



2019
World ATM Congress

SESAR walking tours



#PoweredBySESAR

Stand 849

Improving Capacity in SESAR

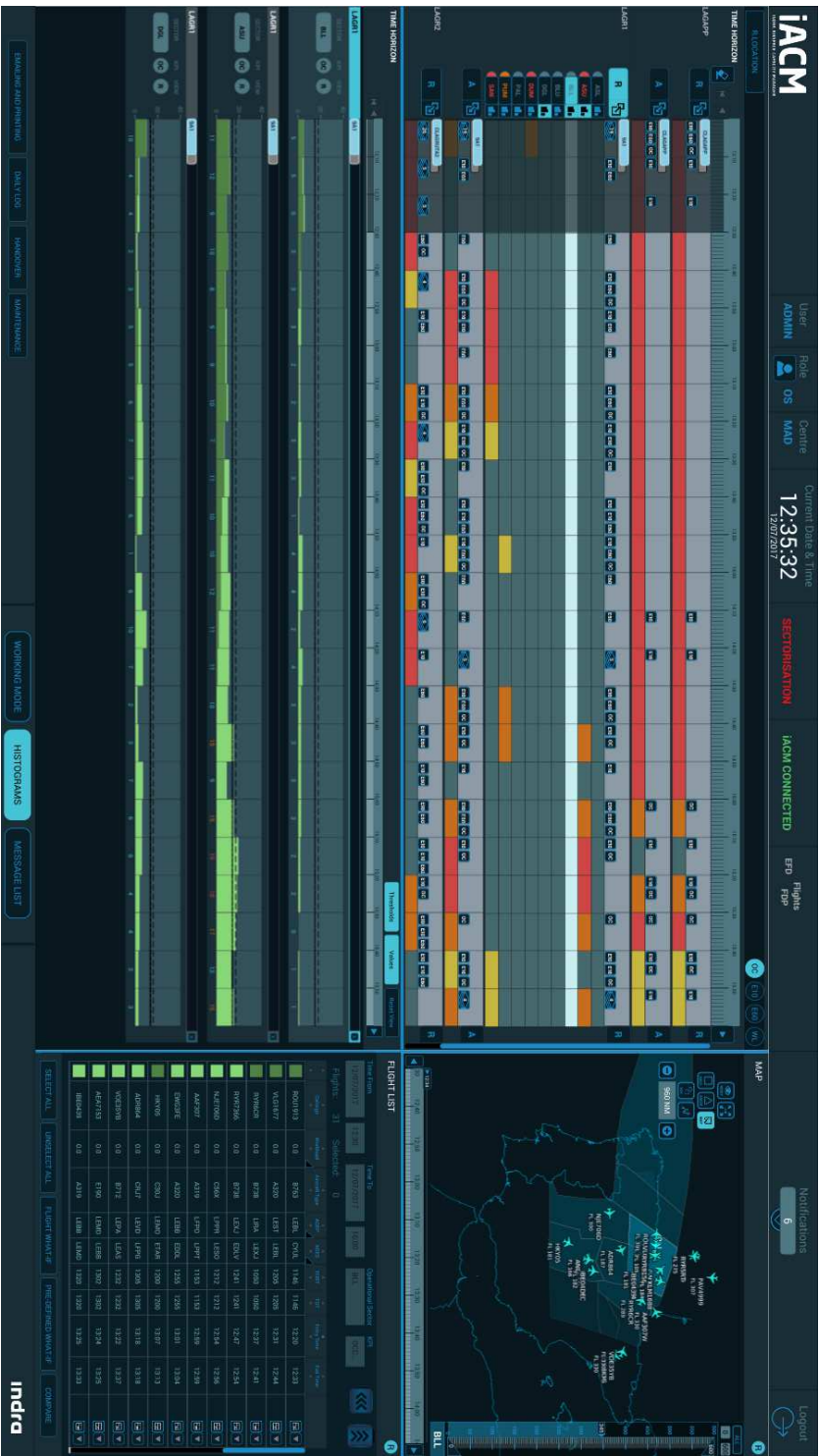
- iACM to support Validation Exercises in SESAR
- PJ09.02 - Integrated Local DCB Processes
 - EXE 09-02.03 (NOV 2018)
- PJ08.01 - Management of Dynamic Airspace configurations
 - EXE 08-01.03 (MARCH 2019)
- PJ01.02 Use of arrival and departure management information for traffic optimisation within the TMA
 - EXE 01-02.02 (MARCH 2019)



2019 World ATM Congress

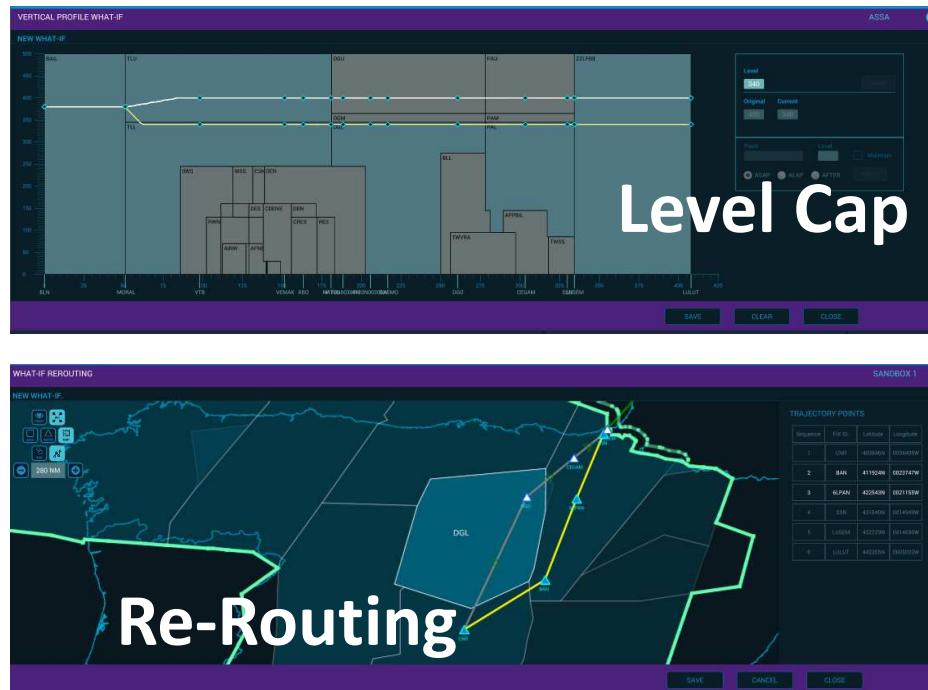


iACM in SESAR

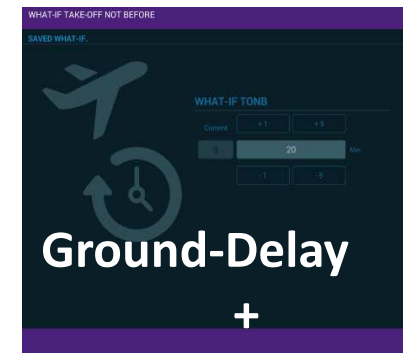


PJ09.02 Integrated Local DCB Processes

Trajectory What-Ifs



Flight What-Ifs



STAM Negotiation

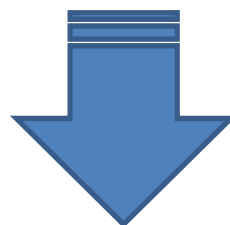
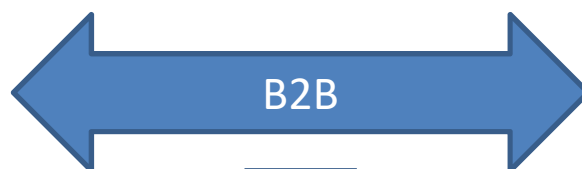
Hotspot Management



2019 World ATM Congress



NM Connection



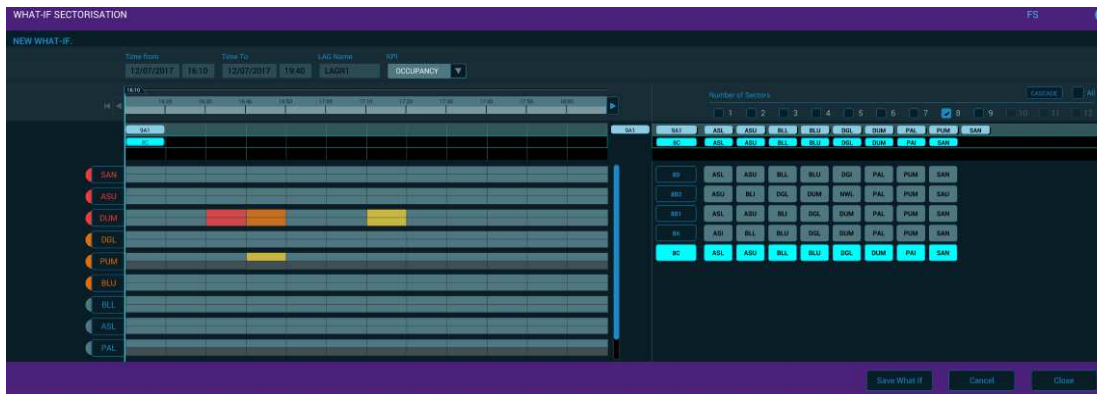
- Publish/Subscribe
- MCP Ground Delay
- Hotspots



2019 World ATM Congress



PJ08.01 Management of Dynamic Airspace configurations



Supporting DAC

Sectorisation What-Ifs



2019 World ATM Congress



PJ01.02 Use of arrival and departure management information for traffic optimisation within the TMA

- iACM to support a systemised route structure
- iACM to balance traffic between routes
 - Proposing the number of flights to be re-routed
 - Proposing the offload route
 - Executing pre-defined re-routing

Date	Time	to
08/03/2019	15:00	17:00

FIXPOINT	15:00	15:10	15:20	15:30	15:40	15:50	16:00	16:10	16:20	16:30	16:40	16:50
ABNLL				1		5	4	1		4	4	2
NOGLL				1		5	4	1		4	4	2
GALLL												
FIXPOINT	15:00	15:10	15:20	15:30	15:40	15:50	16:00	16:10	16:20	16:30	16:40	16:50
RISN												
STKL												
FIXPOINT	15:00	15:10	15:20	15:30	15:40	15:50	16:00	16:10	16:20	16:30	16:40	16:50
ABNED				1	3	11	8	4	2	6	5	3
NOGHO				1	3	4	4	4	2	4	4	2
GALSO						5	4			2	1	1
FIXPOINT	15:00	15:10	15:20	15:30	15:40	15:50	16:00	16:10	16:20	16:30	16:40	16:50
ABNLK				1			4	1			4	2
NOGLK				1			4	1			4	2
GALLK												



2019 World ATM Congress





2019
World ATM Congress

SESAR walking tours

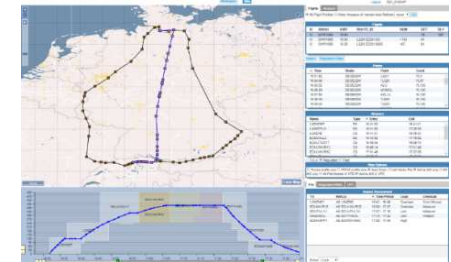


#PoweredBySESAR

Stand 849

Enhanced Network Operations

- Flexible Airspace Management
- Optimised Airspace User Operations
- Advanced Demand Capacity Balancing



2019 World ATM Congress



Flexible Airspace Management

- Increased flexibility allows better use of capacity/efficiency opportunities.
- Dynamic airspace configurations support increasing and changing traffic patterns.



2019 World ATM Congress



Optimised Airspace User Operations

- AUs integrated into ATM decision making can better meet their business priorities.
- AUs optimize their operations thanks to aligned operation plans.
- Shared trajectory fosters improved predictability and efficient use of ATM resources.



2019 World ATM Congress



Advanced Demand Capacity Balancing

- Improved demand predictability prevents unused capacity buffers.
- Fine-tuned Flow Management measures consider AU priorities and reduce the impact on demand.
- Network effects and overall performance are better managed.



2019 World ATM Congress



Thanks for your time!

