SITUATION AWARENESS

& A-CDM

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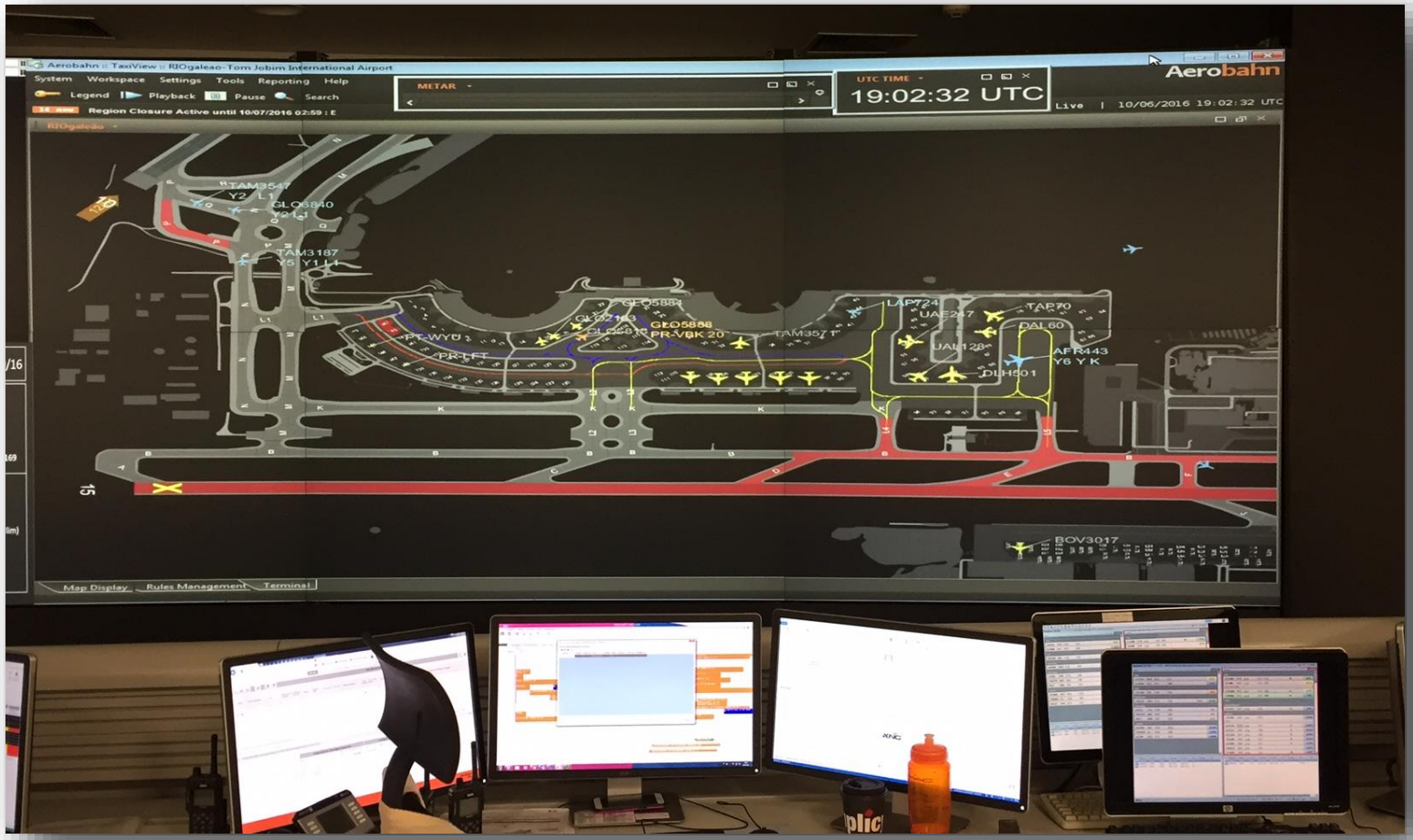
AGENDA

- **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

SURFACE

*That´s what **A-CDM** is all about !*

WHY TALK ABOUT SITUATION AWARENESS ?

