SESAR Showcase

A Conference & Exhibition of SESAR 1 Results

Amsterdam, 14-16 June 2016

SESAR JOINT UNDERTAKING

EU 2016

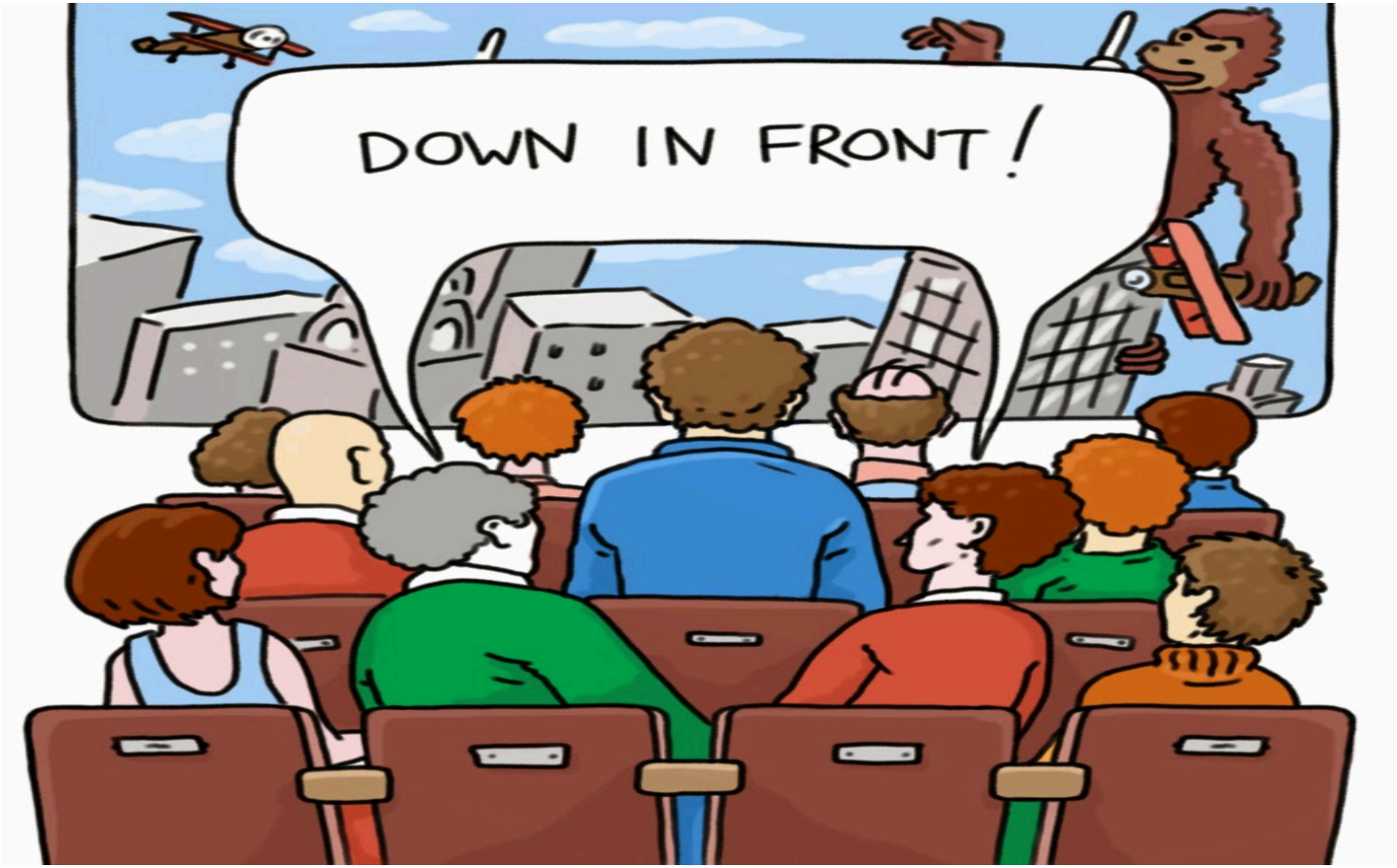
Precision approaches using GBAS Cat II/III

José Manuel Rísquez – ENAIRE

George Papageorgiou – HONEYWELL

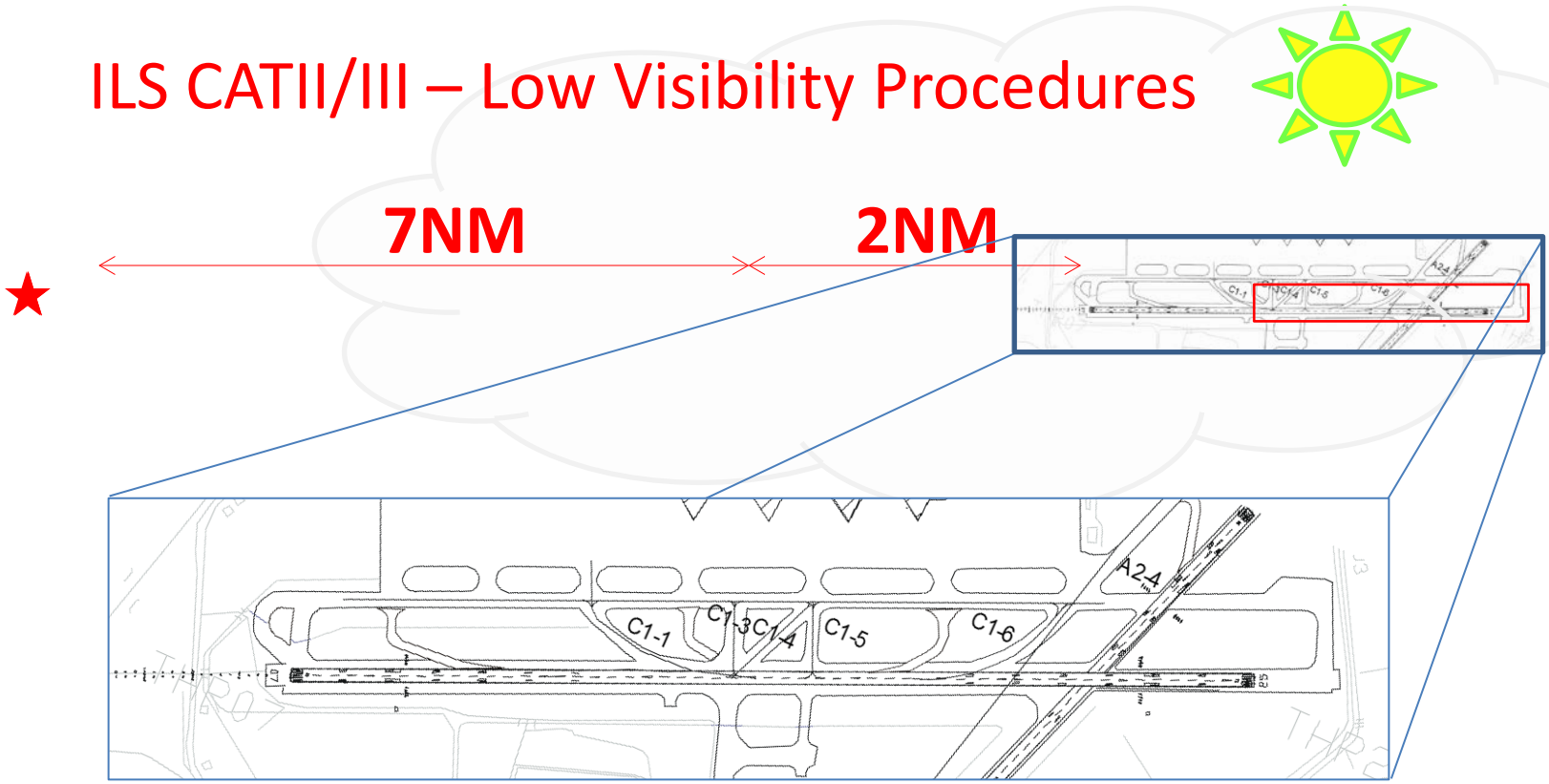
SESAR Showcase
Amsterdam, 14-16 June 2016

Illustrating a problem



Challenge – low visibility conditions

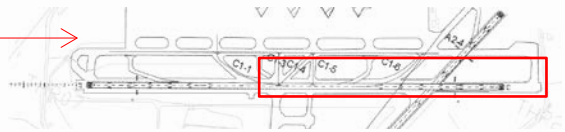
ILS CATII/III – Low Visibility Procedures



Solution - GBAS

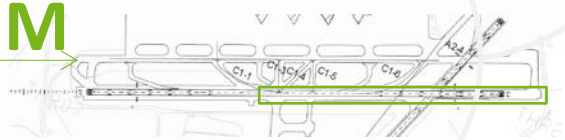
ILS CATII/III – Low Visibility Procedures

