Airport performance monitoring & improvements in case of disruptive events

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META-CDM Workshop

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Meta CDM
Multimodal, Efficient Transportation in Airports and Collaborative Decision Making

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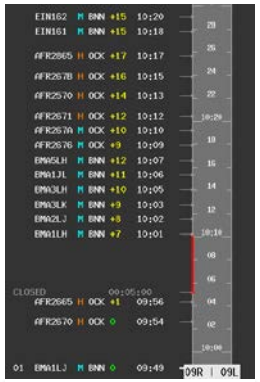
COOPERATION

Introduction Barco Orthogon

- Orthogon GmbH founded 1989 in Bremen, ~ 75 employees
- since 2002 100% subsidiary of Barco N.V
- specialized in software for ATC, Airlines and Airports
- Queue Management Tools (Arrival, Departure and Flow Management) with worldwide references, including:

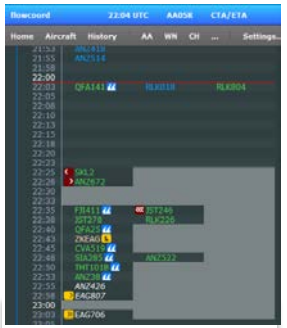

NATS (London)


Skyguide Zurich


EUROCONTROL

Avinor (Oslo)


Hong Kong CAD


Airways New Zealand


Gatwick Airport


DHMI (Istanbul)

CAA Qatar


CAA Singapore

META-CDM Context for Barco Orthogon

	*Innovations **in operation***	*Innovative **trails***	*Innovative **concepts***
Queue Management	AMAN supports ***Point Merge System***	Cross center/border arrival management (***TOPFLIGHT*** trails)	Autonomous arrival management (***UTOPIA*** project)
SWIM & User Interfaces	AMAN/DMAN HMI based on ***ODS Open Platform*** (Java)	AMAN xml output & SWIM AMAN HMI (***SWIM Master Class***)	
Airline & Airport Interfaces	***Web interfaces*** for airlines (slot swap)	Total Airport Management Suite (***TAMS*** project)	Passenger satisfaction in disruptive events (***META-CDM*** project)

SIEMENS INFORM ATRiCS

BARCO DLR Flughafen Stuttgart

ENAC BARCO UNIVERSITY OF CAMBRIDGE

Background: ANS Performance Scheme (1)

Year	Document	Key message
2004	Regulation (EC) 549/2004	"To improve the performance of air navigation services and network functions in the single European sky, a performance scheme for air navigation services and network functions shall be set up."
2010	Declaration of Madrid	"A performance-based European ATM: Enhanced performance is the keystone of the second SES package and must be achieved by 2012. An ambitious performance scheme, with clear targets on safety, environment including decarbonisation of the sky, capacity and cost-efficiency, together with performance monitoring and incentive mechanisms, ***shall meet the needs of the airspace users*** and incentivise air navigation service providers to manage their business within a sound and sustainable financial framework."

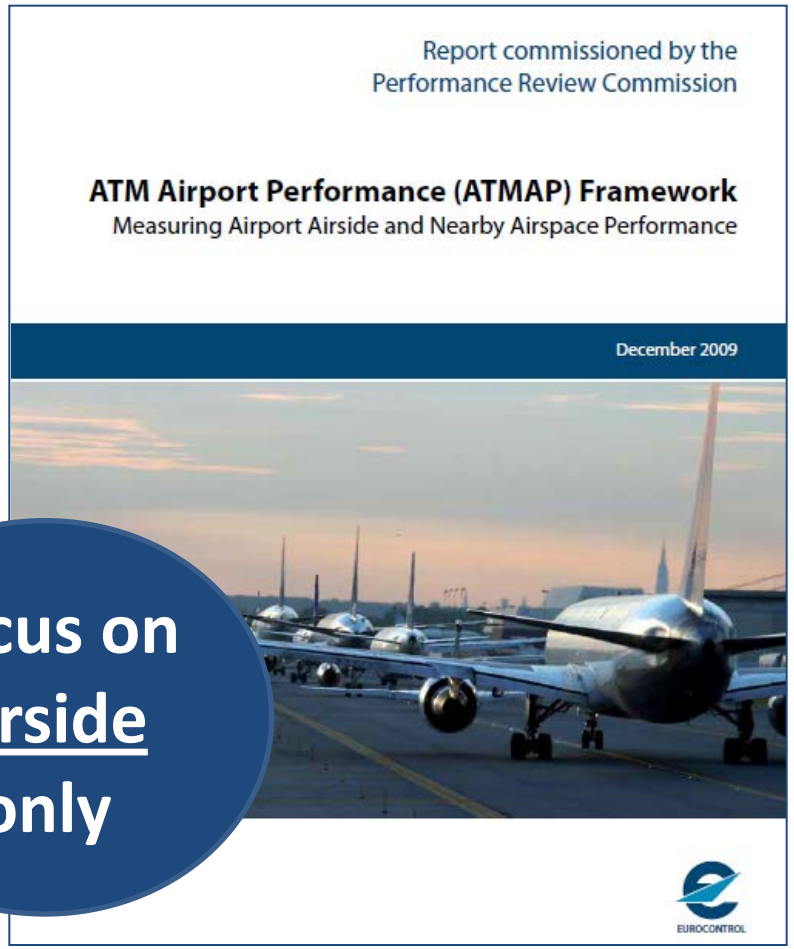
Background: ANS Performance Scheme (2)

