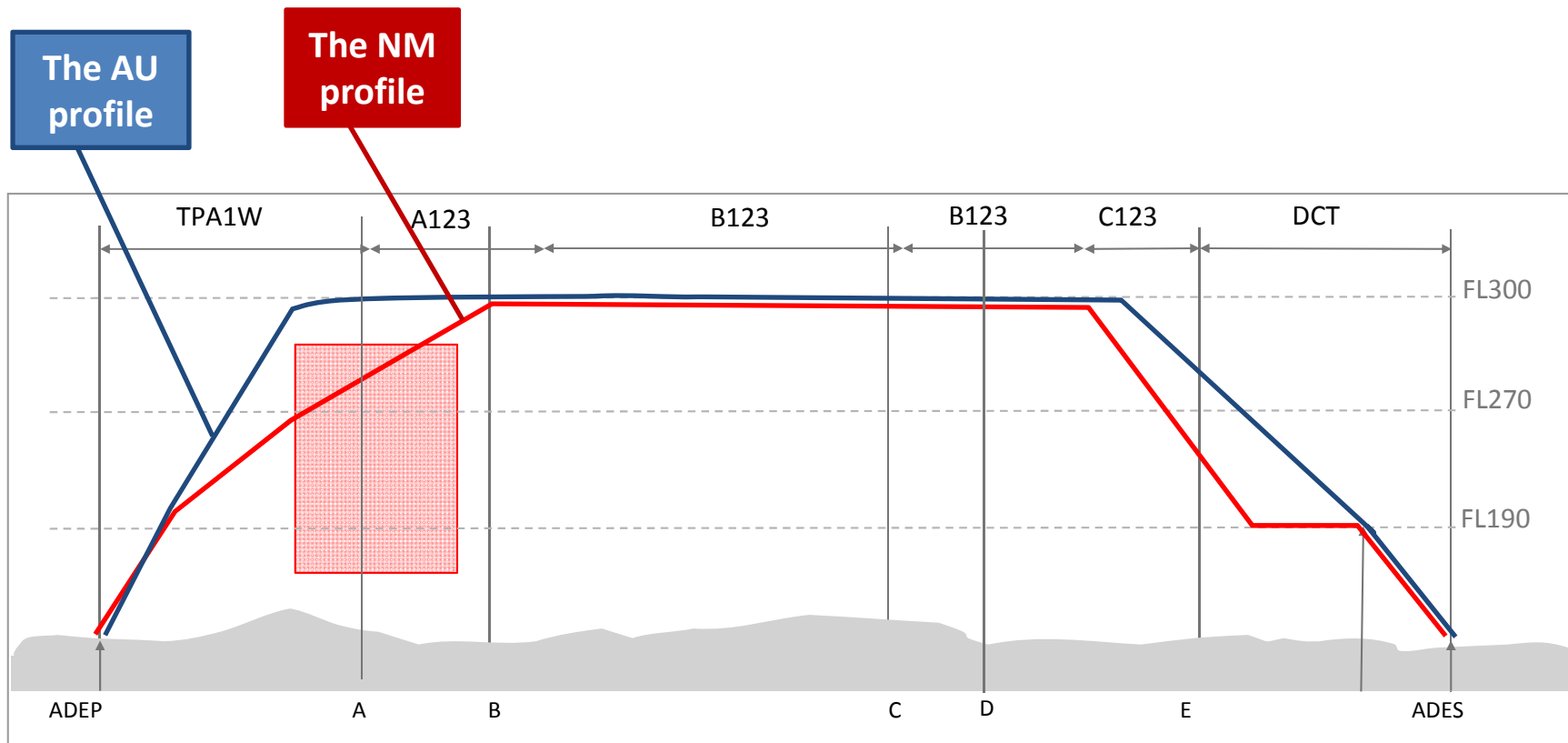
- Induce issues in flight plan acceptance and flow management processes
- Reduce the effectiveness of collaborative processes



