



2018
World ATM Congress



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walking
tours

EUROCONTROL Stand





Can elements of the A-CDM milestone approach be automated?

The background of the lower half of the slide is a blurred photograph of people walking in what appears to be an airport terminal. Several colorful location pins (purple, blue, and white) are overlaid on the image, suggesting a path or sequence of events.

Bob Graham Head of Airport Research
for Alan Marsden TAM Manager

Airport challenges ?

- Multiple stakeholders and systems
- Poor data integration
- Insufficient or poor quality information
- No partner has the complete picture
- Airports “black holes” for the network



Impacting:

- Punctuality, Predictability, Efficiency...and Network Performance

Our challenge ?

Can we reduce the number of A-CDM Milestones?

Reduce the cost of A-CDM yet achieve the accuracy and quality criteria demanded by the Network Manager?

Open the door to achieving common situation awareness and access to A-CDM applications for regional airports

Could this be done through:

- Data driven predictions, and
- A reduced set of A-CDM milestones?:



A-CDM concept elements

Collaborative Management of Flight Updates

Variable Taxi
Time
Calculation

Collaborative
Pre-Departure
Sequencing

CDM in Adverse
Conditions

Milestone Approach

Airport CDM Information Sharing

Airport-Network data exchange

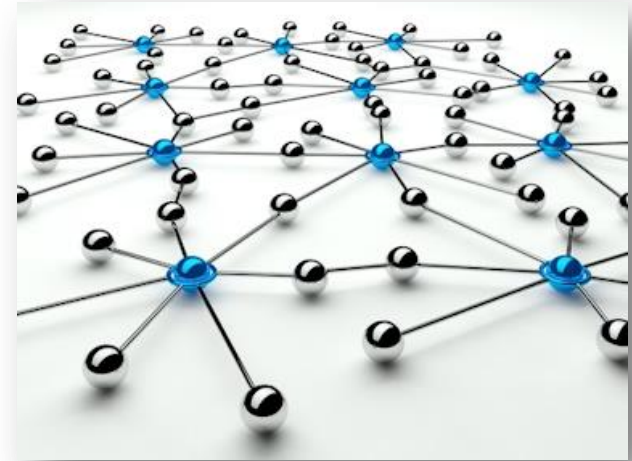
- Airport efficiency - limited by incoming flight information.
- ATFCM efficiency - limited by pre-departure flight information.

Airports - Flight Update Messages (FUM)

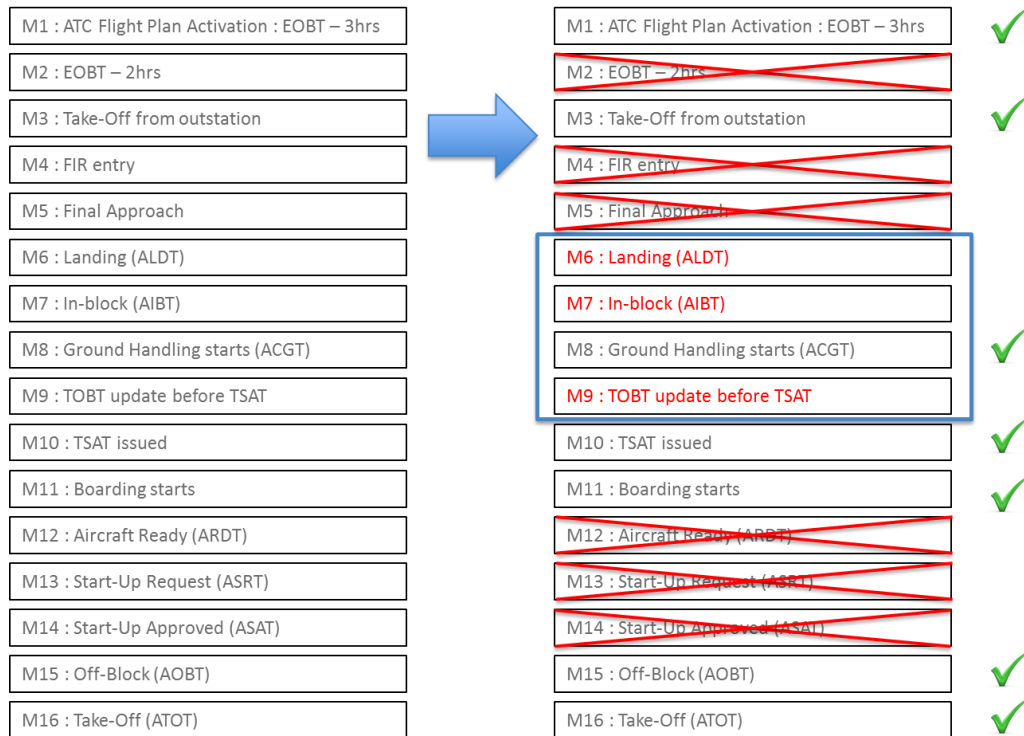
- **FUM:** Flight plan accuracy +/- 5 minutes

