

Airport-Collaborative Decision Making (A-CDM) Integration to the Network

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- 2015 – Present → To70 The Netherlands
 - Project Leader Schiphol
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- 2010-2015 → Free lance Consultant Asia
 - Senior Consultant for A-CDM
- 2007-2010 → Eurocontrol HQ Belgium
 - A-CDM team
- 2002-2007 → NLR The Netherlands
 - Project Manager, Validation Manager
- Education
 - MSc. Computer Science, University of Amsterdam
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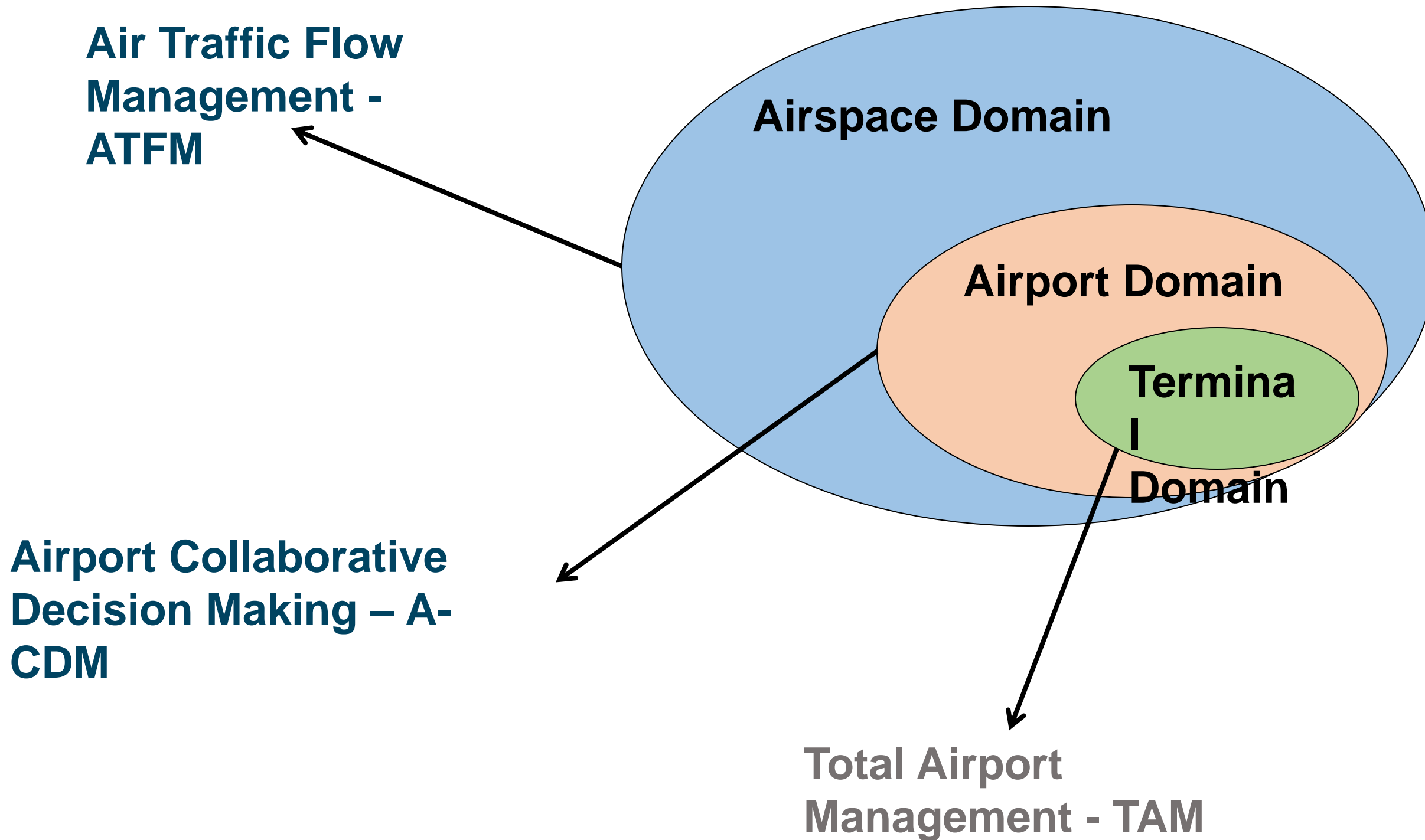
Topics