k] kYj &ç'† {y>}

Amsterdam, 14-16 June 2016

# Misaligned trajectories – operational issues



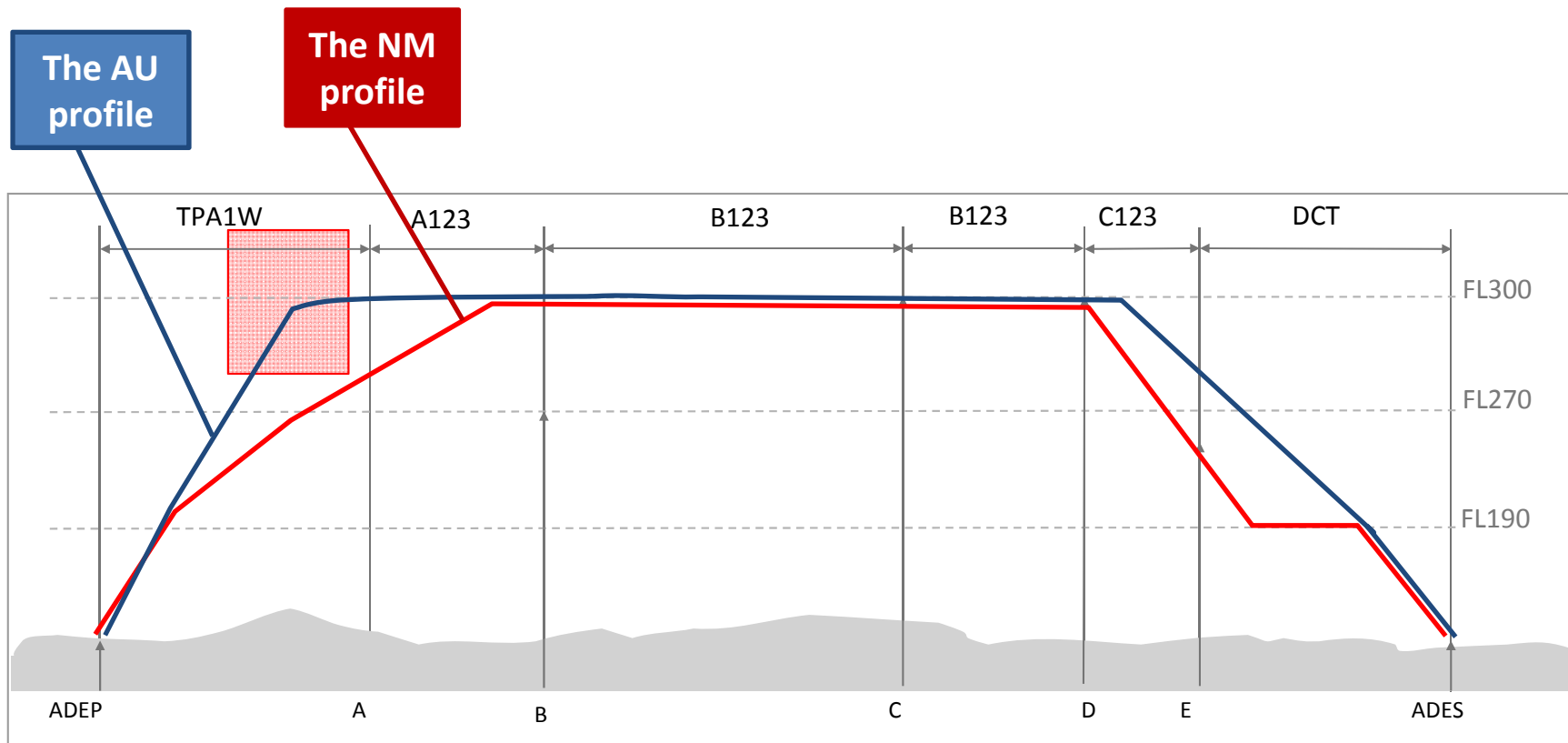
Flight plan wrongly rejected or unnecessary ATFCM delay