Network - Departure Planning Information (DPI) messages

- **DPI:** (TTOT) update if +/- 5 minutes



Concept .. reduce milestones



Alicante .. airport model

Milestone	Actions performed
At M1 (EOBT – 3hrs)	Determination of E-DPI
At M3 (take-off from outstation)	Calculate first T-DPI-t $EIBT = ELDT + EXIT$ $TOBT = \max(EOBT, ELDT + EXIT + XTTA)$ $TTOT = TOBT + EXOT$
After M3	Monitor FUM messages and send new T-DPI-t if newly calculated TOBT differs by more than 5' from previous
After ACGT (proxy AIBT in most cases)	Determine 'Latest Boarding Start Time (LBST)' from TOBT and 'Boarding Time duration' (look-up-table) If no M11 at LBST – 5' then : • Issue warning to handler • Increase automatically TOBT by 5' • Increase LBST by 5' • Determine new TSAT and corresponding T-DPI-s Continue this boarding monitoring until boarding actually starts
After M11	Monitor boarding progress. If boarding not completed at TOBT-5' then raise warning If boarding not completed at TOBT then : • Increase automatically TOBT by 5' • Determine new TSAT and corresponding T-DPI-s Continue this boarding monitoring until boarding actually finishes
At TSAT + 5'	If no M15 (AOBT) then increase TOBT by 5' Limit this to 3 iterations and if still no AOBT request handler to provide new TOBT and remove from sequence. If still no manual entry within 10 minutes then transmit C-DPI
At M15	As per A-CDM

Airport network integration

3 levels of airport integration with the ATM Network

Category	Characteristic	Network Impact
Full A-CDM	Full set of DPI Messages	25 airports covering 34% departures in NM area
Advanced Tower	ATC-DPI on leaving block	17 airports covering 7% departures
Standard airports	No DPI transmission	

“Can we create a category where full DPI message set is transmitted, meeting NM accuracy criteria, but in a quasi-automated manner” ?

Concept “regional a-cdm”

Reduce number of milestones. Concentrate on event-driven milestones.

Support tower operations with pre-departure management

Airport Model based on historical airport data to predict subsequent milestones based on :

1. taxi-times (stand/runway)
2. boarding times (a/c type, handler, contact or remote) and
3. turnaround times (a/c type, contact or remote, destination, PRM)

Considering:

- Key events (take-off from outstation, landing, boarding time, automated TOBT (not earlier than EOBT, SOBT).
- TOBT can be amended by the handler (exception) or updated automatically
- TOBT used in pre-departure sequence with automated amendment if a/c not ready at TSAT



Alicante .. trial objectives

1. Provide TOBT to handling agents, calculated automatically from preceding milestone, forward predictions based on historical airport data.
2. Automatically update TOBT milestone as a function of landside processes
3. “Update only by exception” to reduce airline/handler workload associated to maintaining an accurate TOBT.
4. Support tower operations by defining an acceptable pre-departure sequence (TSAT) based on the TOBT milestone, including TOBT revisions.
5. Derive full set of Departure Planning Information messages with Network Manager’s “required” accuracy