7NM **2NM**

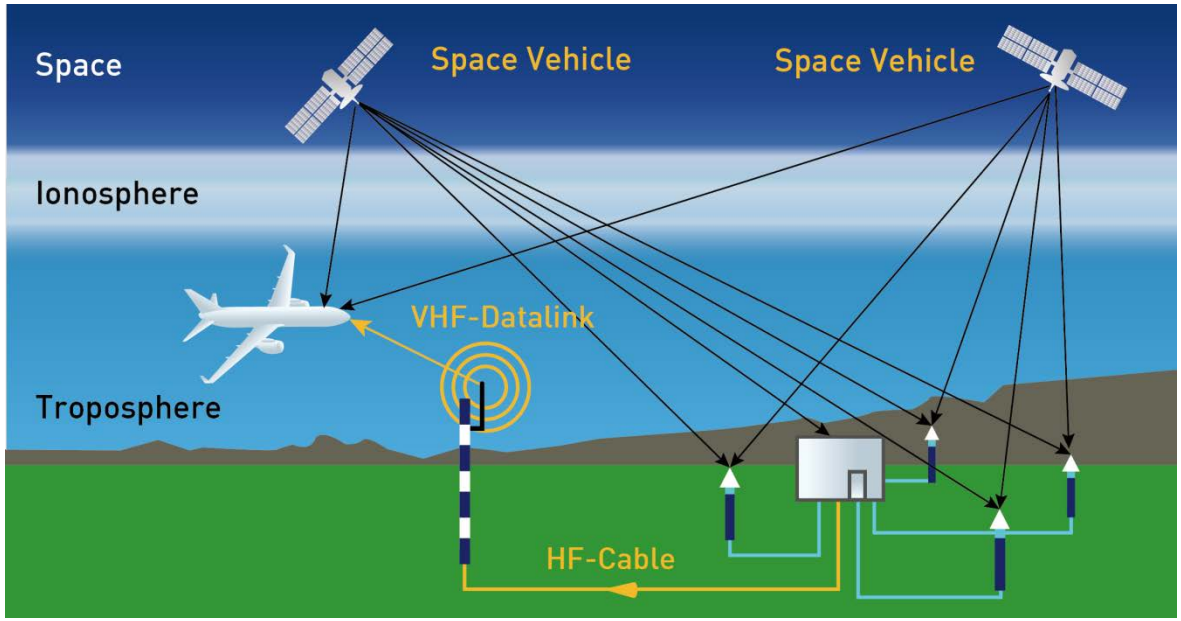


GBAS CATII/III – Low Visibility Procedures

5NM **1NM**



Understanding GBAS



Antenna real position is
40,40° N – 3,60° W

Antenna GPS position is
40,42° N – 3,61° W

GBAS ground system informs you that there is an error of 0,02 ° N and 0,01°W

Your flight GPS position is
40,49° N – 3,67° W

Your more accurate position with GBAS would be 40,47 ° N – 3,66° W

GBAS project partnership

AIRBUS
Air Navigation Services of the Czech Republic
Alenia Aermacchi A Finmeccanica Company
AT-One
DASSAULT AVIATION
DFS Deutsche Flugsicherung
dgac DSNA
DLR
CC99
Elbit Systems
ENAIRE
ENAV
EUROCONTROL
Fraport
Honeywell
indra
Lufthansa
NATMIG
NATS
NETJETS
noracon
SEAC
Selex ES A Finmeccanica Company
skyguide
SWISS
THALES
ZÜRICH AIRPORT

SESAR CAT II/III validation

Ground & System Development

Prototype I

Thales | DSNA (Toulouse)

Prototype II

IndraNavia | DFS (Frankfurt)