k] kYj &φ'† {y>}

Amsterdam, 14-16 June 2016

# Misaligned trajectories – operational issues



Flight plan wrongly accepted – Potential safety issue

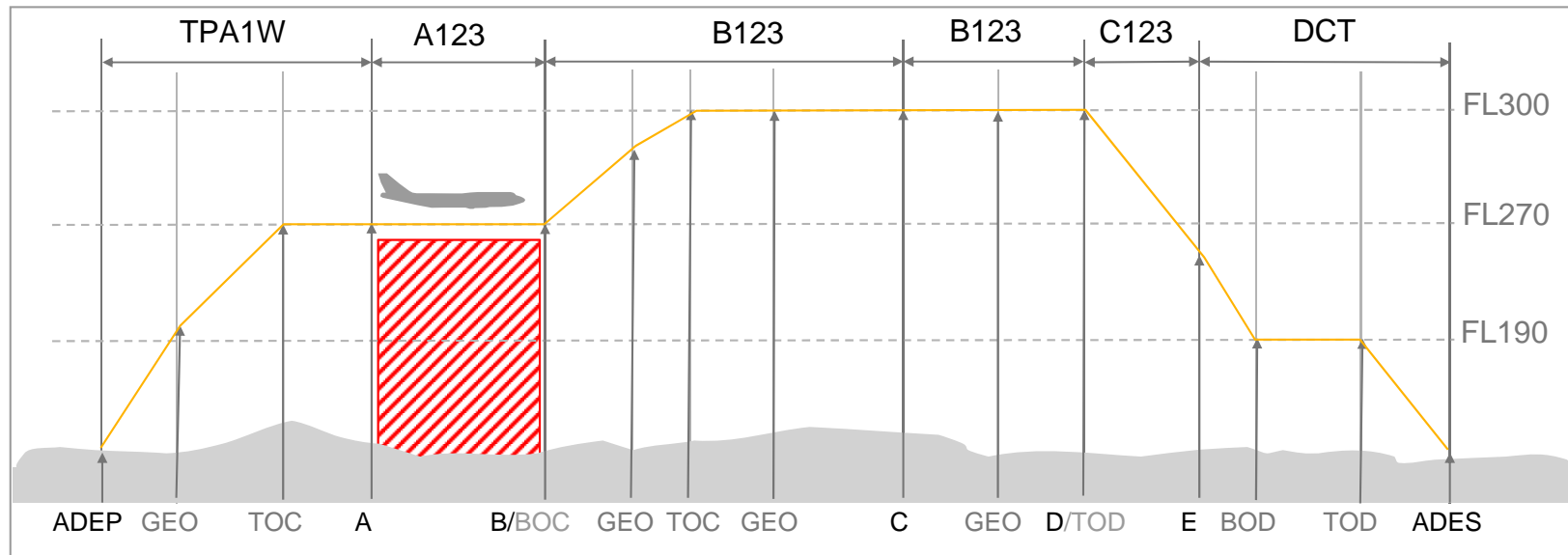


k] kYj &ϕ'† {y>}

Amsterdam, 14-16 June 2016



# The solution: EFPL



- Full 4D trajectory picture is delivered via the EFPL
- Flight specific performance data to improve ATM traffic predictions
- Full transparency of the flight path intention of the AU is delivered
- Use of B2B Service Technology



k] kYj &ϕ'† {y>}

Amsterdam, 14-16 June 2016



# EFPL uses in different timeframes

## EFPL use in current Network operations

- Flight planning
- Flow management

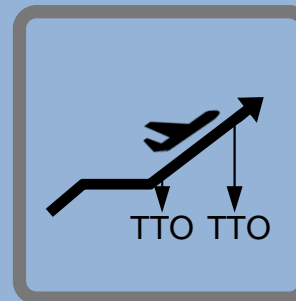
## *PCP deployment scope*

## EFPL use in current ATC operations

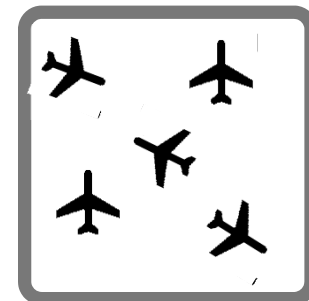
- Complexity management
- ATC tactical processes

## EFPL as enabler for advanced concepts implementation

- Shared Business Trajectory
- Target Times management
- Trajectory based operations
- Free route



