



# Unpacking SESAR's performance measurement framework

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EUROPEAN PARTNERSHIP



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# What's on the agenda?

**Performance overview from the Single European Sky to SESAR - “Why is there a need to measure performance benefits?”**

Riccardo Massacci, Performance Expert, SESAR 3 Joint Undertaking

**The SESAR performance measurement process - “What do I need to do?”**

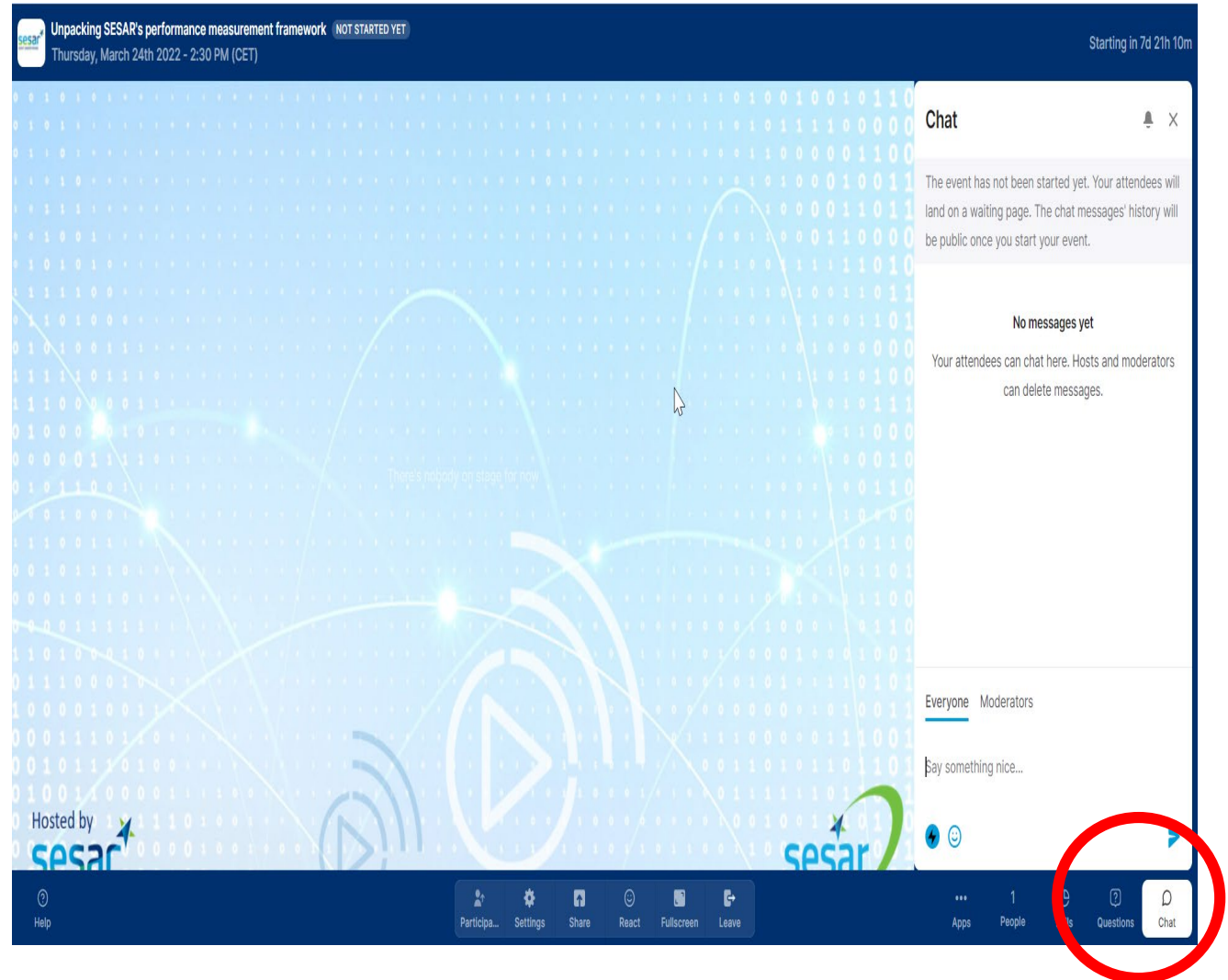
Jose Manuel Cordero Garcia, Principal ATM Researcher, ENAIRE