Year	Document	Key message
2010	Regulation (EU) 691/2010	"laying down a performance scheme for air navigation services and network functions and […] laying down common requirements for the provision of air navigation services"
2011	Commission Decision 2011/121/EU	"***Environment target***: improvement by 0,75 of a percentage point of the average horizontal en route flight efficiency indicator in 2014 as compared to the situation in 2009; ***Capacity target***: an improvement of the average en route Air Traffic Flow Management (ATFM) delay so as to reach a maximum of 0,5 minute per flight in 2014; ***Cost-efficiency target***: a reduction of the average European Union-wide determined unit rate for en route air navigation services from 59,97 EUR in 2011 to 53,92 EUR in 2014 […]"

Airport Performance Monitoring (1)

Performance Review Commission defined ATM Airport Performance (ATMAP) indicators, including:

- Handled traffic
- Coordinated cancelled demand
- On-time arrivals/departures
- ATFM arrival delays
- ASMA additional time
- Pre-departure delays
- Taxi-out additional time
- …

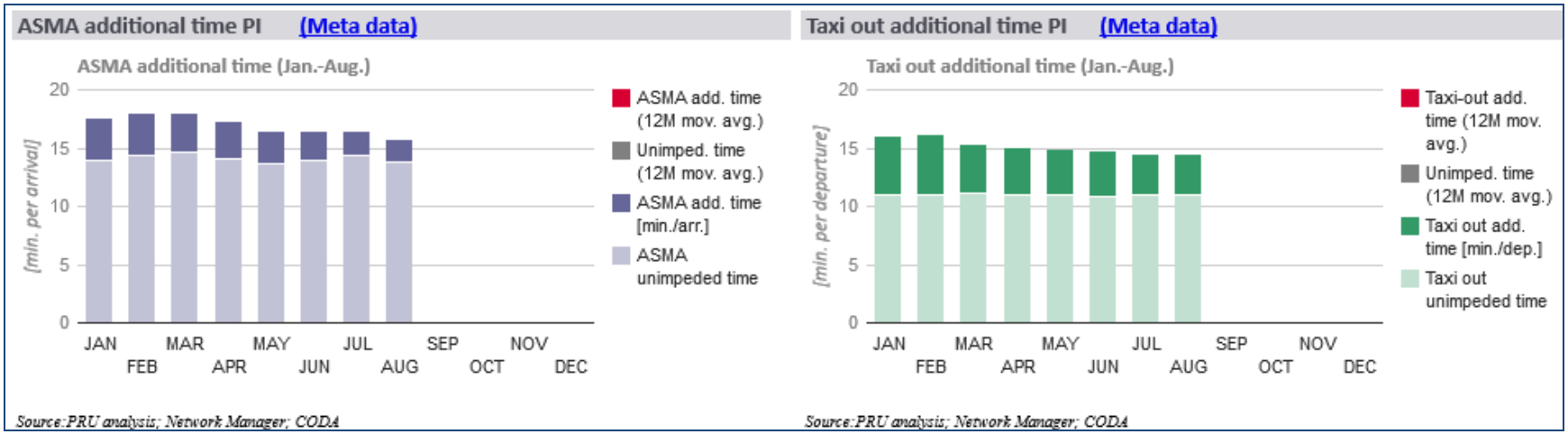


Focus on airside only

Airport Performance Monitoring (2)

Some ATMAP KPIs are already be collected and monitored:

Year	Document	Key message
2010	Regulation (EU) 691/2010	"… the Commission shall collect […] the total of ATFM delays […]; the additional time in the taxi out phase; […] the additional time for ASMA".