Airborne Development & Verification

Mainline aircraft

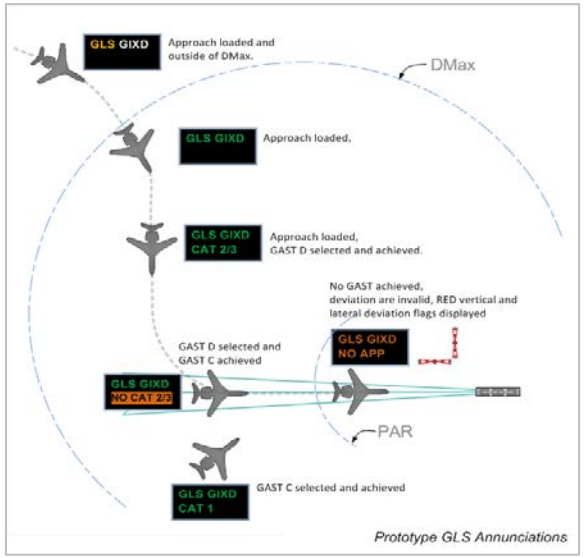
Airbus (Toulouse) | Thales MMR

Business Aircraft

Honeywell (Brno) | Honeywell Avionics Receiver

Interoperability Flights

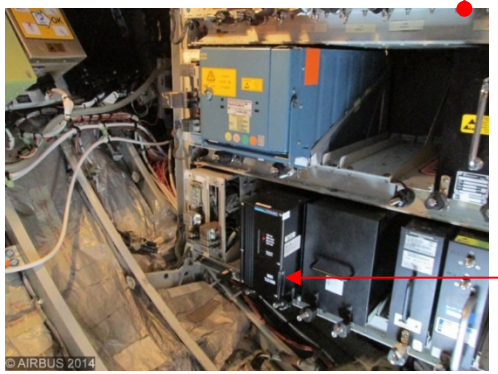
Let’s fly GBAS

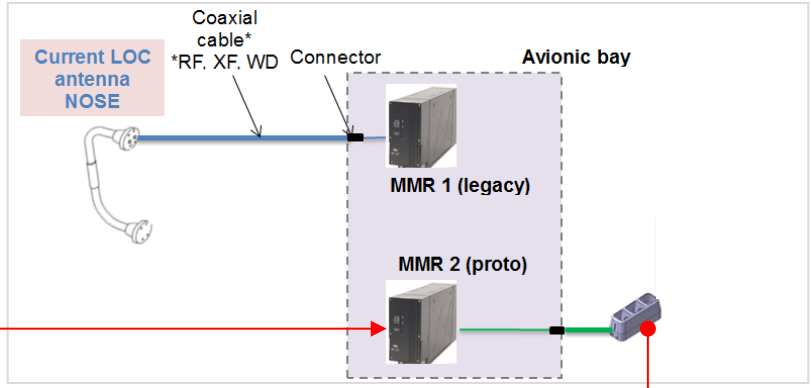



Honeywell flight test aircraft F900 EX

Airbus flight test campaign 2013/2014

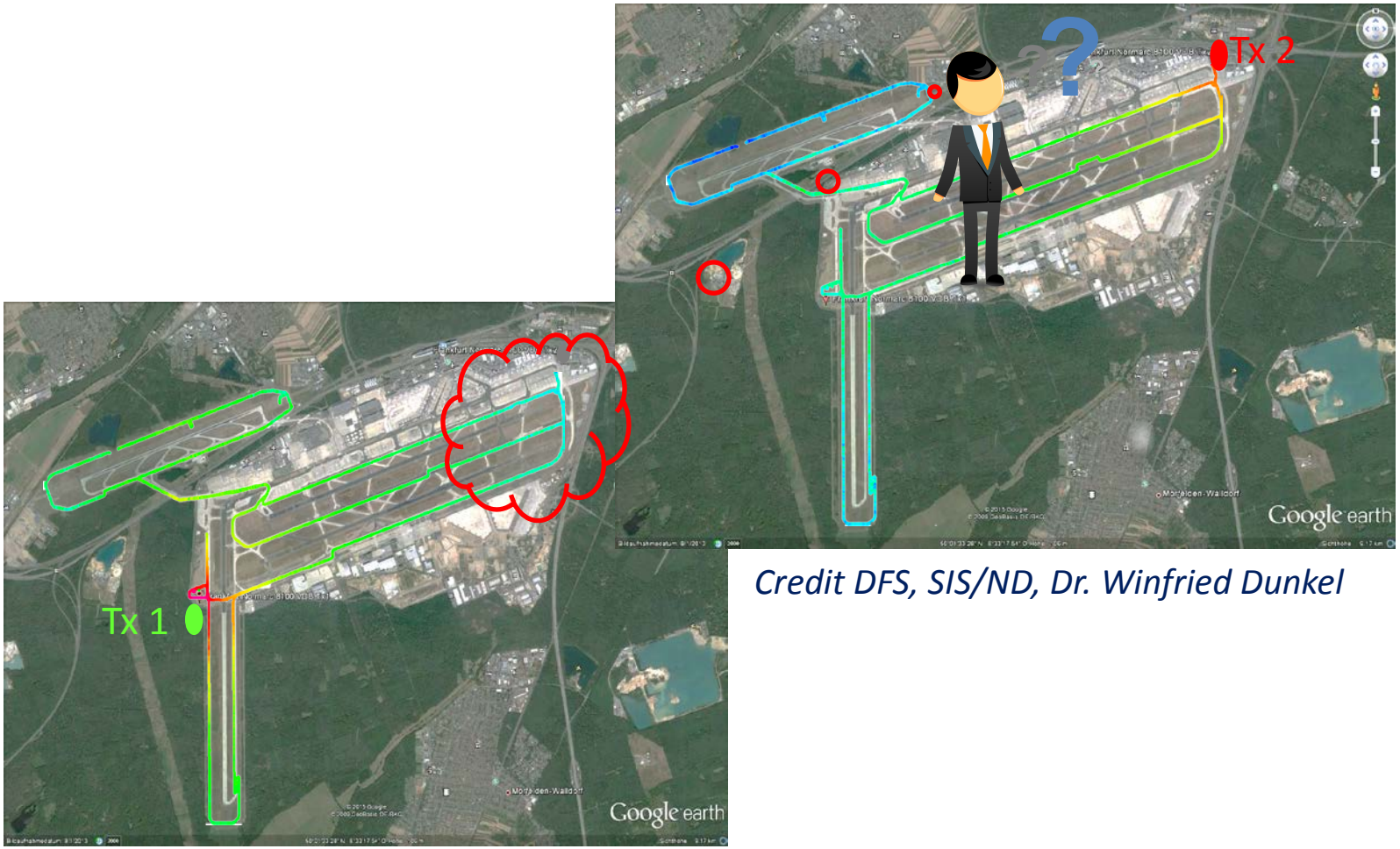
Installation A320 MSN#1 test A/C



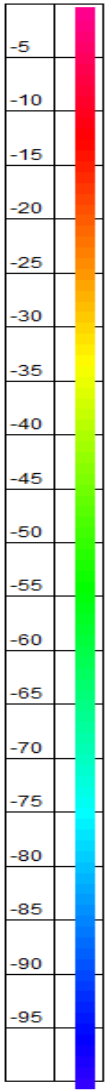


Current VOR antenna TAIL

Unforeseen but under control



Credit DFS, SIS/ND, Dr. Winfried Dunkel

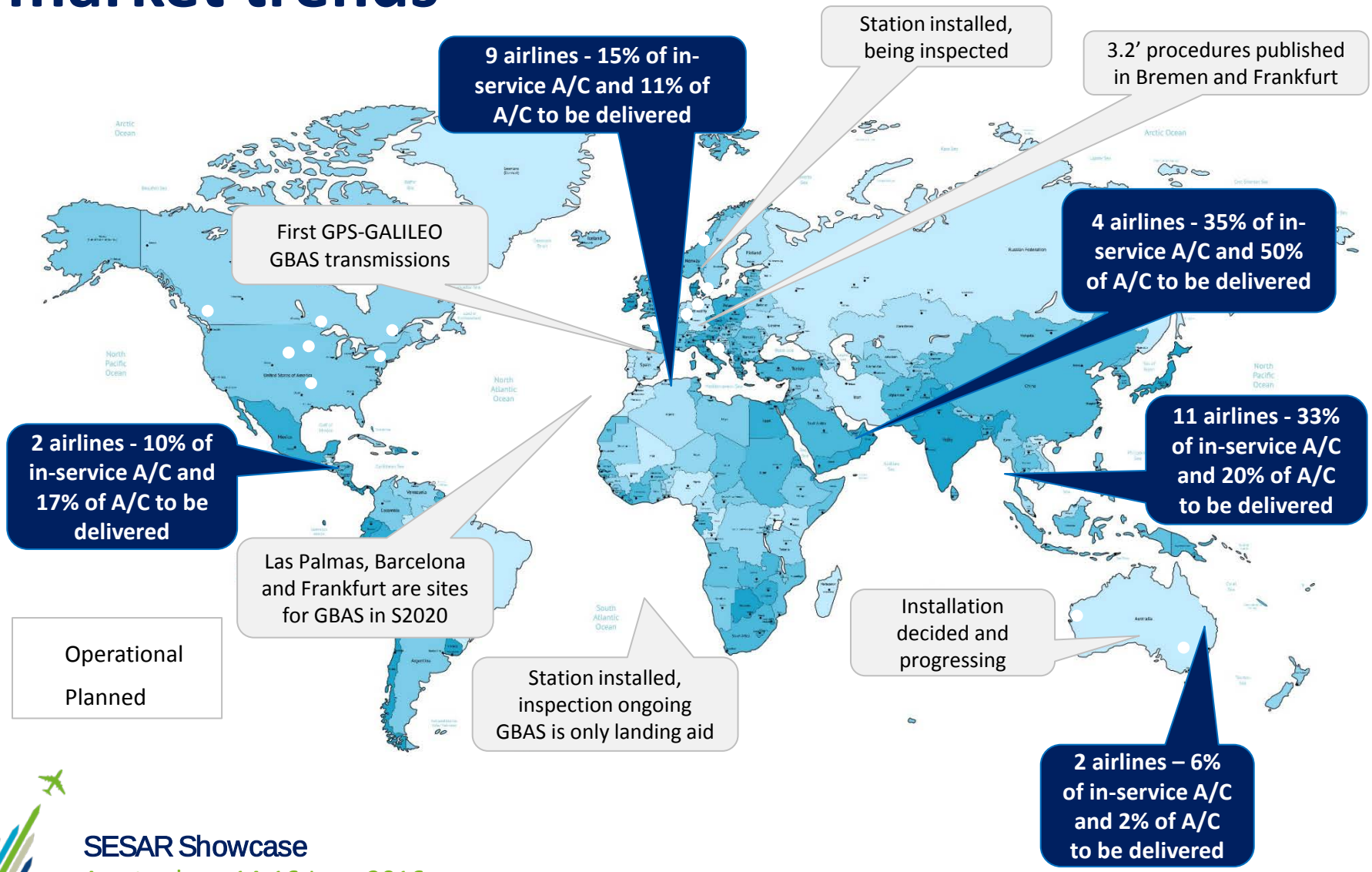


dBm

Benefits


Less diversion to alternative airports
Same safety level
Less Flight Cancellations
Up to 30% of capacity is recovered
