



# SESAR Showcase

A Conference & Exhibition of SESAR 1 Results

Amsterdam, 14-16 June 2016



# AMAN RESEARCH IN SESAR

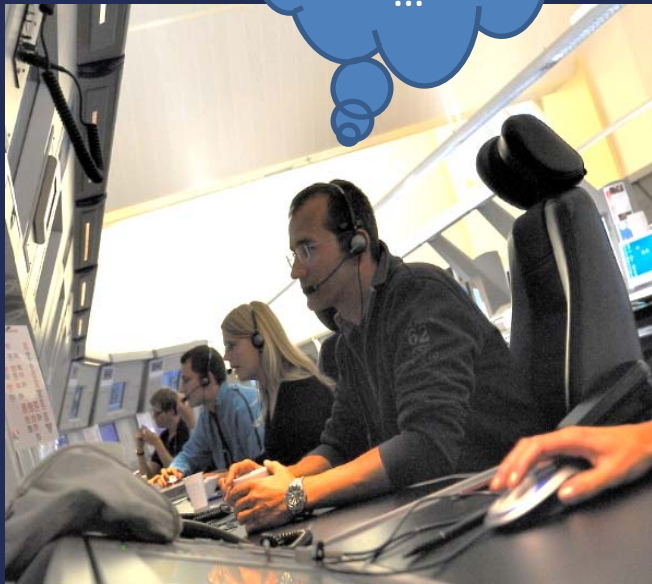
CCA939  
TAP842  
AZA1480  
BPA1713  
...



ARRIVAL SEQUENCE LIST LIRF/16L : 12							
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04		BPA1713	16L	1647	1655	L	0008
05		AZA549	16L	1650	1656	L	0006
06		AEE65R	16L	1652	1657	L	0005
07		AZA1634	16L	1654	1658	L	0004
08		AMC614	16L	1656	1659	L	0003
09		AMM53GR	16L	1656	1700	L	0004
10		AZA1164	16L	1659	1701	L	0002
11		AZA4VX	16L	1710	1710		0000
12		EZY490K	16L	1721	1721		0000

## Arrival MANager (AMAN)

- Advisories to ground in complex cross-border AMAN:
  - Time-To-Lose/Time-To-Gain (TTL/TTG)
  - Speed
- Use of new avionics capabilities:
  - Downlinked airborne data
  - Controlled Time of Arrival (CTA)





# SESAR Solution Extended AMAN

Paul NICHOLLS (NATS)

Gerald REGNIAUD (DSNA)



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**NATS**



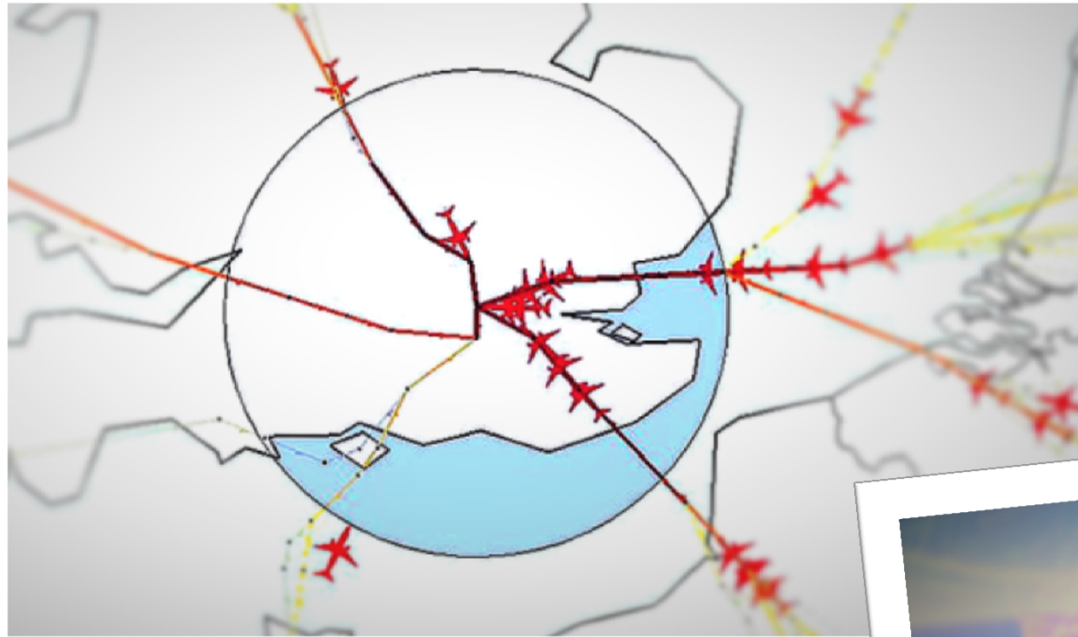
**THALES**



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# The challenge before SESAR (Heathrow Case)



- ✓ Capacity constrained, arrival holding in the TMA routine
- ✓ Asymmetric Radar coverage
- ✓ Inbounds from south and east enter NATS airspace ready for immediate descent

- ✓ NATS reliant upon neighbours to enable the benefits of Extended AMAN
- ✓ Cross border collaboration is a key enabler to delivering the SESAR solution