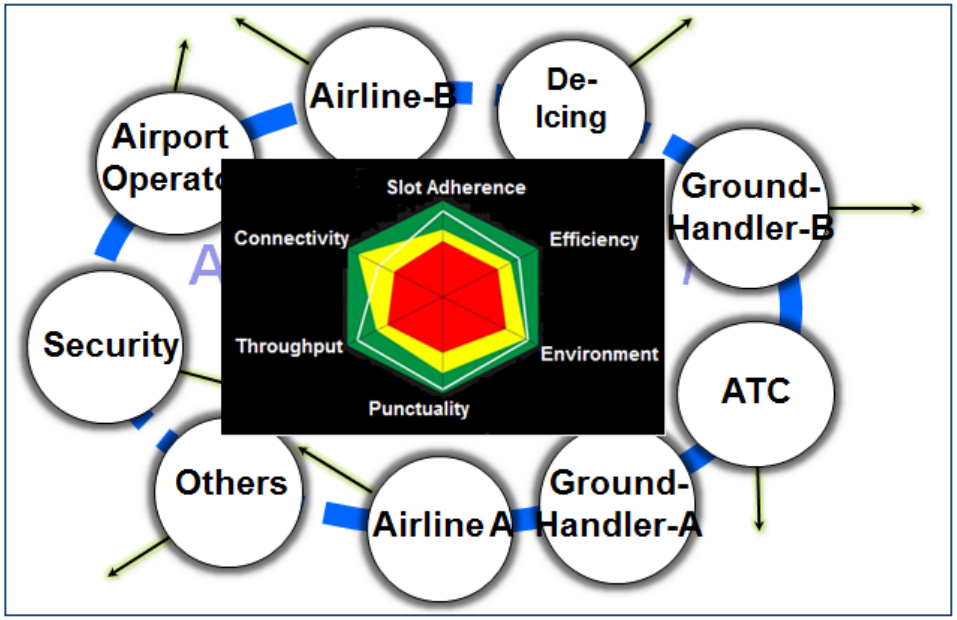


Example: Frankfurt/Main Airport

http://prudata.webfactional.com/Dashboard/eur_view_2013.html

Integration of Landside Processes

- **Total Airport Management (TAM)** concept developed by EUROCONTROL / DLR to “create an environment enabling airport partners to maintain a joint plan” based on “performance-based airport operations”



Souce: DLR: Total Airport Management an evolutionary approach to managing an airport

Airport Performance (ACI Definition) (1)

- ACI published "Guide to Airport Performance Measures" including performance indicators in 6 performance areas

Core	Safety and Security	Service Quality
1. Passengers	1. Runway Accidents	1. Practical Hourly Capacity
2. Origin and Destination Passengers	2. Runway Incursions	2. Gate Departure Delay
3. Aircraft Movements	3. Bird Strikes	3. Taxi Departure Delay
4. Freight or Mail Loaded/Unloaded	4. Public Injuries	4. Customer Satisfaction
5. Destinations—Nonstop	5. Occupational Injuries	5. Baggage Delivery Time
	6. Lost Work Time from Employee Accidents and Injuries	6. Security Clearing Time
		7. Border Control Clearing Time
		8. Check-in to Gate Time

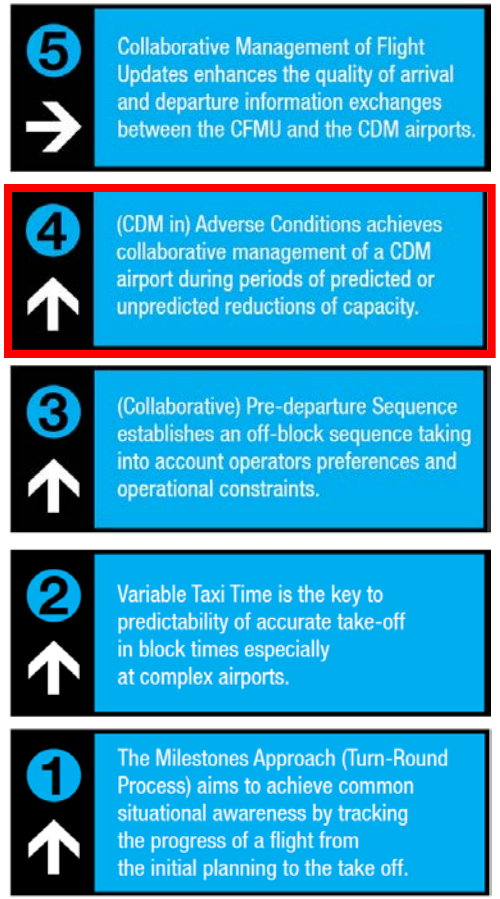
Airport Performance (ACI Definition) (2)