**New benefits for a modernised ATM system - “How is the evolving ATM landscape being assessed?”**

Iciar Garcia-Ovies, Aeronautical Engineer, ENAIRE

# Housekeeping

- This webinar is being recorded
- Please ask your questions in the questions tab only
- Use the chat to signal any issues you are having or to say hello to fellow listeners
- We will try to dedicate time at the end to answer all of your questions but we will ensure that all questions will be answered after the webinar
- The PPT slides and webinar playback will also be provided to you afterwards
- There will be a feedback poll at the end of the webinar and we would be grateful to hear from you on how we can improve.





# Performance overview from SES to SESAR

*“Why is there a need to measure  
performance benefits?”*

*Riccardo MASSACCI*



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# SES HLGs and SES Performance Scheme

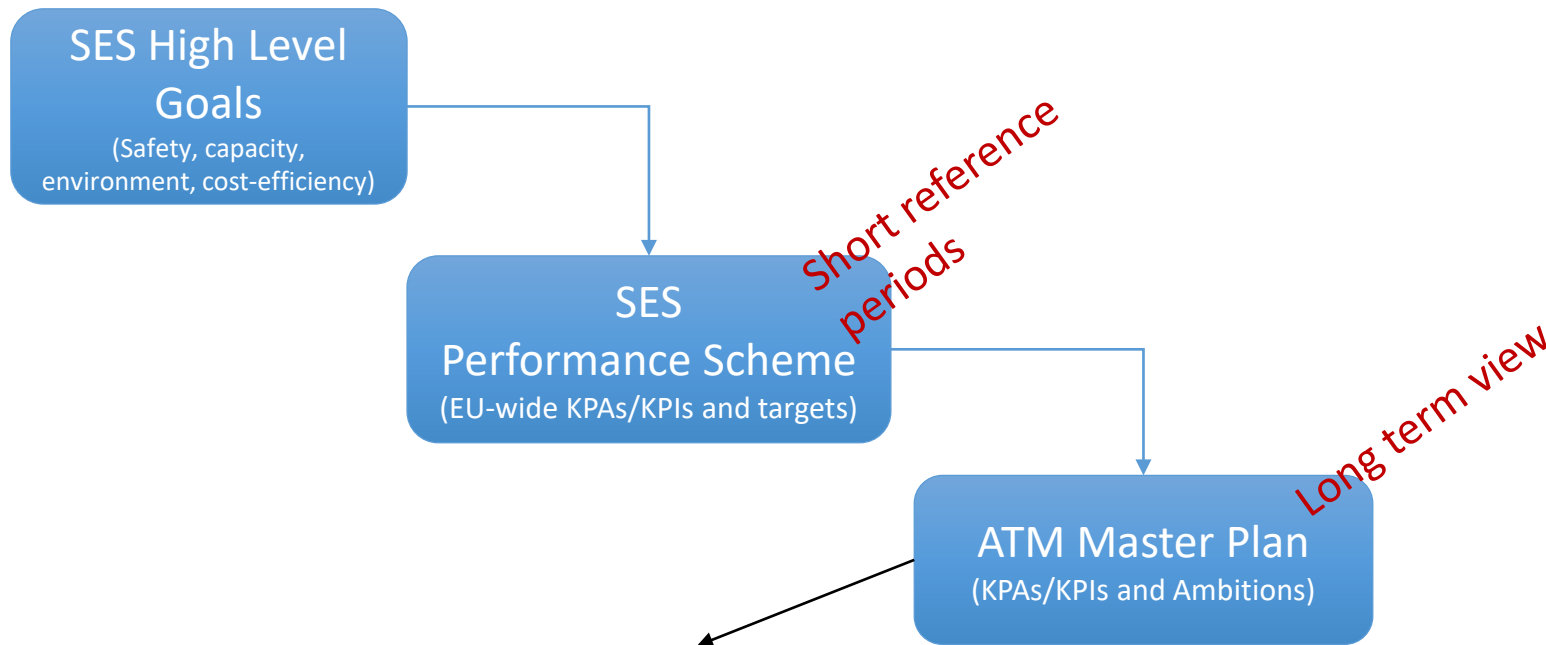


The **SES High Level Goals** are aspirational ambitions set up by the EU in key areas such as **safety, environment, capacity and cost-efficiency**.