Target Times  
management & TBO



Free Route

k] kYj &ç'† {y>}

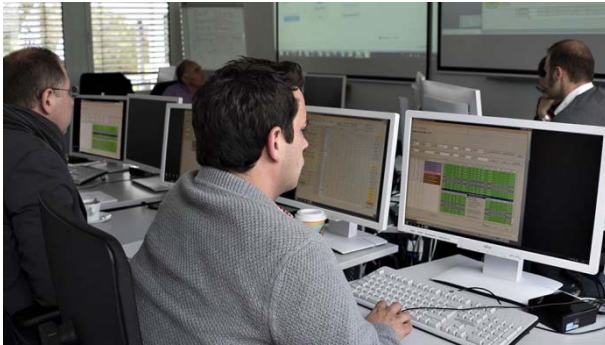
Amsterdam, 14-16 June 2016



# EFPL exercises & partners

## Human in the loop sessions

13 Dispatchers  
2 NM operators



## Shadow mode sessions

Legacy FPL system on AUs sites  
sending EFPLs to NM validation  
platform

**More than 10 000 Extended  
Flight Plans received**

## ATC simulations

Benefit of using EFPL  
information on ATC  
operations



**Lufthansa Systems**



k] kYj &ç'† {y>}

Amsterdam, 14-16 June 2016

# EFPL validation results

## The planning phase

### Flight planning

- Flight plan rejections could be decreased by 15% after initial adaptation phase
- No risk of significant increase of flight plan rejections at early stage of implementation
- Decrease of NM and airspace users operators workload after initial learning phase
- FPL route/profile optimisation opportunities to be progressively exploited in implementation

### Alignment of Airspace User & Network Manager trajectory views

- Alignment of trajectory times (in general) => requirement for target times management
- Partial alignment regarding vertical profiles : e.g. ATC procedures not published as constraints

### Traffic predictions / Demand Capacity Balancing

- Improved prediction of flight times and flight duration in sectors
- Improved prediction of climbing profiles and sectors crossed in some geographical areas

### Standards / Format

Technical feasibility of using FIXM – the future format for ICAO eFPL - is demonstrated

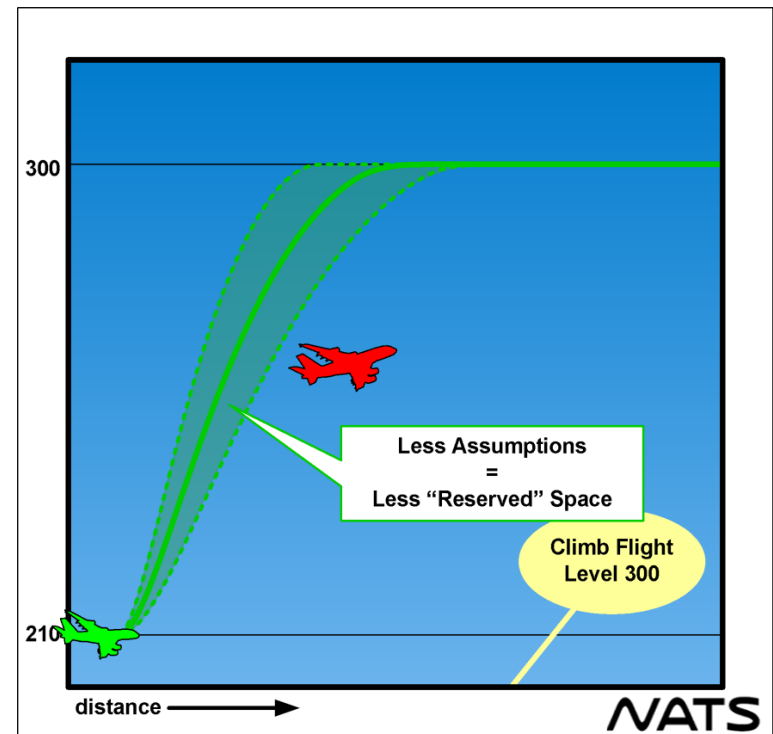
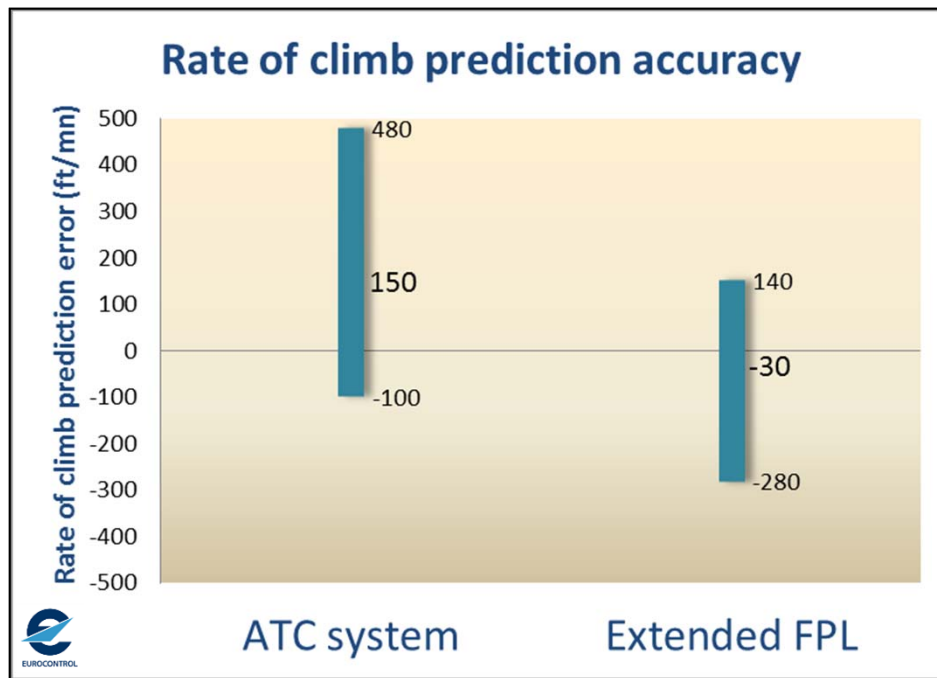


