SESAR 1 Solutions Implementation

Key Feature – High Performing Airport Operations

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SESAR Innovation Lifecycle

SESAR Joint Undertaking

Definition

Development

SESAR Deployment framework

Deployment

European ATM Master plan

SESAR solutions

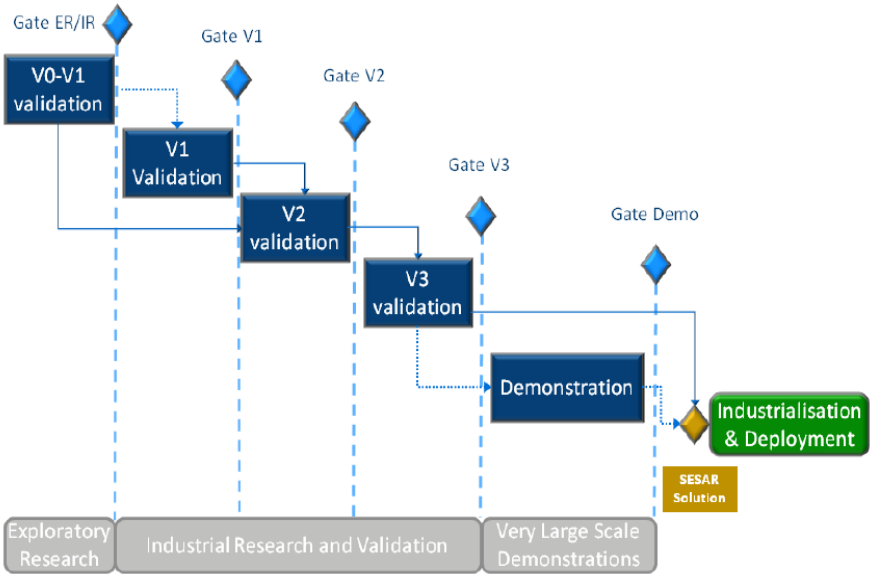
Common Projects Deployment governance

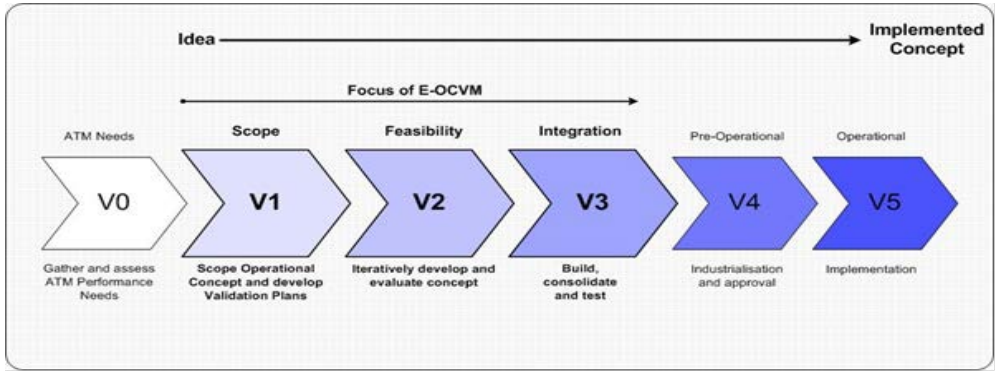
- **The focus** is on SESAR solutions that are contributing to High performance Airport Operations SESAR Key feature
- **The aim** – analysing deployment progress and determining which SESAR solutions are the most "attractive" for airports

SESAR SOLUTIONS

SESAR Solution is a new improved procedure or technology, elaborated to modernise and improve the existing ATM system.