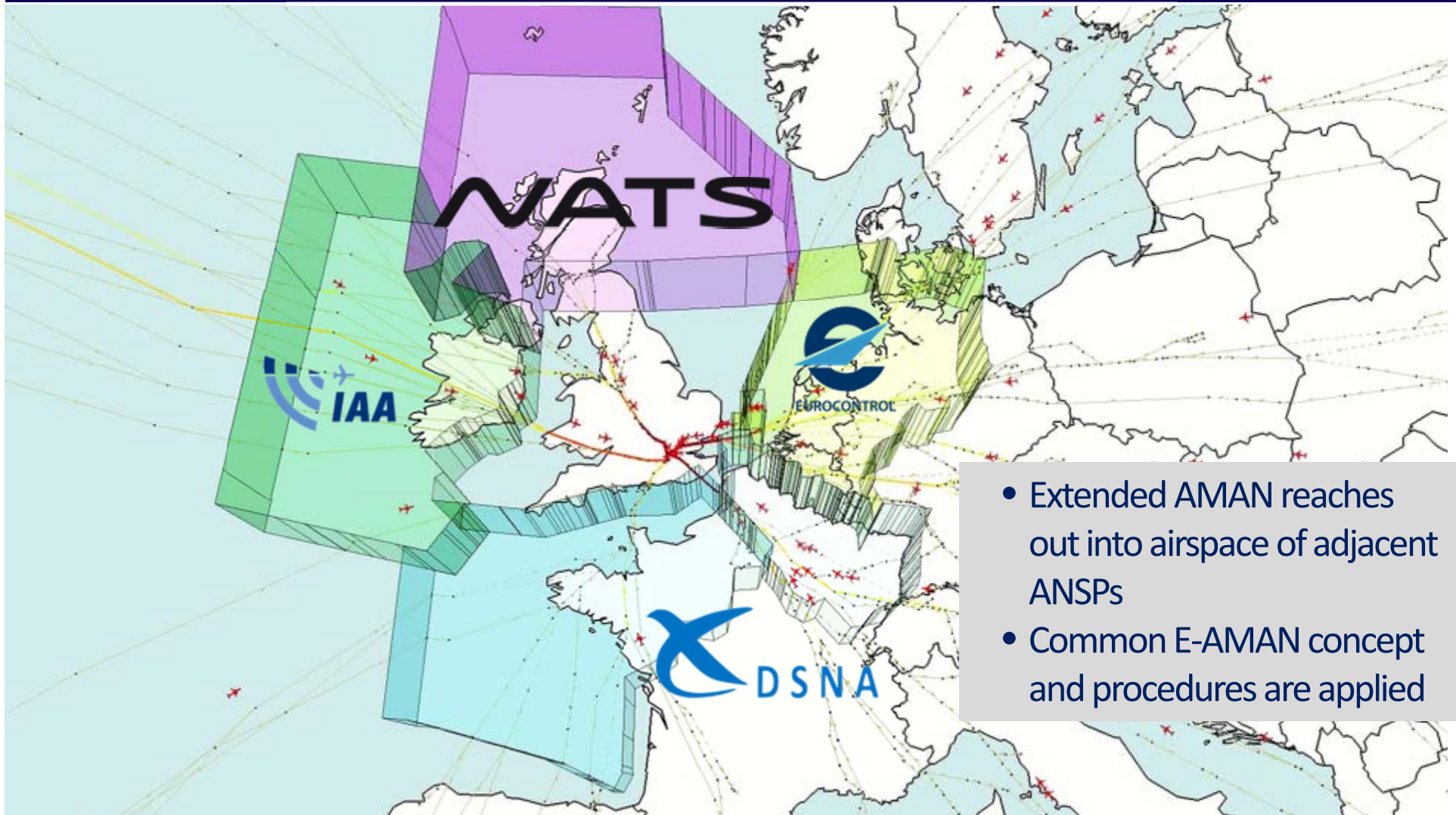


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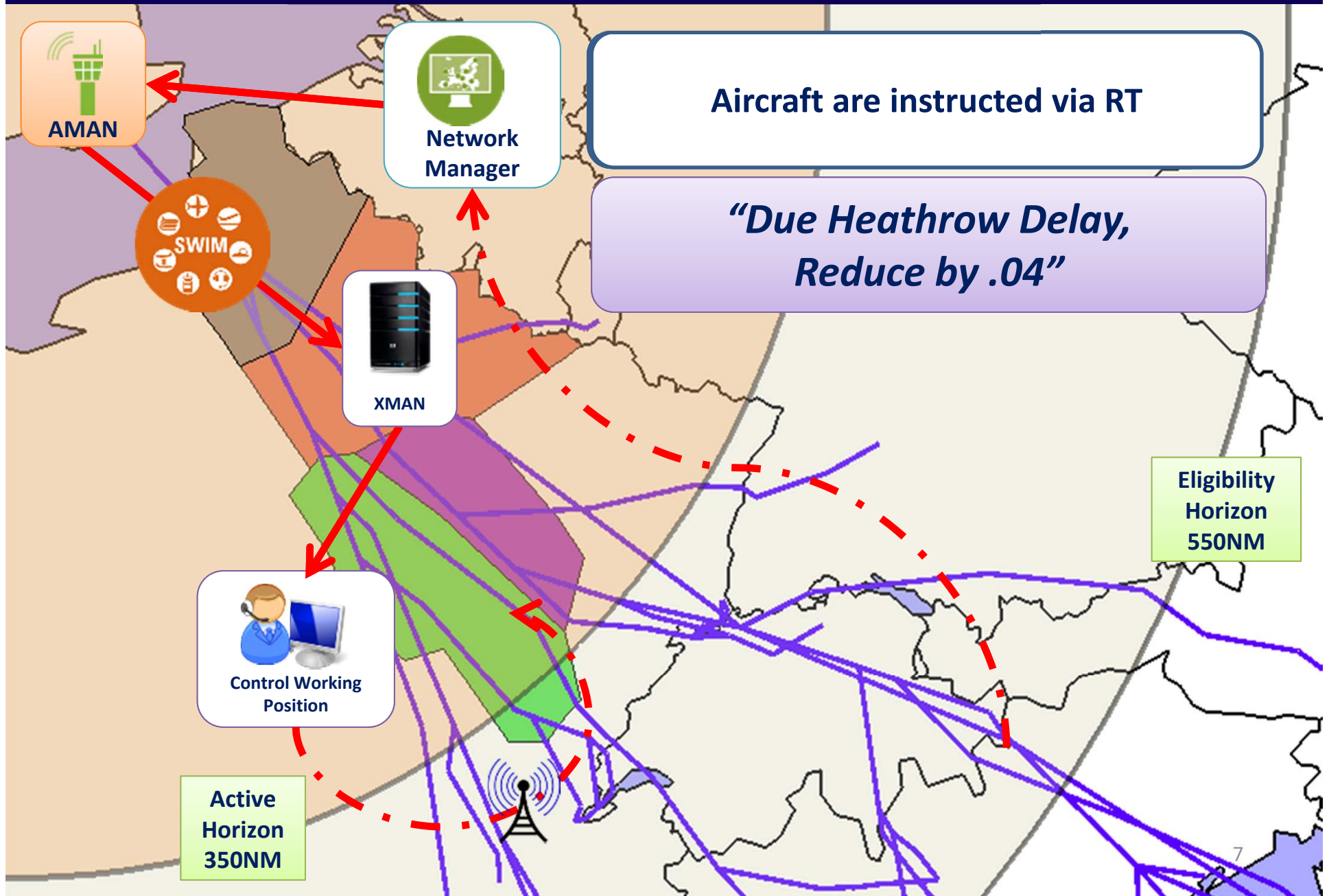
# Cross-border collaboration



