

Supporting
European
Aviation



Driving airport capacity, predictability and efficiency

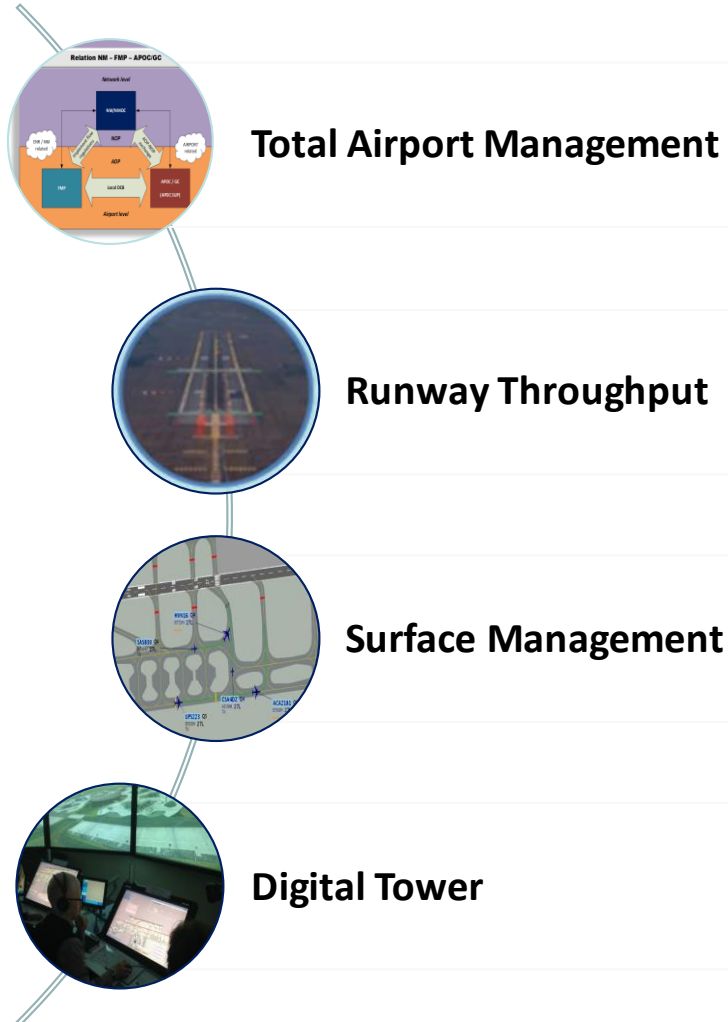
Alan MARSDEN
Total Airport Manager
7 November 2019



NETWORK
MANAGER



Airport Contribution



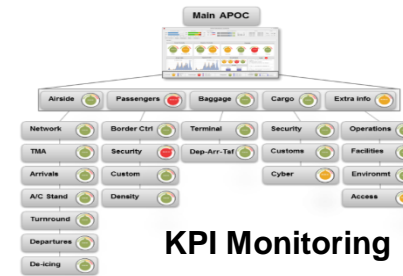
Total Airport Management - Airport Operation Centres
Regional Airport Network Integration
Modelling Data and Machine Learning

RECAT EU, RECAT Pairwise and ROCAT
Optimised Runway Delivery (Time Based Separation)
Enhanced Approach Procedures

A-SMGCS – Planning, Routing, Guidance
Follow The Greens
Safety Nets

Electronic Stripping
Low Visibility Capability and Augmented Reality
Data Driven Predictability

Total Airport Management (TAM)



- **Airport Operation Centre - APOC**

- Dashboard and DCB for air and landside
- What-if modelling in degraded situations
- Data Modelling and Machine learning

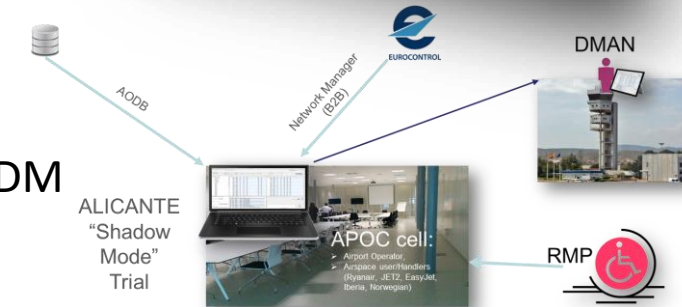
Paris Charles de Gaulle (dashboard)
 Paris Orly (gate and boarding LT)
 London Heathrow (Distributed process)
 Madrid Barajas (degraded situations)



- **Regional Airport Network Integration**

- Simplified & automated milestones
- Support processes (pre-departure ...)