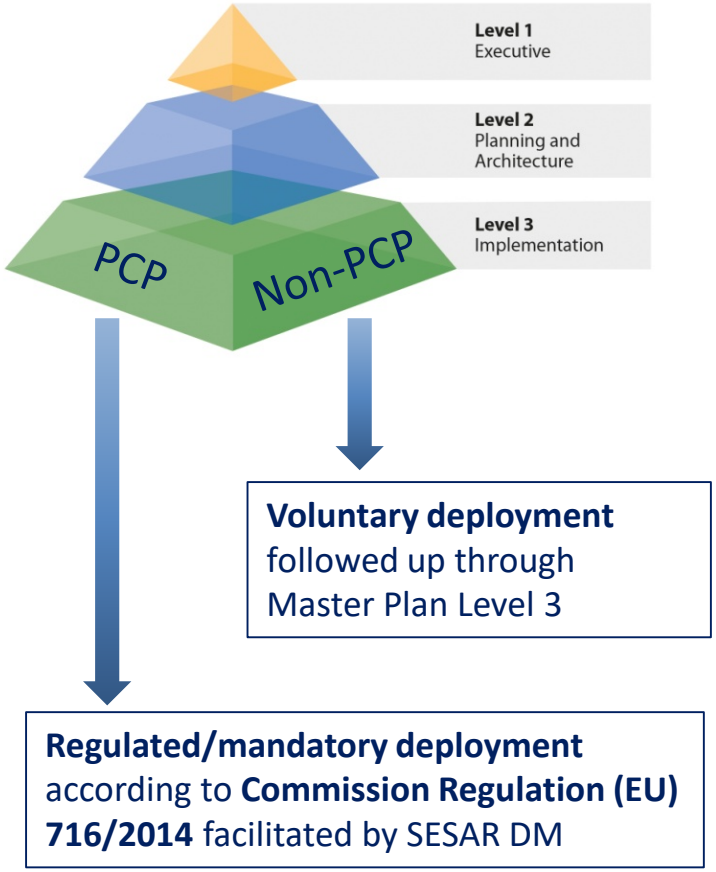
SESAR Solutions are delivered in a structured way through a release process.