More information:

<https://www.sesarju.eu/>

franck.ballerini@eurocontrol.int



2019 World ATM Congress





2019
World ATM Congress

SESAR walking tours

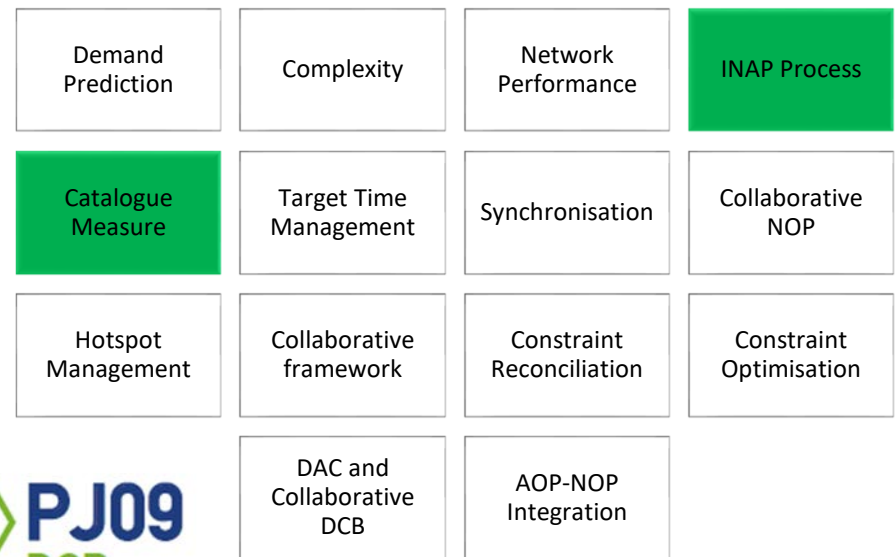


#PoweredBySESAR

Stand 849

STAM: Short-Term ATFCM Measure

- Part of the Demand and Capacity Balancing project



2019 World ATM Congress



STAM background

Objectives

- Identify & Solve imbalances between demand and capacity

Actors

- LTM – Local Traffic Manager
- EAP – Extended ATC Planner

Validation

- Real-Time Simulation
- 5 ANSP
- 2 INDUSTRY + 2 Local Developments
- NM

Name

Ground Level Capping (A/C on ground)

CAPACITY

H-6h to H-3h

H-3h to H-2h

H-2h to H-40 mins.

to H-20 mins.

Offload Sector



2019 World Congress

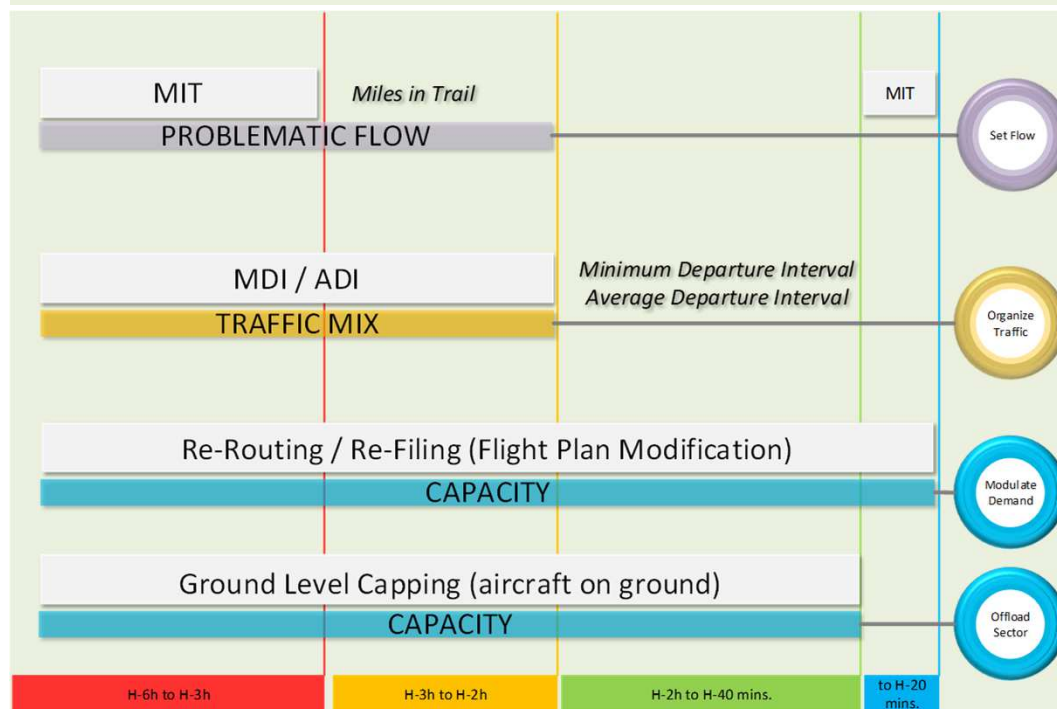
Problem Solved

When do I expect to identify and apply the measure



Solution Type
Walking tours

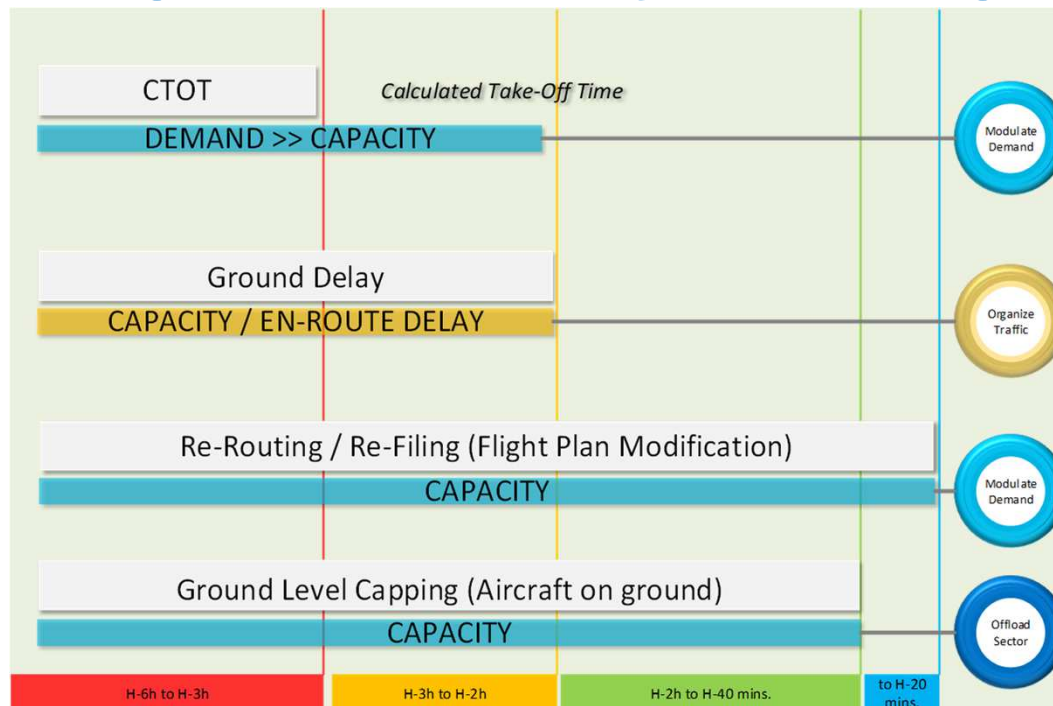
Flow



En-route and Airport

- Uncertainty: little traffic knowledge
- Need to impact several flights
- Impacts all traffic

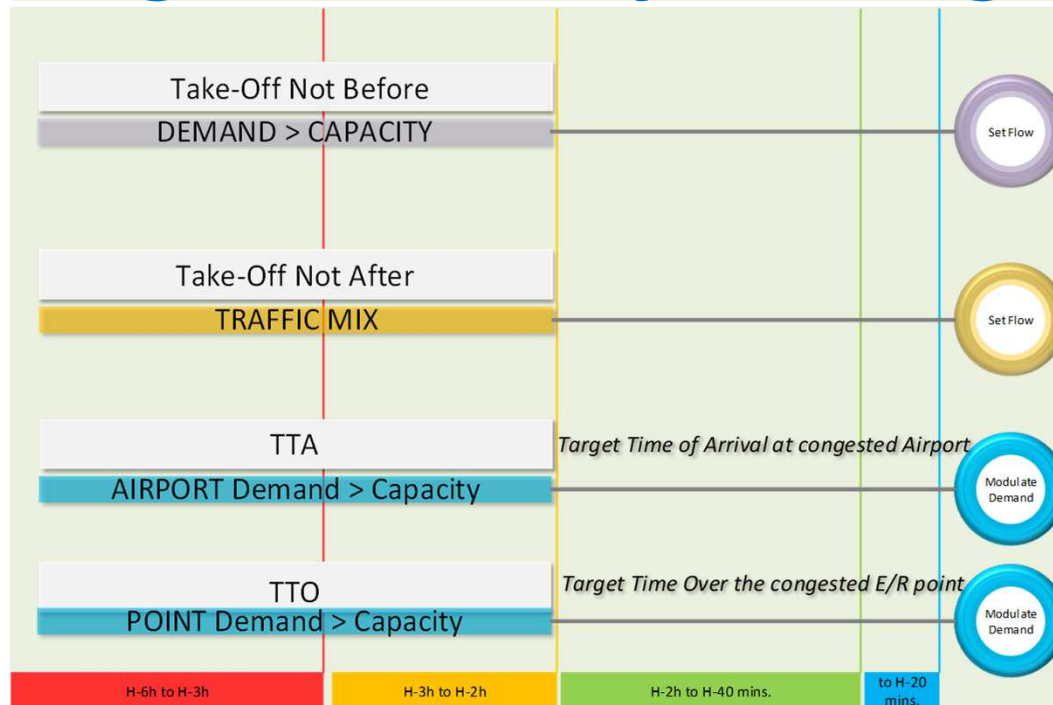
Flight – Cherry Picking



En-route and Airport

- Uncertainty: some traffic knowledge
- Able to identify the relevant flight(s)
- Impact limited to specific flights

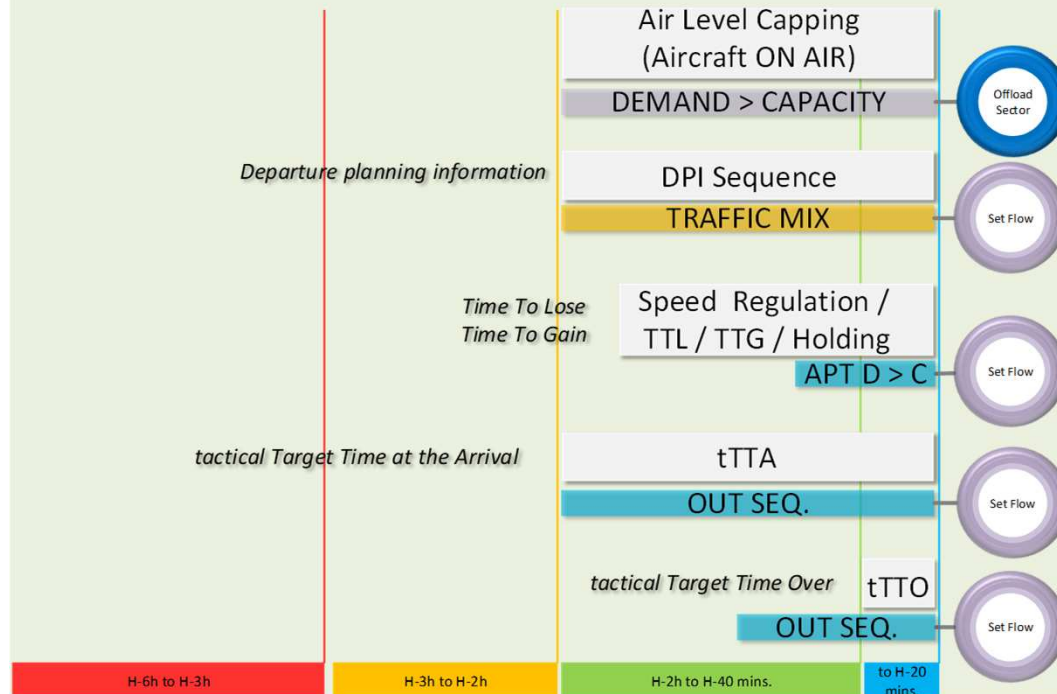
Flight – Cherry Picking



Airport

- Uncertainty: Good traffic and airport situation knowledge
- Impact limited to specific flights
- Requires time to implement

Flight – Cherry Picking



En-route and Airport

- Uncertainty: Precise traffic knowledge
- Tactical measure
- STAM can be translated into “ATC commands”

Thanks for your time!

