SITUATION AWARENESS

& A-CDM

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AGENDA

• Step I, A Word about Situation Awareness
  ➢ Why talk about Situation Awareness?
  ➢ Situation Awareness in Latin America
  ➢ Situation Awareness Tools

• Step II, A-CDM, from Words to Acts
  ➢ Why go for CDM?
  ➢ A-CDM, the Concept
  ➢ A-CDM Elements
  ➢ A-CDM Best Practices
WHY TALK ABOUT SITUATION AWARENESS?

COR - RIOgaleão’s Operations Center
WHY TALK ABOUT SITUATION AWARENESS?

A-CDM Concept Overview

En-route CDM
Flow Planning and Real-Time updates

Airside Airport-CDM
Collaborative Processes and Information Sharing

TAXI IN
ANSP, Airport, Airline, Ground Handling, RAMP

TAXI OUT

Flights Processing

LANDSIDE AIRPORT-CDM
Planning and Real-Time updates

SURFACE
That’s what A-CDM is all about!
### Why Talk About Situation Awareness?

**Atlanta Hartsfield Jackson (ATL)**

Surface Surveillance Platform

Implemented in 2010

#### Aerobahn Benefits Assessment at ATL Airport

**Version: 1**

October 23, 2013

Prepared for:
The City of Atlanta
Department of Aviation

<table>
<thead>
<tr>
<th></th>
<th>Arrivals</th>
<th></th>
<th></th>
<th>Departures</th>
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<th>Total</th>
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<tr>
<td></td>
<td>Taxi Duration</td>
<td>Schedule</td>
<td>Delay</td>
<td>Operating Cost</td>
<td>Passenger Time</td>
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<td>Arrivals</td>
<td>12,400 hrs</td>
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<td>$224 million/yr</td>
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<tr>
<td>Total</td>
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<td>$97 million/yr</td>
<td>$278 million/yr</td>
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SITUATION AWARENESS IN LATIN AMERICA

• **Primary** Sensor - Surface Movement Radar
  - NO Cooperative Surveillance
  - NO Positive Identification
  - Focus on Safety (ATC)

• **Secondary** Sensor - Multilateration
  - Cooperative Surveillance
  - Positive Identification
  - Focus on Efficiency (Airside Management)

Surface Surveillance Platform
**A-SMGCS**
ICAO 9830 / Eurocae ED-117 C
SITUATION AWARENESS IN LATIN AMERICA

A-SMGCS in Latin America...

- Favorable Meteorological Conditions
  - Less Concern on the Safety

- Airport operation as Public Service
  - No Competitiveness - reduced emphasis on Efficiency

- Regional delay in A-SMGCS implementation

Surface Surveillance Platform
A-SMGCS
ICAO 9830 / Eurocae ED-117 C
SITUATION AWARENESS IN LATIN AMERICA

Privatization and Paradigm Shift

Safety with no Prejudice do Efficiency

Surface Surveillance Platform
A-SMGCS
ICAO 9830 / Eurocae ED-117 C

ATC Perspective

Airport Operator and Airlines’ Perspective
Efficiency with no Prejudice to Safety
SITUATION AWARENESS TOOLS

Surface Surveillance Platform
A-SMGCS
ICAO 9830 / Eurocae ED-117 C

Multilateration
SITUATION AWARENESS TOOLS

• Fully customizable Workspaces
• Dynamic Rules – set up of automatic alerts for relevant events
• “Management by Exception” concept
• Historical Reports and Statistical Analysis
• Accessible via PC or mobile devices
SITUATION AWARENESS TOOLS

Combination of Map Displays & Counters highlighting relevant flights and KPIs

Business Rules configured to highlight important alerts

Statistical information and Forecasts
SITUATION AWARENESS TOOLS

Customized Work Spaces grouping arriving A/C by allocated Terminal/Gate

Business Rules configured to use color codes to highlight the predefined events

Can be combined with ATC Voice as optional tool

Combination of Map Display to show different pars of the Airport/Airspace
WHY GO FOR A-CDM?

15 AIRPORTS have fully implemented A-CDM

BENEFITS

A-CDM allows for real-time sharing of operational data and information between the stakeholders using an airport

Saving airlines €56.3 M in fuel

WHY GO FOR A-CDM?

NEW YORK JFK CASE STUDY

- Airlines are saving an average of USD 15.6 millions in fuel costs per year.
- Along with a reduction in 32,000 metric tons of harmful CO2 emissions.

<table>
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<tr>
<th>DEPARTURE SAVINGS PER MONTH</th>
<th>2012</th>
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<tbody>
<tr>
<td>Taxi-out Time</td>
<td>2,100 hours</td>
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<tr>
<td>Fuel</td>
<td>1.0 million kg</td>
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<td>Fuel Cost</td>
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<tr>
<td>CO2 Emissions</td>
<td>3,200 metric tons</td>
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<tr>
<td>Take-off Delay</td>
<td>2,400 hours</td>
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<td>Passenger Time</td>
<td>12,600 person-days</td>
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<td>Passenger Time @ $30/hr</td>
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<table>
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<tr>
<th>ARRIVALS SAVINGS PER MONTH</th>
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<tr>
<td>Taxi-in Time</td>
<td>700 hours</td>
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<tr>
<td>Fuel</td>
<td>0.3 million kg</td>
</tr>
<tr>
<td>Fuel Cost</td>
<td>$0.3 million</td>
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<tr>
<td>CO2 Emissions</td>
<td>1,100 metric tons</td>
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<tr>
<td>Arrival Delay</td>
<td>700 hours</td>
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<tr>
<td>Passenger Time</td>
<td>3,700 person-days</td>
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<tr>
<td>Passenger Time @ $30/hr</td>
<td>$2.6 million</td>
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A-CDM, THE CONCEPT
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- AODB
- RMS
- FIDS
- CUTE
- CUSS
A-CDM, THE CONCEPT