The **Performance Scheme** fully commits to the achievement of these HLGs by enhancing **performance of air navigation services** through a **gate-to-gate** approach covering both en-route and terminal ANS.

**Impacted actors:** Air navigation services are provided by ANSPs, Airports, METs, NSAs and EUROCONTROL

# ATM MP contribution to SES performance goals



The **ATM Master Plan** is the agreed roadmap that connects ATM development and deployment activities to contribute to the SES performance objectives.



# SES HLGs vs ATM Master Plan

|                        |                                                                                     | Performance ambition vs. baseline                                                                                                                                         |                            |                                                                 |                      |                      |
|------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------------------------------------------------------------|----------------------|----------------------|
| Key Performance Area   | SES high-level goals vs. 2005                                                       | Key Performance Indicator                                                                                                                                                 | Baseline value (2012)      | Ambition value (2035)                                           | Absolute improvement | Relative improvement |
| Capacity               |    | Enable 3-fold increase in ATM capacity                                                                                                                                    |                            |                                                                 |                      |                      |
|                        |                                                                                     | Departure delay <sup>4</sup> , min/dep                                                                                                                                    | 9.5 min                    | 6.5-8.5 min                                                     | 1-3 min              | 10-30%               |
|                        |                                                                                     | IFR flights at congested airports <sup>5</sup>                                                                                                                            | 4 million                  | 4.2-4.4 million                                                 | 0.2-0.4 million      | 5-10%                |
|                        |                                                                                     | Network throughput IFR flights <sup>5</sup>                                                                                                                               | 9.7 million                | ~15.7 million                                                   | ~6.0 million         | ~60%                 |
|                        |                                                                                     | Network throughput IFR flight hours <sup>5</sup>                                                                                                                          | 15.2 million               | ~26.7 million                                                   | ~11.5 million        | ~75%                 |
| Cost efficiency        |    | Reduce ATM services unit cost by 50% or more                                                                                                                              |                            |                                                                 |                      |                      |
|                        |                                                                                     | Gate-to-gate direct ANS cost per flight <sup>1</sup> , EUR(2012)                                                                                                          | EUR 960                    | EUR 580-670                                                     | EUR 290-380          | 30-40%               |
| Operational efficiency |    | Gate-to-gate fuel burn per flight, kg/flight                                                                                                                              | 5280 kg                    | 4780-5030 kg                                                    | 250-500 kg           | 5-10%                |
|                        |                                                                                     | Additional gate-to-gate flight time per flight <sup>2</sup> , min/flight                                                                                                  | 8.2 min                    | 3.7-4.1 min                                                     | 4.1-4.5 min          | 50-55%               |
|                        |                                                                                     | (Within the: Gate-to-gate flight time per flight <sup>3</sup> , min/flight)                                                                                               | (111 min)                  | (116 min)                                                       |                      |                      |
| Environment            |    | Enable 10% reduction in the effects flights have on the environment                                                                                                       |                            |                                                                 |                      |                      |
|                        |                                                                                     | Gate-to-gate CO <sub>2</sub> emissions, tonnes/flight                                                                                                                     | 16.6 tonnes                | 15-15.8 tonnes                                                  | 0.8-1.6 tonnes       | 5-10%                |
| Safety                 |   | Improve safety by factor 10                                                                                                                                               |                            |                                                                 |                      |                      |
|                        |                                                                                     | Accidents with direct ATM contribution <sup>6</sup> , #/year<br>Includes in-flight accidents as well as accidents during surface movement (during taxi and on the runway) | 0.7<br>(long-term average) | no ATM related accidents                                        | 0.7                  | 100%                 |
| Security               |  | -                                                                                                                                                                         |                            |                                                                 |                      |                      |
|                        |                                                                                     | ATM related security incidents resulting in traffic disruptions                                                                                                           | unknown                    | no significant disruption due to cyber-security vulnerabilities | unknown              | -                    |