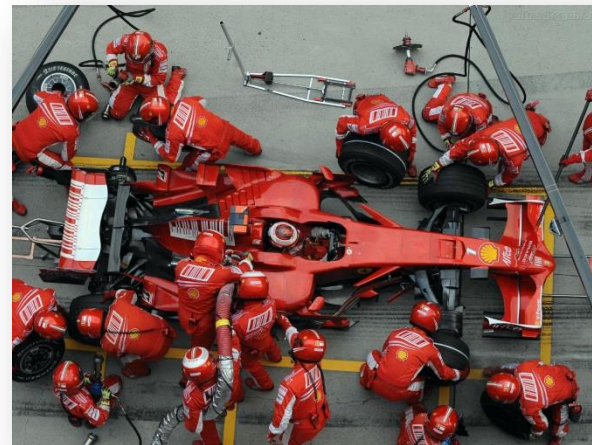
Alicante .. our trial site



Alicante .. traffic mix

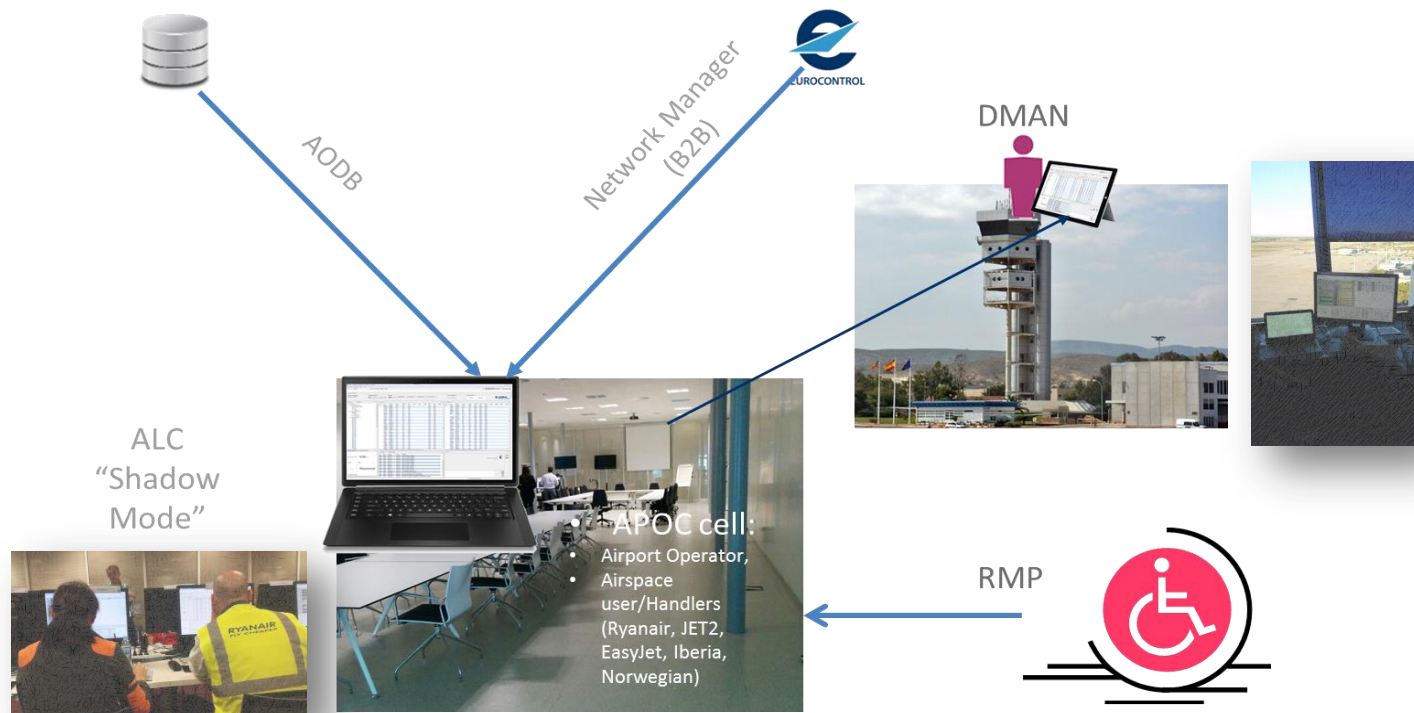
- Main carriers are low cost :
Ryanair, Easyjet, Vueling,
Norwegian, Air Europa, Air
Nostrum, Flybe, Iberia etc.
- Traffic is point to point (no hub)
- 75% of the traffic are A320 and
B737 types.
- Short Turn-around, typically 35'