- Approach Radar
- ATC Flight Plan System
- Electronic Strip
- Surface Movement Radar
A-CDM, THE CONCEPT

Airports... the missing link in the ATM network

Landside

ATC
A-CDM, THE CONCEPT

Landside

Fuel Waste / CO2 Emission

ATC
A-CDM, THE CONCEPT

Landside

Flight Delays

ATC
A-CDM, THE CONCEPT

Landside

ATC

Airline Operator

Ground Handling

Airport Operation

NMOC

A-CDM
A-CDM ELEMENTS

I. Data Sharing
   a. Stakeholders’ commitment to share information, for the sake of operation efficiency
   b. Implementation of a Common-use Data Platform

II. Milestone Approach
   a. Link between Landings and Takeoffs
   b. Dynamic updates of Predefined Events

III. Departure Sequencing
   a. Adoption (by ATC) of automated Departure Sequencing Tool
   b. Variable Taxi Time

Permanent Integration between
Airports and Air Traffic Flow Management

- FUMs (Flight Update Messages) - ATFM > Airport on Arriving flights
- DPIs (Departure Planning Information) - Airport > ATFM on Departing flights
A-CMD: DATA SHARING

- Common-use Data Platform

Data grouped by Aircraft Registration

<table>
<thead>
<tr>
<th>A-CMD Flight Status</th>
<th>AIR</th>
<th>FNL</th>
<th>FL</th>
<th>Aircraft Registration</th>
<th>Dest</th>
<th>Reg</th>
<th>EOTT (Area)</th>
<th>TOTT (Area)</th>
<th>AODT (Area)</th>
<th>TSTAT (Area)</th>
<th>CTOT</th>
<th>ADT (Area)</th>
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</thead>
</table>

- Airport Systems (AODB, FIDS, CUTE, etc.)
- Airlines and Ground Handlers’ Systems
- Meteorological Information
- Surface Surveillance A-SMGCS
A-CDM: MILESTONE APPROACH

Link between Landings and Takeoffs

**Target Off-Block Time**
- Specific for each departing flight
- Continuous update (Airline’s responsibility)
- Impacted by multiple *stakeholders* (Cleaning, Catering, Refueling, Passenger Boarding, Aircraft Airworthiness, etc.)

**Target Start-up Approval Time**
- Issued by ATC for each departing flight
- A function of TOBTs
- Takes into account RWY configuration, Approach Volume, ATC restrictions, slots, Taxi Time and maximum size of takeoff cue
- Optimization of Airport capacity - fuel savings and reduced CO2 emission
A-CDM: MILESTONE APPROACH

Link between Landings and Takeoffs
A-CDM: MILESTONE APPROACH

Link between Landings and Takeoffs
A-CDM: DEPARTURE SEQUENCING

Automated Construction of Departure Sequence

- **Maximization** of RWY usage
- **Configurable** Parameters
  - RWY in use
  - RWY Capacity
  - Maximum Takeoff cue length
- Allows airlines to **re-sequence their own flights** prior to TSAT issue
- Adoption of **Variable Taxi Times**
- Considers operational restrictions and limitations (**Wake Vortex**, **Balance of Exit fixes**, etc.)
- Continuous Validation of **planning integrity**
A-CDM: DEPARTURE SEQUENCING

Automated Construction of Departure Sequence

Departure management list with Target Start-up Approval Times (TSATs)

Runway Configuration Tool

Slot Management Tool
A-CDM, INDUSTRY RESULTS

Benefits Vs Costs

B/C Ratio = 91.32/10.86 = 9

https://www.eurocontrol.int/sites/default/files/content/documents/nm/airports/acdm-cba.pdf
A-CDM, INDUSTRY RESULTS

https://www.eurocontrol.int/sites/default/files/content/documents/nm/airports/acdm-cba.pdf
A-CDM BEST PRACTICES

Engage All Stakeholders as of Day One!

1. Airport Operators
2. Airlines
3. ATC Provider
4. Ground Handlers

Dully Empowered A-CDM Steering Committee
A-CDM BEST PRACTICES

Develop a jointly agreed Long Term Implementation Plan

1. Situation Awareness
2. Data Sharing
3. Milestone Approach (Gradual)
4. Departure Sequencing (by ATC)

Dully Empowered A-CDM Steering Committee

THINK, PLAN, AGREE... and then BUY!
SAAB - SITUATION AWARENESS & A-CDM, WORLDWIDE

AEROBAHN - CDM PLATFORM
SURFACE MULTILATERATION (> 500 Millions Pax/year)

Atlanta: 82 Millions
Frankfurt: 58 Millions
Heathrow: 70 Millions
Gatwick: 34 Millions
Charles de Gaulle: 80 Millions
Hong Kong: 61 Millions
Dubai: 66 Millions

SAAB - SITUATION AWARENESS & A-CDM, WORLDWIDE
A3000 A-CDM PLATFORM (> 90 Airports)

ASDE-X
Airport Surface Detection Equipment
Mode X
35 Airports
+ 9 to be implemented!
SURFACE MULTILATERATION ( > 500 Millions Pax/year )

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SAAB - SITUATION AWARENESS & A-CDM, WORLDWIDE

AEROBAHN A-CDM PLATFORM

29 Deployments World Wide
- 19 in USA
- 4 in Europe
- 1 in South America
- 5 in Asia Pacific

Deployed at 12 of the 30 top airports in the world*
More than 1.500.000 operational user hours

*ACI statistics 2015
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