- ATFM and Airport CDM Integration
 - Main Airport CDM Benefits
 - Cost Benefit Analysis
 - Implementation Overview
 - Enhancements

 - Purpose? → How to Achieve Benefits!

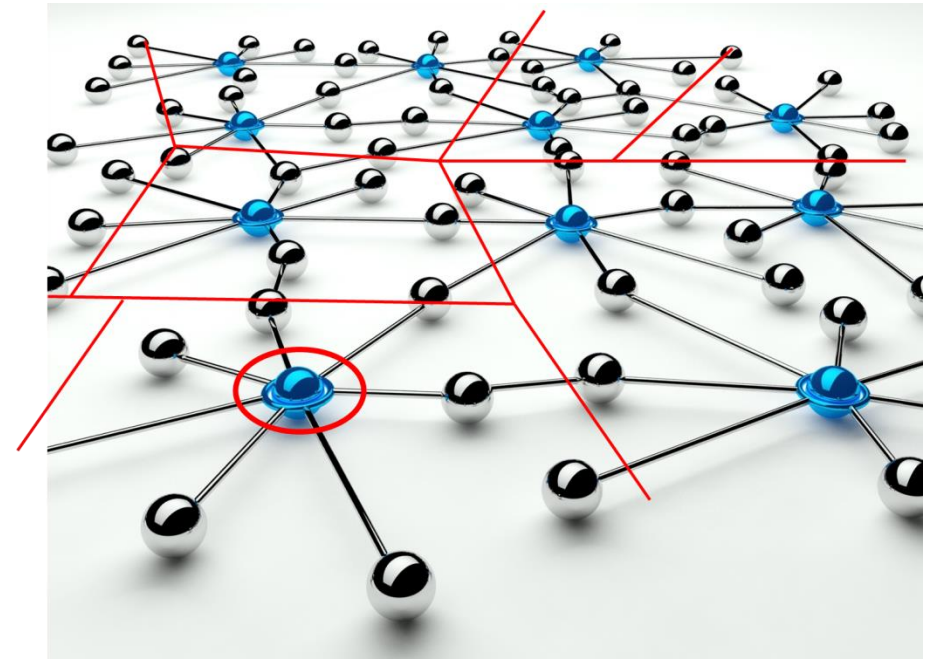
 - Capacity
 - Punctuality
 - Efficiency
- } Predictability → Airport CDM