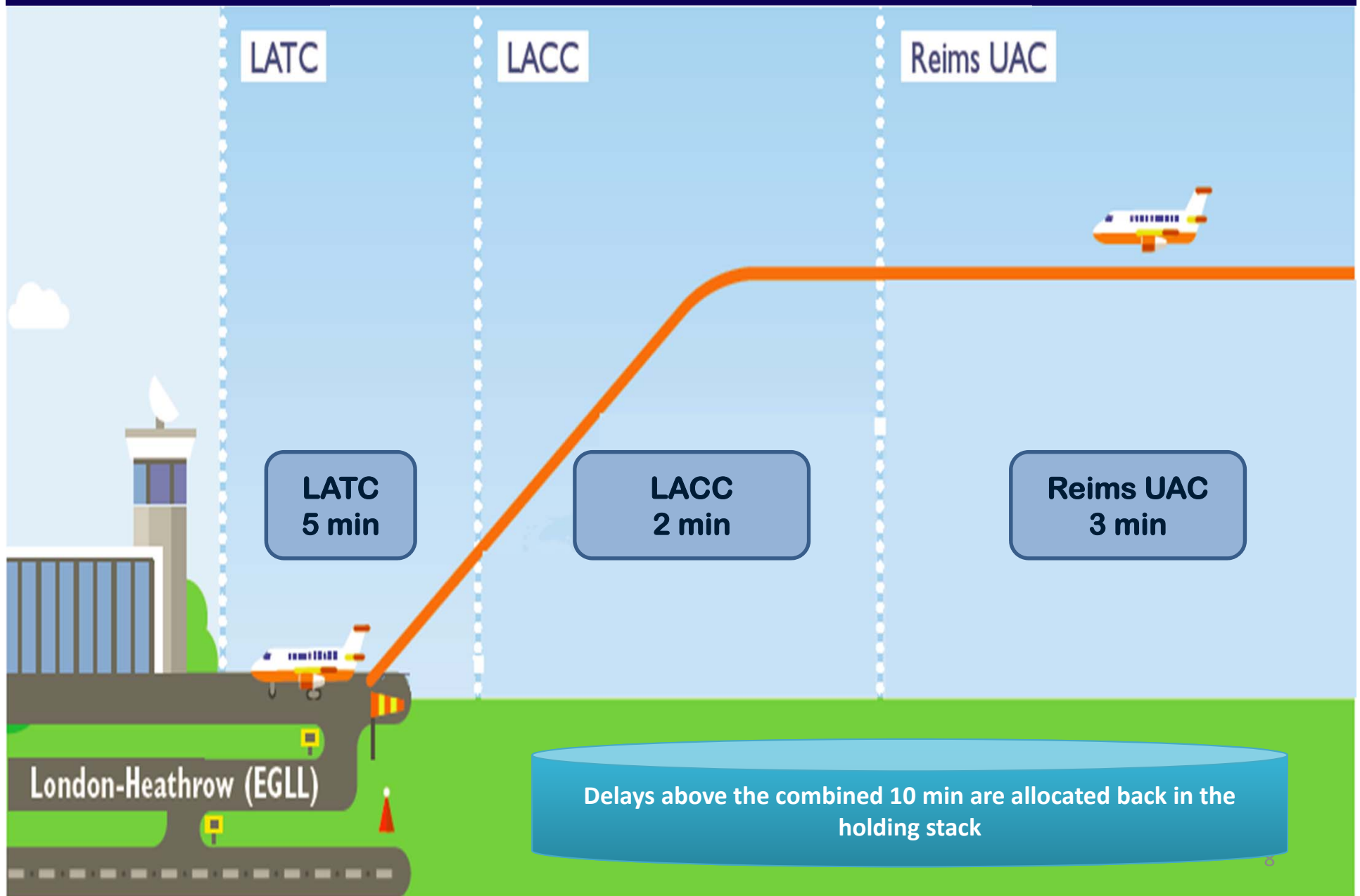
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# How does XMAN work ?

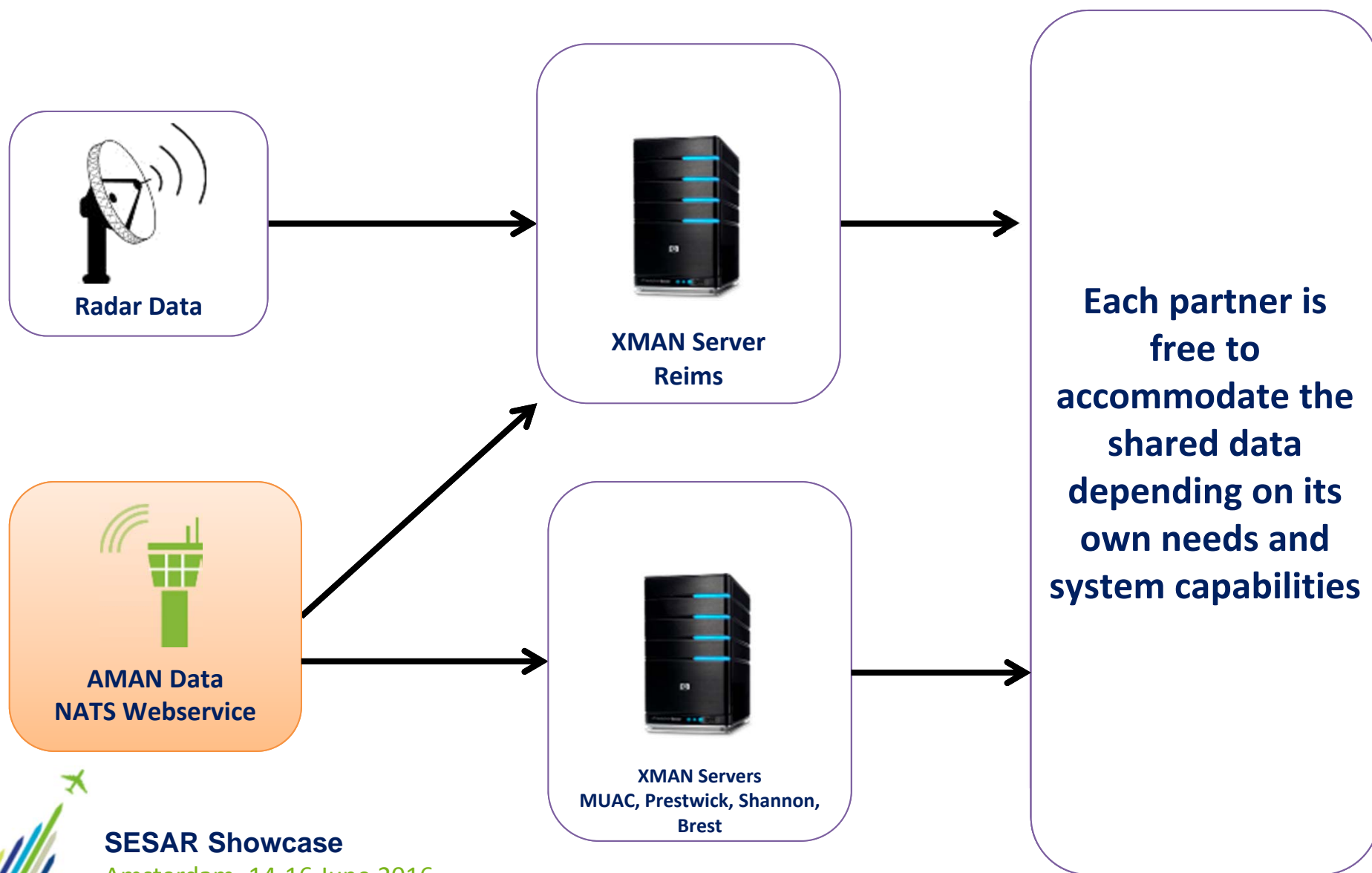


# Delay sharing strategy





# High level system overview



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# Operational deployment in Reims UAC



- ✓ Operational room now fully deployed (22 CWP, FMP, Supervisor and Military CWP)
- ✓ XMAN has been a fore runner, allowing the introduction of a SWIM based technology into OPS.