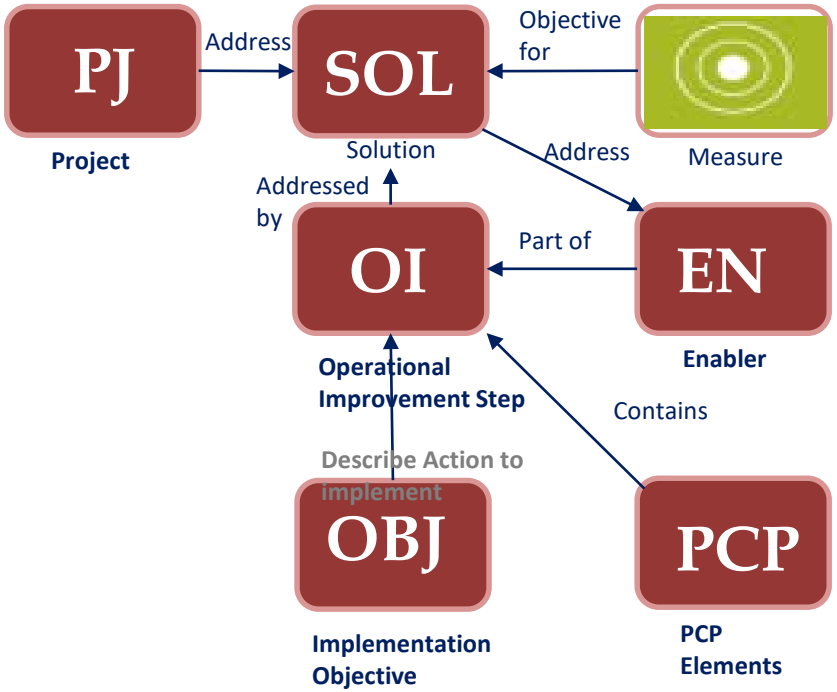




SESAR DEPLOYMENT

ATM Master Plan



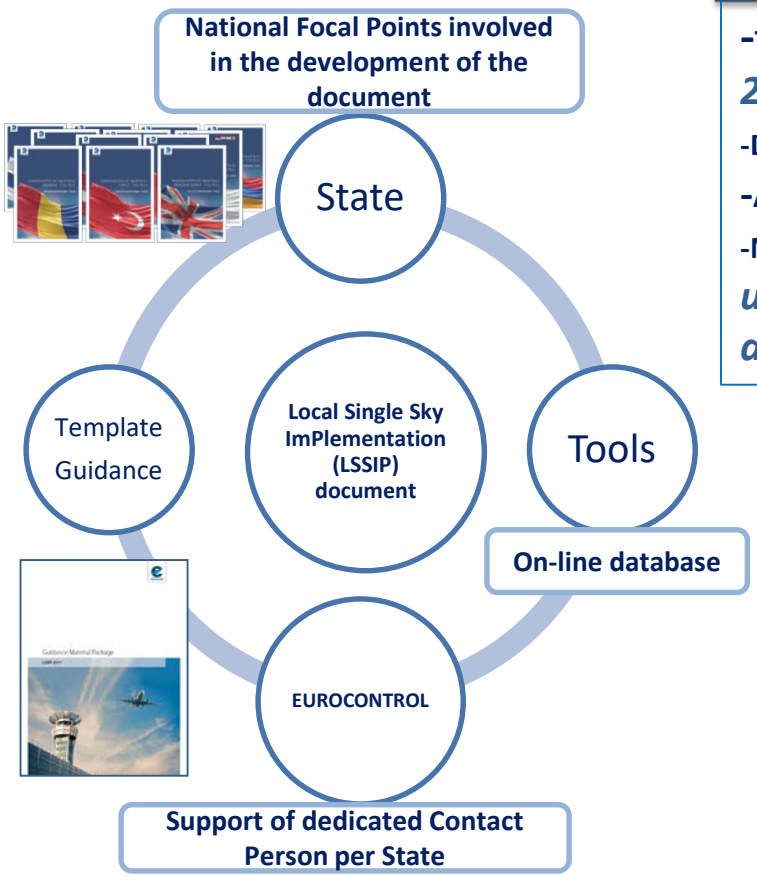


PCP AND NON PCP SOLUTIONS

Solutionno.	Solution name
01	Runway status lights
02	Airport safety nets for controllers: conformance monitoring alerts and detection of conflicting ATC clearances
04	Enhanced traffic situational awareness and airport safety nets for vehicle drivers
12	Single remote tower operations for medium traffic volumes
13	Remotely provided air traffic service for contingency situations at aerodromes
21	Airport operations plan (AOP) and its seamless integration with the network operations plan (NOP)
22	Automated assistance to controllers for surface movement planning and routing
23	D-TAXI service for controller-pilot data-link communications (CPDLC) application
26	Manual taxi routing function
47	Guidance assistance through airfield ground lighting
48	Virtual block control in low visibility procedures (LVPs)
52	Remote tower for two low density aerodromes
53	Pre-departure sequencing supported by route planning
54	Flow based integration of arrival and departure management
55	Precision approaches using GBAS Category II/III
61	A low-cost and simple departure data entry panel for the airport controller working position
64	Time-based separation
70	Enhanced ground controller situational awareness in all weather conditions
71	ATC and AFIS service in a single low-density aerodrome from a remote controller working position (CWP)
106	DMAN Baseline for integrated AMAN DMAN
116	De-icing management tool

THE DATA SOURCES USED

The official Master Plan monitoring mechanism



LSSIP

-Timeline: *Nov 2017- Feb 2018*
-Data: *end 2017*
-Area: *ECAC*
-Nature: *Public use/Limited access*

SURVEY

-Timeline: *Dec 2017- Feb 2018*
-Data: *end 2017*
-Area: *ECAC*
-Nature: *Public use/Limited access*

NM

-Timeline: *Continuous*
-Data: *end 2017*
-Area: *ECAC*
-Nature: *Limited access*

Master Plan Level 3 Implementation Report

→ Currently mostly objective driven

→ Solution driven

SOLUTIONS CONSIDERED IN THE ANALYSIS

Solutionno.	Solution name
01	Runway status lights
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Analysis of SESAR 1 Deployment at Airports

Period of analysis: **2017 - 2024**

A. **Implementation trend by categories**
B. **Performance view**
C. **Implementation locations**

Which SESAR solutions are the most "attractive" for airports?