1 Unit rate savings will be larger because the average number of Service Units per flight continues to increase.

2 “Additional” here means the average flight time extension caused by ATM inefficiencies

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3 Average flight time increases because the number of long-distance flights is forecast to grow faster than the number of short-distance flights

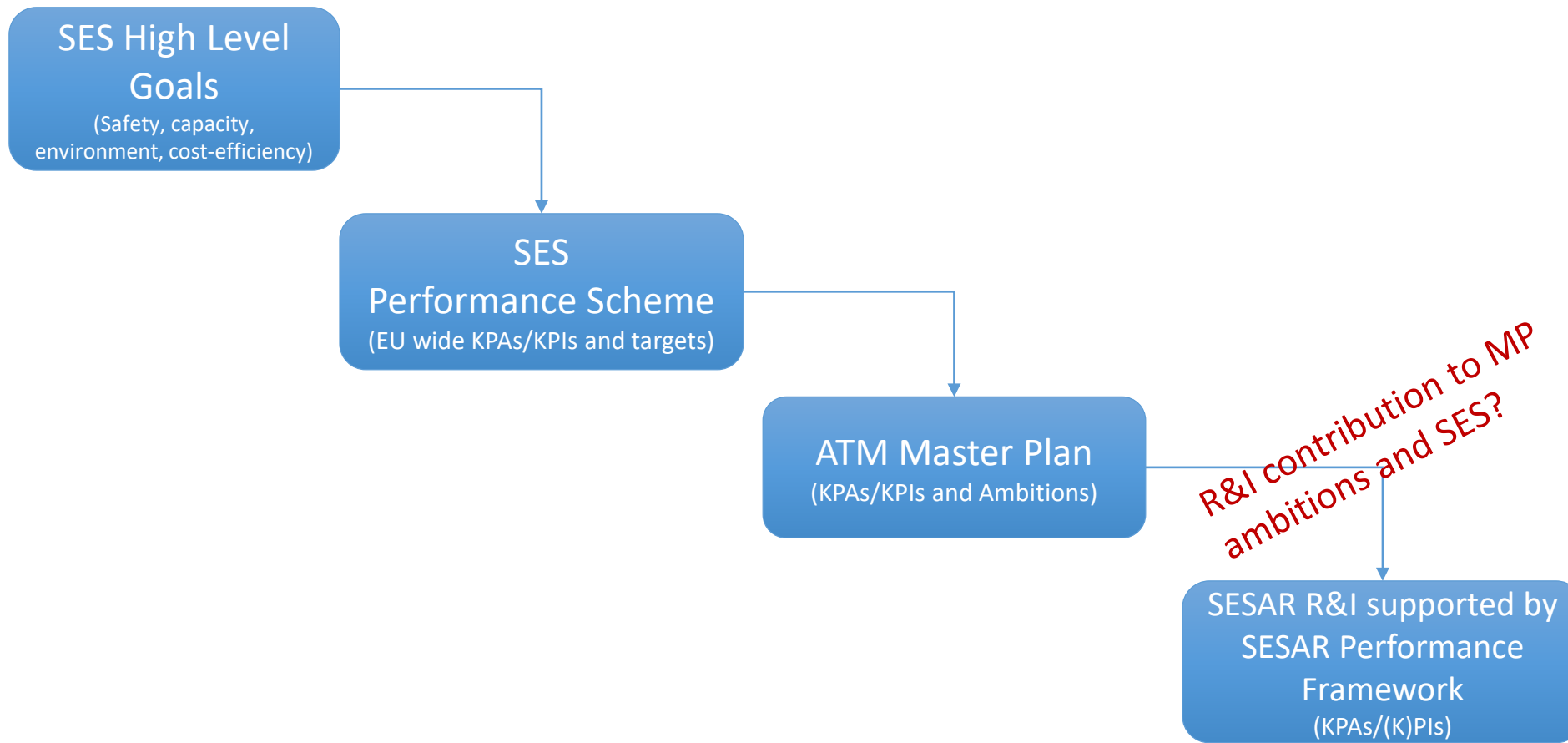
4 All primary and secondary (reactionary) delay, including ATM and non-ATM causes