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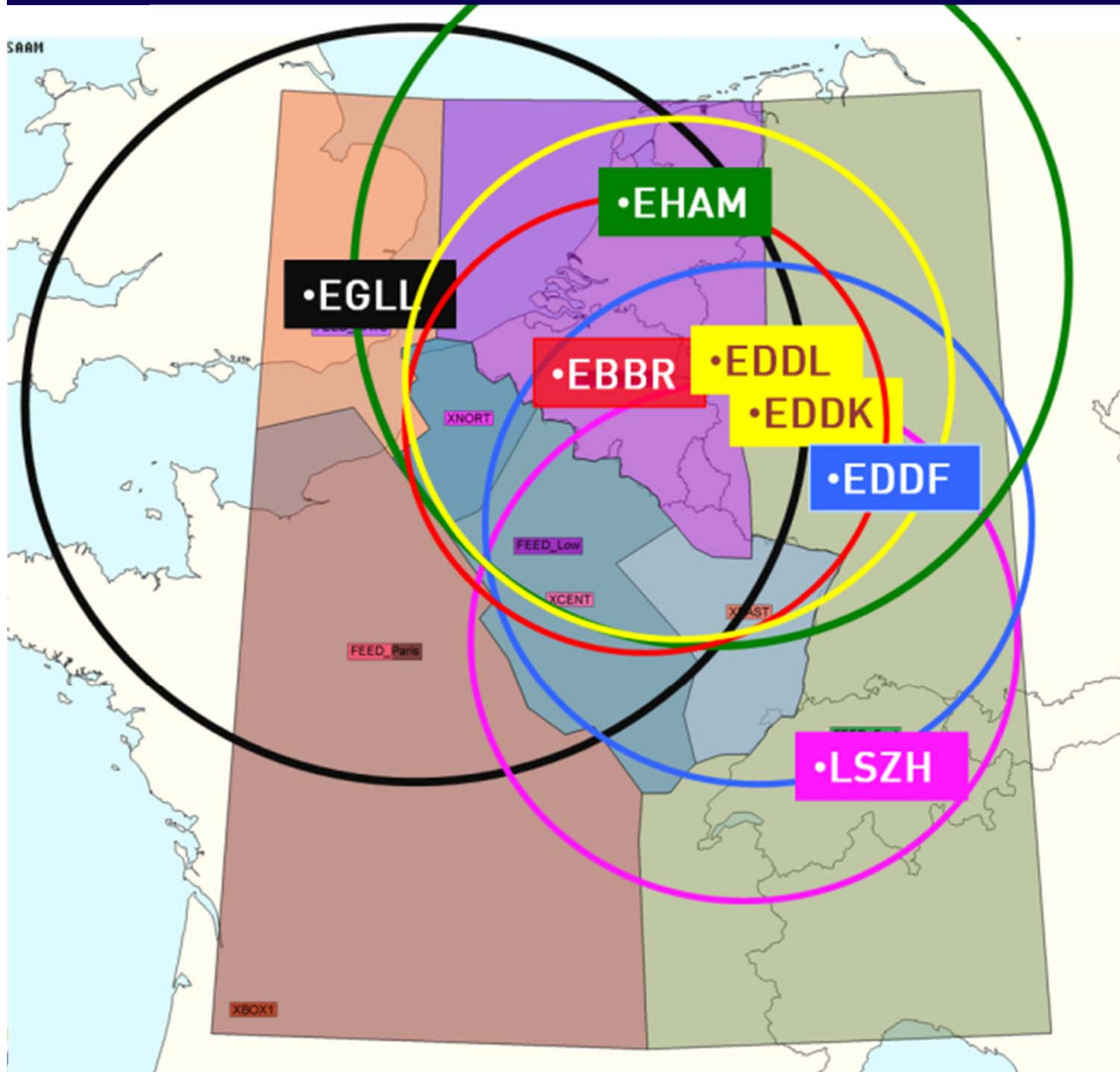
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# Heathrow XMAN benefit assessment

- Operational trials since April 2014
- 40 % candidate flights
- 75 % speed instructed
- Reduction of up to a minute in holding
- €4 million in fuel per annum
- 15.000 tonnes of CO<sub>2</sub> per annum
- Reduced noise beneath the stacks



# XMAN for multi-airport environment



- Real time simulation achieved in Eurocontrol Experimental Center in Dec 2015
- 7 Airports
- 1 Upper Area Unit