Capacity and Demand Domain Concepts

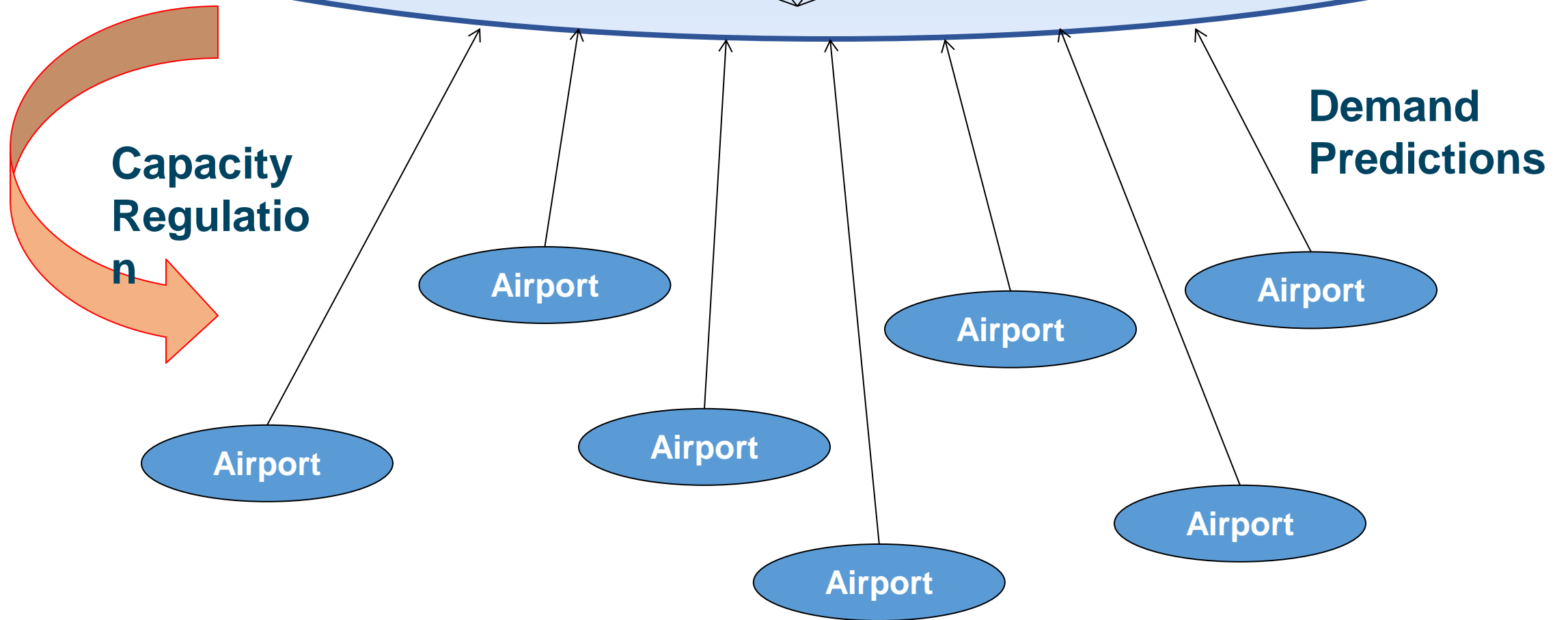


ATFM & A-CDM

- ATFM
 - Why: Efficient Use of Airspace Capacity
 - How: Prediction of Demand
- Airport CDM
 - Why: Efficient Use of Airport Resources
 - Runway
 - Gates
 - Equipment & Services
 - How: Prediction of Pushback and take-Off



ATFM → Network Manager



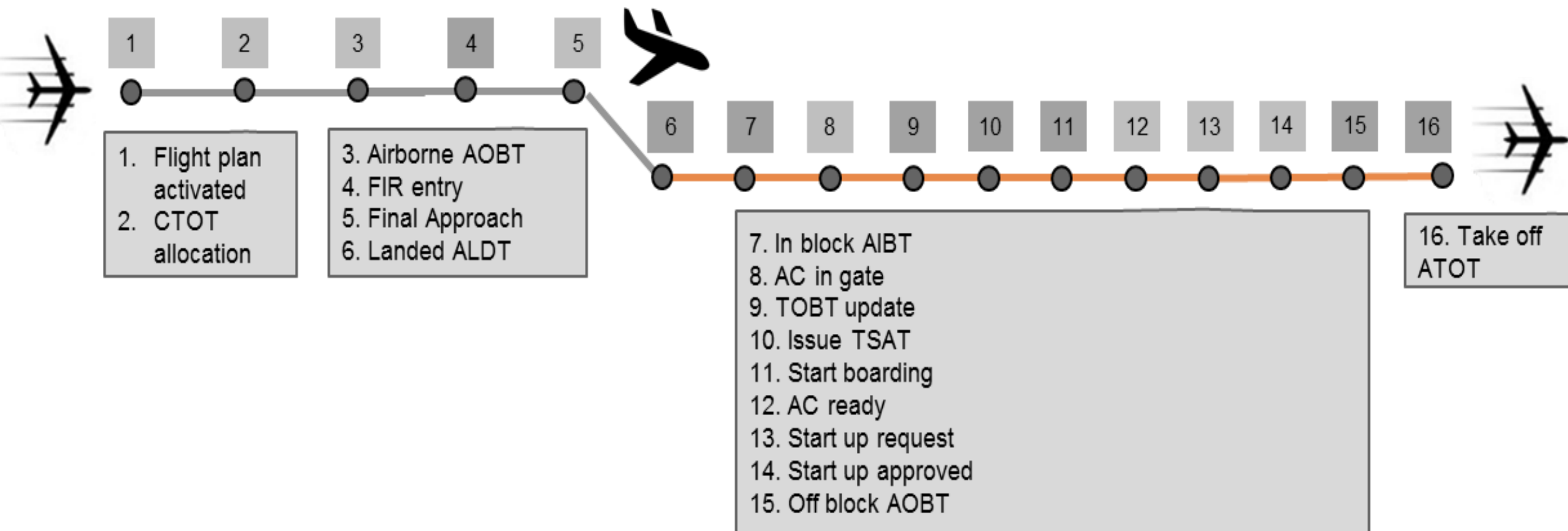
ATFM Integration: What Data to send?