5 Includes all non-segregated unmanned traffic flying IFR, but not the drone traffic flying in airspace below 500 feet or the new entrants flying above FL 600

6 In accordance with the PRR definition: where at least one ATM event or item was judged to be DIRECTLY in the causal chain of events leading to the accident. Without that ATM event, it is considered that the accident would not have happened

A significant part of the SES high level goals to be achieved by rolling-out SESAR

# R&I performance contribution



# Measurement in SES PS and SESAR R&I

SES High Level  
Goals

(Safety, capacity,  
environment, cost-efficiency)

SES  
Performance Scheme  
(EU wide KPAs/KPIs and targets)

Regulation that makes use of targets and (K)PIs to drive performance improvement in the deployed system (today)! Measurements are based on real operations! Impacts a wide number of stakeholders!

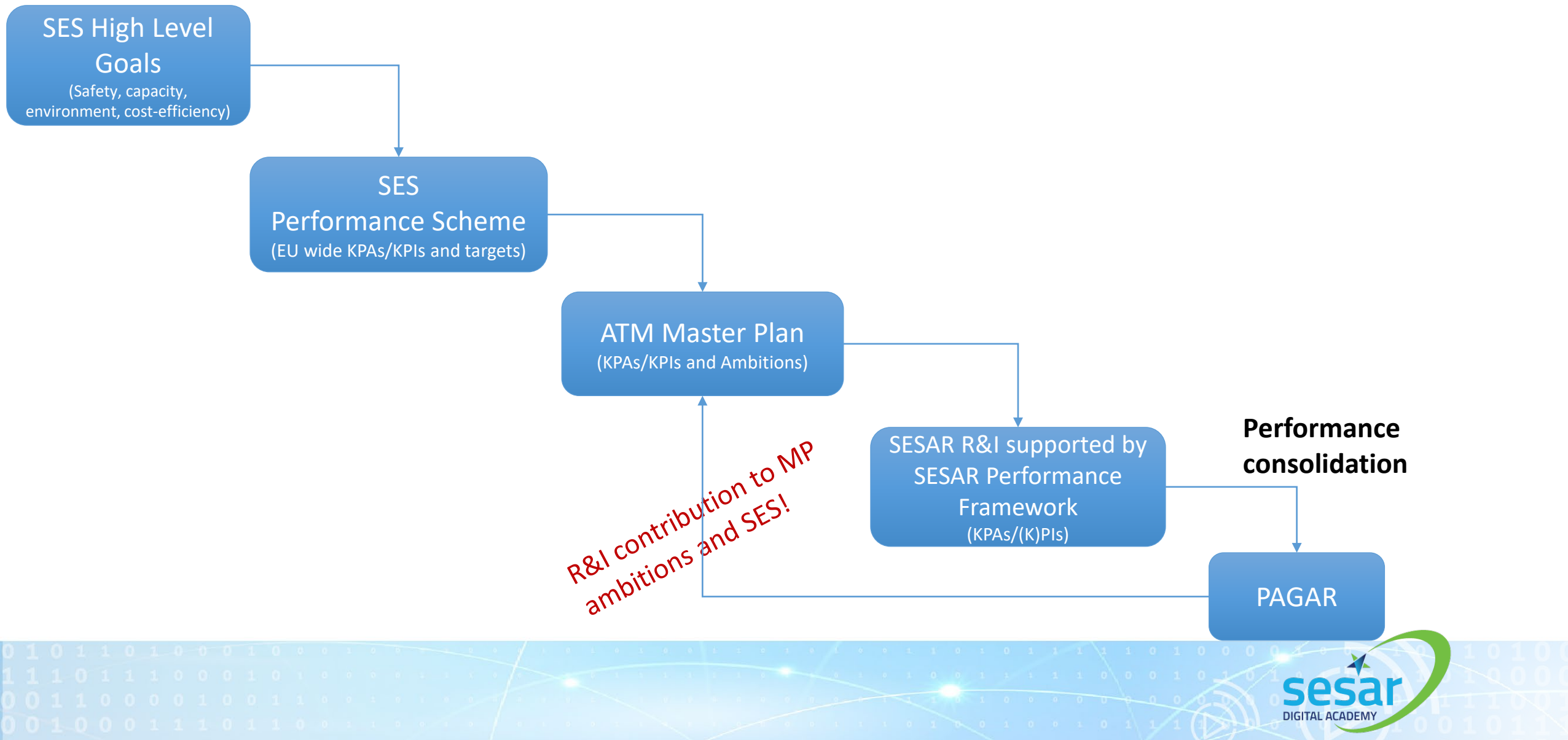
ATM Master Plan  
(KPAs/KPIs and Ambitions)