## FABEC ATCOs

- Maastricht UAC
- Karlsruhe UAC
- Zurich ACC
- Reims UAC

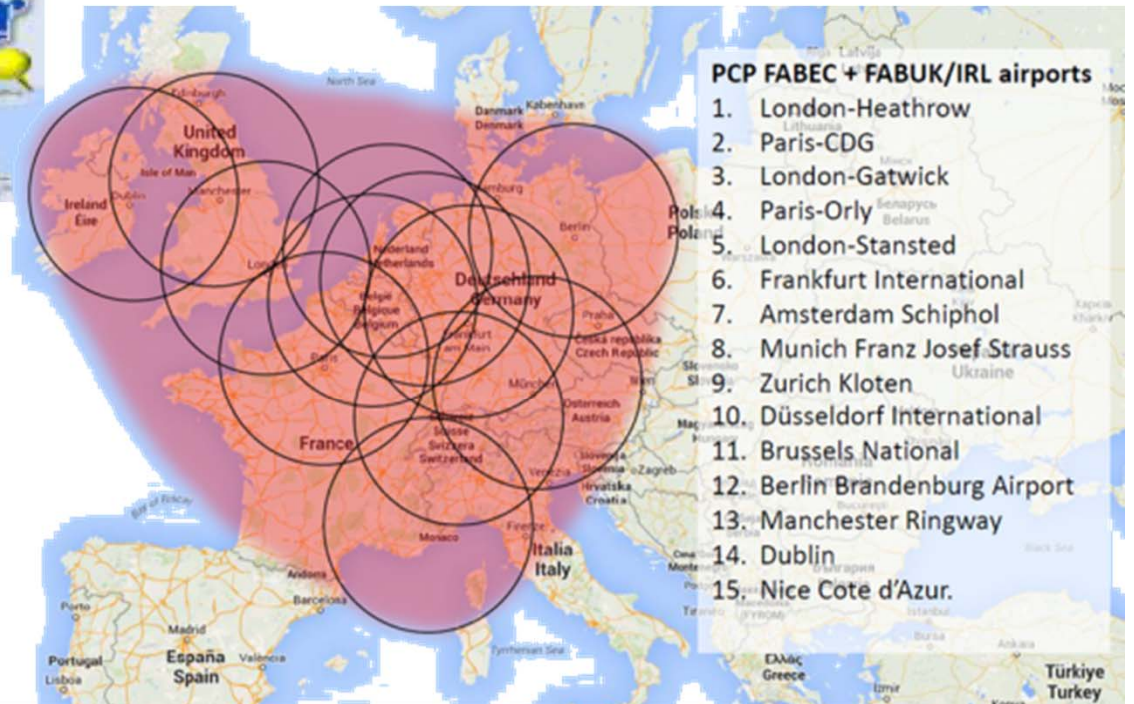
## Interesting results

- Dependencies between Horizons
- Include XMAN workload analysis in ATFCM/CDM processes
- Guidance on HMI

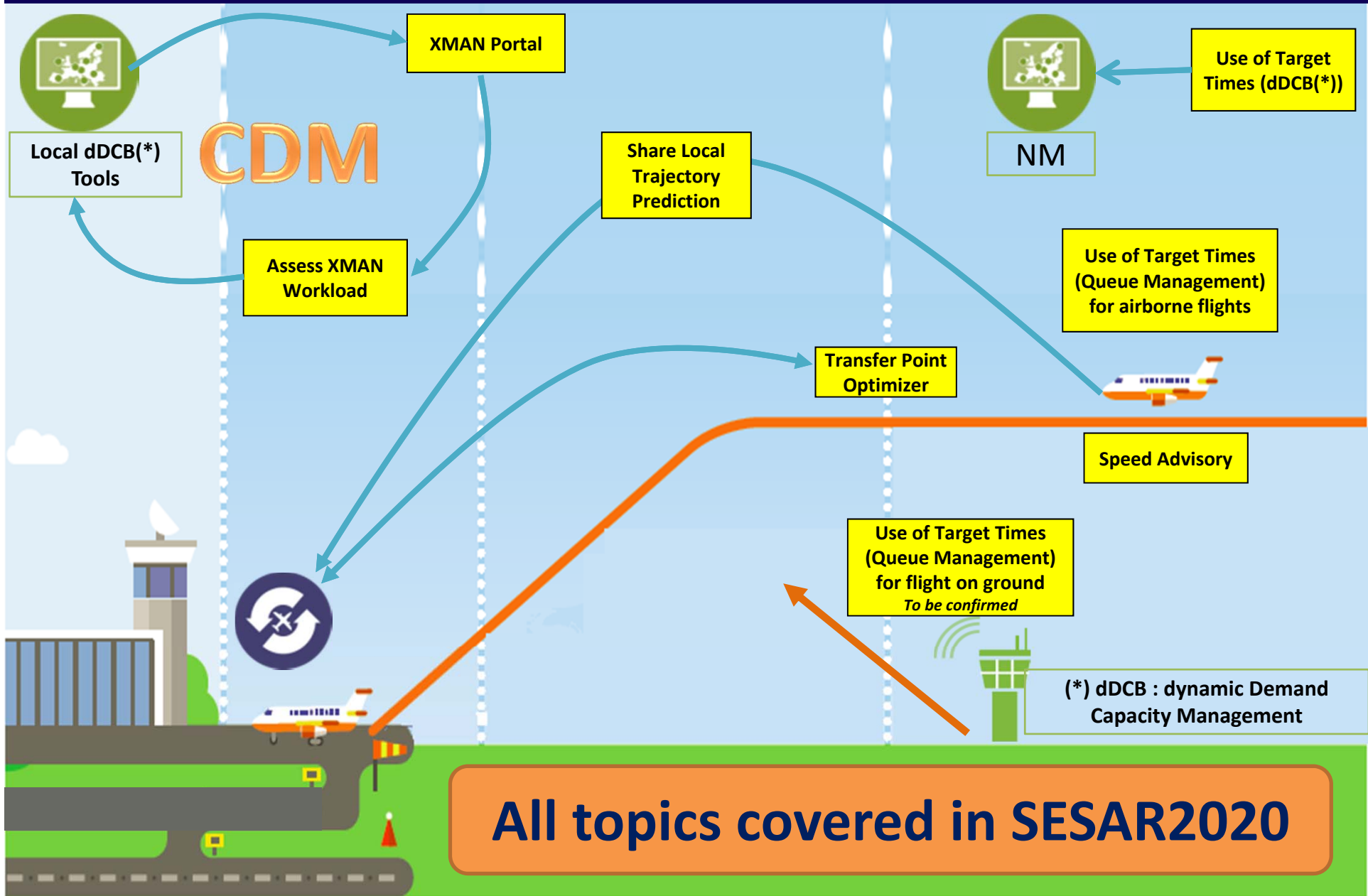


# E-AMAN deployment programme

- PCP implementations at 25 targeted airports are due by 2023
- FABEC & FABUKIrl deals with 15 Airports + support to partners E-AMAN
- Maastricht UAC, Reims UAC and Karlsruhe UAC are impacted by 12 to 15 airports.



# Next in SESAR2020





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Traffic synchronisation  
supported by Time  
synchronisation with aircraft  
trajectory data  
CTA including i4D

Peder Id, NORACON



## Slide 16

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**A1**

Thanks you for the presentation, please see detailed comments on the content directly in the slides. REgarding the layout, it may be improved by removing text (please refer to Christine's guidelines). The removed text can be kept as speaker notes. It is suggested that some more graphics/animations are added. Please review the presentation on EAMAN that will precede yours in order to avoid duplication and to ensure a harmonized style.