- For the Network Demand Prediction
 - Take Off Prediction and Actual (TTOT, ATOT)
- For the Aircraft Operators and Ground Handlers:
 - Pushback Prediction, Taxi Time and ATC Delay (TOBT, TSAT)
- For ATC and Airports
 - Flight Registration, Aircraft Type, Runway, SID



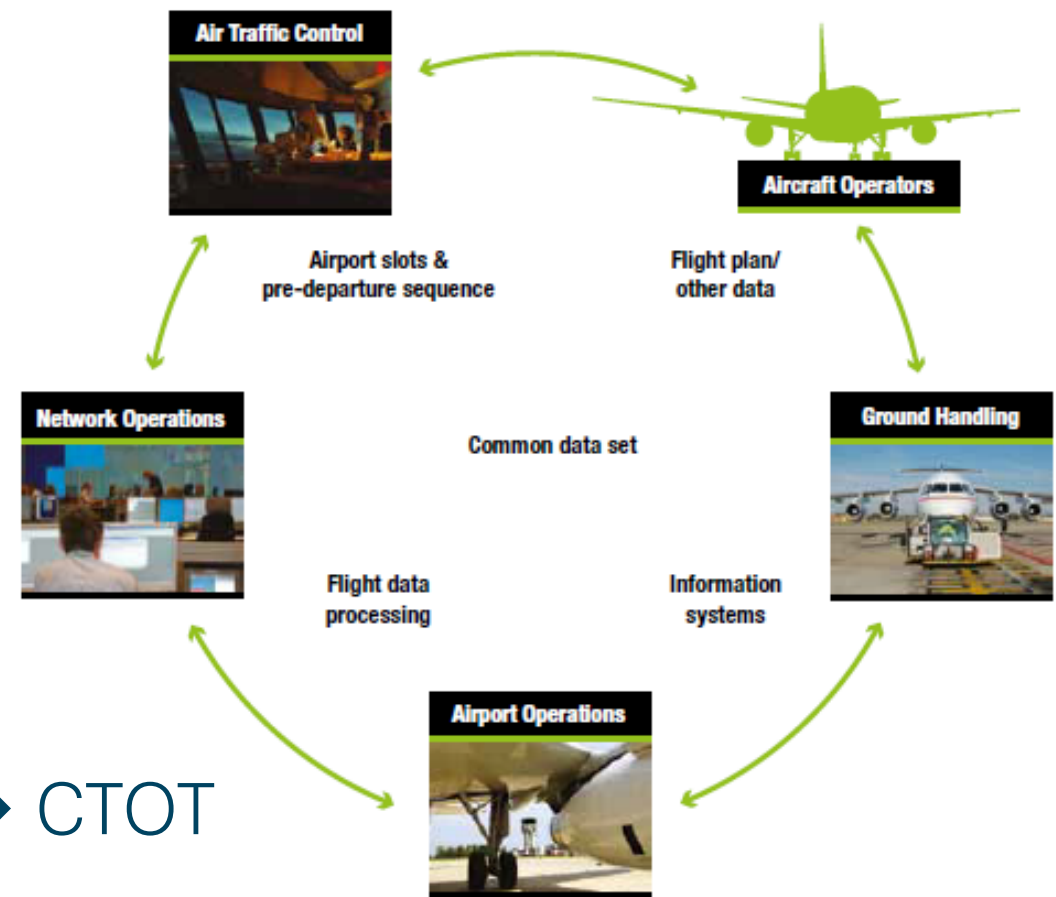
When to update Data?