Analysis of SESAR 1 Deployment at Airports

A. Implementation trend by categories

1. **Safety nets and visual aids** (Safety): 01, 02, 04, 26, 47, 48, 70
2. **Integration in the Network** (Network): 21, 53, 61, 116
3. **Arrival, departure and Surface Operations** (ARR/DEP/SO): 22, 23, 54, 55, 64, 106
4. **Remote Tower Services** (RTS): 12, 13, 52, 71

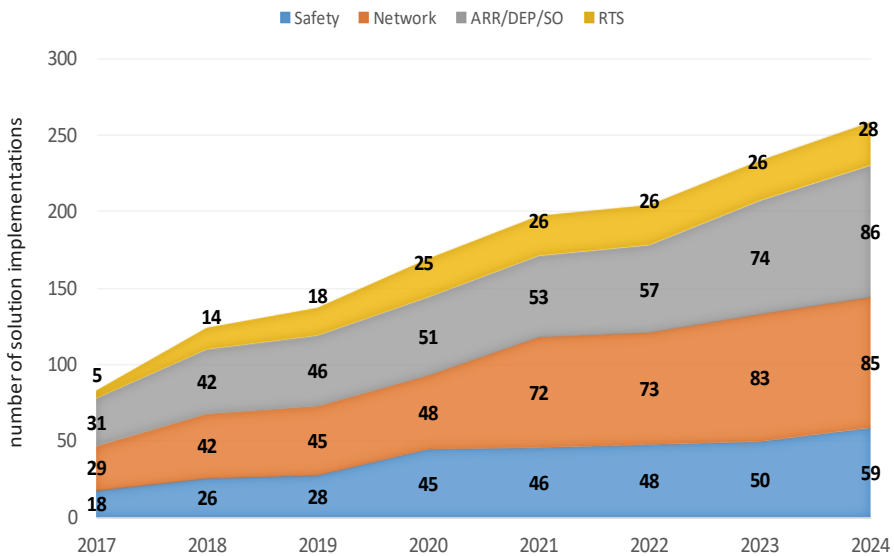
By 2024 →

- 16 airports will be congested
- Airports in 17 States will need more capacity

} Six different capacity gap mitigation

ANALYSIS OF SESAR 1 DEPLOYMENT AT AIRPORTS

A. Implementation trend by categories



Cumulative number of solution implementations by categories

83 implementation plans → **2017**

258 implementation plans → planned for **2024**

Network and ARR/DEP/SO → similar solutions deployment trend

Safety → lower rate in planned solutions deployment

RTS → lower numbers in overall deployment

ANALYSIS OF SESAR 1 DEPLOYMENT AT AIRPORTS

A. Implementation trend by categories

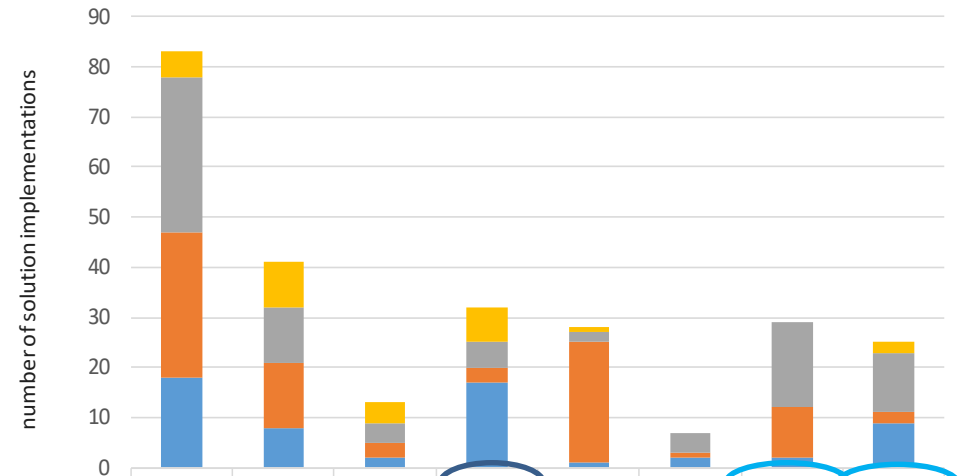
Base year: 2017

40 solution implementations→ **end of 2018**

30 solution implementations→ **per year** for the **next six years**

Safety solution implementations→ **focus in 2020**

ARR/DEP/SO solution implementations→ **focus in 2023 and 2024**



	2017	2018	2019	2020	2021	2022	2023	2024
RTS	5	9	4	7	1	0	0	2
ARR/DEP/SO	31	11	4	5	2	4	17	12
Network	29	13	3	3	24	1	10	2
Safety	18	8	2	17	1	2	2	9

Number of implementation cases planned for the period 2017-2024

Analysis of SESAR 1 Deployment at Airports

A. Implementation trend by categories

258
implementation cases
by 2024

92
airports

Network
Solutions
↓
62
airports

ARR/DEP/SO
Solutions
↓
45
airports

Safety
Solutions
↓
37
airports

RTS
Solutions
↓
26
airports

Analysis of SESAR 1 Deployment at Airports

B. Performance view

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CAPACITY GAINS WITH TIME-BASED ARRIVALS

Time-based separation

SJU references: #64/Release 2

STAKEHOLDERS: ANSP, AO, AU, NM