Author, 29/04/2016

# Challenge before SESAR

## ➤ Improved Arrival Management

## ➤ Definitions

- Controlled Time of Arrival (CTA)
- i4D Services



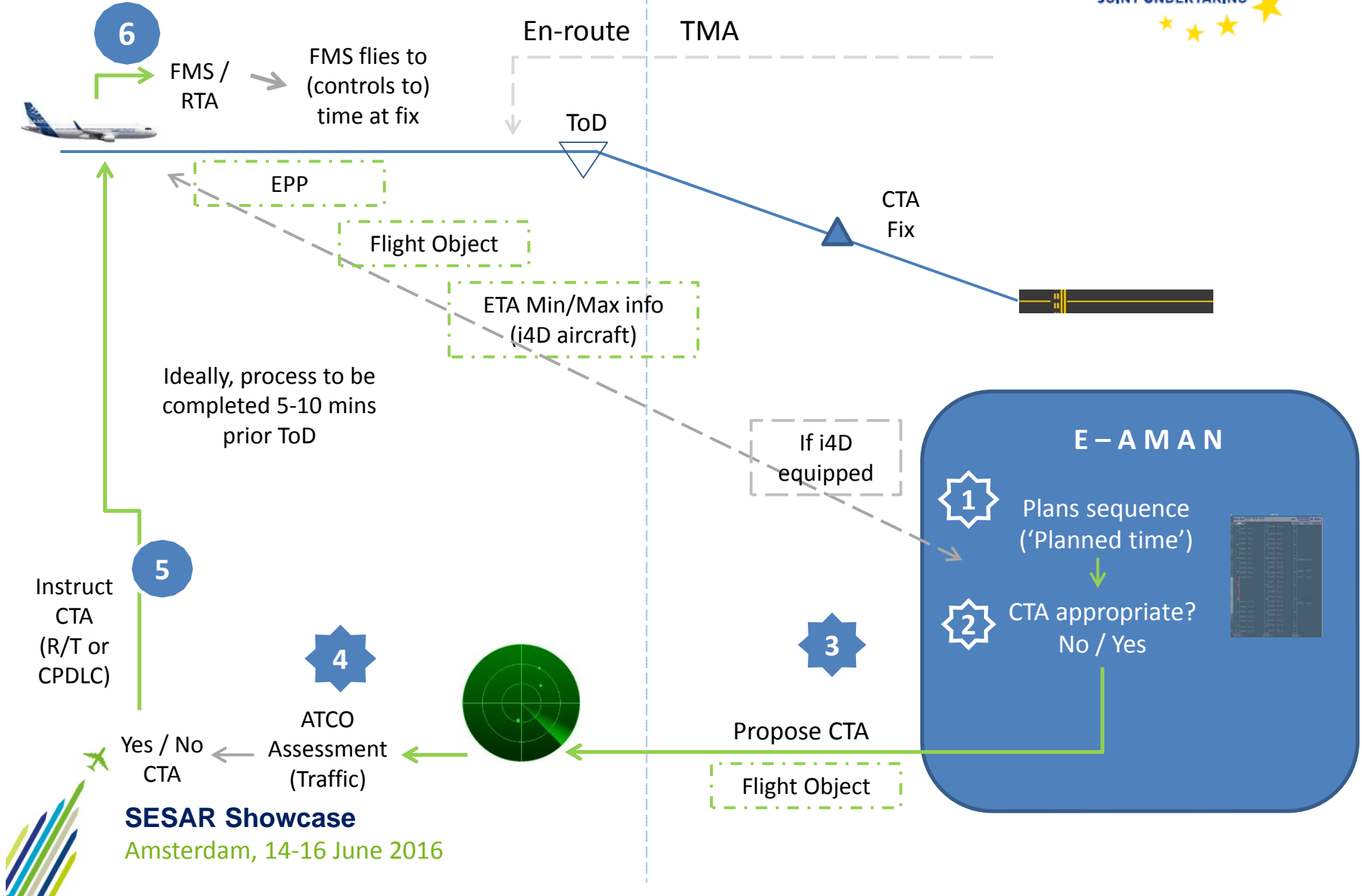
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51-80	A10	Bangkok
51-80	A04	Moscow
51-80	A02	Via Luxor
89-99	A18	Hurghada
112-125	A16	Frankfurt
112-125	C60	Stuttgart
51-80	B35	Belgrade
51-80	A17	Munich
51-80	C51	Amsterdam
27-31	C58	Zurich
51-80	C55	Zagreb
51-80	A10	Zagreb



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# Concept CTA+i4D+IOP

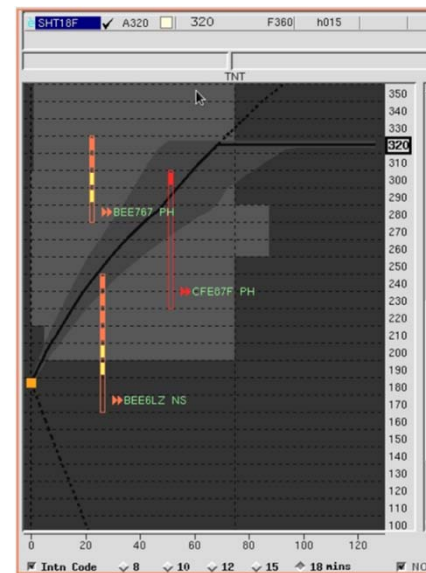
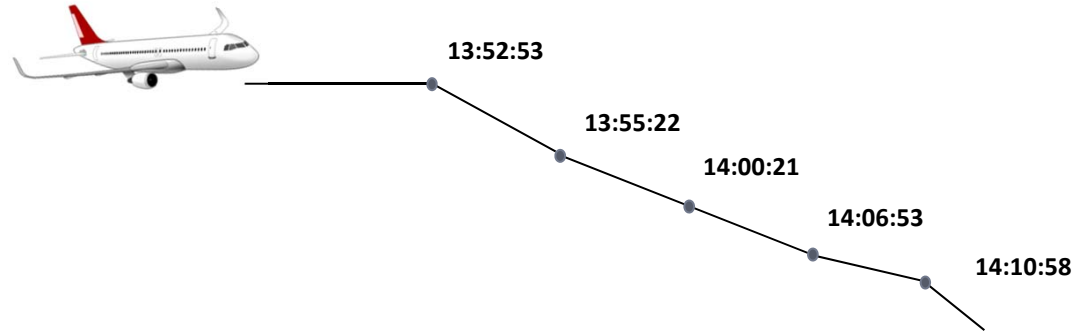