More information: SESAR JU PJ09

<https://www.sesarju.eu/projects/dcb>



This project has received funding from the SESAR Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No 699238



2019 World ATM Congress





2019
World ATM Congress

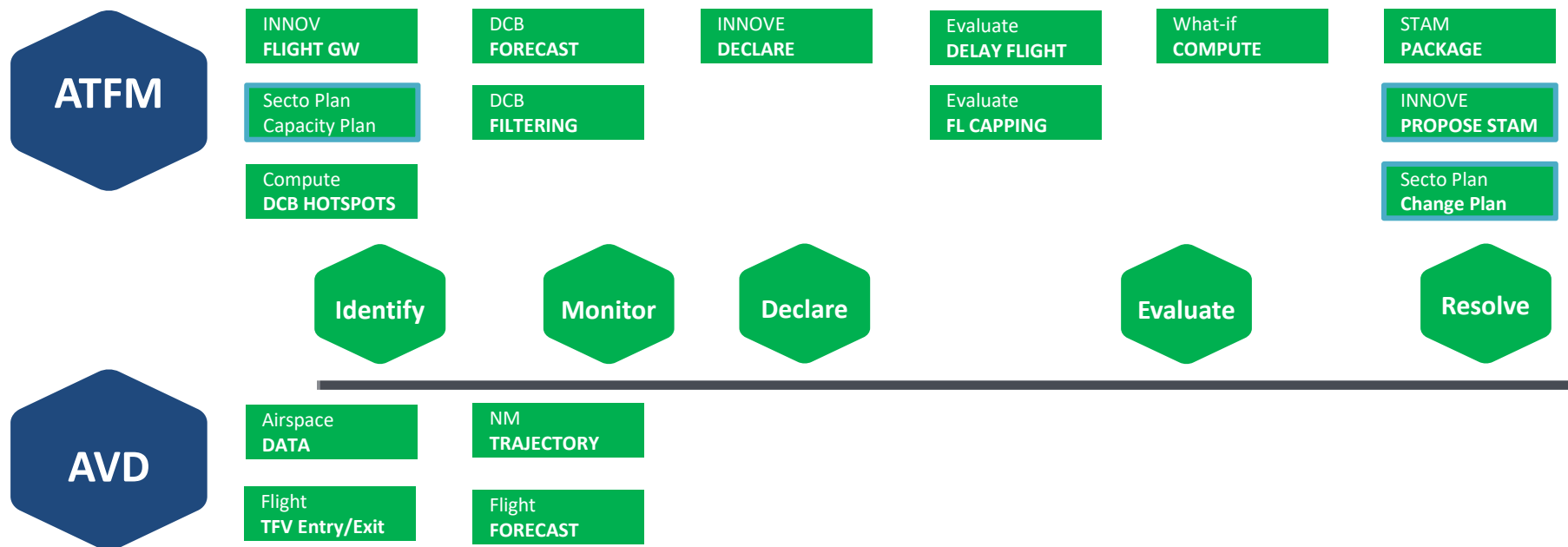
SESAR walking tours



#PoweredBySESAR

Stand 849

PJ09 : Hotspot Management



PJ09: Hotspot management - Results

1. I was able to maintain situational awareness in the monitoring and detection task

[More Details](#)

Strongly Agree	0
Agree	8
Disagree	3
Strongly Disagree	0
N/A	1



5. The tool provided me with information needed to detect a hotspot in a relevant and timely manner.

[More Details](#)

Strongly Agree	0
Agree	10
Disagree	2
Strongly Disagree	0
N/A	0



3. The workload to detect hotspots was acceptable in the monitoring and detection task

[More Details](#)

Strongly Agree	0
Agree	12
Disagree	0
Strongly Disagree	0
N/A	0



10. When using the new tool, I estimate that the number of hotspots solved by capacity management will be:

[More Details](#)

Significantly Lower	0
Slightly Lower	0
The Same	6
Slightly Higher	6
Significantly Higher	0
N/A	0



2019 World ATM Congress



PJ09: Room for Improvement

6. The tool allowed me to accurately identify underload periods

[More Details](#)

Strongly Agree	0
Agree	6
Disagree	2
Strongly Disagree	4
N/A	0



12. The impact on the adjacent airspaces concerned can be assessed and appropriate action taken.

[More Details](#)

Strongly Agree	0
Agree	0
Disagree	6
Strongly Disagree	5
N/A	1



2019 World ATM Congress



ECOsystém ATFM in SESAR Wave 1

- PJ09 : Croatia Control / Austro Control
 - Focus on hotspot management
 - Share the short term ATFCM solutions
- PJ08 : PANSAT
 - Integration of probabilistics convective weather
- PJ24 : Croatia Control / Austro Control / SMATSA
 - Focus on sector plan and capacity plan update
 - Complexity management
 - Assessment of weather impact



2019 World ATM Congress



ECOsystem ATFM: Demonstration



2019 World ATM Congress



Questions

???



2019 World ATM Congress





2019
World ATM Congress

SESAR walking tours



#PoweredBySESAR

Stand 849

XSTREAM

E-AMAN Paris Trials

AZOULAY Marc
GUERIN Etienne



PROJECT OVERVIEW

NATS

WP06 : London
Implementation

DSNA

WP07 : Paris
Implementation

Skyguide

WP08 : Zurich
Implementation

DFS

WP09 : Integrating multiple
AMAN in UAC

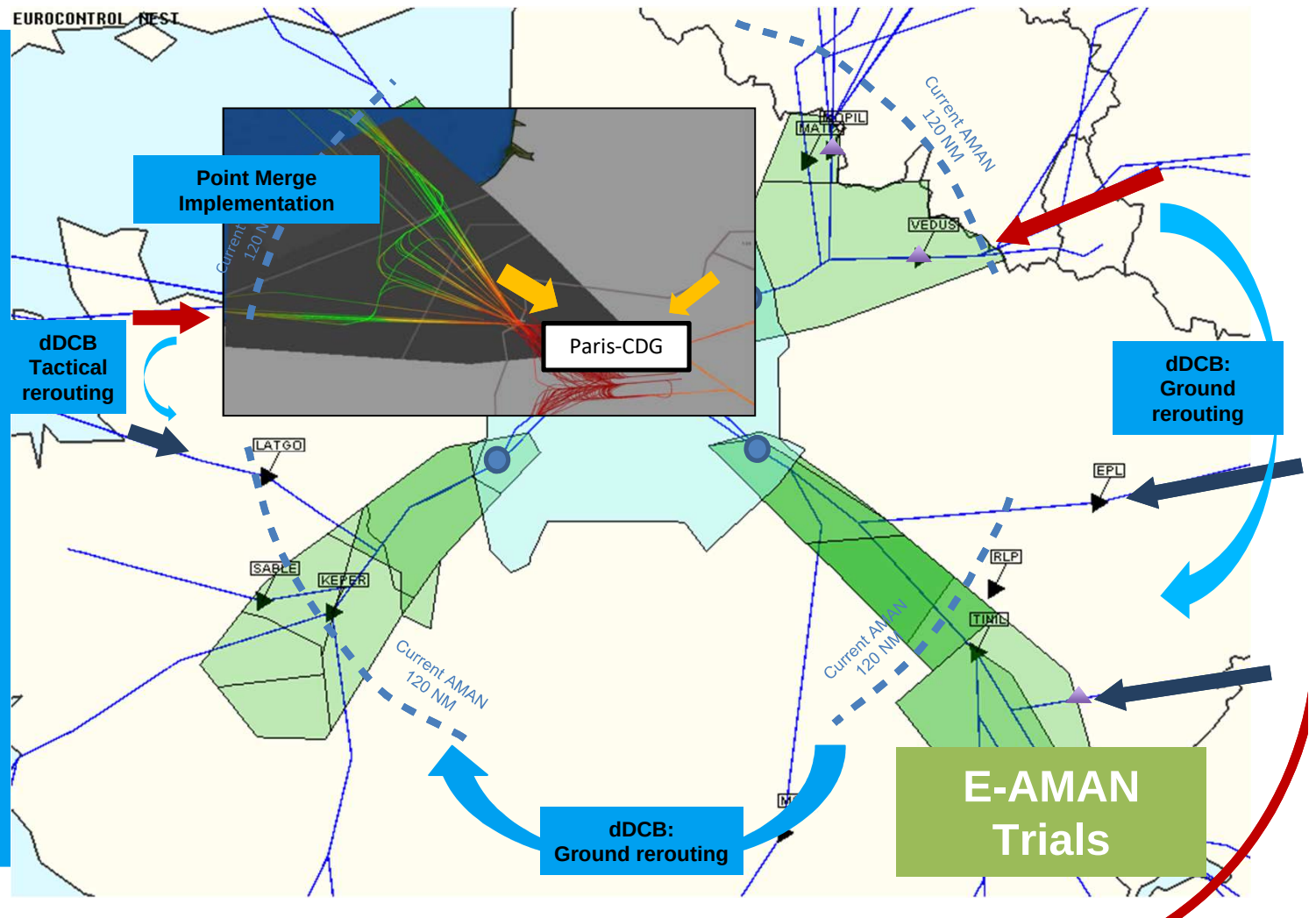


SESAR 2020 Project



This project has received funding from the SESAR Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement 734145.