+6 ops/h
Less Delay
GBAS CATII/III

GBAS ground implementation & airborne market trends



Next steps

GBAS CAT III using GPS L1

- Regulatory steps in final review
- Industrialisation Phase (v4)
- Deployment phase (v5)

Conclusions

- Resilient Airport Efficiency
- Eliminates ILS critical zones
- Enables flexible approaches
  - reduce noise, shorter routes
- Offer precision approach where ILS cannot due to geography
- Lower maintenance and flight inspection cost

Thank you for your attention

More information:

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Time based separation

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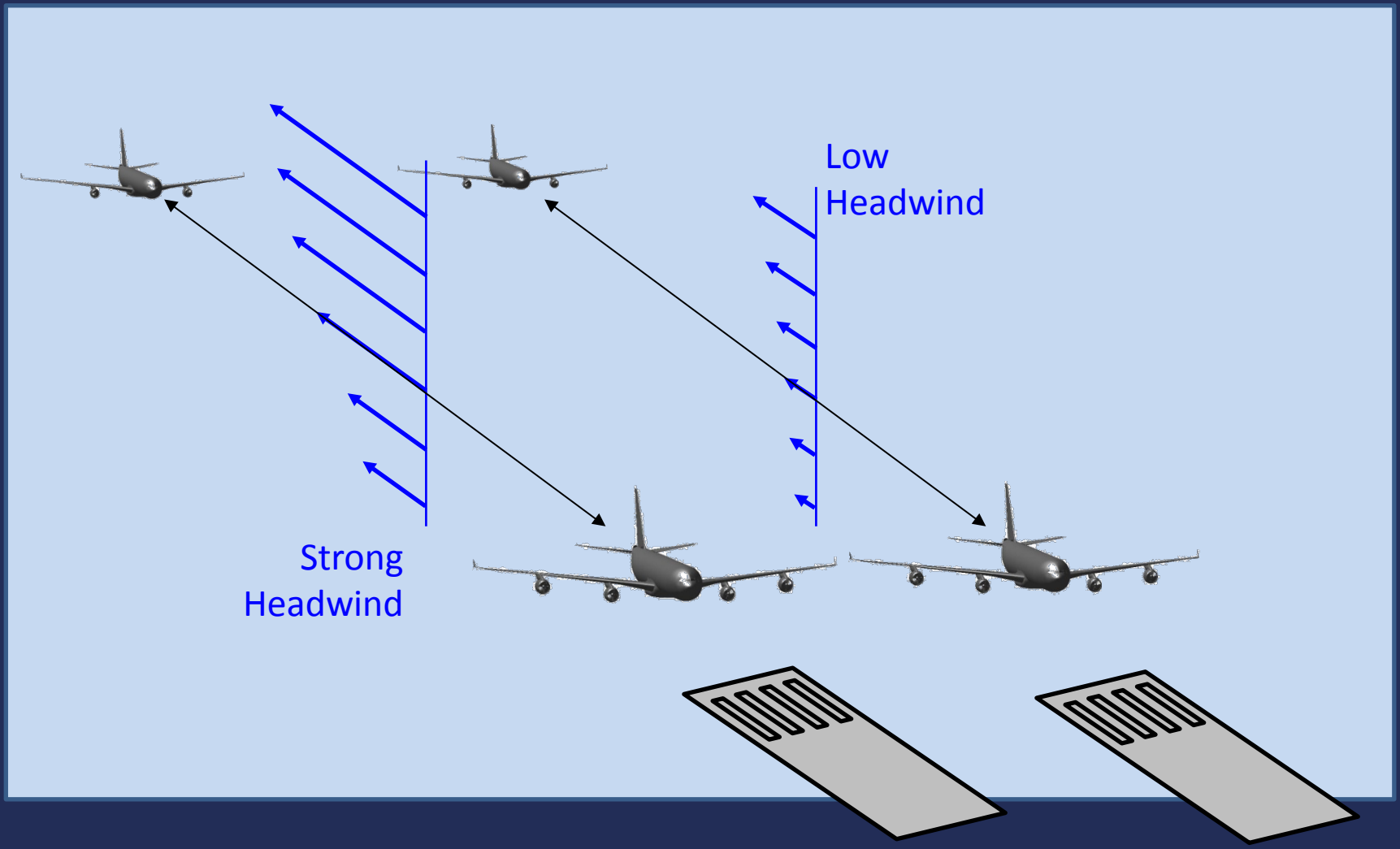
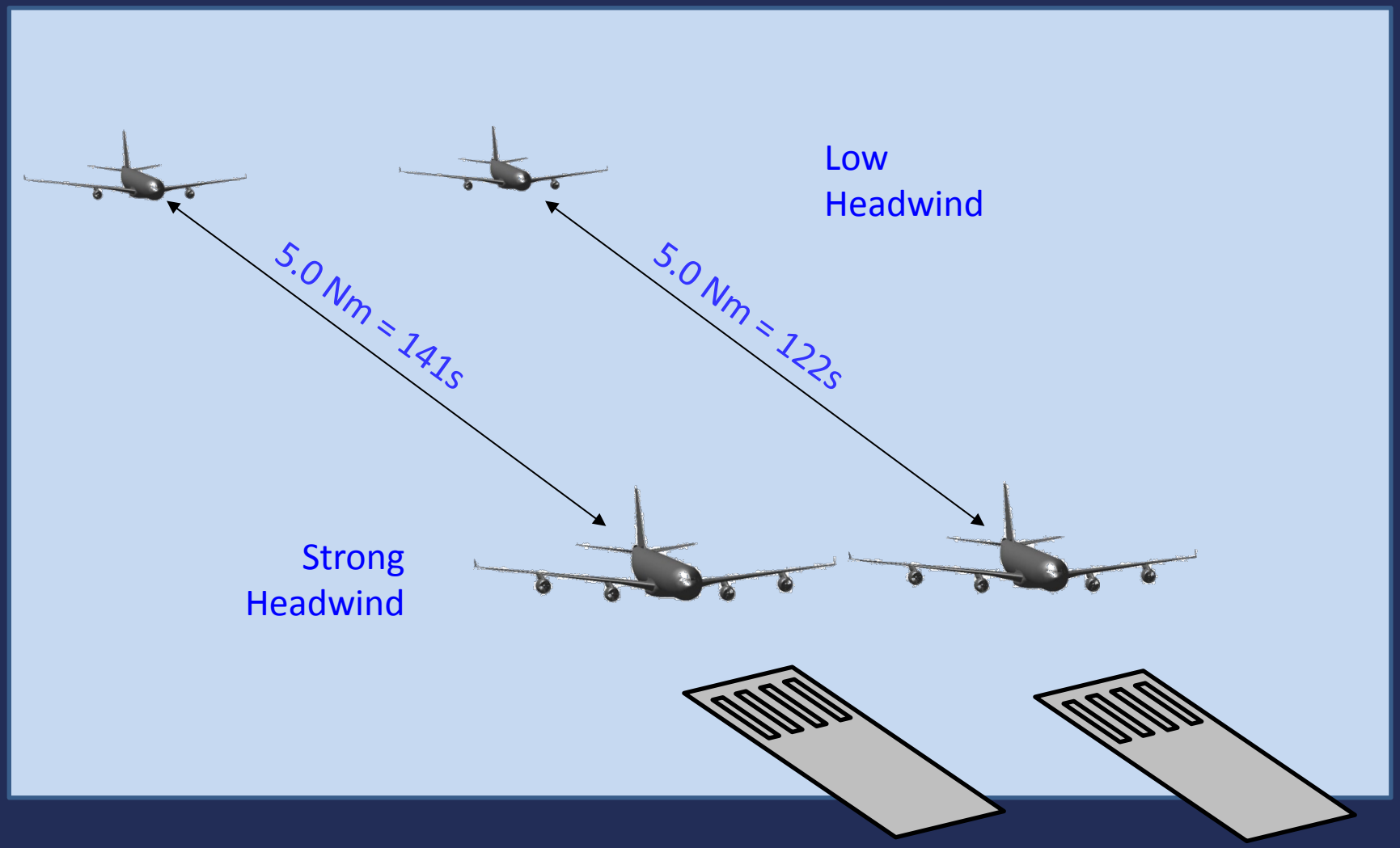
SESAR Showcase
Amsterdam, 14-16 June 2016