# EPP: A key improvement

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Without EPP



With EPP

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# International cooperation

THALES

NATS

Honeywell

Live Flight  
trials

EUROCAE / RTCA  
standardization  
Working Group

Real Time  
Simulations



Expert  
Group



Coupled  
simulations



Fast Time  
Simulations

ENAIRe

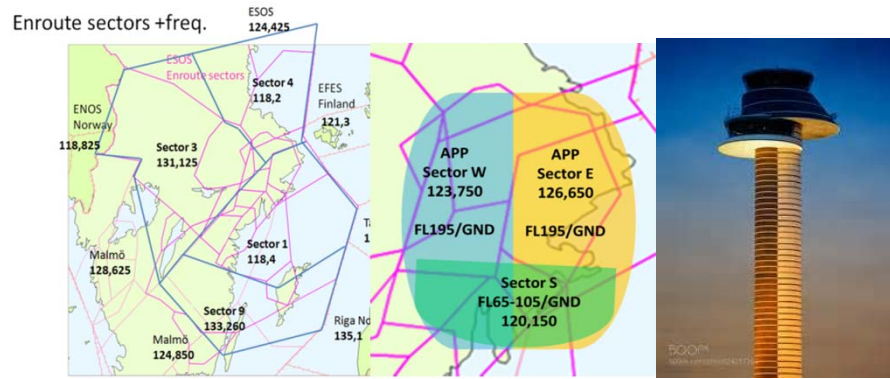


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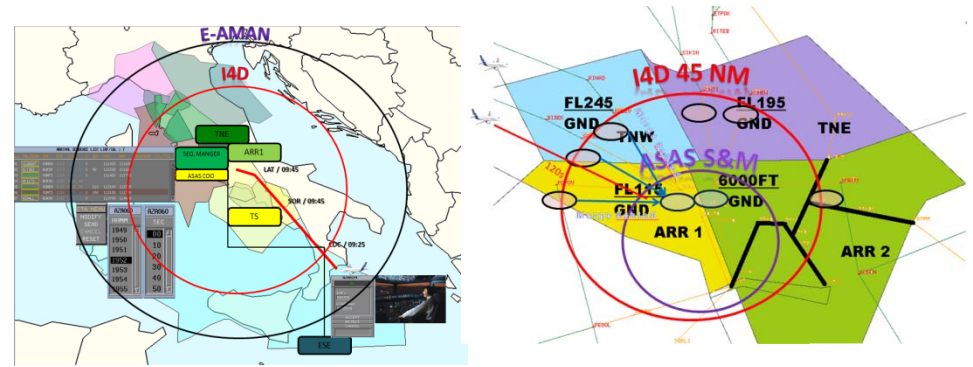


# Validation exercises context

## Stockholm



## Rome



## Maastricht Upper Area Control



## Airbus



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# Results of the challenge 1 →

## CTA + i4D

### Benefits:

- Better arrival sequence prediction
- Self-management
- Fuel savings
- Accuracy
- Adaptable



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# Results of the challenge 2 →

## CTA + i4D

- Standardisation
- Interoperability
  - Sharing of i4D-data
  - CTA coordination
  - Sequence earlier



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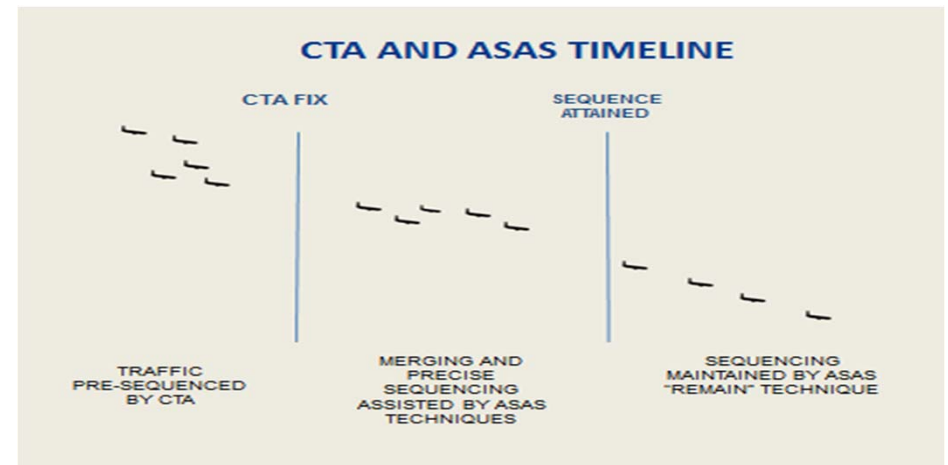
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# Results of the challenge → CTA+i4D + ASAS integration

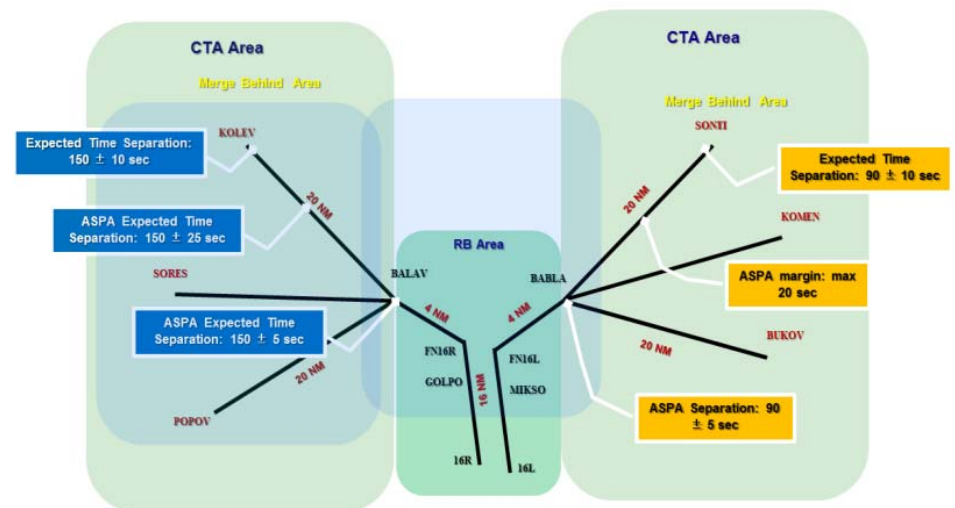
## GROUND

- ASAS S&M sequencing i4D
- Fuel consumption, predictability
- Situational awareness