- From three hours before EOBT
- At inbound and turnaround Milestones:
 - update Flight Ready (TOBT),
 - and calculate Pushback (TSAT) and Take-off (TTOT):



Who makes Data Update?

- Aircraft Operator
 - Flight Plan Delay (DLA) → EOBT
 - Aircraft Type and Registration
- Ground Handler
 - Flight Ready Time → TOBT
- ATC
 - Start-Up Time sequence → TSAT
 - Take-Off Time → TTOT
 - Taxi Time, Runway, SID route
- ATFM Network Manager
 - Regulated Slot Tolerance Window → CTOT



Eurocontrol CDM Manual

How to send Data to Network?

- Frequent Departure Information updates for each flight to depart
- By Automated and filtered Message
- Through Airport/ATC Departure Message Generator
- On trigger moments



Eurocontrol NMOC Model

How to send Messages to Airport Partners?

- To Aircraft Operators and Ground Handlers →
 - Through Airport CDM Portal Interface to all Alerts and Warnings for inconsistency and discrepancy to Airport Partners
 - New information from ATC or Network manager
- To Pilots →
 - Through Visual Guidance Docking System



Eurocontrol CDM Manual

General Benefits of Airport CDM

- Economically
 - Reduced costs for fuel
 - Reduced costs for resources
- Capacity
 - Reduced planning buffers
 - Flight Schedule times
 - Turnround times
 - Airport slots
 - Reduced network capacity buffers
- Environment
 - Reduced fuel and noise emissions
- Safety
 - Contribution to Workload reduction