IMPROVING PARIS-CDG ARRIVAL MANAGEMENT

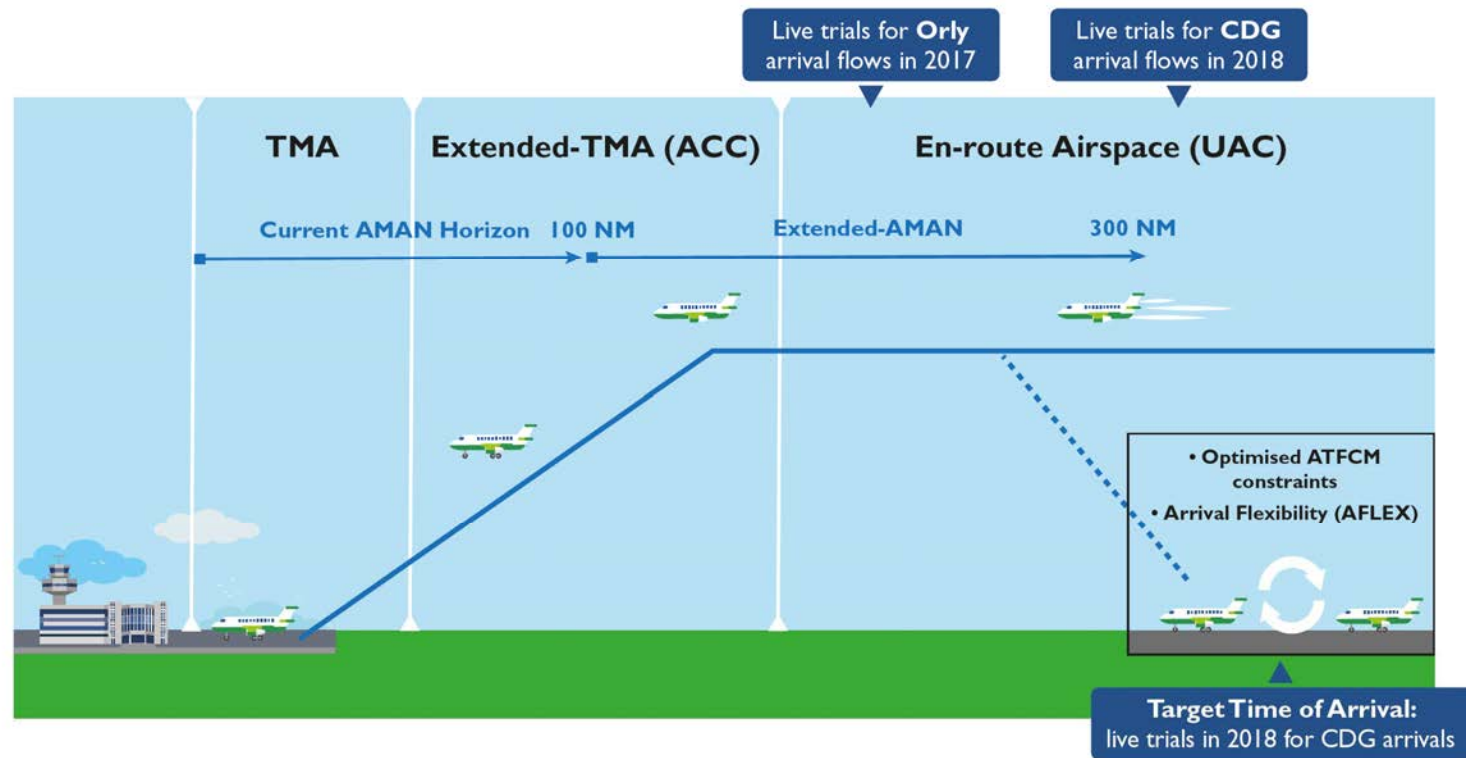




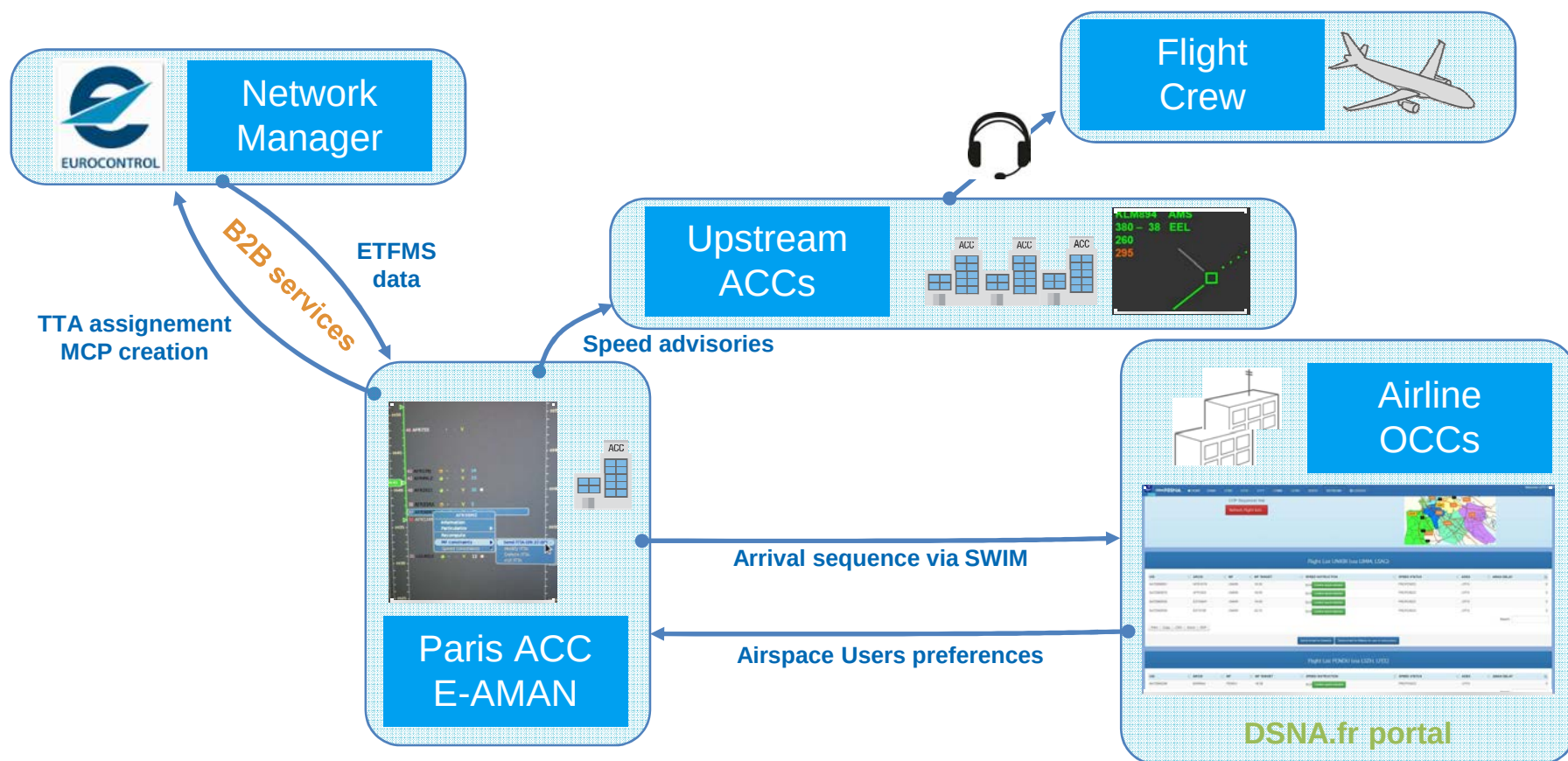
THE OPERATIONAL CONCEPT



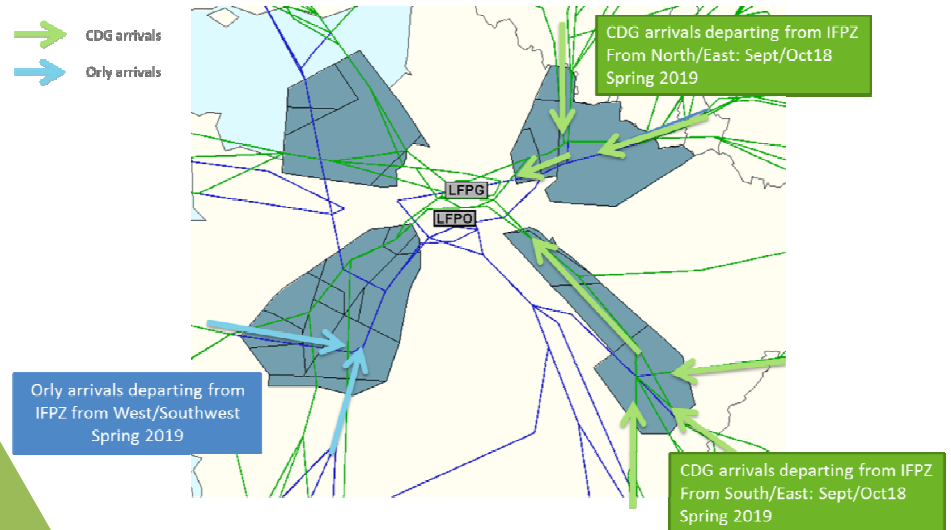
How to
optimise
capacity
to improve
arrival flows
to a
congested
airport



TECHNICAL ARCHITECTURE



IMPROVED ARRIVAL PLANNING MANAGEMENT



Objectives:

- ⦿ Improve efficiency of ATFCM regulations
- ⦿ Reduce ATFCM delays
- ⦿ Include airlines' business needs

Use cases:

- ⦿ Optimisation of ATFCM regulation
- ⦿ Mandatory Cherry Picking (MCP) regulation creation using electronic tools
- ⦿ Airspace users' preferences (A-FLEX):
 - ▶ Express priority needs (hub in CDG, curfew in Orly)
 - ▶ SWAP: Target Time / CTOT between 2 flights

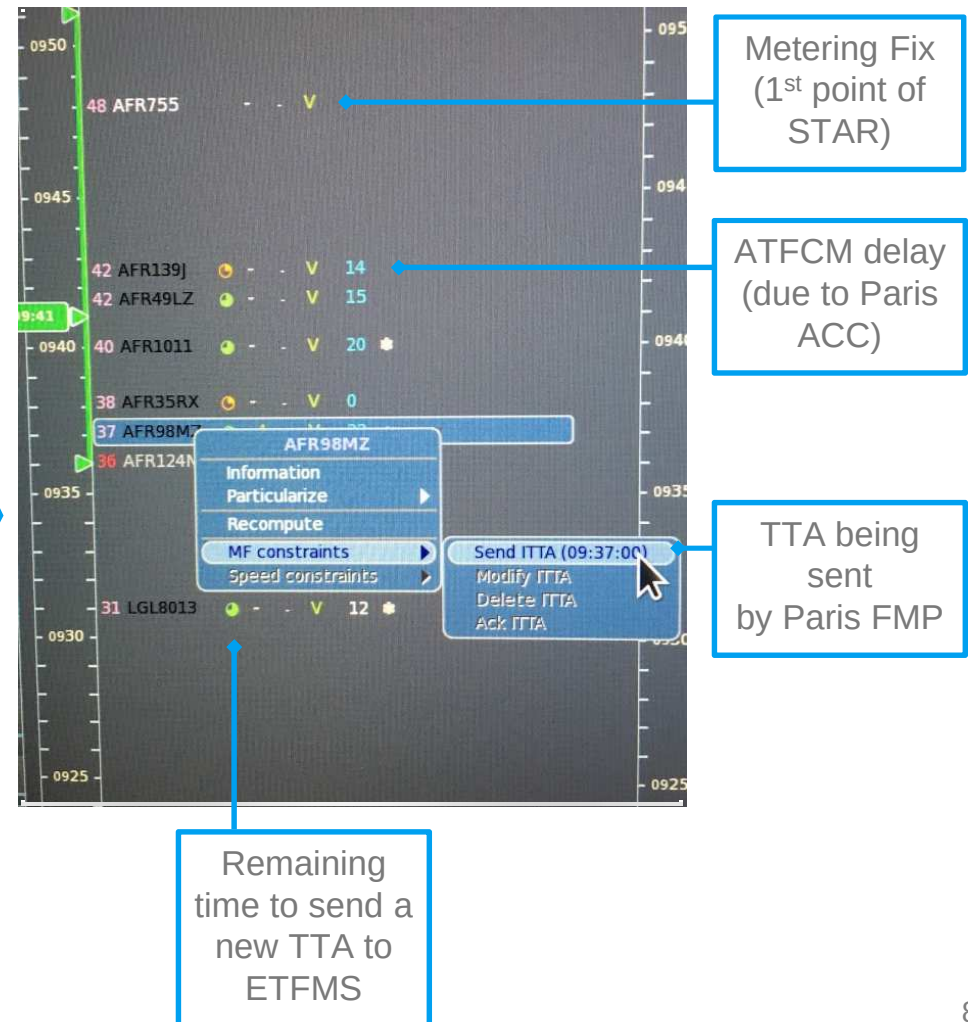
IMPROVED ARRIVAL PLANNING MANAGEMENT



Principles

Flow Manager in Paris ACC:

- Analyses an arrival sequence
- Decides the implementation of an ATFCM or MCP regulations
- Moves flight in the sequence to optimise the arrival flows in ATC sector
- Electronically sends new TTA to EUROCONTROL's Network Manager, generating corresponding CTOT

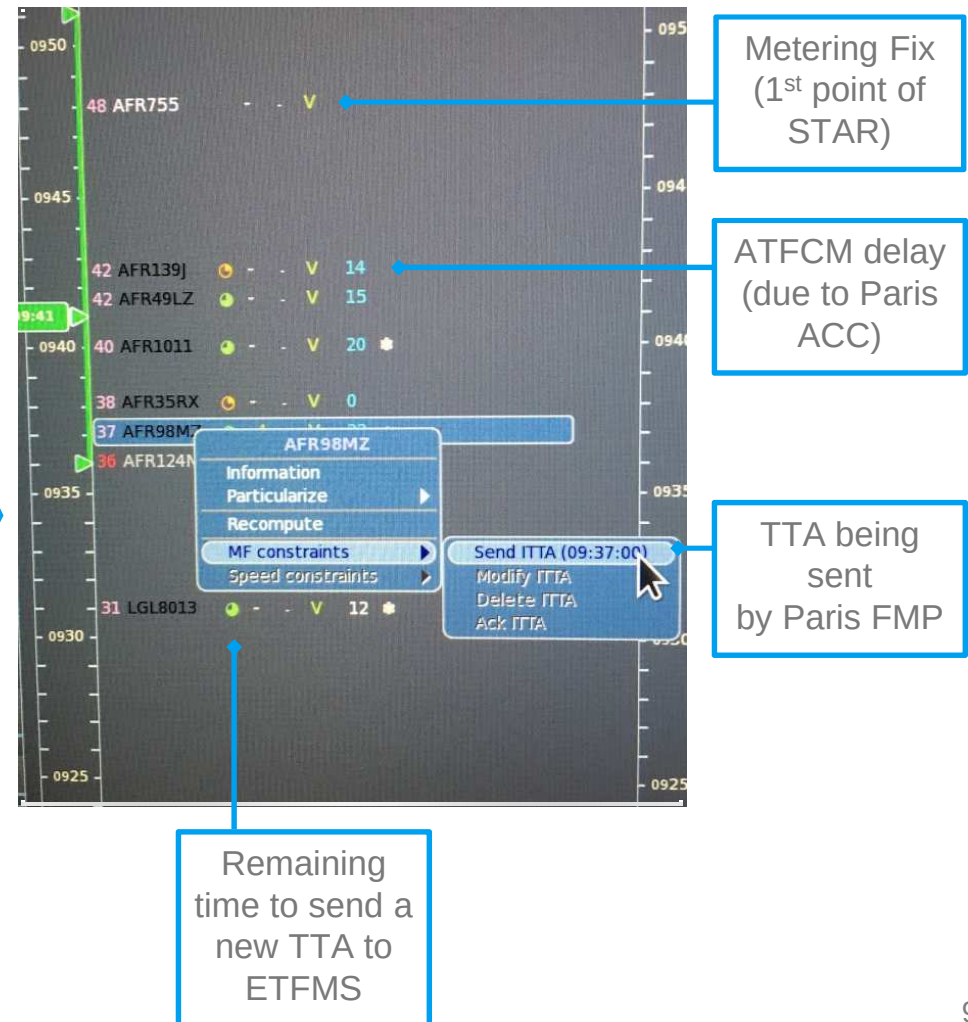


IMPROVED ARRIVAL PLANNING MANAGEMENT



Results (March to October 2018):