Today, aircraft making their final approach to land are obliged to maintain minimum separation distances. These distances are fixed whatever the wind conditions. When keeping to these distances in strong headwinds longer gaps of time develop between aircraft. This means fewer flights landing per hour (reduced airport capacity), leading to delays and increased holding at busy times, which results in increased fuel burn.

SESAR's time-based separation (TBS) replaces current distance separations with time intervals in order to adapt to weather conditions. It provides consistent time-based spacing between arriving aircraft in order to maintain runway approach capacity.

The TBS software uses real-time information about the weather, airspeed, ground speed, heading and altitude to display time-based separation and arrival speed information to the approach controller. No changes are required on board the aircraft, but the controller uses the real-time separation indicators to manage the final approach separations.

TBS research included analysis of the arrival paths of over 100,000 aircraft using state-of-the-art equipment to measure the behaviour of aircraft wake vortices. The procedure now is in daily use at London Heathrow, where, in strong wind conditions, it delivers up to five additional aircraft landings with TBS per hour compared to traditional distance-based separation procedures. TBS results in an average reduction of 0.9 minutes holding time, and an average reduction of 1.4 minutes between stack-entry and touchdown times.

Analysis has shown that there has been no increased risk to wake turbulence encounters, and no increase in the number of go-arounds following introduction of time-based separation at London Heathrow

The SESAR Solution is available for industrialisation. TBS entered into full-time service at London-Heathrow in March 2015. The solution is due for synchronised deployment across Europe in accordance with the Pilot Common Project.

This solution is linked to Eurocontrol's TBS specifications (STD-065)

BENEFITS

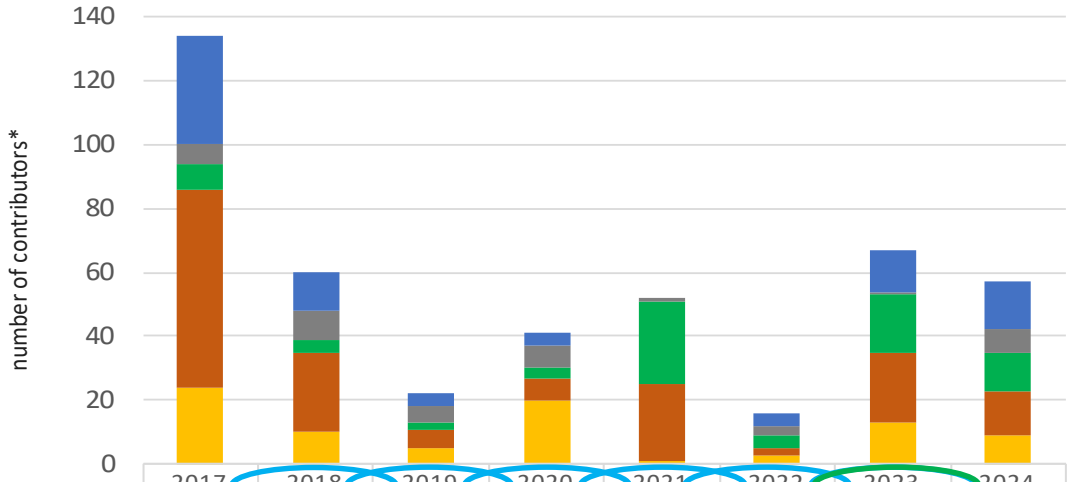
- Improved airport capacity as a result of increased aircraft landing rates in strong headwind conditions
- Reduction in holding times as well as stack entry to touchdown times
- Increased situational awareness