- ACI added productivity, cost effectiveness to the performance areas
- → management of disruptive events must be based on all areas

Productivity/Cost Effectiveness	Financial/ Commercial	Environmental
1. Passengers per Employee	1. Aeronautical Revenue per Passenger	1. Carbon Footprint
2. Aircraft Movements per Employee	2. Aeronautical Revenue per Movement	2. Waste Recycling
3. Aircraft Movements per Gate	3. Non-Aeronautical Operating Revenue as Percent of Total Operating Revenue	3. Waste Reduction Percentage
4. Total Cost per Passenger	4. Non-Aeronautical Operating Revenue per Passenger	4. Renewable Energy Purchased by the Airport (Percent)
5. Total Cost per Movement	5. Debt Service as Percentage of Operating Revenue	5. Utilities/Energy Usage per Square Meter of Terminal
6. Total Cost per WLU	6. Long-Term Debt per Passenger	6. Water Consumption per Passenger
7. Operating Cost per Passenger	7. Debt to EBITDA Ratio	
8. Operating Cost per Movement	8. EBITDA per Passenger	
9. Operating Cost per WLU		

Status Quo: Airport CDM – Adverse Conditions

- A-CDM addresses handling of Adverse Conditions
- Major focus is to enable the management of reduced airport capacity and to facilitate return to normal capacity (e.g. de-icing)
- A-CDM does not address management of disruption for terminal operations & passengers



Airport CDM concept elements (source: Airport CDM Implementation Manual)

Lesson learnt from A-CDM

- A-CDM distinguishes between ***planned*** and ***unplanned*** events, which can disrupt the normal operation of an airport:
  - Adverse conditions which can be foreseen with more or less accuracy and both their scope and likely effects are predictable (e.g. snowy conditions, industrial action) allow the maintenance of elementary services
  - Unpredictable events, e.g. a fire or aircraft incident, are more difficult to prepare for in terms of procedures.

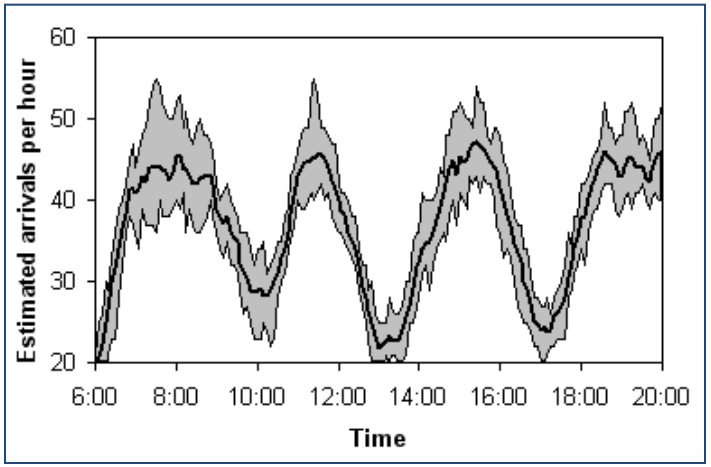
→ ***"In fact too detailed, pre-arranged procedures may even be more of a hindrance than a help."*** (A-CDM Manual)

Predictability of disruptive events

- Short-term handling is relatively well covered, if
  - Predictions are reliable
  - Irregularity procedures are prepared (predictably events)
- However, decision making process in case of disruptive events must be supported by airport performance predictions (incl. PAX satisfaction)
- → Extended future R&D focus on mid- and long-term prediction including consideration of uncertainties to provide stable information (effects of snow onto terminal congestion)

Concept – Performance Prediction

- Uncertainty consideration must become mandatory part of performance predictions
- → Example: Uncertainties of demand predictions impact uncertainties of:
  - Flight delays / cancellations
  - Missed connections
  - Passengers in terminal
  - Passenger complains, etc.



Example: Airside Tactical Working Position (ATWP) from Total Airport Management Suite