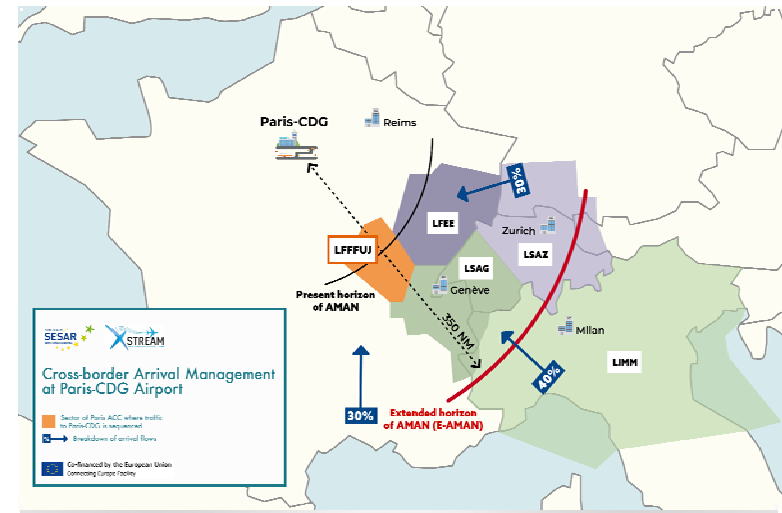
- On 18 classical regulations:
 - ▶ A 69 flights optimised
 - ▶ Delay reduction by 7%
- On 3 MCP regulation creation:
 - ▶ 17 flights impacted
 - ▶ Average of 3 min delay per flight



CROSS-BORDER ARRIVAL MANAGEMENT



COP Sequencer for
hotspot resolution



Objectives:

- ⦿ Increase sector capacity in Paris Extended-TMA by reducing last flights of a hotspot 300 to 350 NM from Paris-CDG airport
- ⦿ Reduce number of ATFCM regulations & delays
- ⦿ Improve flight efficiency

Principles:

Flow Manager in Paris ACC:

- ⦿ Analyses an arrival sequence 20 to 30 mins before the arrival hotspot in Extended TMA
- ⦿ Selects flights to be reduced by M0.04 at a horizon of ≈ 300 -350 NM from CDG
- ⦿ Coordinates flights to be reduced to Geneva, Zurich or Milano ACCs

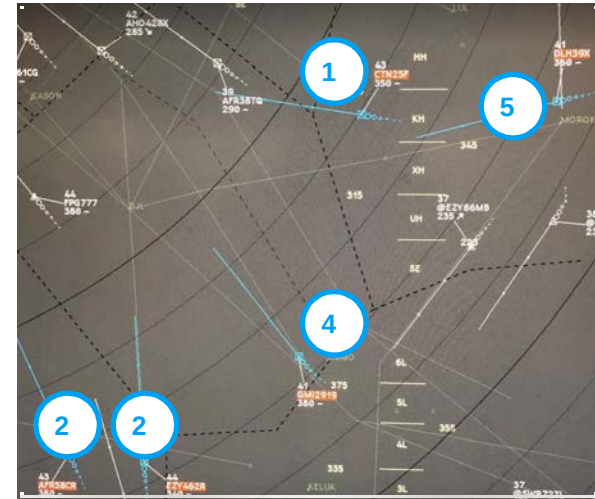


VIDEO TEASER (1')

CROSS BORDER ARRIVAL MANAGEMENT



COP Sequencer for
hotspot resolution



Results (March to October 2018)

- ⊙ 41 CDG arrival hotspots from the South-East on trial
- ⊙ 75 speed reduction requests >> 85% implemented
- ⊙ Improved flight efficiency
- ⊙ ATC complexity lowered in Extended-TMA

0815				
1	17	CTN25F	-	P
2	18	EZY462R	-	KI
2	18	AFR58CR	-	KI
4	19	GMI2919	-	UN
5	20	DLH39X	-	P 0
				SLW



- Optimal feeding of Extended-TMA
- Lowered ATC workload in Paris TMA



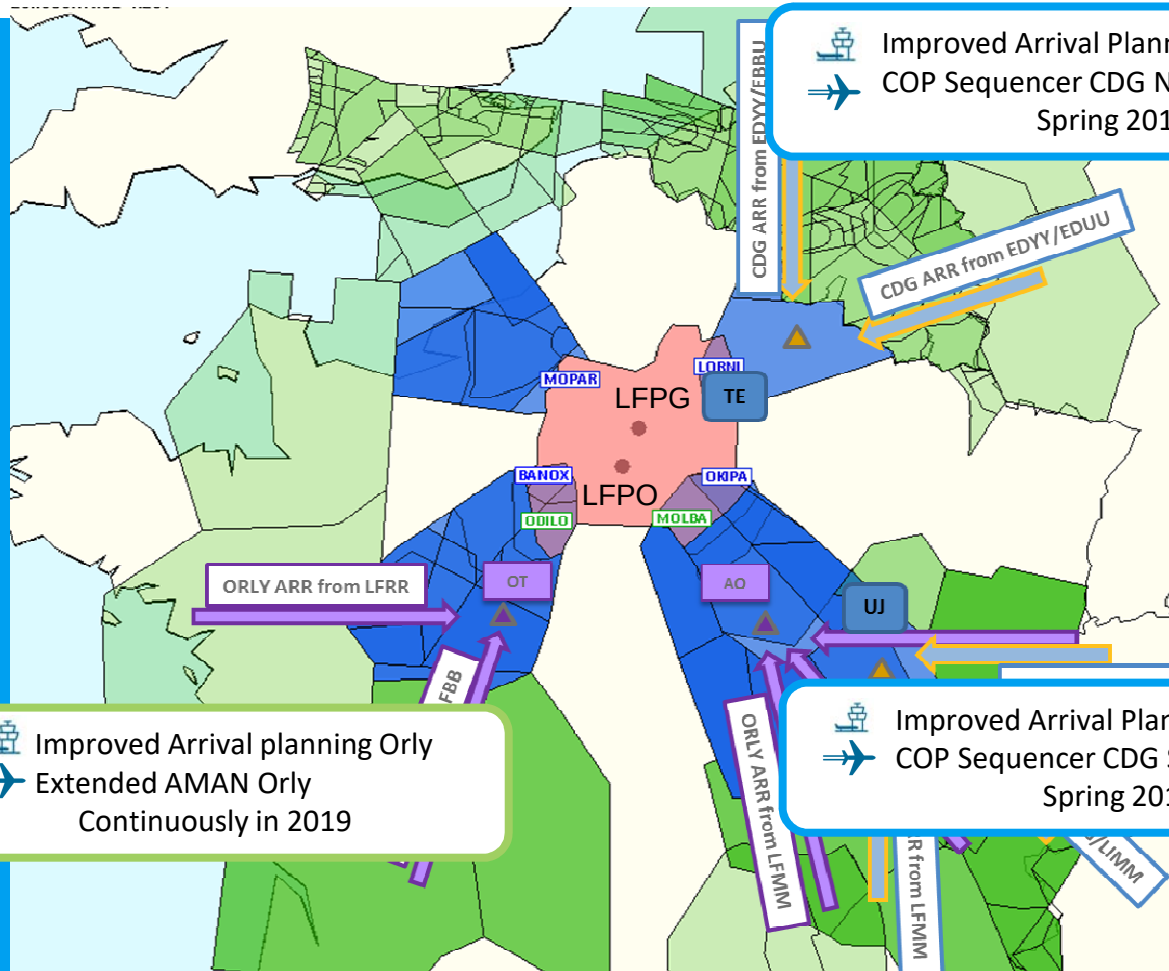
- Reduction of fuel consumption
- Better flight efficiency



XSTREAM IN 2019:

Paris-CDG
Paris-Orly
Trials

 Improved Arrival planning Orly
 Extended AMAN Orly
Continuously in 2019



 Improved Arrival Planning CDG + A-FLEX
 COP Sequencer CDG North-East
Spring 2019

 Improved Arrival Planning CDG + A-FLEX
 COP Sequencer CDG South-East
Spring 2019



marc.azoulay@aviation-civile.gouv.fr
etienne.guerin@aviation-civile.gouv.fr

 **LE VOL PARFAIT**
DSNA





2019
World ATM Congress

SESAR walking tours



#PoweredBySESAR

Stand 849

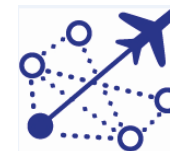
ATFCM

Extended Collaborative Advanced Planning
(Network CAP)

DUFOSSEZ Jérôme
PALMOURIES Bruce



A DYNAMIC CDM APPROACH TO BALANCING TRAFFIC DEMAND



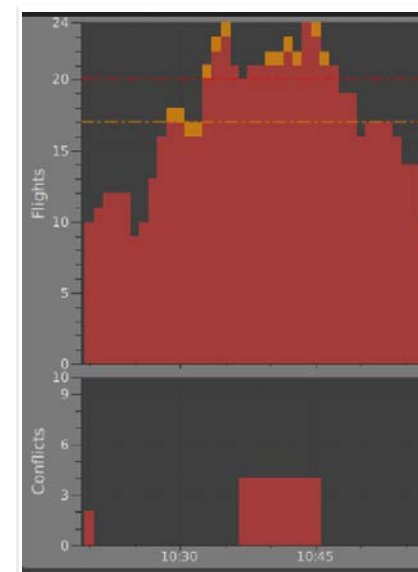
Optimised
ATM
Network
Services

WHAT IS IT ?

A collaborative process and tool developed by DSN to balance traffic load in congested sectors and reduce the need for regulations

WHAT IS IT FOR ?