k] kYj &ç'† {y>}

Amsterdam, 14-16 June 2016

# EFPL validation results

## The ATC perspective



- Significant prediction improvements in climbing phase
- Potentially, 10 % reduction of false medium-term conflicts detection/resolution
- Increased accuracy of estimated times over

k] kYj &ϕ'† {y>}

Amsterdam, 14-16 June 2016



# Conclusions and SESAR Deployment



## Use of the EFPL

ECTRL



- Deployment at NM from 2017
- Synchronized with ICAO standards

FOC



- Airlines are almost ready

ATC



- V3 validation planned in 2017 in SESAR 2020

SDM



- Deployment could start from 2017/2018



k] kYj & c' t {y>}

Amsterdam, 14-16 June 2016



# Thank you for your attention

More information:

[gerard.mavoian@eurocontrol.int](mailto:gerard.mavoian@eurocontrol.int)  
[urban.weisshaar@lhsystems.com](mailto:urban.weisshaar@lhsystems.com)

Knowledge for a better world

Amsterdam, 14-16 June 2016



# Improving ATM performance with integrated improved OAT Flight Plan and Airspace Management from WOC

Klaus Dieter HERMANN – Airbus Defence  
and Space

Edgar REUBER - EUROCONTROL

WOC 2016

Amsterdam, 14-16 June 2016



# Typical environment of mission trajectory and its needs for civil - military coordination

**Military flights in  
the future Single European Sky**



# Civ – mil coordination, integration of OAT flights into ATM network operations environment

Why?