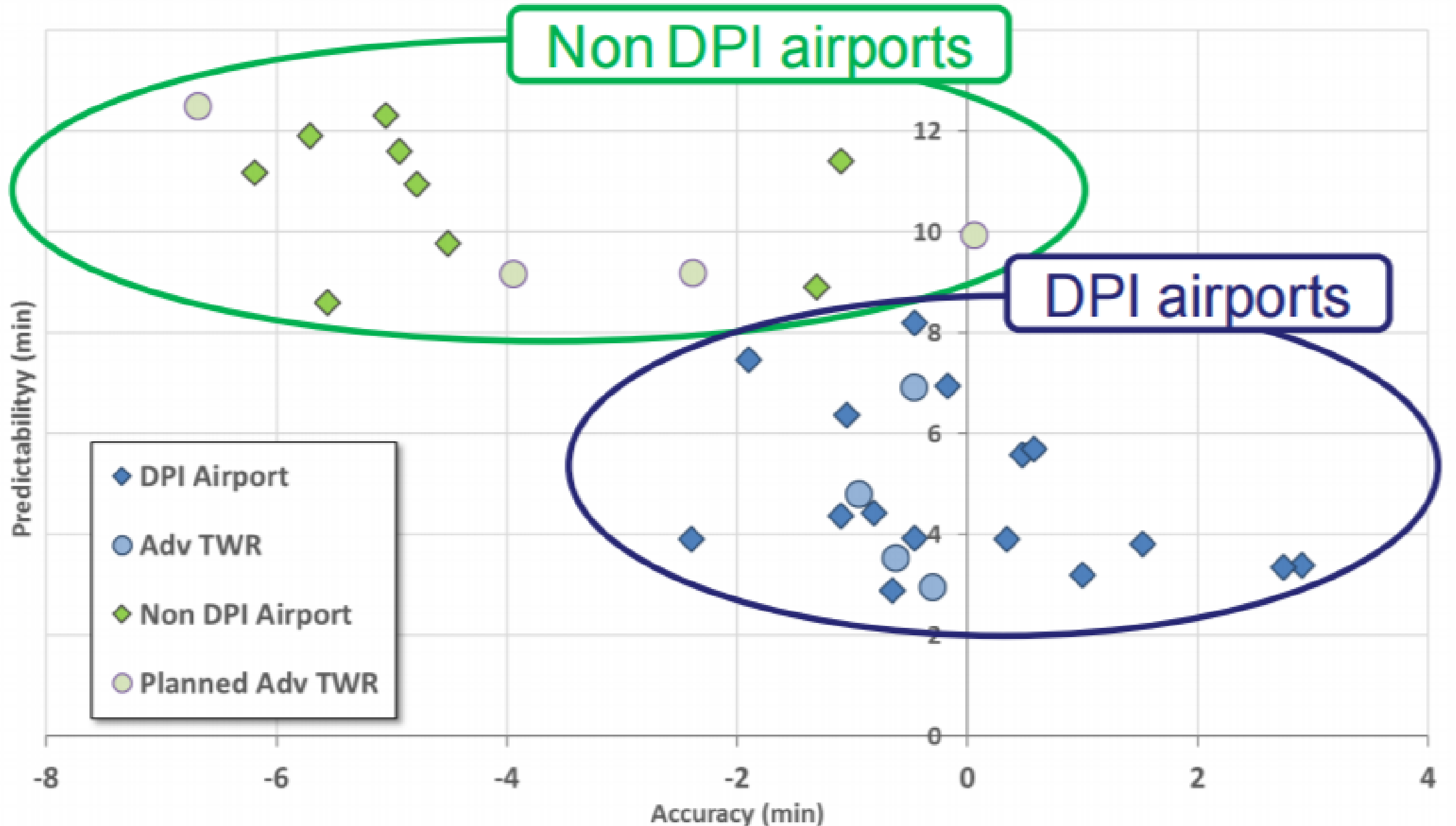


Take-Off Predictability Improvement

Take-off accuracy and predictability

DPI vs. non DPI airports (1507)