To off-load a congested sector by acting only on a few flights during the short-term planning phase, reducing the impact (or even the need) for applying a regulation



An additional measure in the ATFCM toolbox
to balance Demand and Capacity

CAP ACTIVITIES SINCE 2015



Summer 2015

Summer 2016

Summer 2017

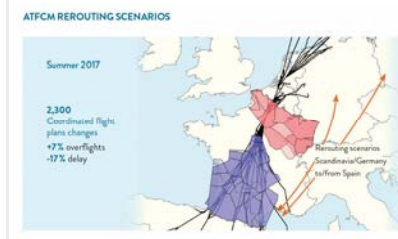
2018

Q1 2019

CAP 2015

CAP 2016

CAP 2017



DSNA
Local Scale

Extended DSNA
Local Scale

Large Scale Demonstration
EXE4 "Extended CAP"

EXE#1 NCAP
technical feasibility &
pre-ops Test

BETTER PREDICTABILITY - INCREASED SAFETY - REDUCED DELAY

7

FMPs from DSN, DFS and ENAIRE

20

airlines participating

6,500

implemented
FPL changes

8,200

Requests (acceptance
rate 80%)

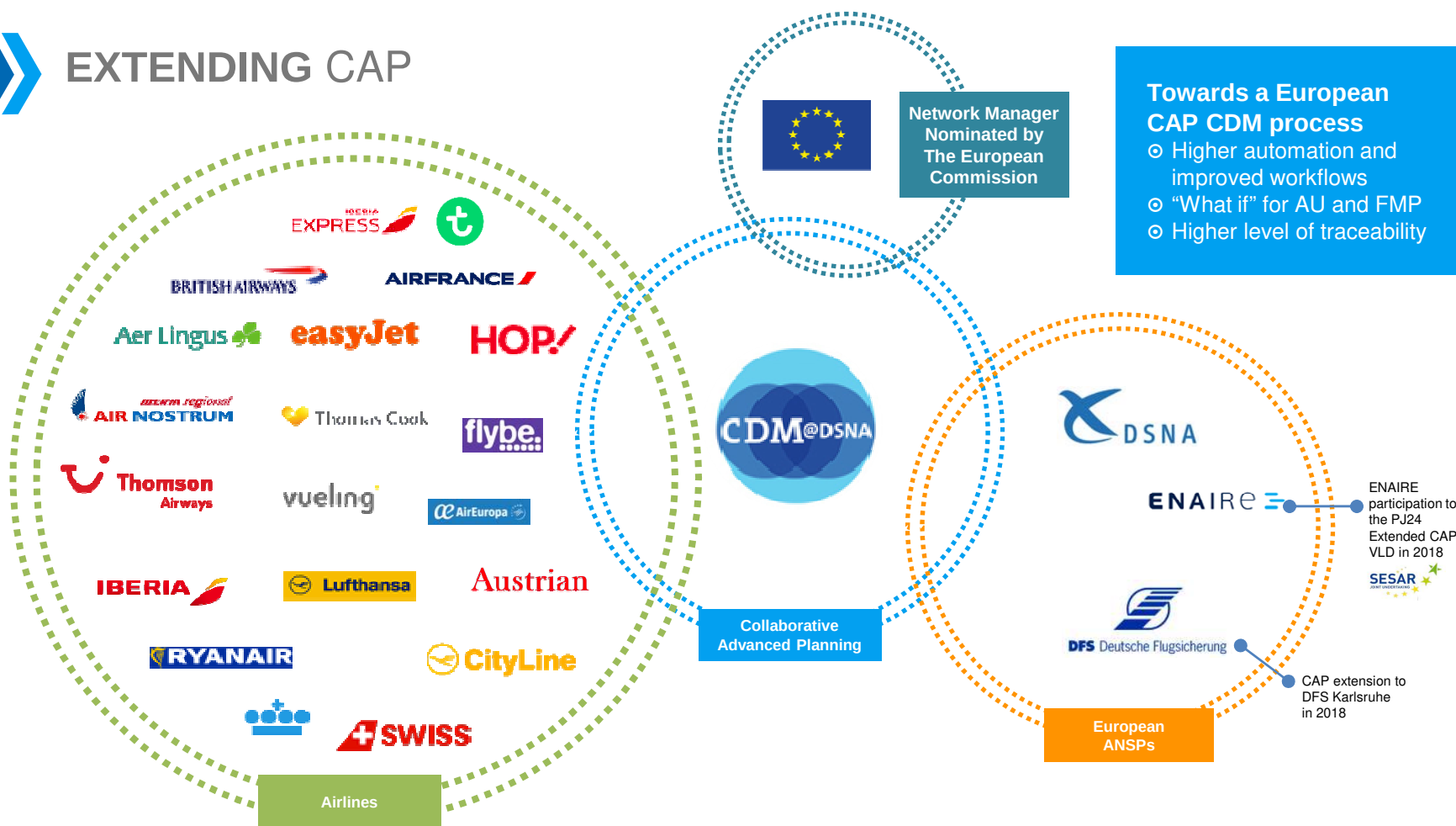
The screenshot displays the CDM@DSNA website interface. At the top, there's a navigation bar with links like HOME, CAP, DSN, DO, CDG, ACC, SOOO, ADP ORY, XSTREAM, ADMIN, and LOGOUT. The main content area features a grid of airline logos (Antares, CityLine, Iberia, Air France, easyJet, Ryanair, Swiss, etc.) with associated flight status indicators. Below this, there's a section titled 'LIST OF COORDINATED FLIGHTS' with a table listing flight details. To the right, there's a 'WORKING FLIGHT LIST' section and an 'AQ/ANSP CHAT ROOM' for communication.

STATUS	PROC.	A/C ID	ADEP	ADES	EOBT	INIT. TV	ETO	SOLUTION
IMPLEMENTED	BRY-CLM	BAW2597	LIPX	EGKK	10:20	LFEHYR	11:25	Full Level Cap at FL360
IMPLEMENTED	BRY-CLM	BAW62NL	LIML	EGLL	10:20	LFEHYR	11:17	Full Level Cap at FL360
IMPLEMENTED	DFS OTHER	EZY36UM	EHAM	LIMC	08:35	EDUNTM3C	09:11	Stay FL350 or below until ABUKA
IMPLEMENTED	BRY-CLM	EZY46RE	LFLS	EGGD	10:40	LFEHYR	11:28	Full Level Cap at FL360
IMPLEMENTED	DFS OTHER	RYR1829	LFOB	LKPR	08:30	EDUNTM3C	09:07	Stay FL350 or below until BOMBI
IMPLEMENTED	BRY-CLM	RYR91SX	LIPZ	EGGD	10:00	LFEHYR	11:15	Full Level Cap at FL360
IMPLEMENTED	BRY-CLM	RYR96WE	LIME	EGSS	10:25	LFEHYR	11:25	Full Level Cap at FL360

PROC.	STATUS	A/C ID	ADEP	ADES	EOBT	SOLUTION	INIT. TV	ETO
BRY-CLM	4-ROT	TOM9XT	LFLB	EGKK	10:50	Full Level Cap at FL360	LFEHYR	11:32



EXTENDING CAP



EVOLUTION OF CAP: CAP becomes Network-CAP

The SESAR PJ24 has demonstrated and extended the CAP beyond boundaries with a closer collaboration with the Network Manager (EUROCONTROL)



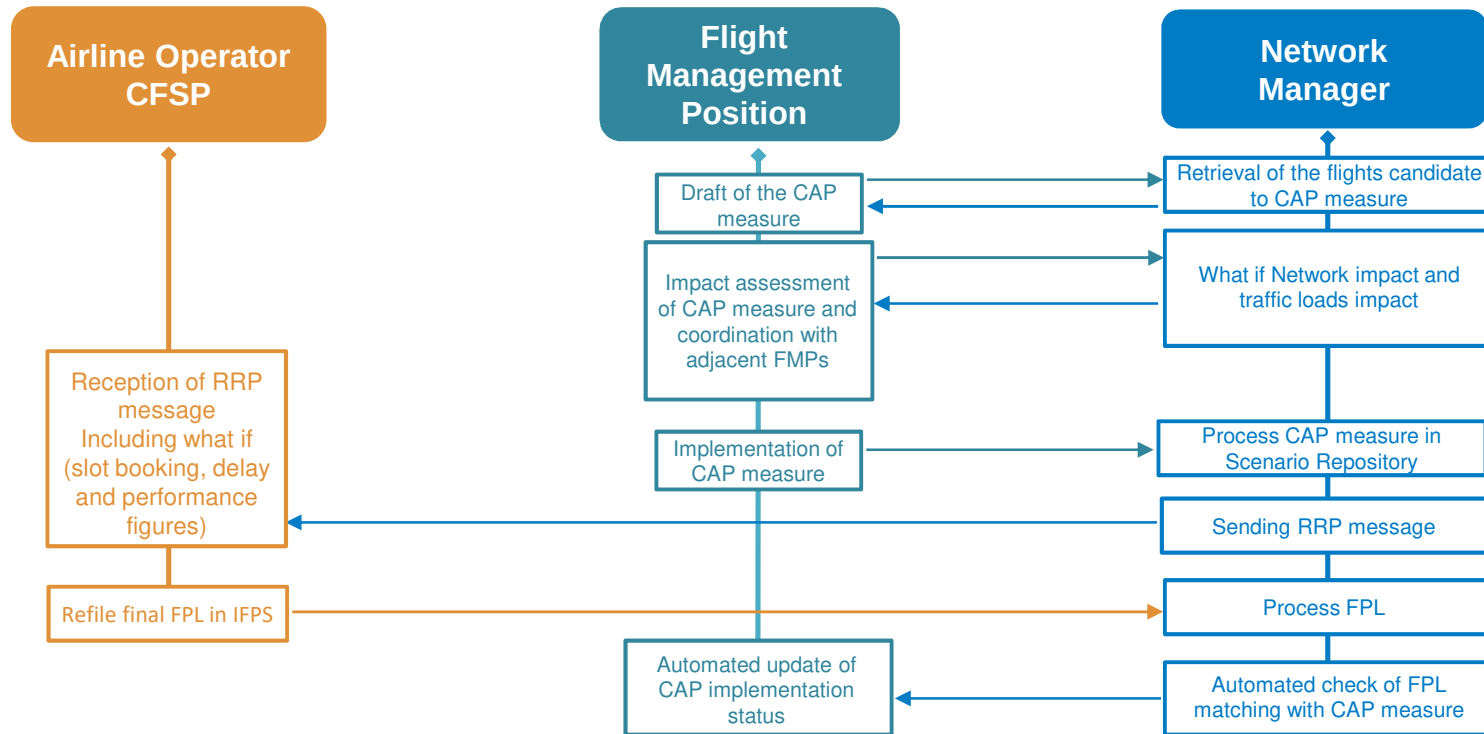
Further developments are now ongoing to send flight plan proposals to airlines via NM Reroute Proposals, taking advantage of the specific NM B2B services supporting ATFM and CDM processes

**Working towards N-CAP,
the next step for a better
sharing of information among
all stakeholders and
improved workflows**



EVOLUTION OF CAP

Network - CAP process





EVOLUTION OF CAP

**N-CAP -Towards a
European CAP CDM
Process...**



Taking advantage of NM B2B services to support the process

- ⊙ What-If and Slot booking for proposed ATFCM measures
→ Avoiding the “late updater” status “risk”
- ⊙ Traceability over the whole European network
- ⊙ Occupancy counts impact assessment (local and Network levels)
- ⊙ Automated check of compliance with requested measures
- ⊙ Improvement of flight dispatches workflow (+ integration with CFSPs to be investigated)
- ⊙ Opening support of coordination of measures in future via B2B between FMPs

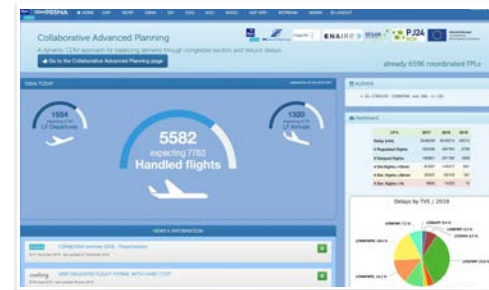


EVOLUTION OF CAP

N-CAP -Towards a
European CAP CDM
Process...

Process remains based on collaborative decisions,
and not mandatory

- Technical feasibility of the interoperability between the tools hosted on DSN operational portal and NM was demonstrated in **December 2018**
- Trials are planned for **Spring 2019** taking advantage of the SESAR exercises framework
- Towards an implementation by the **end of 2019?**





jerome.dufossez@aviation-civile.gouv.fr
bruce.palmouries@aviation-civile.gouv.fr





2019
World ATM Congress

SESAR walking tours



#PoweredBySESAR

Stand 849

SESAR SOLUTION: EXTENDED AMAN

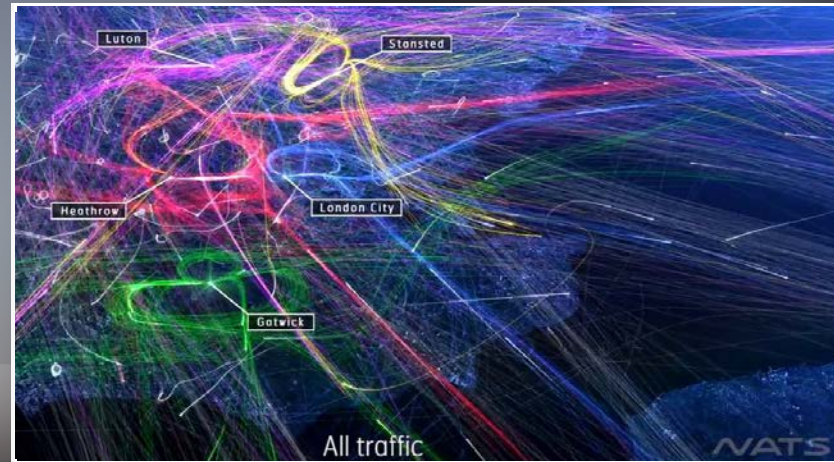
Cross-border Arrival Management
by Reims UAC