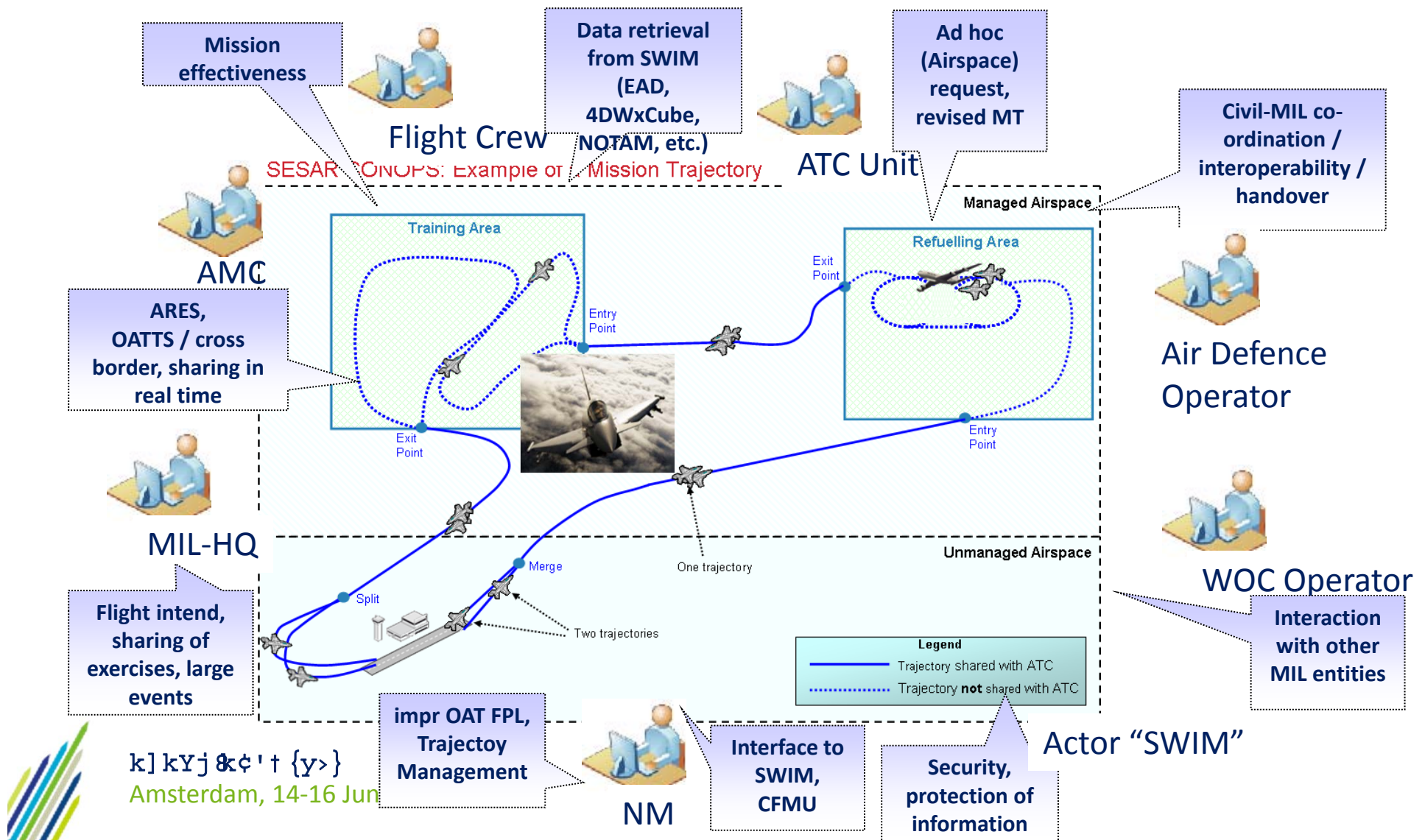
- Today's OAT flights look like this:
- Tomorrow's OAT flights look like this:



k] kYj &ç'† {y>}

Amsterdam, 14-16 June 2016

# Conceptual Environment of Mission Trajectory (OAT Flight plan initially) and its needs for Civil - military coordination



# Civ – mil coordination, focus

- Automation of ATM processes via
  - ASM interfaces from WOC
  - iOAT Flight Plan
- Supporting the Collaborative Decision Making process and ATM performance