Alicante airport describe themselves as



... a formula 1 pit-stop airport

Alicante .. trial configuration



Alicante .. team members



....and capturing 100% of the ALC traffic



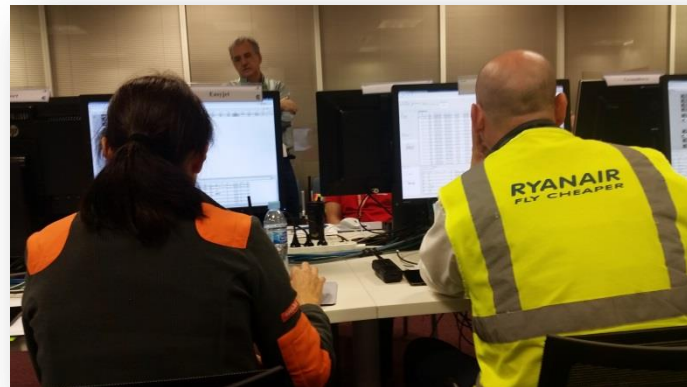
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Results - subjective

- Handlers:
 - *Very happy with the system.*
 - *Task largely reduced to monitoring only.*
- Tower monitored all flights against push-back and TSAT+/- 5' window as determined in DMAN.
 - *Very successful and request for deployment !*



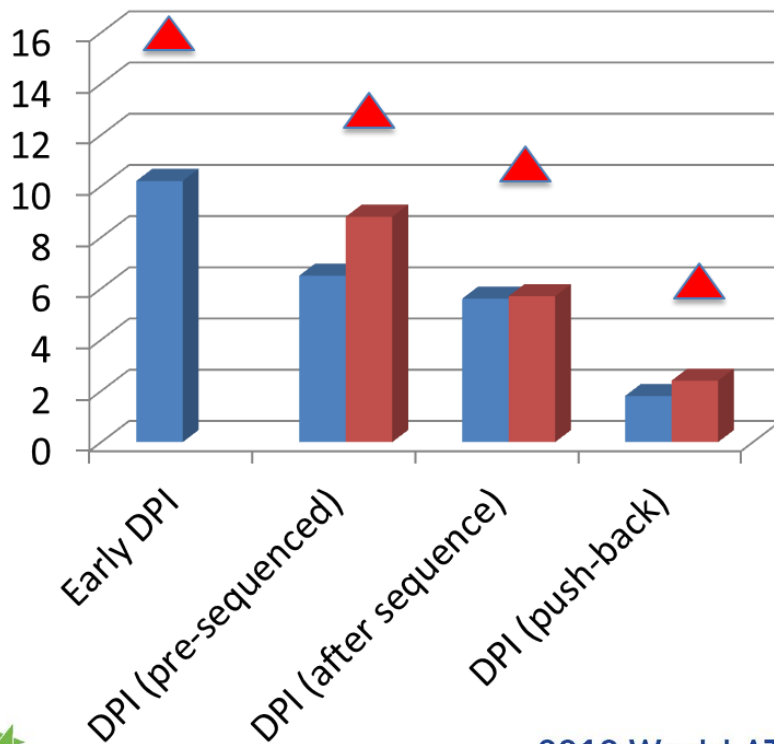


Results – subjective Q'aire

- *“The information presented was clear “.*
- *“When a TOBT was automatically updated, it was easy to understand“.*
- *“ ... concept is a step forward compared to the manual entry of all TOBTs “.*
- *“ ... support the deployment of this concept at Alicante airport “.*



Results - quantitative



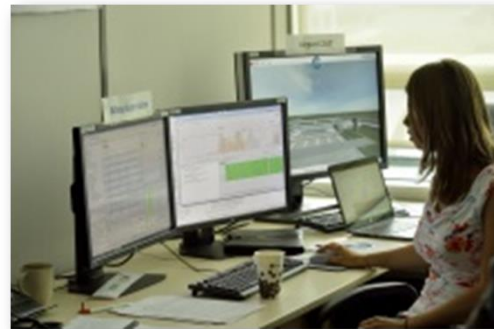
Average difference between TTOT in DPI message and ATOT

■ Exercise
■ Fully automated

▲ *Network Manager DPI accuracy requirements*

Next steps .. ?

- In-depth data analysis for multiple airports with wider modelling
- Capture requirements and performance needs
- Large Scale Demonstrations .. SESAR Wave 2 ?
- Network and airport benefits case



Thanks to our partners ..





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Thank You