REGNIAUD G rald, Reims UAC



THE CHALLENGE: London-Heathrow case

- ⦿ Capacity limited, arrival holding in the TMA routine
- ⦿ Asymmetric radar coverage
- ⦿ Inbounds from South and East enter NATS airspace ready for immediate descent

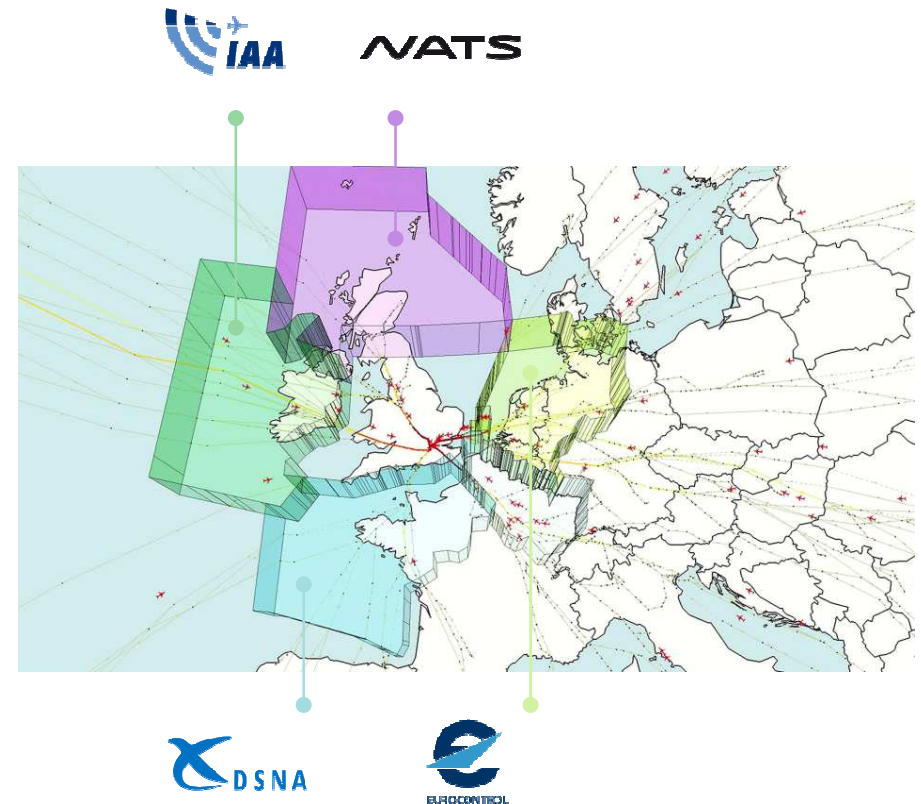




SESAR SOLUTION: Extended AMAN horizon

A cross-border collaboration to optimise flight arrival management

- ⦿ E-AMAN reaches out into airspace of adjacent ANSPs
- ⦿ Common E-AMAN concept and procedures are applied
- ⦿ All parties share the same information using SWIM services

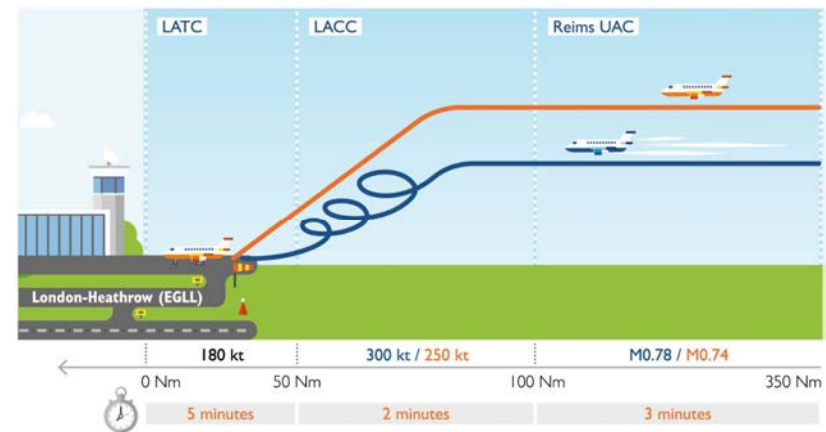
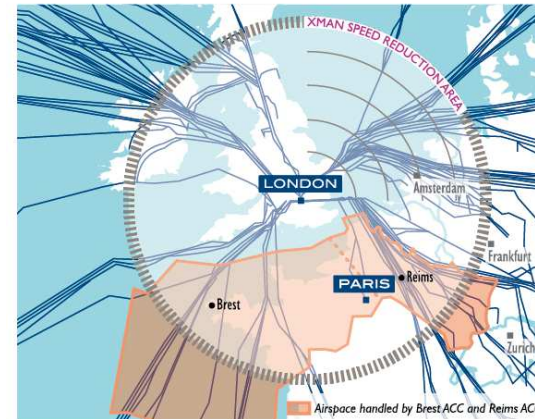




SESAR SOLUTION: Extended AMAN horizon

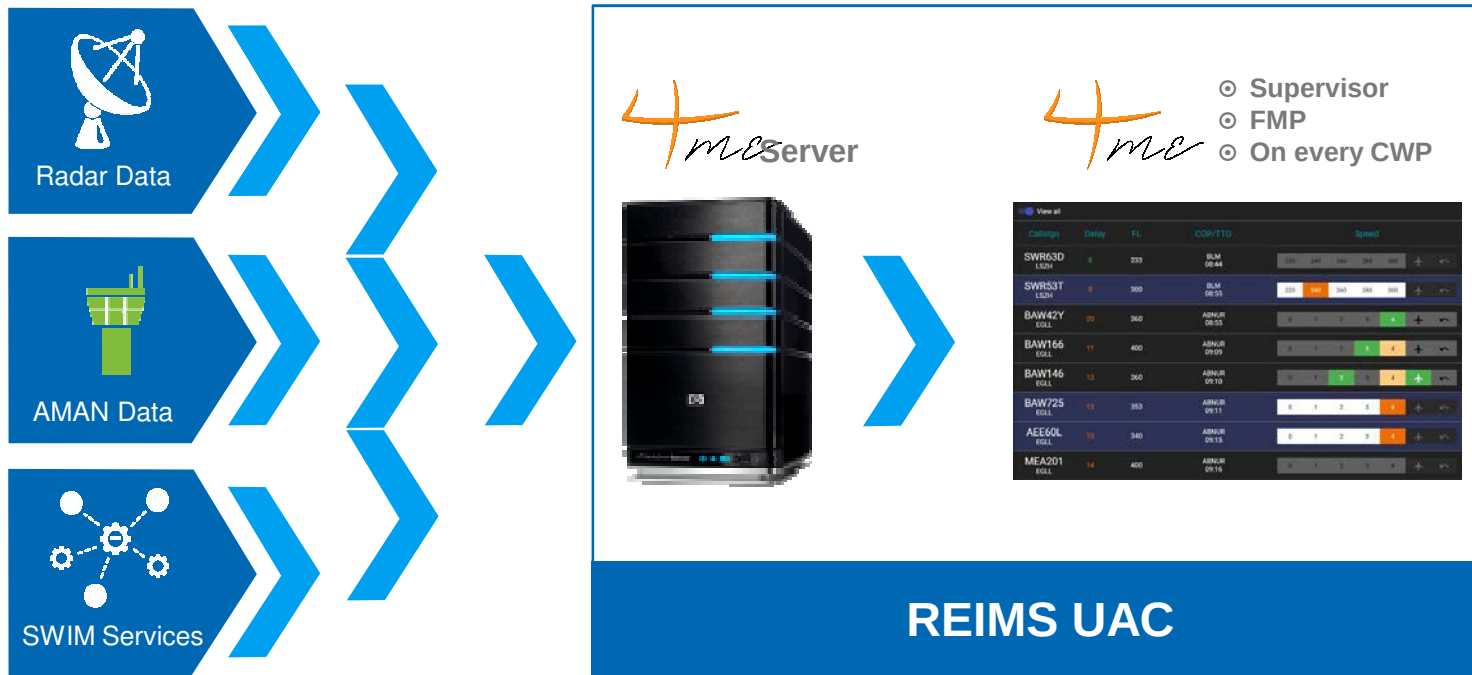
A cross-border collaboration to optimise flight arrival management

- ◉ The delay sharing strategy up to 10 minutes between London terminal (LATC), London ACC (LACC) et Reims UAC
- ◉ Above 10 minutes: delays are allocated back in the holding stack





ARCHITECTURE OVERVIEW





AN INNOVATIVE HMI TO BRIDGE THE GAP BETWEEN ATFCM AND ATC

E-AMAN for London-Heathrow and Zurich

Basic Extended ATC Planning (BEAP)

10:52:31 - KD2F

XMAN

CONTROL ROOM

ETFMS PROFILE

STAM

URR 4N

KDZF

KHR

4E

HH

XXH

UH

9

FR

P32: KD2F

BAW42Y
LFL - EGLL

12

FREE

1

2

3

4

MCS

✈

BAW62NL
LIML - EGLL

8

FREE

1

2

3

4

MCS

✈

BAW75M
LIMC - EGLL

17

FREE

1

2

3

4

MCS

✈

BAW16MT
LFML - EGLL

11

FREE

1

2

3

4

MCS

✈

XMAN

HYR
Hotspot - (3 STAM)

3

10:30 - 13:30

KHE
Hotspot

10:45 - 13:30

ATFCM Measures

RYR4JV
LIMF - EGSS

HYR

XR

FL-340

NOK

✈

BAW07Q
LIMF - ECKK

HYR

XR

FL-340

NOK

✈

EZY84ZT
LSZH - LOKK

HYR

KR

FL-360

NOK

✈

STAM

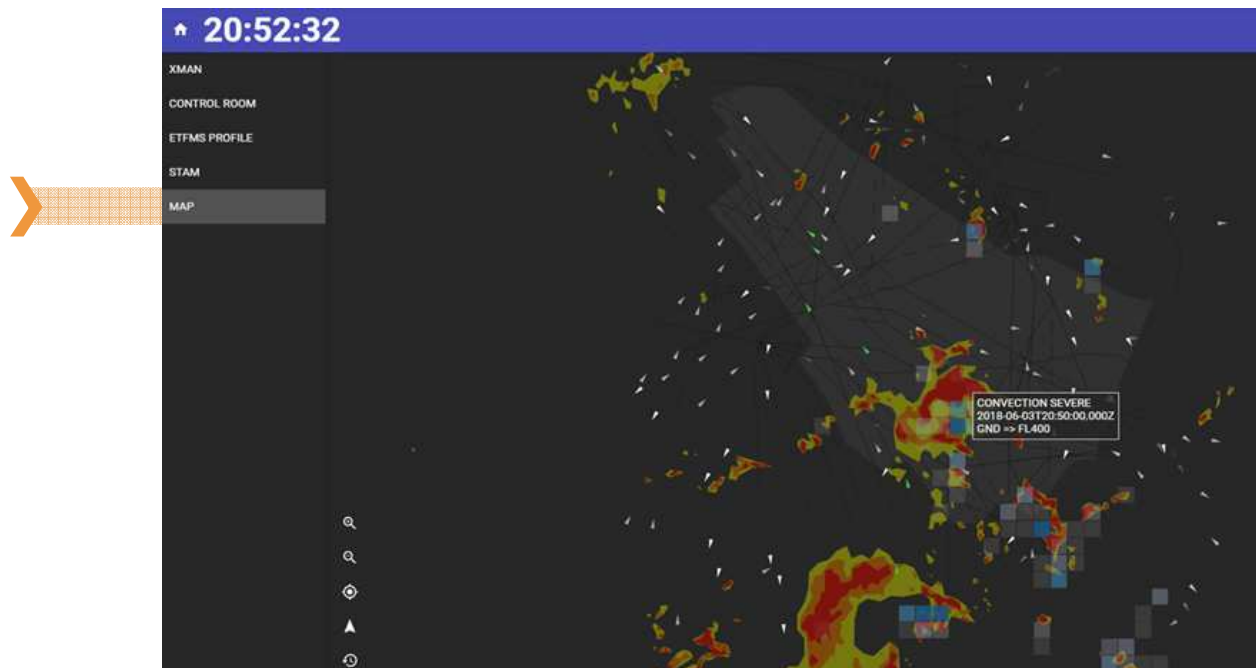
7



AN INNOVATIVE HMI TO BRIDGE THE GAP BETWEEN ATFCM AND ATC

Summer 2019:

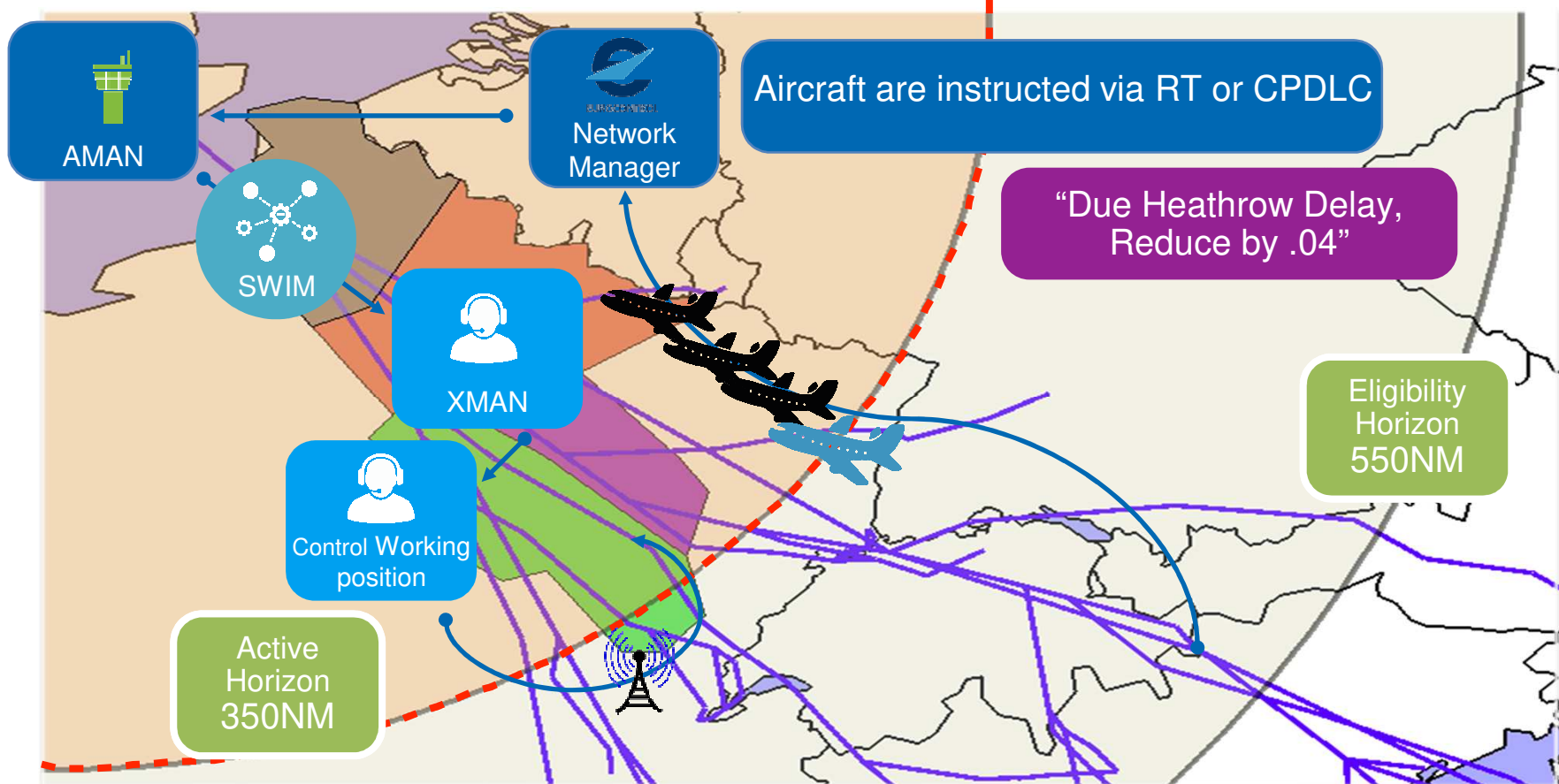
Display of integrated weather and air situation information thanks to SWIMet





HOW DOES XMAN WORK ?

IMPLEMENTED





E-AMAN OPERATIONAL BENEFITS

- ⊙ No need for additional equipment for airlines
- ⊙ Acceptable workload increase for ATCOs and flight crews

- ⊙ **London-Heathrow** has cut holding times in its arrival by 1 minute, reducing noise emissions
- ⊙ **Airlines** save over EUR 2 million in fuel bills and 7,500 tonnes of CO₂ annually



Safety



Environment

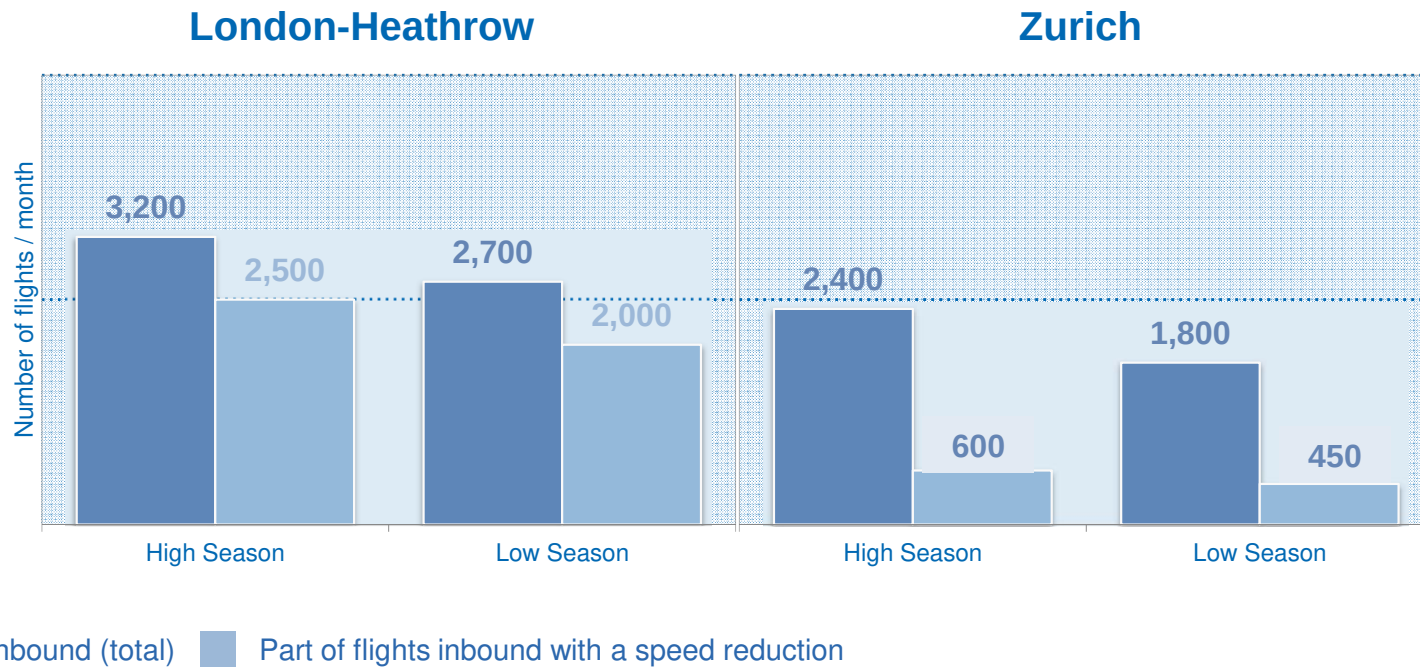


Saving Time



E-AMAN OPERATIONAL BENEFITS

REIMS UAC - XMAN PROCEDURE



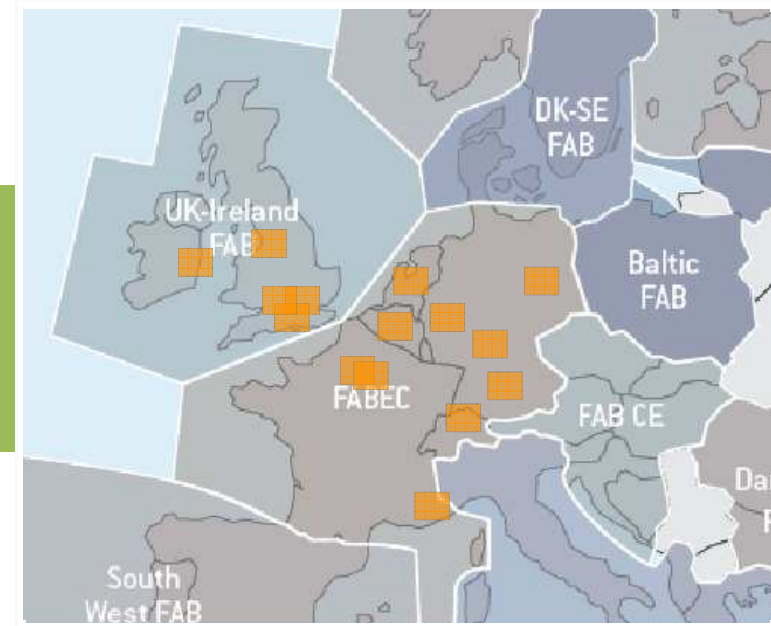


Implementation at
25 targeted airports
by 2023



15 airports within
FABEC & FAB UK-Ireland

London-Heathrow / Paris-CDG / London-Gatwick / Paris-Orly /
London-Stansted / Frankfurt / Amsterdam / Munich / Zurich /
Düsseldorf / Brussels / Berlin / Manchester / Dublin / Nice



E-AMAN Deployment Programme

XMAN is an integral part of the FABEC Airspace strategy



Karlsruhe UAC

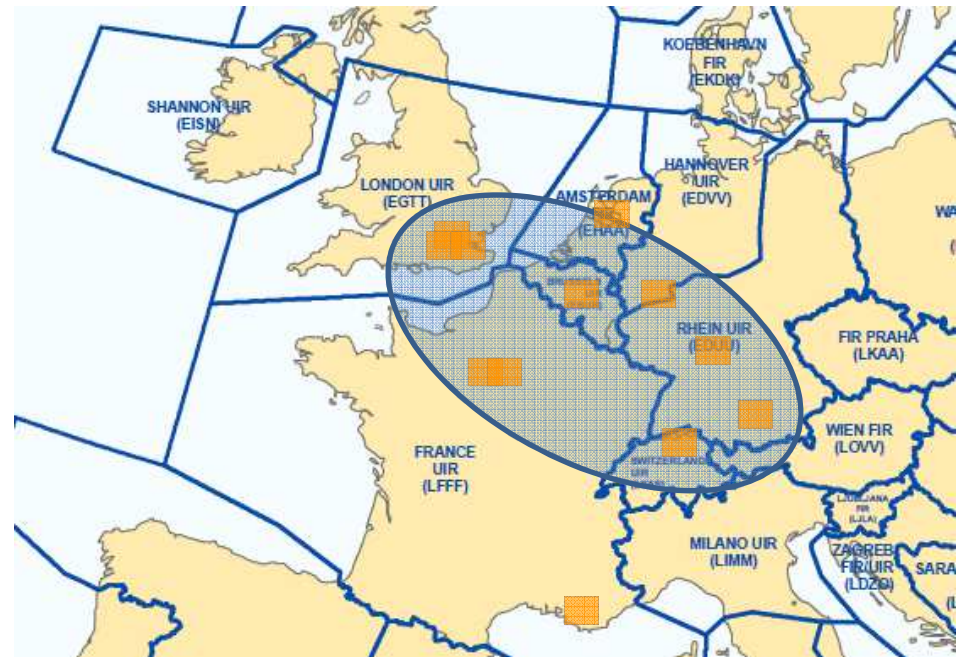


Maastricht UAC



Reims UAC

The biggest contributors to the implementation



London-Heathrow / Paris-CDG / London-Gatwick / Paris-Orly / London-Stansted / Frankfurt / Amsterdam / Munich / Zurich / Düsseldorf / Brussels / Nice

E-AMAN: Further deployment and development in 2019



SESAR 2020 Project



This project has received funding from the SESAR Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement 734145.

- ◉ **Paris (CDG and ORY) – London-Gatwick**
Live Trials by DSNA, NATS, Zurich and Skyguide
- ◉ **Multi-XMAN** in En-route (XMAN Portal)



- ◉ **London-Heathrow**
Involvement of Brest ACC
- ◉ **Amsterdam**
FABEC: trial between Reims UAC, MUAC, Skeyes and LVNL



gerald.regniaud@aviation-civile.gouv.fr

