Local and network impact assessment of ACDM
Implementation of A-CDM in Europe

- 23 full A-CDM airports in Europe.
- Acceleration since 2013.
- Represents 38% of ECAC departure in 2016. (46% with Advanced TWRs)
- Still more European airports to become CDM:
  - 15 additional airports have initiated the process.
  - Part of SESAR Deployment Programme.
Objective of the study

- Refine conclusions of a report published in March 2010. (Extrapolation of benefits at MUC to 42 airports)

- Reason for update:
  - From 1 to 17 CDM airports. More to come.
  - SESAR focus on APOC developments.
  - New EU Performance scheme.

- Financed through EUROCONTROL contribution to SESAR APOC concept.

- Developed with...
Structure of the study

- Two parallel phases:

**Review of local benefits at CDM airports:**
- On-site visits to the 17 CDM airports.
- Information gathering on tangible and quantified benefits.
- Gathering local point of view.

**Analysis of A–CDM impact on the network:**
- How has A-CDM implementation at 17 airports impacted the network?
- Are the conclusions of the 2010 study still valid?
- Analyse any other impact on the network.
Local benefits: engagement with airports

- Close interaction with CDM airports which have **all** actively engaged in the study.

- 4-page factsheets covering:
  - Operational Overview;
  - CDM Process Fundamentals;
  - Qualitative Benefits;
  - Quantitative Benefits.

- Based on detailed analysis discussed with each airport.

- Are annexed to the final report and made publicly available.
Higher Peak Departure Rates

- A-CDM airports have shown to operate at a higher peak departure rates:
  - Achieved with no increase in runway buffer…
  - …but rather through a more optimal runway departure sequence…
  - …based on specific TOBT and TSAT procedures.
Reduction of push delays; and Improvement of Start-up Time compliance

- Reduction of the number of instances where the push delay recorded was more than 5 minutes.

- Reduction of the number of instances where the actual SAT was outside the compliance window.
Faster Recovery from Adverse Conditions

- Clear faster recovery:
  - 60 departures realised
  - 20 minutes sooner with CDM.

- Mainly due to the reduction of phantom start-up delay:
  - ATC handling ‘real’ flights only!

- Significant benefits:
  - Optimum departure mix facilitated;
  - Delay reduction;
  - Less cancellations;
  - Night programme usage.

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**Average Duration to achieve departing ATM's after a period of adverse conditions at LHR**

- PRE-CDM = 120 mins
- POST-CDM = 100 mins

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**Average Time to Depart (mins)**

**NUMBER OF DEPARTURES**

- CDM
- NON-CDM

Heathrow: Making every journey better
Reduction of taxi-out times

- Overall improvement between 0.5 min and 1.5 min.
- Achieved mainly during high departure rates.
- Massive improvement in the management of de-icing queues in winter operations.
- However no or little improvement at some airports:
  - Where airport is already hyper constrained or not constrained;
  - Where CDM effects are hidden by other events (i.e. new runway, new ATC TWR, …).
Reduction of ATFM delays (1/2)

- The higher the share of A-CDM flights in a regulation…
  
  … the lower ATFM delay per flight is.

- Some 2 minute reduction in average ATFM delay due to en route restrictions.

- A-CDM flights also incur on average less ATFM delay than those departing from non CDM airports.
In 2015, almost all CDM airports have generated very significant ATFM delay savings.

Smaller CDM airports are generating delay savings that are very significant.
Reduction in Off-Block Delay

- Reduction in off-block delay at medium levels of congestion.

- CDM Airports tend to show ‘tightening’ of start-procedure.

- Benefits tend to disappear at higher levels of congestion:
  - TSAT Delay grows and takes hold.
Improved take-off time accuracy and predictability (1/2)
Improved take-off time accuracy and predictability (2/2)

- **Key network benefits:**
  - Improved precision of flight profiles;
  - Improved tactical decision making and ETFMS / CASA flexibility.

- **Key local benefits:**
  - Reduced levels of ATFM delay resulting from airport flow restrictions;
  - Reduced Flight Activity Monitoring (FAM) suspensions;
  - Improved ATFM slot adherence;
  - Enabler of single engine taxi (SET) procedures.

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**Take-off accuracy and predictability**

DPI vs. non DPI airports (1507)

Non DPI airports

DPI airports
Reduction in over-delivery

- Overall reduction of over-delivery at ECAC level…
  … however, extent depends on States and number of CDM airports.
- Response of an individual sector to improved take-off predictability seems to be highly dependant on:
  - Its location in the Network;
  - Ratio of flights from DPI connected airports feeding each stream around it.
The response of an individual sector to improved take-off predictability is highly dependant on:

- Sector location; and
- Ratio of flights from DPI connected airports feeding each stream.
Evolution of CDM flights during a day
(05/11/2015)
Estimated Enroute Capacity Improvements (ECAC wide)

2010 Study

2016 Study – High scenario (SD3)

2016 Study – Low scenario (SD5)

June 2017 Implementation Progress (46%)
(A-CDM + Adv. TWR)

# NMOC Integrated Airports

Most dramatic improvements
Plateau

15 23 30 70
Conclusions

- Final report published.
- Clear benefits due to A-CDM:
  - Good stories on A-CDM implementation at 17 airports.
- Identification of areas for further work.
- Extend study to airlines and ATC.
- Full report available here:

http://www.eurocontrol.int/publications/a-cdm-impact-assessment