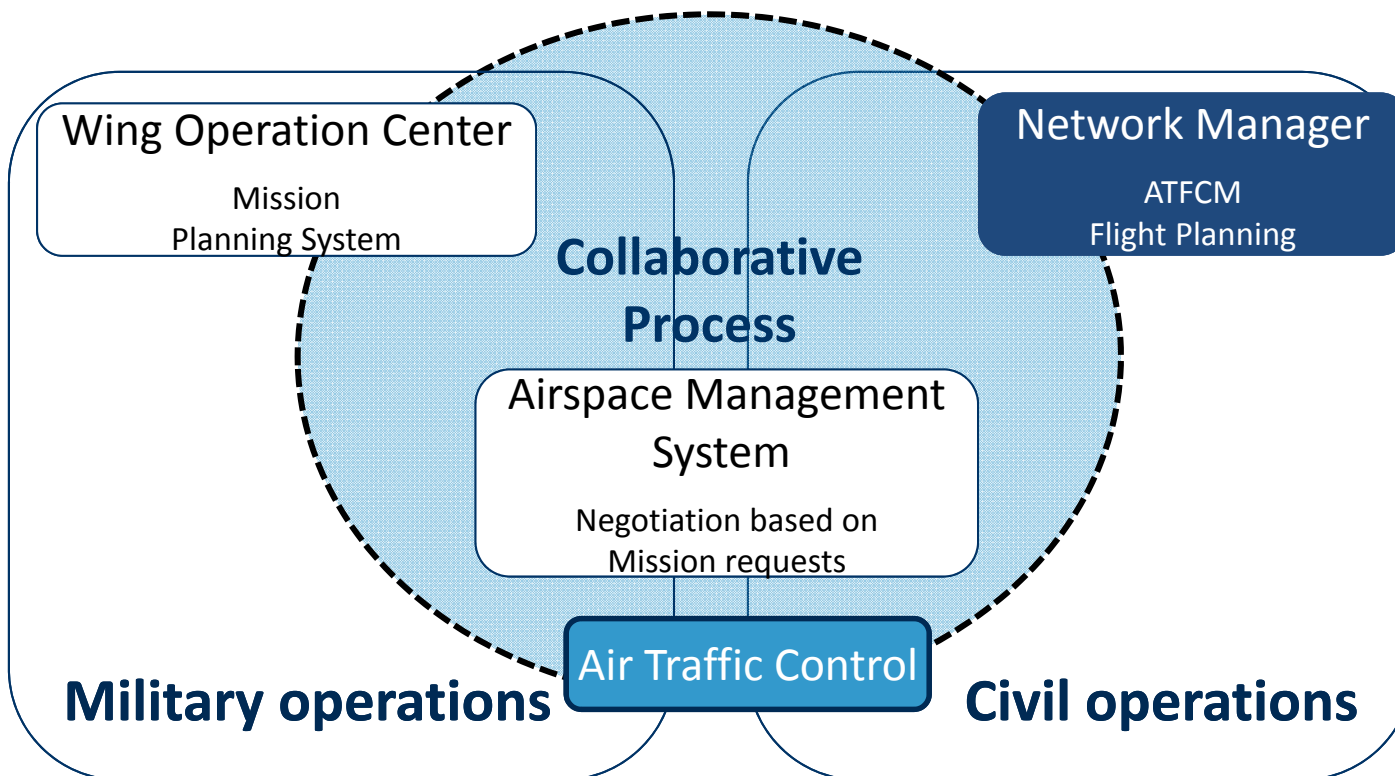
**Network Manager**  
nominated by  
the European Commission