Time based separation principle



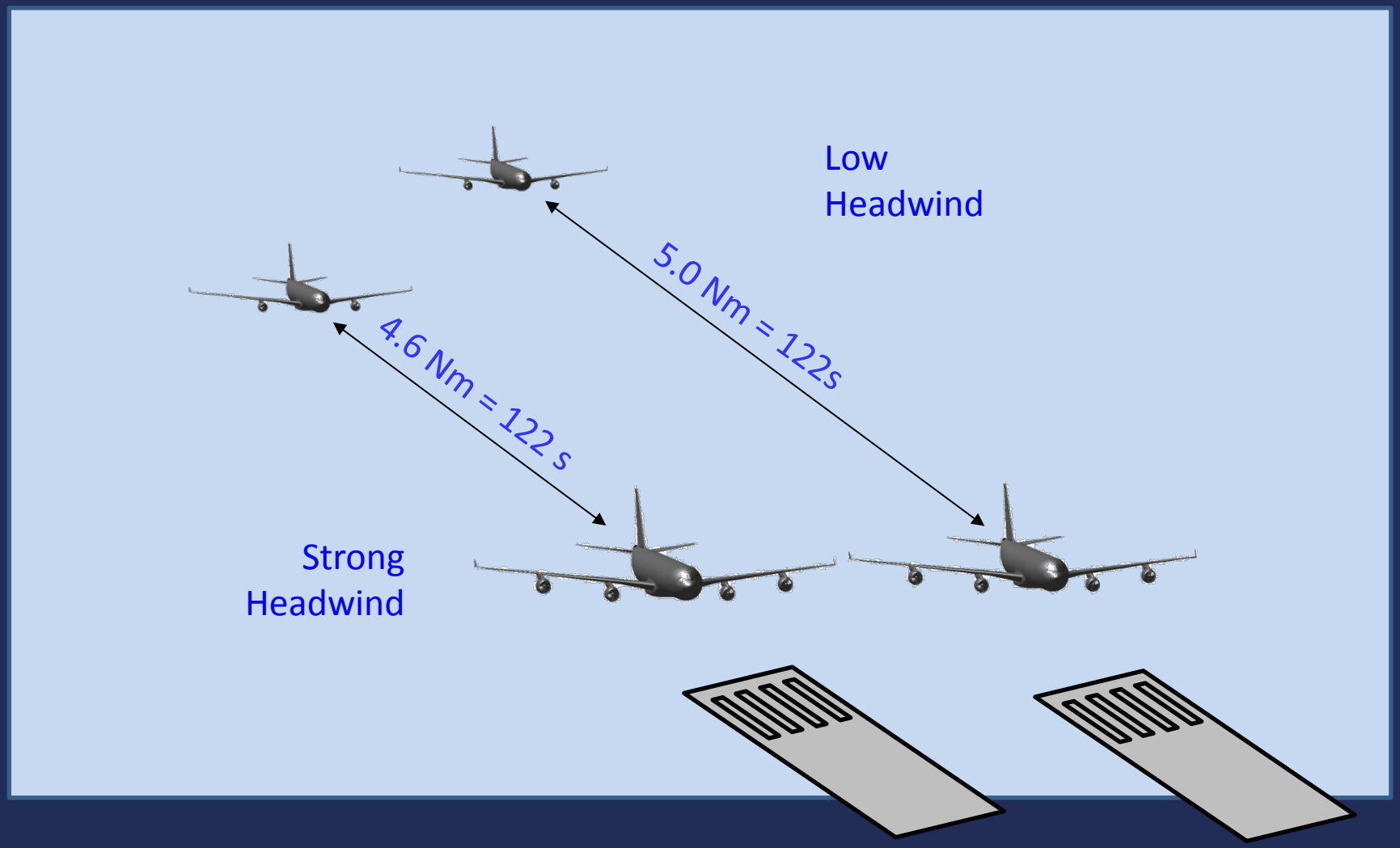
Strong head wind reduces aircraft ground speed…

Time based separation principle



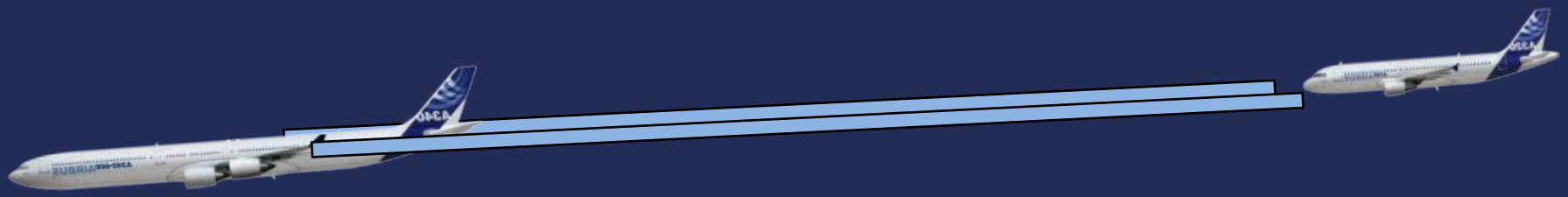
… and increases time to fly distance based separations.

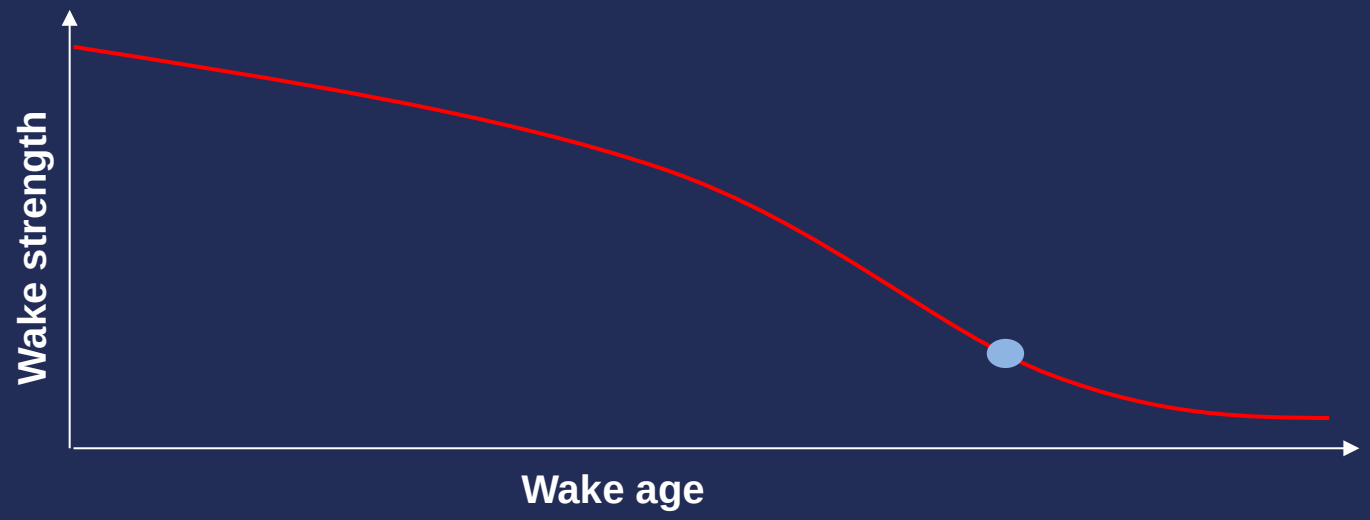
Time based separation principle



Reduced separations support constant time between 2 landings in strong headwind conditions