PCP

SOLUT \ PA	safety	operational efficiency	capacity	cost efficiency	environment
01					
02					
04					
12					
13					
21					
22					
23					
26					
47					
48					
52					
53					
54					
55					
61					
64					
70					
71					
106					
116					

Analysis of SESAR 1 Deployment at Airports

B. Performance view

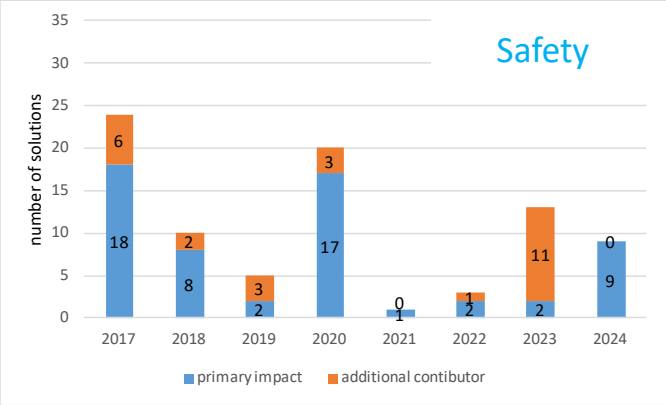


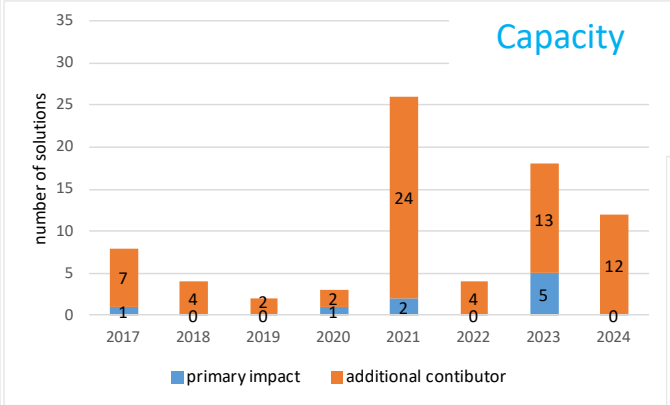
	2017	2018	2019	2020	2021	2022	2023	2024
Environment	34	12	4	4	0	4	13	15
Cost efficiency	6	9	5	7	1	3	1	7
Capacity	8	4	2	3	26	4	18	12
Operational efficiency	62	25	6	7	24	2	22	14
Safety	24	10	5	20	1	3	13	9

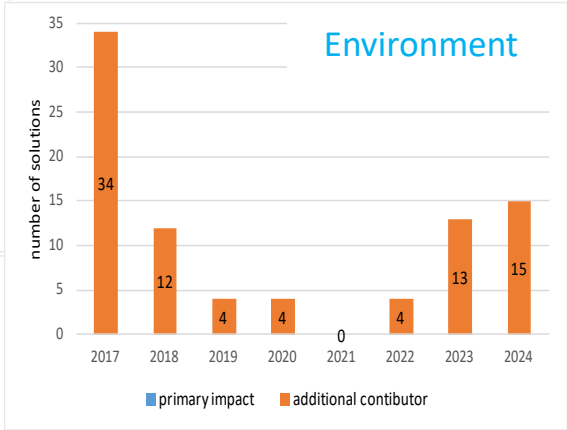
Number of contributors by performance area, period 2017-2024