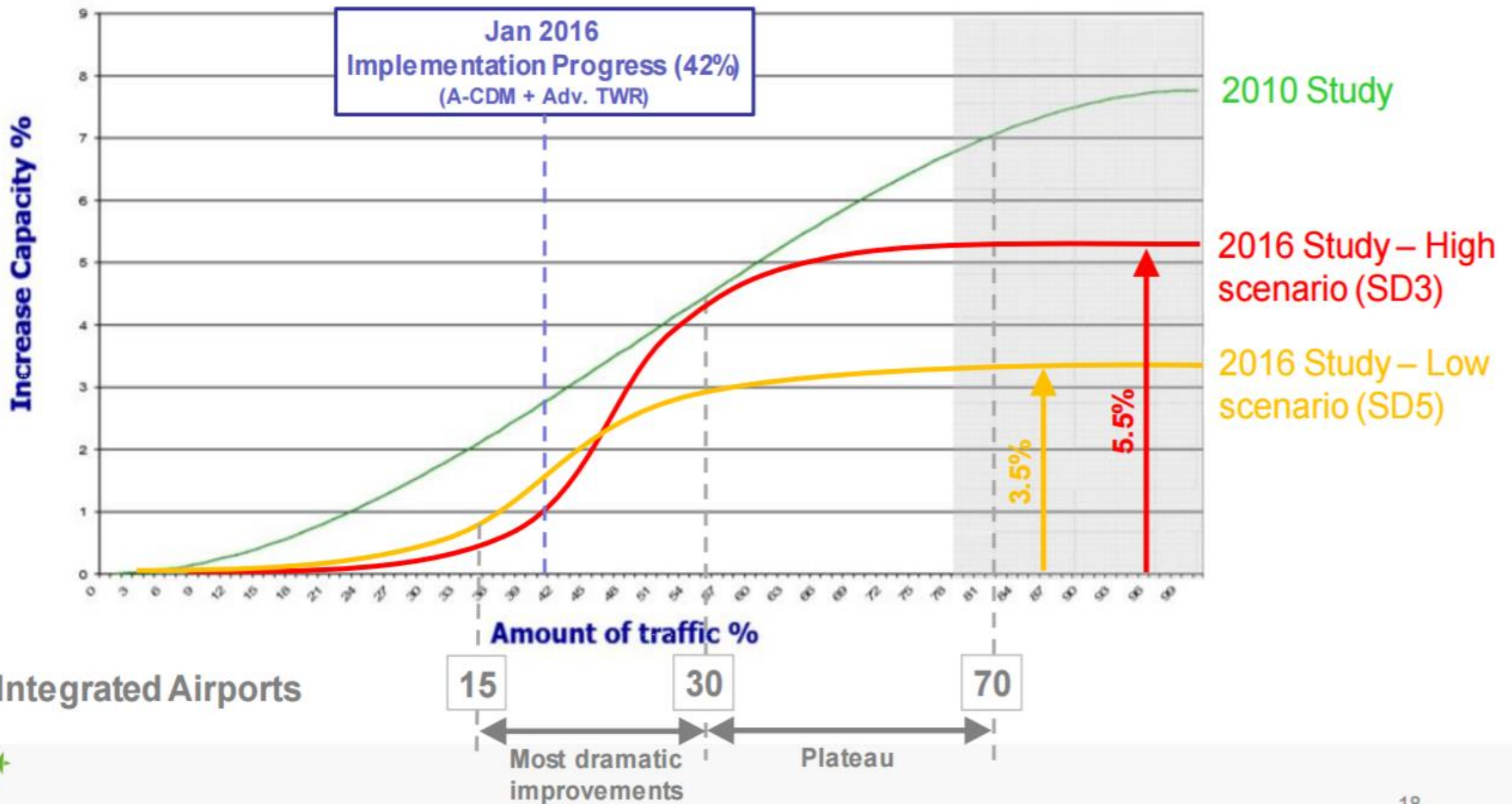
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Capacity Benefits for the Network



Estimated Enroute Capacity Improvements (ECAC wide)



2015 Quantitative Benefits from European Airports

Airport	Taxi Time reduction (minutes)	Delay Reduction (£/€)	Delay Reduction (minutes)	Fuel reduction (tons)	Fuel Savings (£/€)	CO2 (tons)	SO2 (kg)
London Heathrow				5,000	2,000,000 (British Air)	16,000	4,200
Helsinki	60,000	6,900,000	86,000	800	650,000	2,600	700
Paris CDG	470,000			6,500	5,000,000	20,300	5,400
Madrid	170,000	10,100,000	136,000	1,100	1,100,000	3,700	1,000
Munich	370,000		135,000			16,000	4,200
Rome Fiumicino	480,000	1,100,000	13,400	6,600	5,100,000	20,800	5,550