Toulouse (Simplified APOC)
 Alicante and Gothenburg (RNI A-CDM automation LT)



- **Modelling, Data and Machine Learning**

- Predictive Analytics

Bordeaux (Parking and security flows)
 Heathrow (Passenger transfer, deployed)
 Heathrow (Scheduling)
 Orly (Gate Management)



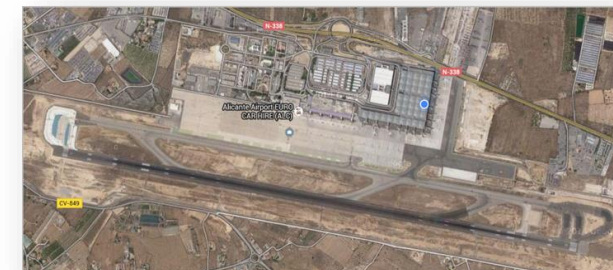
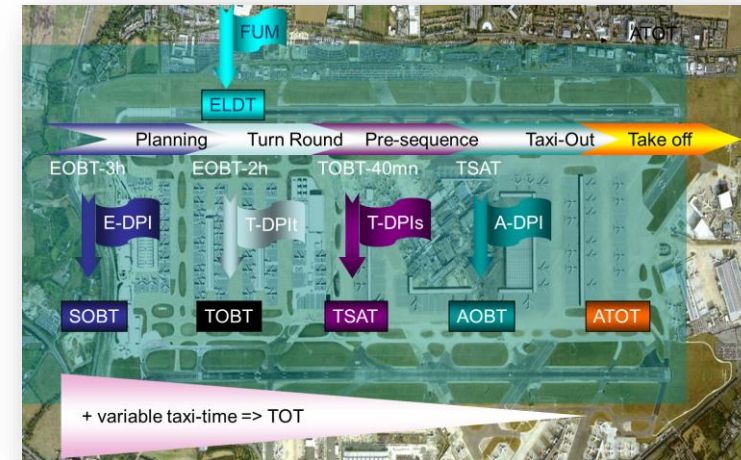
Total Airport Management - Opportunity

- **Airport Operation Centre - APOC**

- Orly and Madrid: machine learning (landside processes and degraded situations).
- Benefits for AUs - improved resilience and involvement in CDM process

- **Regional Airport Integration**

- Low cost CDM solution. Tested in ALC, GOT
- Airline, Handler, ATC, Airport
- Based on automated timestamp calculation with Handler input as an exception
- Predictability (off-block and take-off) within accuracy requirements for full CDM



Total Airport Management: Next Up - Deployment

- **Major Airports Integrated in the Network**

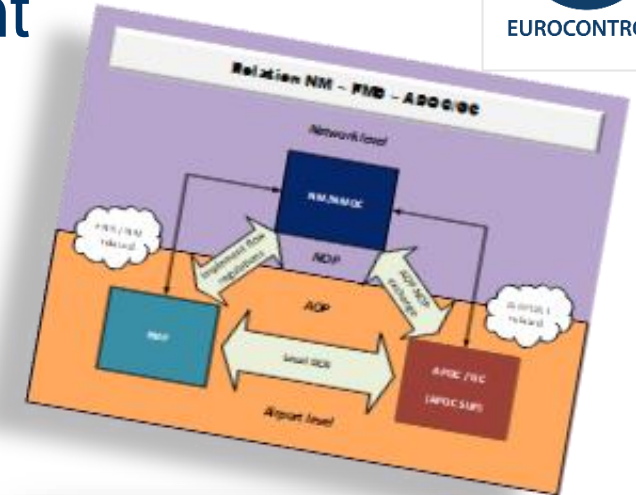
- Target Time of Arrival
- AOP – NOP Integrated
- Airport and Network Iterative Demand and Capacity Balancing