## AIRBORNE

- Situational awareness

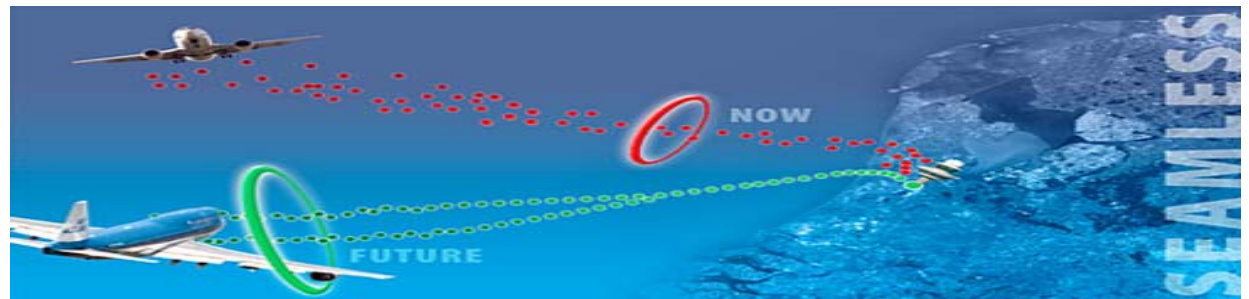
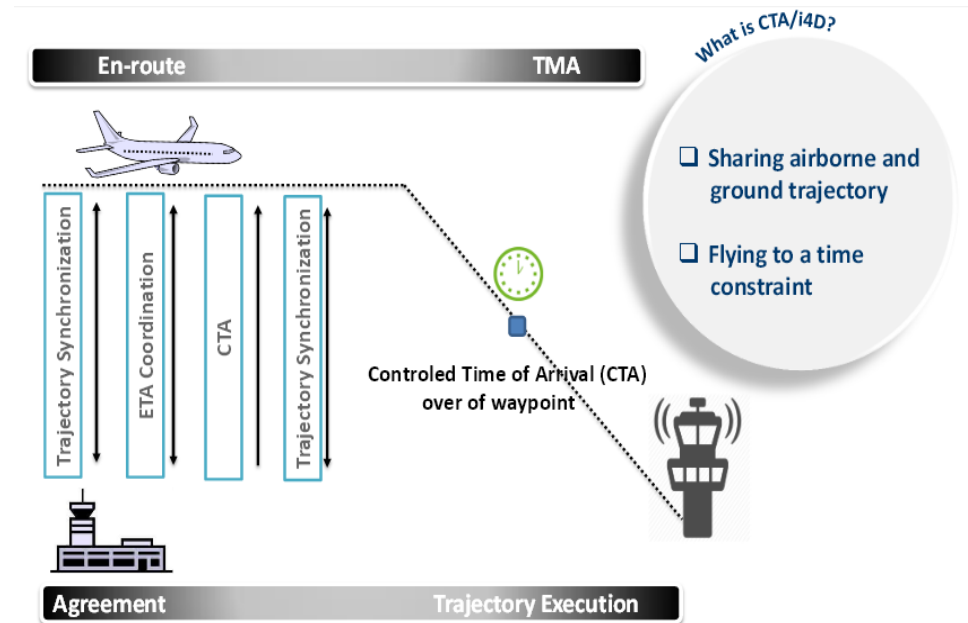


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# CTA+i4D from Ground industry perspective

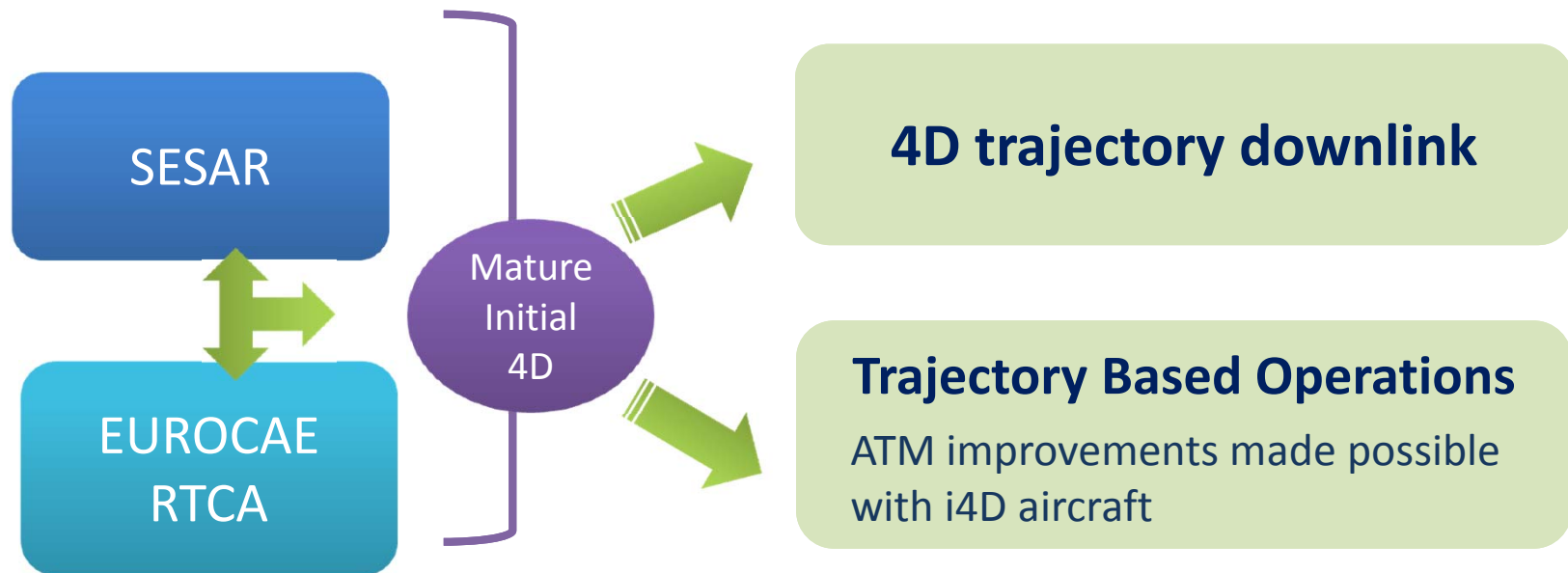
- Trajectory based operations
- Initial deployment
- Measurable benefits



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# CTA+i4D from Air industry perspective



## SESAR provided the conditions for:

- extensive development
- securing deployment road



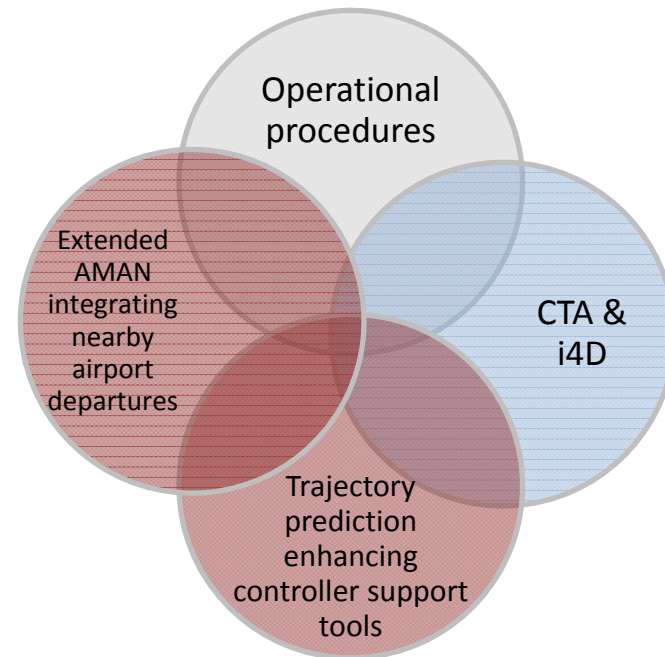
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# CTA+i4D- SESAR 1 conclusions

- Sequence building
  - Extended AMAN
  - Airport Operations
  - ASAS S&M
- Operational
- Benefits
- Interoperability



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# What's next?

## Related deployment

- PCP#6 Initial Trajectory Information Sharing

## Further investigations – SESAR2020

- High density / High complexity environments
- Controller Supporting Tools



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# Thank you for your attention



**More information:**

**You can find project representatives on the Exhibition Floor**

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