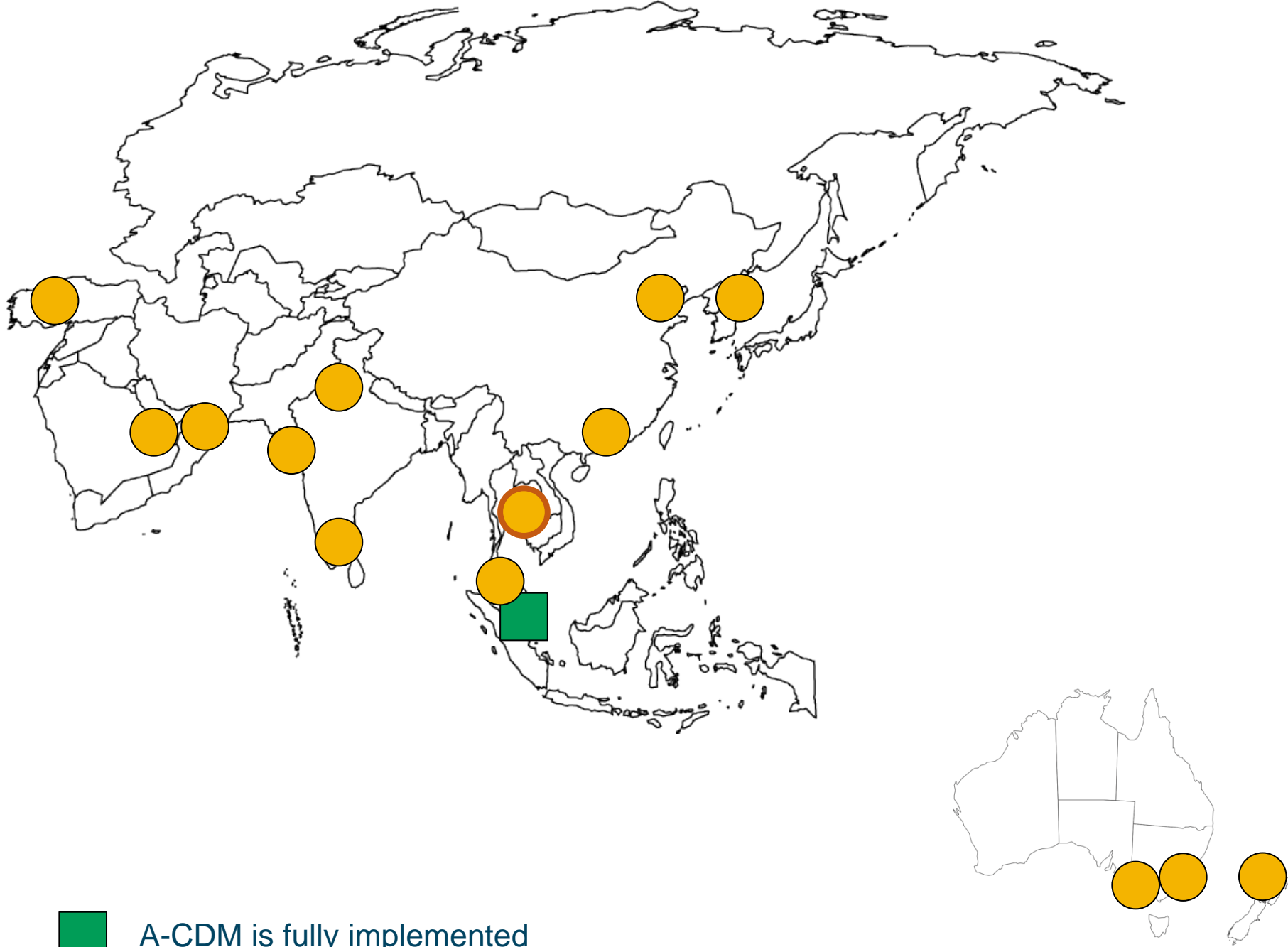
Generic Cost Benefit Analysis



- Eurocontrol 2008 generic CBA study
 - Four airports provide input
- Generic Benefit to Cost ratio: 9
 - Over 10 year period:
 - 91 Million EUR Benefits
 - 4 Million EUR Capital Expenditure
 - 7 Million EUR Operational Expenditure
- Return of Investment: 2 years



	Airspace User	Ground Handlers	Airport	Air Traffic Control
Net Present Value	30 M€	17 M€	29 M€	4 M€
Benefit/Cost Ratio	8	14	8	6
Return Of Investment	1 year	1 year	2 year	2 year

Far East Implementation



-  A-CDM is fully implemented
-  A-CDM is being implemented

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European implementation

- A-CDM is fully implemented
- A-CDM is being implemented





Thank you

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