*R&I contribution to MP  
ambitions and SES?*

SESAR R&I supported by  
SESAR Performance  
Framework  
(KPAs/(K)PIs)

It measures expected improvements from deploying SESAR Solutions (long term 2035)! Measurements made in simulation environments!  
It mostly impacts on ANSP/airports/AUs

# R&I performance consolidation - PAGAR



# Relationship between SES PS, MP and SESAR PF



| KPA             | SES HLGs vs 2005                                                    | SES Performance Scheme KPIs                                                                               | ATM MP Ambitions vs 2012                              | SESAR Performance Framework (KPIs)                                                                                                                                                               |
|-----------------|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cost efficiency | Reduce ATM service unit costs by 50% or more                        | Average Determined Unit Cost (DUC) for en-route and terminal                                              | 30-40% reduction in ANS costs per flight              | Flights per ATCO hour on duty<br>Technology Cost per flight                                                                                                                                      |
| Capacity        | Enable 3-fold increase in ATM capacity                              | Average minutes of en-route ATFM delay per flight                                                         | 10-30% reduction in departure delays                  | Average departure delay per flight:<br>% of Flights departing (Actual Off-Block Time) within +/- 3 minutes of Scheduled Off-Block Time after accounting for ATM and weather related delay causes |
| Environment     | Enable 10% reduction in the effects flights have on the environment | Average horizontal en-route flight efficiency of last filed flight plan (KEP) and actual (KEA) trajectory | 5-10% reduction in Kg fuel per flight (CO2 emissions) | Average fuel burn per flight<br>(CO2 Emissions = 1kg fuel=3.15 kg CO2)                                                                                                                           |
| Safety          | Improve safety by factor 10                                         | Effectiveness of Safety Management (both Regulators and ANSPs)                                            | No ATM related accidents                              | Total number of ATM accidents                                                                                                                                                                    |

# Example SESAR vs SES – Cost Efficiency

| KPA             | SES HLGs vs 2005                             | SES Performance Scheme KPIs                                  | ATM MP Ambitions vs 2012                 | SESAR Performance Framework (KPIs) |
|-----------------|----------------------------------------------|--------------------------------------------------------------|------------------------------------------|------------------------------------|
| Cost efficiency | Reduce ATM service unit costs by 50% or more | Average Determined Unit Cost (DUC) for en-route and terminal | 30-40% reduction in ANS costs per flight | Flights per ATCO hour on duty      |
|                 |                                              |                                                              |                                          | Technology Cost per flight         |

## SES Cost efficiency indicator (DUC):

**Average (EU States + Norway and Switzerland) Determined Unit Costs =**  
**Total Determined Costs / Total Service Units**

**Determined costs include** ANSP, Airport, NSA, EUROCONTROL, MET costs i.e.

- Staff costs
- Operating costs (other than staff)
- Depreciation
- Cost of capital
- Exceptional costs



**SESAR influence determined costs by mainly reducing ANSP and airport costs**

*SESAR does not refer to service units in its performance framework (simulations based on flight movements)*