k] kYj &ϕ'† {y>}

Amsterdam, 14-16 June 2016

# Civ – mil coordination, ASM interfaces

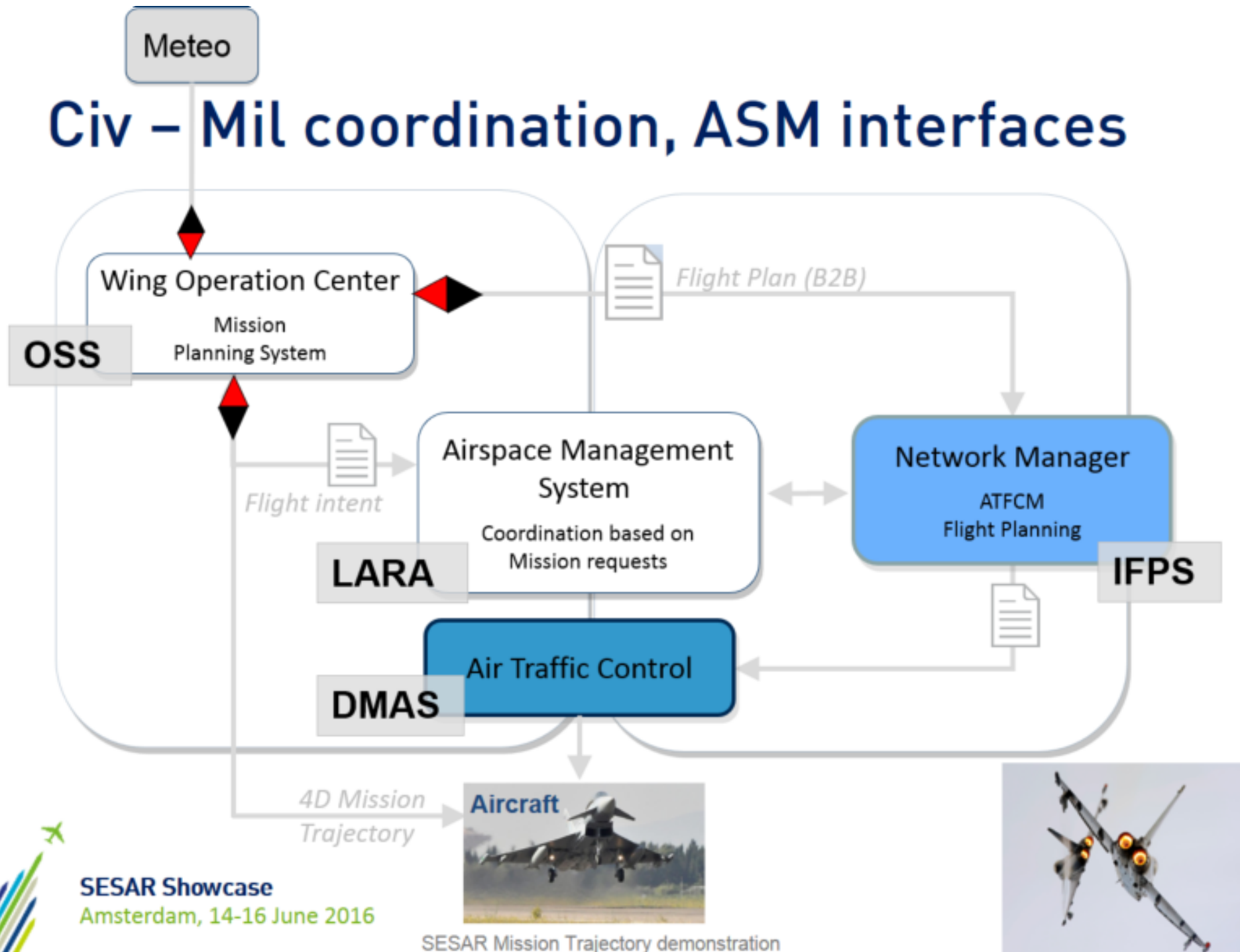


k] kYj &ç'† {y>}

Amsterdam, 14-16 June 2016



# Civ – Mil coordination, ASM interfaces





# Civ – Mil coordination, iOAT Flight Plan

## iOAT FIPI

- to express State Airspace Users' intents to fly
- to describe a typical Mission Trajectory
- to use harmonised data format supporting automated data exchange
- enable centralised management of iOAT FPLs by NM to enable improved performance orientation and measurement



k] kYj &ç'† {y>}

Amsterdam, 14-16 June 2016



# Civ – Mil coordination; impressions VP 789



# Outlook – SESAR 2020



## What comes next

- The full 4D Dataset will be used by all stakeholders in the future
- The development of integrated support functions for all stakeholders
- The full situation awareness for all ATM stakeholders for the complete life cycle of the Trajectory



k] kYj &ç'† {y>}

Amsterdam, 14-16 June 2016

# Outlook – SESAR 2020



**SESAR Showcase**

Amsterdam, 14-16 June 2016



# Thank you for your attention

More information:

K.D. HERMANN: [klaus-dieter.hermann@airbus.com](mailto:klaus-dieter.hermann@airbus.com)

E. REUBER: [edgar.reuber@eurocontrol.int](mailto:edgar.reuber@eurocontrol.int)

Amsterdam, 14-16 June 2016

Amsterdam, 14-16 June 2016