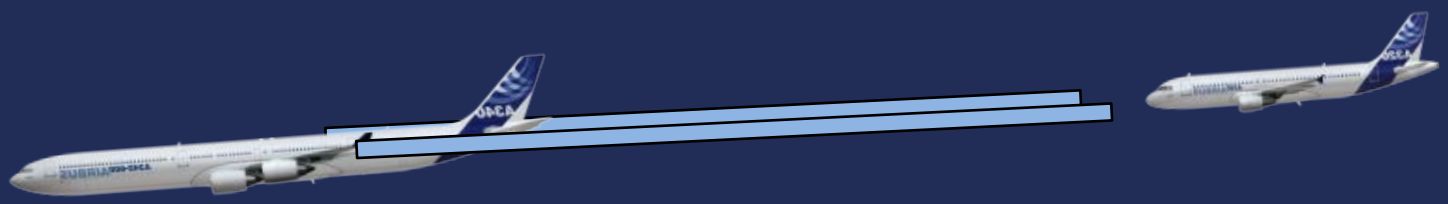
Validation of the separation

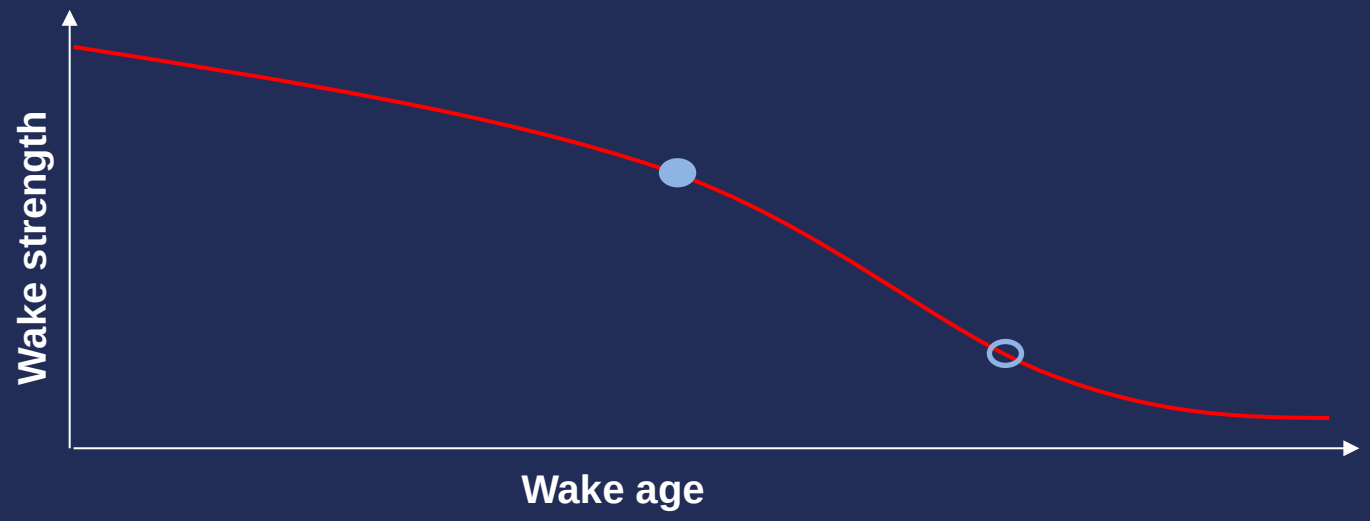




Even if time between touchdowns remains constant…

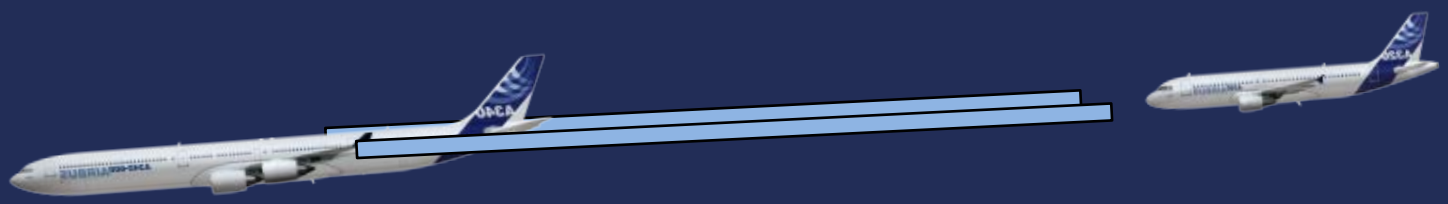
Validation of the separation

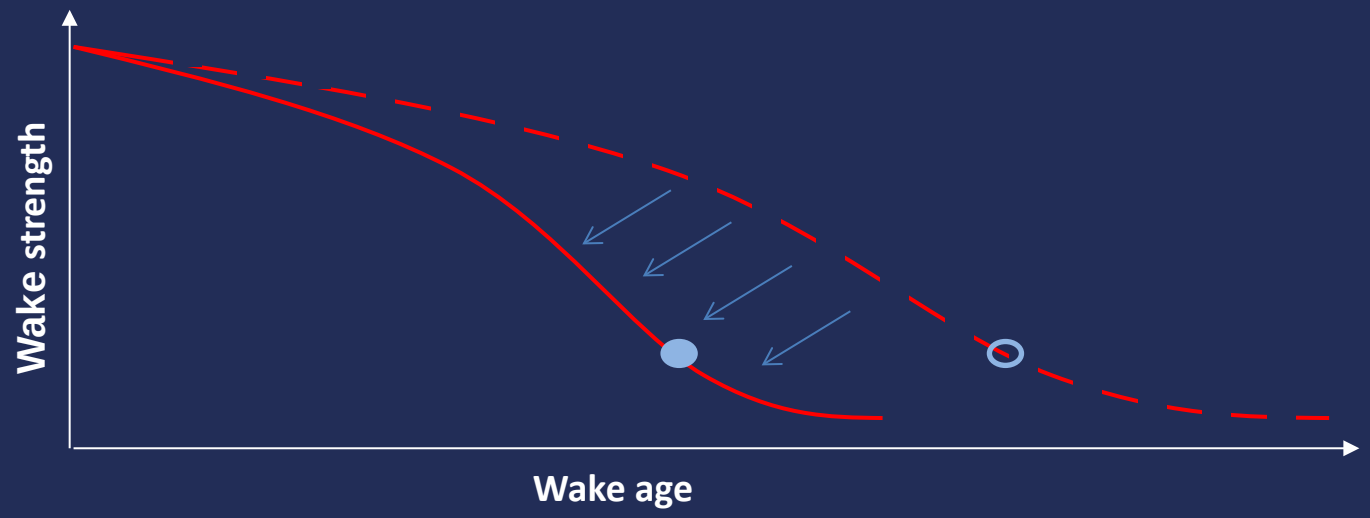




… reduction of separation will reduce the “age” of the wake encountered BUT …

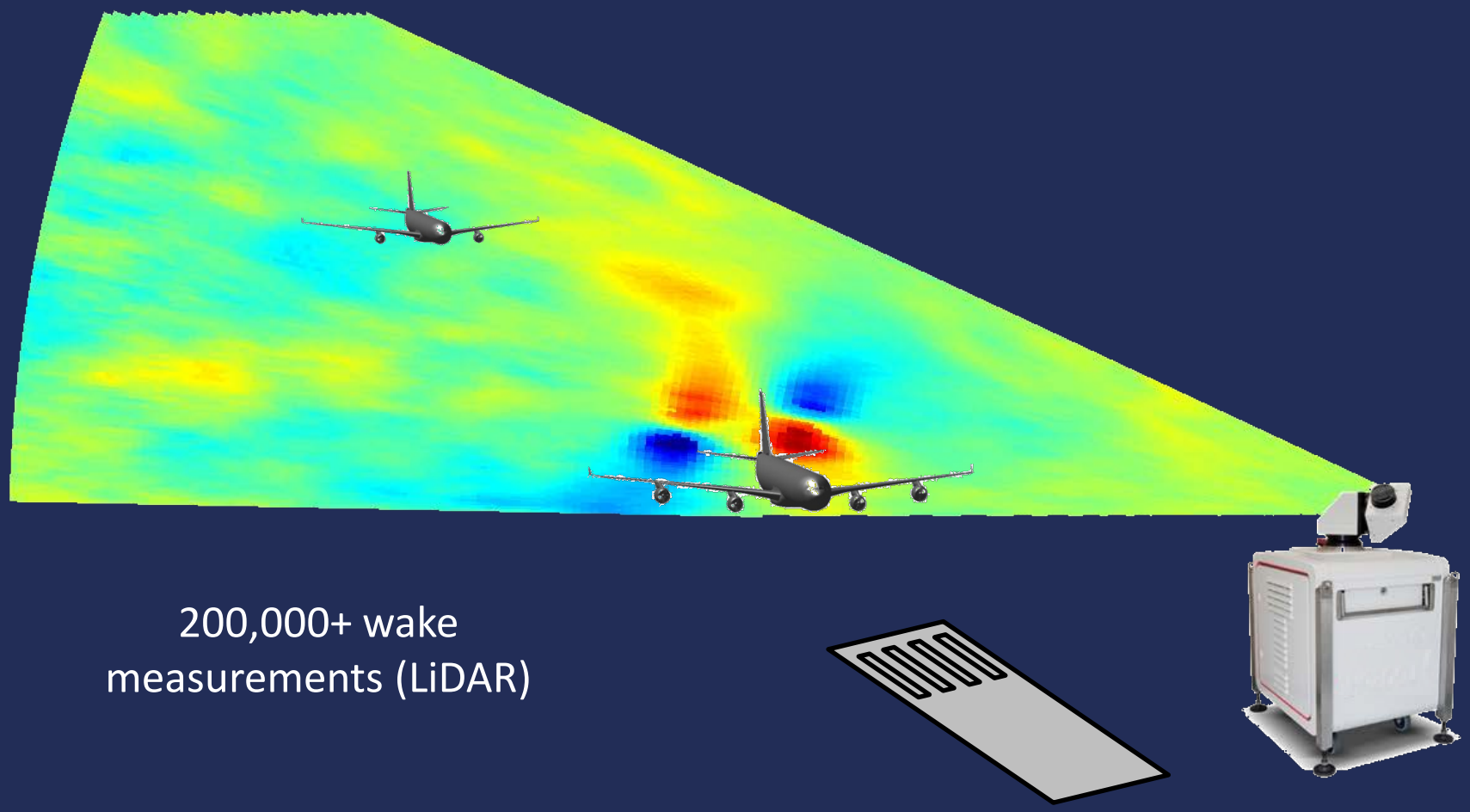
Validation of the separation