# Why is SESAR a performance driven programme?

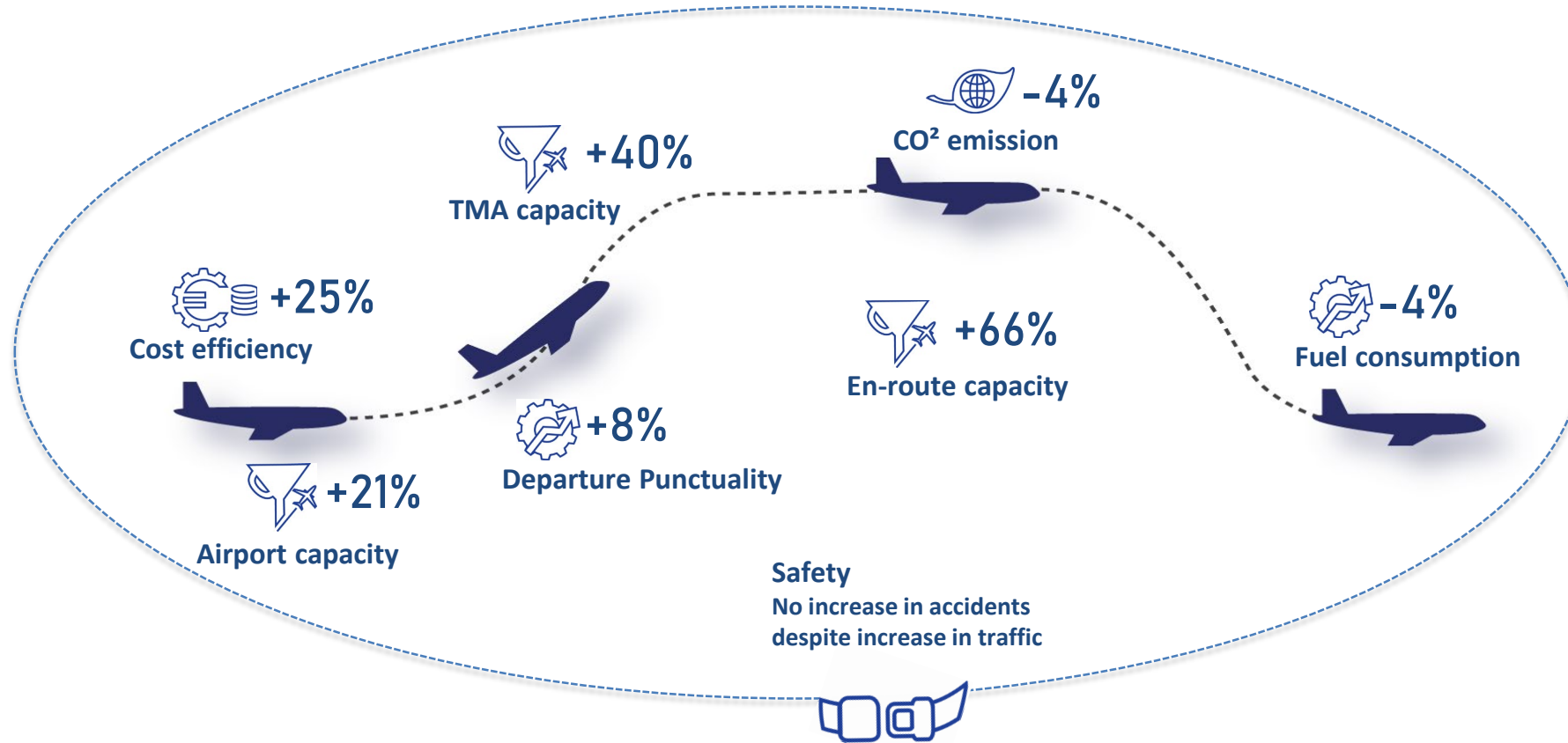
- It is a key activity to identify gaps vis-à-vis the ambitions set at the Master Plan level
- It is paramount to set expectations in terms of deployed performance (what will be the effect if solutions are deployed at ECAC level)
- It therefore justifies and accelerates deployment into operations
- It supports the planning and execution of an R&I programme through an efficient and effective allocation of limited resources

## Other take-aways:

- SESAR directly influences and contributes to the achievement of SES performance objectives
- SES PS/ SESAR: The typology of environment, the nature of activities and perspective of time differ but the objective is the same i.e. ATM performance improvement in Europe!

# PAGAR 2019

## SESAR contribution to ATM Master Plan KPAs



# THANK YOU



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