- **Regional Airport Integrated**

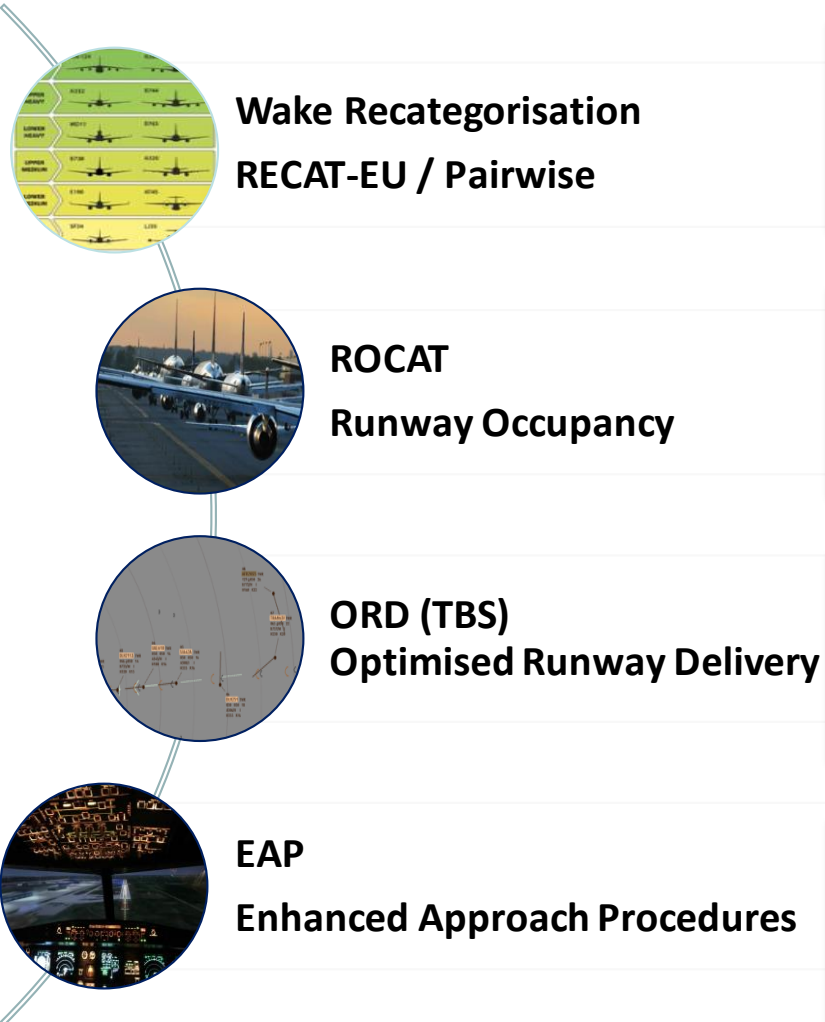
- Simplified & automated milestones
- Service Applications e.g. DCB

- **Airline Priorities Communicated**

- Landside processes - Connecting passengers/flights
- Rotation / Arrival changes - Cancellations
- Business Priorities



Runway Throughput Package



RECAT EU: 6 wake categories
Split Heavy and Medium in 2
With Super and Light

Pairwise: Matrix 100 X 100
Each pair has a defined
separation minima.

Runway Occupancy comprises:
Runway occupancy time, wake
vortex and minimum radar

Requires ATC, Airline and
Airport to work together to
reduce occupancy time

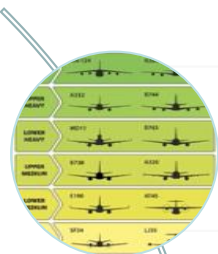
Distance / Time separation
Takes account of compression
and Runway Occupancy

Controller support tool -
Target separation minima and
safety warning on “catch-up