… wind effect on wake decay always mitigates that reduction.

Validation of the separation



200,000+ wake measurements (LiDAR)

The separation reductions were validated by extensive LiDAR campaigns in SESAR…

Validation of the separation

Frankfurt

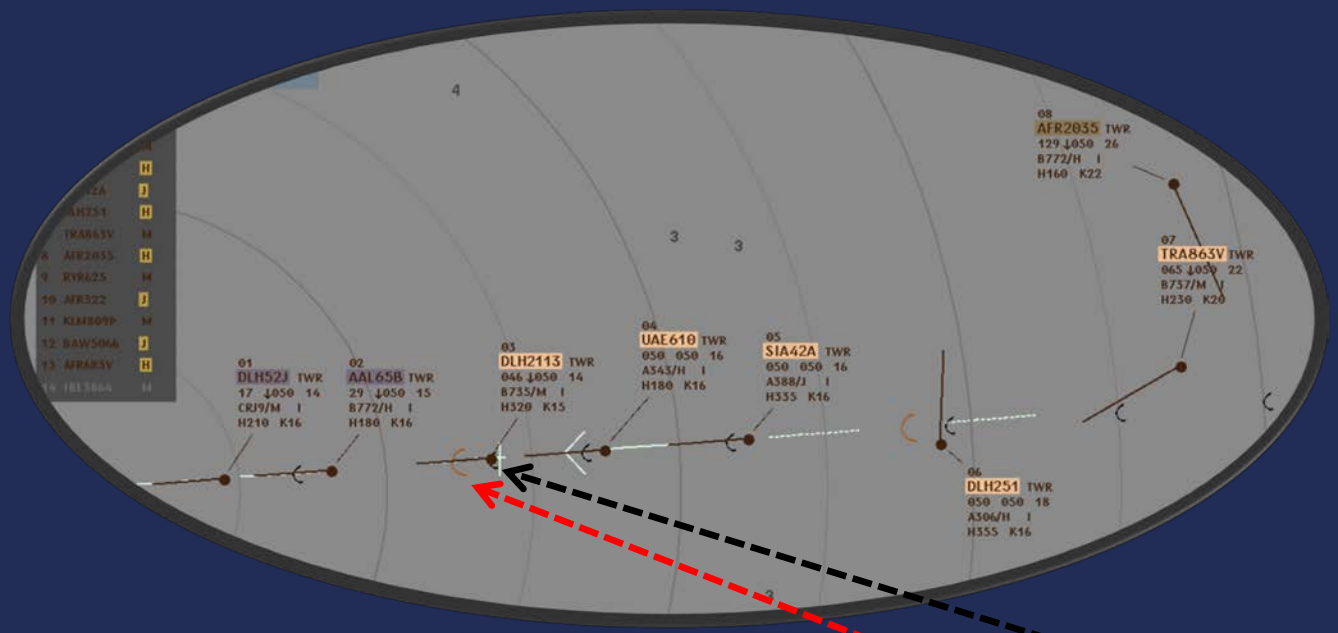
Paris

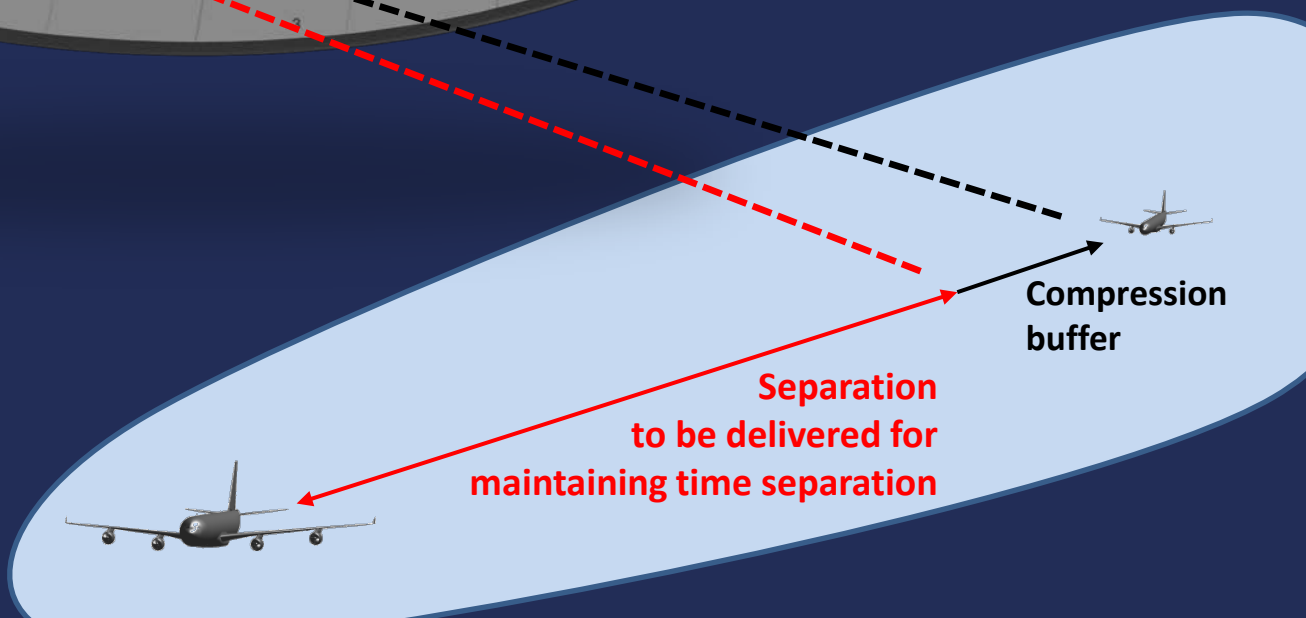
London

Dubai

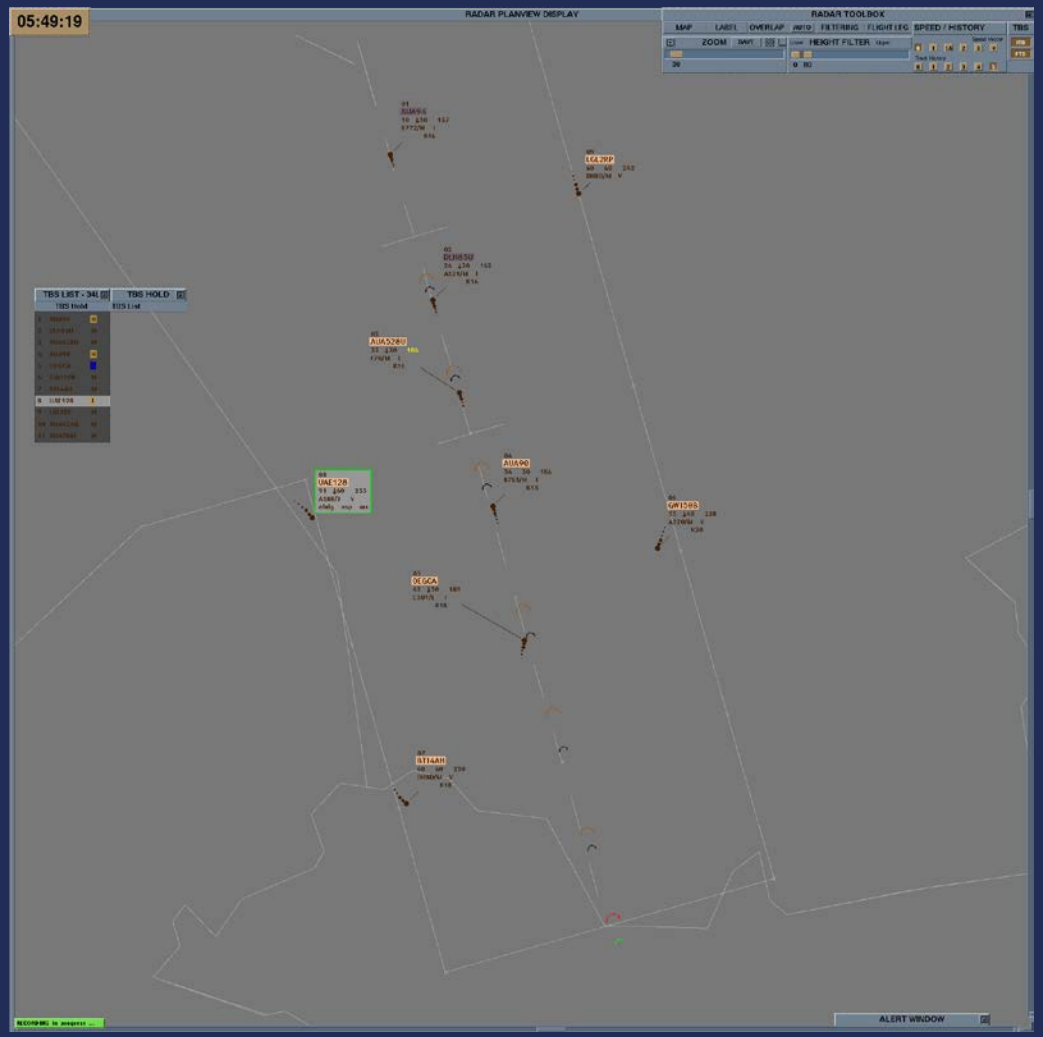
… and wake behaviour was shown to be consistent with other EUROCONTROL databases