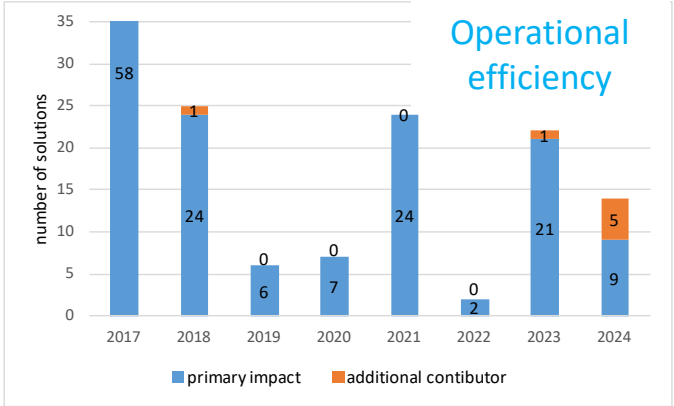
Analysis of SESAR 1 Deployment at Airports

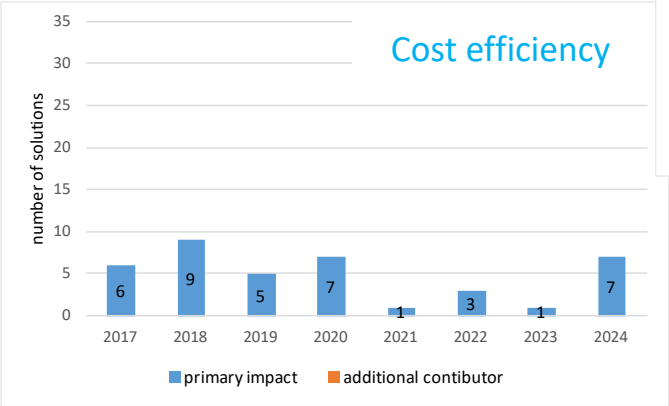
B. Performance view





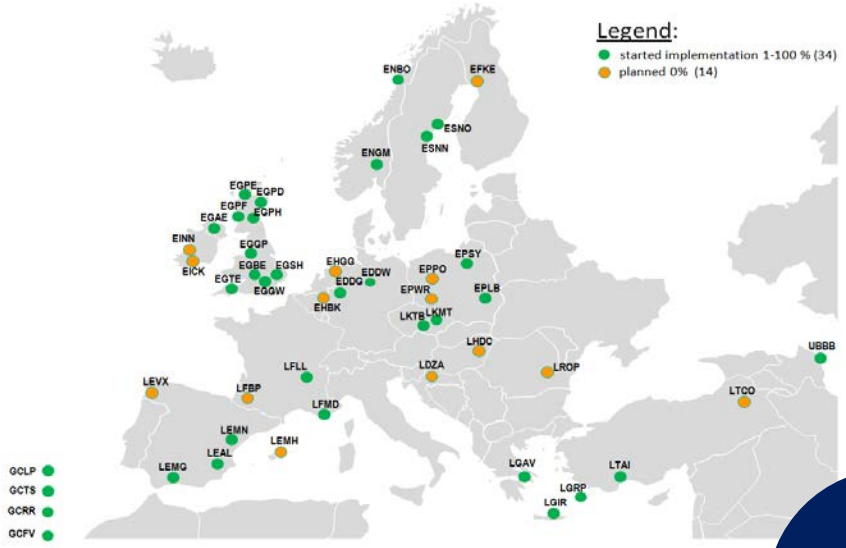


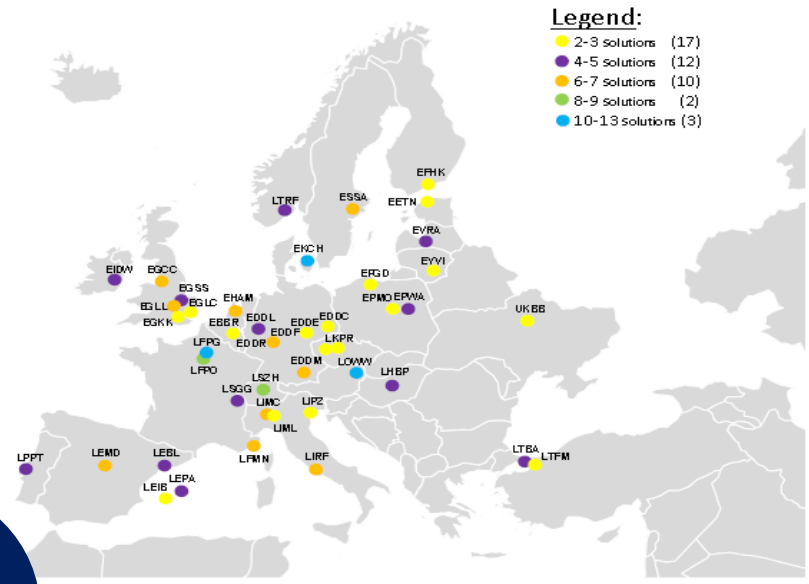




Analysis of SESAR 1 Deployment at Airports

C. Implementation locations





92 airports

Analysis of SESAR 1 Deployment at Airports

C. Implementation locations

14 (out of 21) solutions→ fully implemented at one or more airports

41 airports→ one solution, fully implemented

11 airports→ two or more solutions, fully implemented

Slot coordination levels:
Level 1
Level 2
Level 3

Fully Implemented Solutions

Solution no.	Airports completed the implementation (100%)
01	LFPG, ESSA
02	EGKK, EGLL, EBBR
13	EKCH, LHBP, EYVI
47	EVRA, EPWA
48	EVRA
55	EETN
61	LEMG, LEAL, LEIB, LEMN*, LFMN, EDDR, EDDE, EDDG, EDDC, EDDW, EGLC, EGSS, EGGW, EGGP, EGCC, EGPH, EGPD, UKBB
64	EGLL
70	EFHK, LFPG, LHBP,EVRA
106	EFHK, ESSA, ENGM, EKCH, EIDW, EGSS, EGLL, EGLC, EGKK, EBBR, EDDL, EDDF, LKPR, LFPG, LFPO, EDDM, LOWW, LSZH, LSGG, LFLL, LIMC, LIML, LIPZ, LIRF, LTBA, LEBL, LEPA, LEMD, LPPT
116	EFHK, LFPG
12,52,71	ESNO, ESNN

Analysis of SESAR 1 Deployment at Airports

C. Implementation locations

Solutions by Performance Area and Airport Traffic

Performance Area	Traffic volume		
	High	*Medium to high*	*Low to medium*