Includes Second Runway
Aiming Point and second
steeper glide slope e.g. 3.5°

Avoids wake if Heavy are on
lower slope.
Reduced noise contour

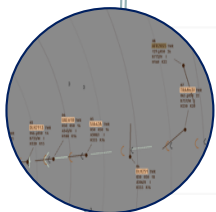
Runway Throughput Package



Wake Recategorisation
RECAT-EU / Pairwise



ROCAT
Runway Occupancy



ORD (TBS)
Optimised Runway Delivery



EAP
Enhanced Approach Procedures

Deployed: Paris, London, Leipzig, Toulouse, Vienna

Pairwise FASA agreed 2019

CDG throughput + 10%, missed approach reduced 10%, TMA holding time reduced 10%

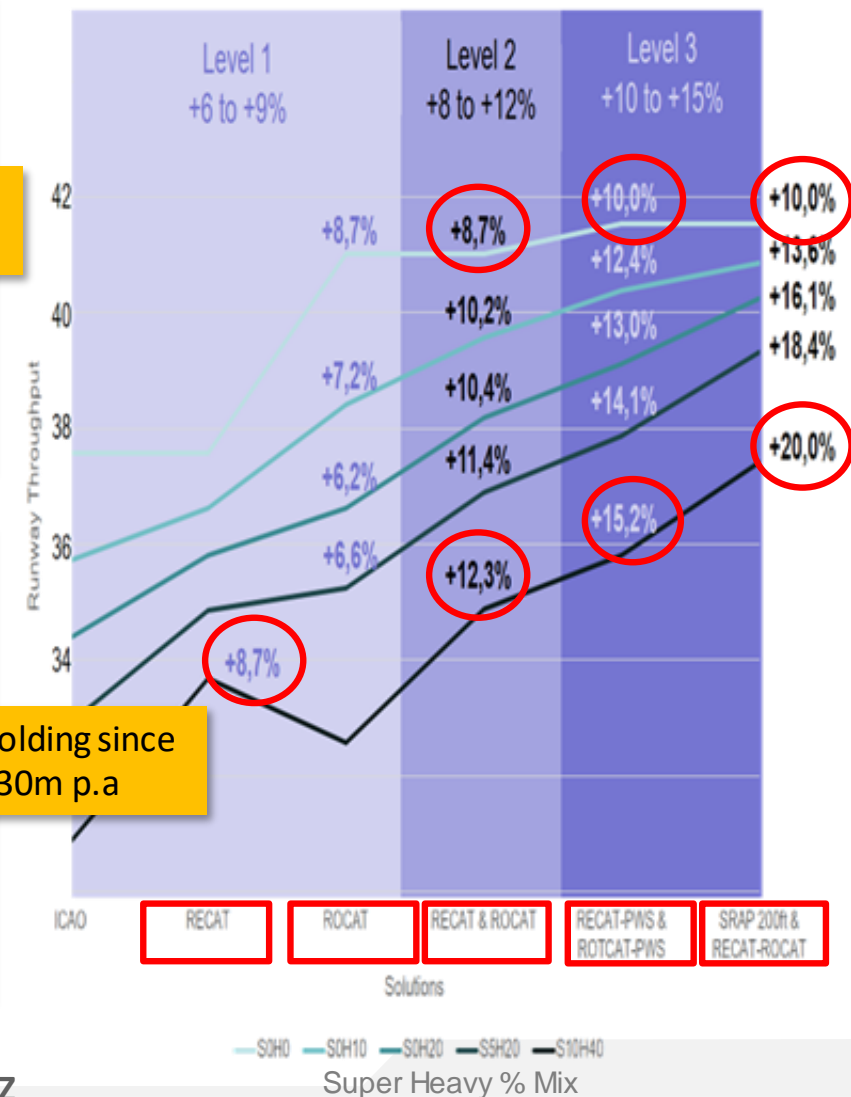
In deployment trials: Vienna, Barcelona, Zurich
London with TBS

Deployed: London with RECAT
SESAR 15 deployment airports
VIE CDG CPH ZRH AMS

115,000 minutes/p.a. reduction in LHR ave airborne holding since TBS went live. Overall savings inc. holding & delay c. €30m p.a

Ready 2023.

Trials planned 2021 (TLS, MXP)





DIGITAL TOWER



Old Tower



New Tower

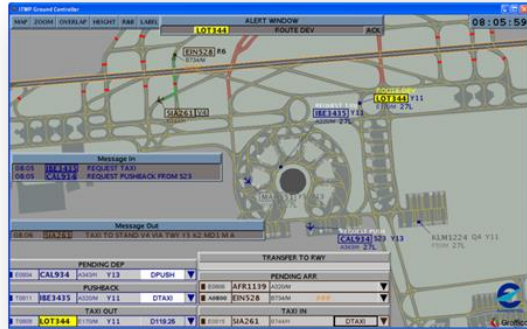


ROUTE DEVIATION	ROUTE DEVIATION
NO PUSH / NO TAXI	NO TAKE OFF
STATIONARY	NO LANDING
NO CONTACT	STATIONARY IN RPA
NO TRANSFER	RED STOP BAR CROSSED
RUNWAY/TAXIWAY TYPE	WRONG RUNWAY
RUNWAYCLOSED	RUNWAY INCURSION
TAXIWAY CLOSED	RESTRICTED AREA INCURSION
HIGH SPEED	RUNWAY CLOSED
	TAXIWAY CLOSED

Conformance Monitoring Conflicting ATC Clearance Runway Status Lights (Paris)

Predictive analytics:
Runway clear,
Leader follower separation
Augmented reality for LVP

Surface Management, Safety Nets and Digital Tower



Knowledge Transfer - EUROCONTROL SESAR Specification (SDM)
Gatwick, Amsterdam, CDG, Orly, Oslo, Istanbul, Budapest, Prague



Deployment Support (Prototype and Requirement Capture)
Heathrow – A-SMGCS, Lighting, Controller Working Position
Vienna – A-SMGCS, Controller working position



Data Predictive Analytics:
Vienna – Runway Exit
Orly – Runway Occupancy



Thank You