Delivery of the separation

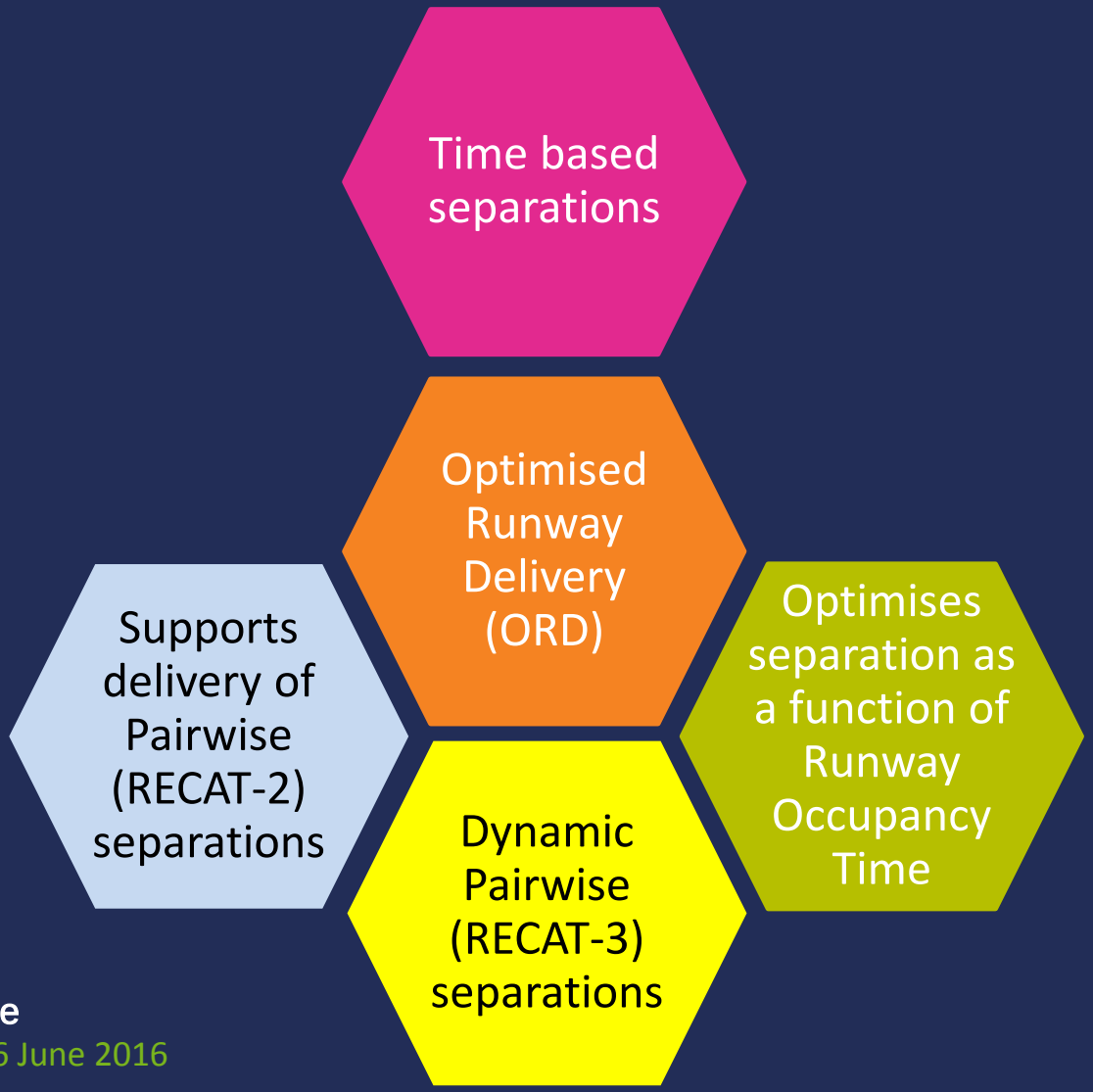




Delivery of the separation

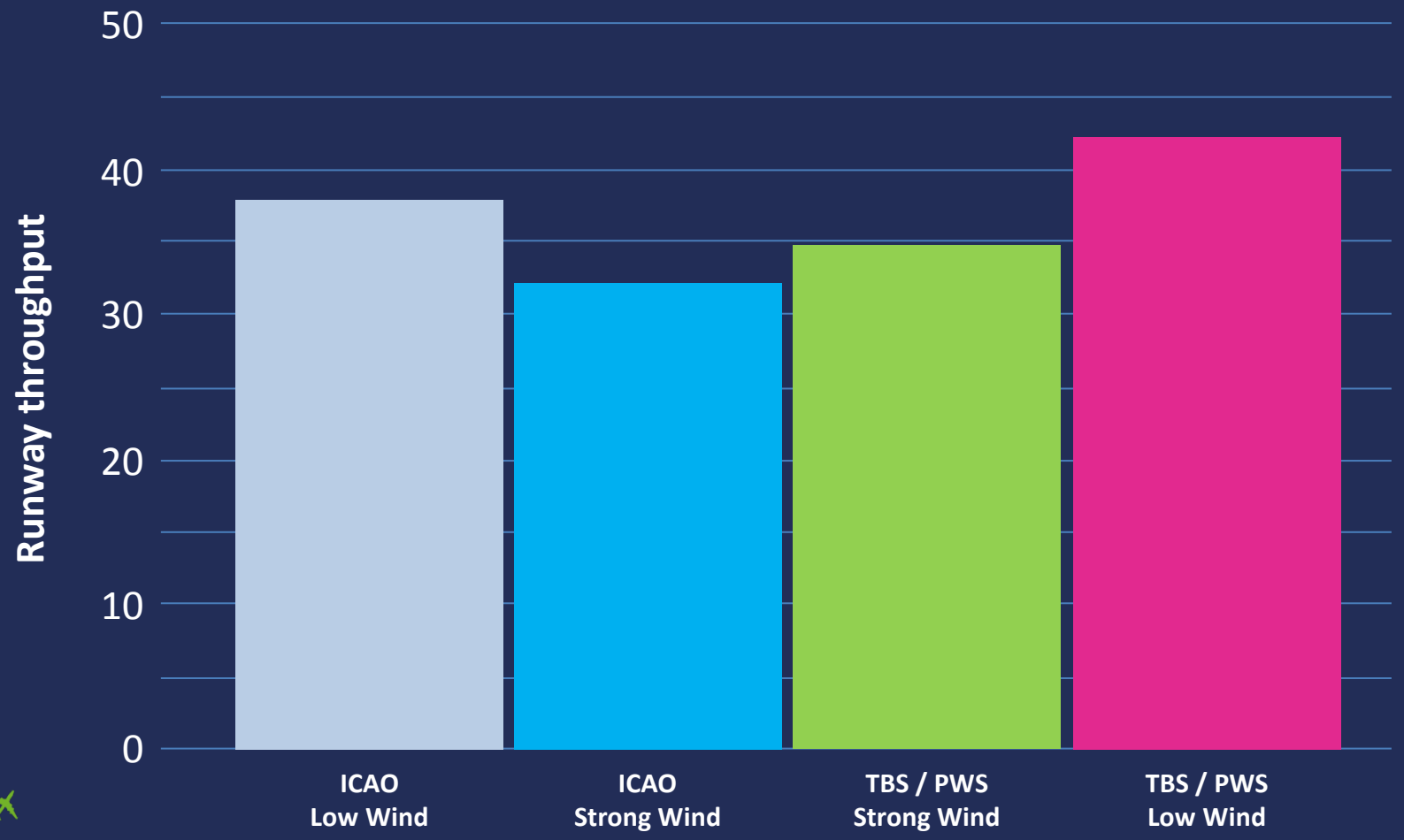


The TBS delivery tool is an enabler for many SESAR concepts

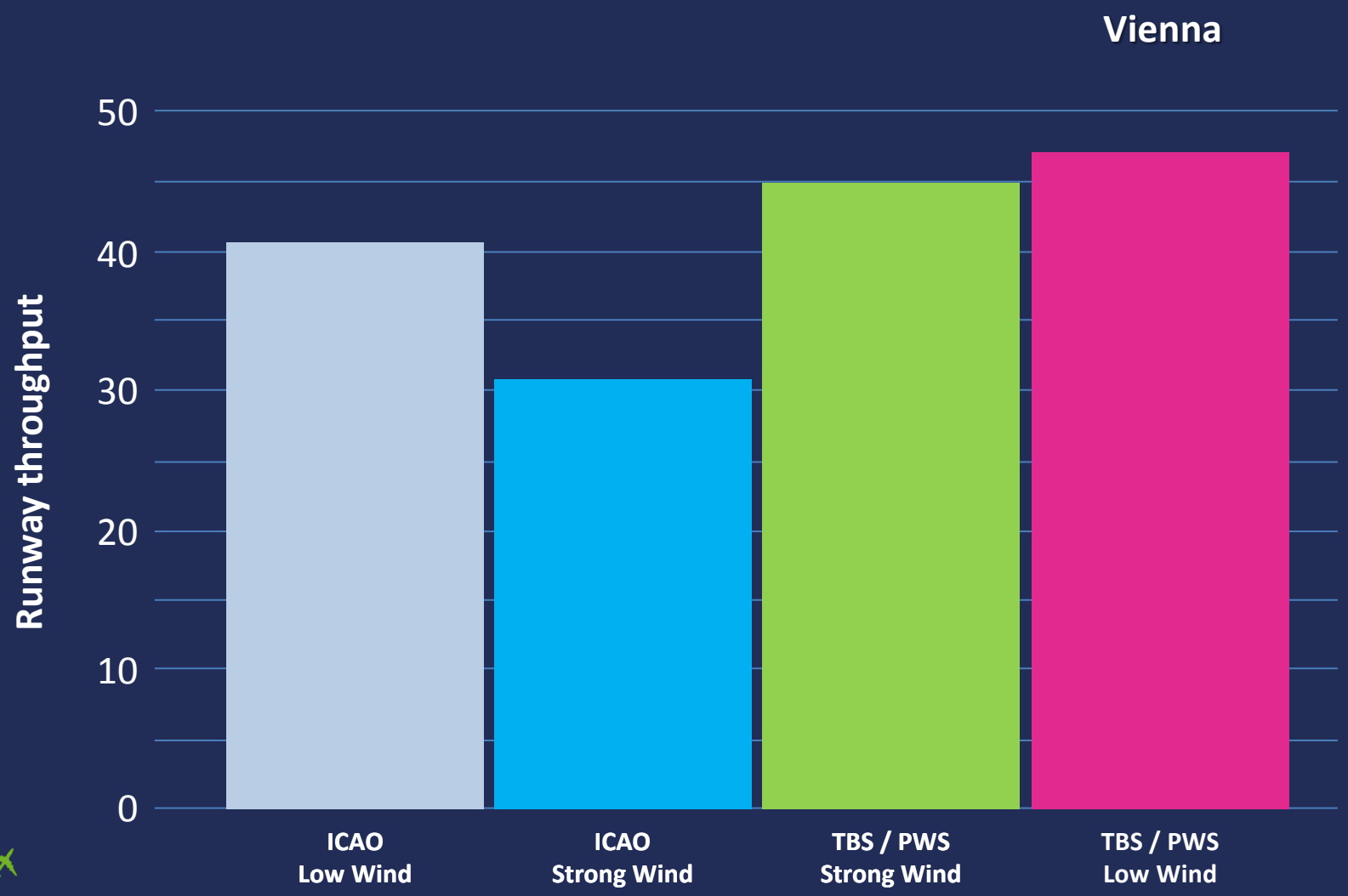


Impact assessment

Paris Charles de Gaulle



Impact assessment



Impact assessment

- At least 50% reduction of strong headwind related delay
- 10% increase in runway throughput during peak hours
- Reduces the number of pairs below separation minima
- Simple HMI ensures no increase in ATCO workload

Regulation

- Regulation supports PCP
- EUROCONTROL TBS Specification was prepared under EC mandate (currently in consultation phase)
- Deployment Guidance in preparation

Deployment

- London Heathrow since spring 2015
- Progressive in Vienna in Deployment manager project
- Deployment Regulation identifies 16 European airports for TBS Deployment.

More information:

TBS

http://www.eurocontrol.int/articles/time-based-separation

RECAT

http://www.eurocontrol.int/articles/recat-eu

http://www.eurocontrol.int/articles/pair-wise-separations-pws-recat-2

Leading Optimized Separation (LORD) Tool

https://www.youtube.com/watch?v=ZUG5ywZvtnw

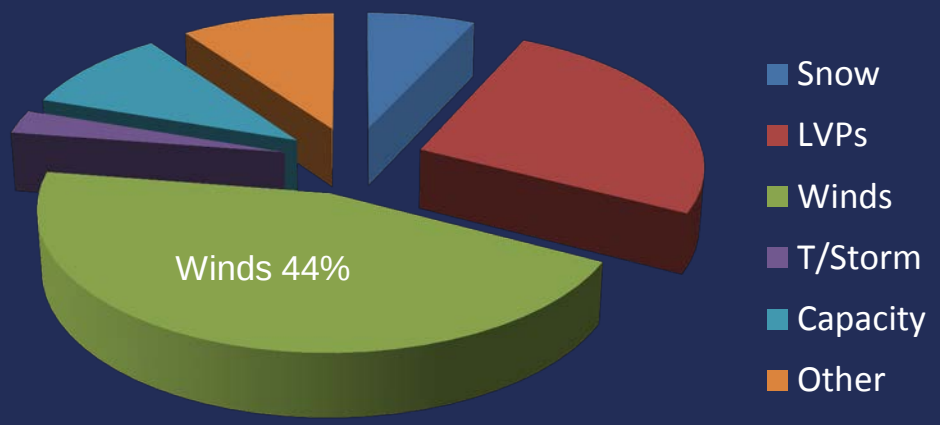
Deploying Time Based Separation in Heathrow

Mark Watson
Head of Research and Development
NATS

SESAR Showcase
Amsterdam, 14-16 June 2016

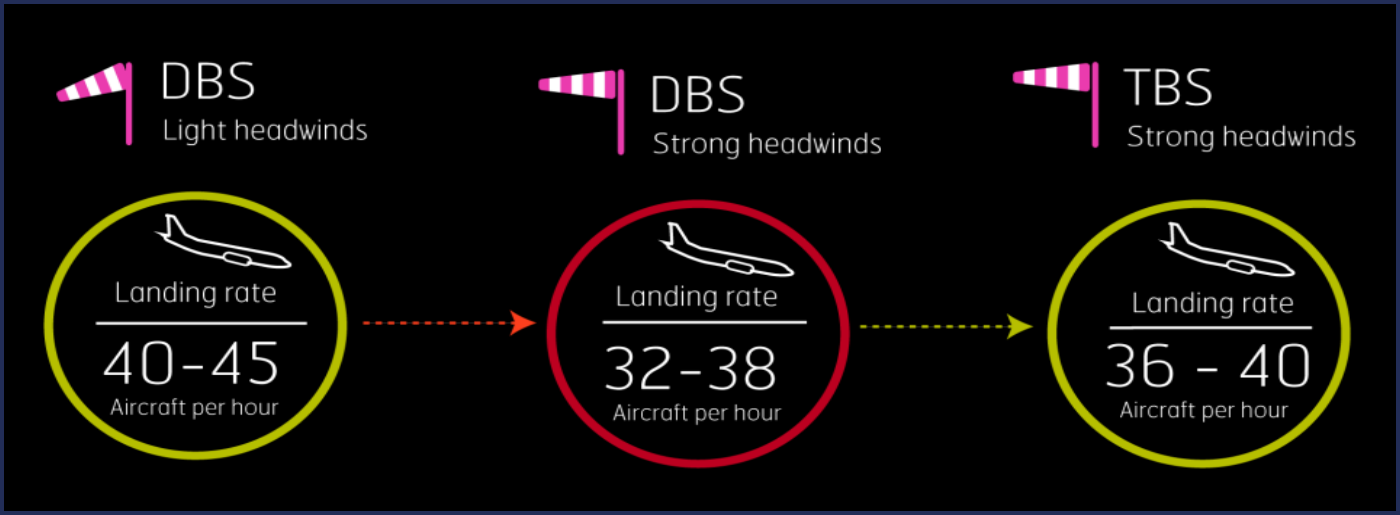
The problem

- Heathrow Arrival Delay (ATFM)
- Strong headwinds on final approach were the biggest single cause of delay at Heathrow
- Wind related ATFM delay of 160,000 – 180,000 minutes per annum
- Wind causes significant delays on 55-65 days per annum



The solution - TBS

- Assured operations – improved resilience and safety
- High performance ATC – consistent delivery of approach spacing
- Maximising runway throughput



SESAR TBS

- Concept Development to V3
- Measured wake vortex behaviour with ECTL Lidar at Heathrow
- Safety, human performance & benefits assessments
- Prototype air traffic control tools
- Approach and tower real-time simulations
- SESAR solution in 2013

SESAR to Deployment

Developed from SESAR

- TBS tool jointly developed for deployment by NATS and Lockheed Martin
- Adopted successful “AGILE” approach to project
- The project was accelerated by 2 years in response to customer demand

Engagement

- Early and consistent engagement of regulator
- Early and consistent stakeholder engagement – airport & airlines
- Video materials & crew briefings to engage with customers and airspace users
- Strong support from airline & airport customers

Operational Service

- Limited Operational Service started 24th March 2015
- Full operational service at London Heathrow from 1st May 2015

Demonstrated results

25,000 minutes saved by TBS in November 2015

Reduced cancellations

2.9 additional movements per hour in strong winds

62% Reduction in ATFM delay

No increase in go-arounds

No increase in wake turbulence encounters

Improved consistency of final approach spacing

1.2 extra movements per hour

20 extra landings per day

Beyond TBS implementation

"TBS at Heathrow is the start of a journey"

Pairwise (RECAT) separations

Optimised Runway Delivery (ORD)

Capacity gains

Thank you
for your attention

More information:

TBS http://www.nats.aero/tbs/

Future http://www.nats.aero/discover/intelligent-approach/