Safety	01,02,04,**26,47,48**,70	01,04,**26,47,48**,70	01,**26,48**
Operational efficiency	**21,22**,23,53,**54,106,116***	**116***	61
Capacity	64		
Cost efficiency	13,**55**	13,**55**	13,**55,**12,52,71

Example

EKCH:

- **10 solutions** (02, 04, 13, 21, 22, 23, 26, 53, 64, 106)
- **6 solutions** are currently being implemented (02, 13, 21, 22, 53, 106)
  - **2 solutions** are fully implemented (106, 13)
- **4 solutions** are still planned to be implemented (04, 23, 26, 64)

CONCLUSIONS

- A total of **92 airports** are either implementing or planning to implement one or more **SESAR solutions**
- By **2017** (inclusive), there were **83** solution implementations at airports in the **ECAC area**
- By **2024**, that number will increase to a total of **258 implementations**
- The most successful **solutions** with the biggest population of airports, (already implemented or planed to implement those solutions) relate to integration into the **network and ARR/DEP/SO operations**
- **Capacity and operational efficiency-related** solutions will be the focus in **2021,** while **Safety** will be the focus in **2020**
- Distribution of solutions by airport traffic level shows a **limited amount of solutions available for low to medium traffic** – the focus is on delivering performances at major, very busy airports

Questions please…