Atlanta Hartsfield Jackson (ATL)

Surface Surveillance Platform
Implemented in 2010

	Annual Savings			
	Taxi Duration	Schedule Delay	Operating Cost	Passenger Time
Arrivals	12,400 hrs	12,400 hrs	$19 million/yr	$54 million/yr
Departures	24,000 hrs	52,000 hrs	$78 million/yr	$224 million/yr
Total	36,400 hrs	64,400 hrs	$97 million/yr	$278 million/yr

Aerobahn Benefits Assessment at ATL Airport

Version: 1

October 23, 2013

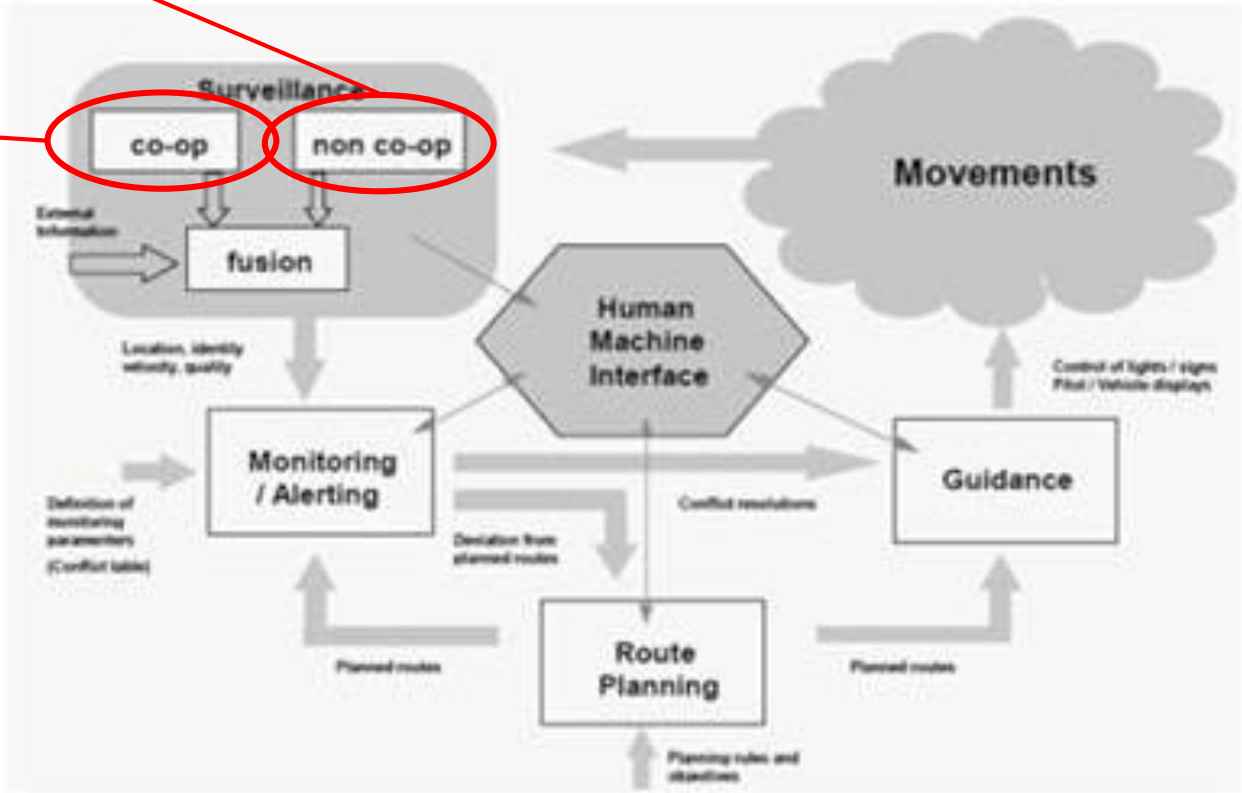
Prepared for:

The City of Atlanta Department of Aviation

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

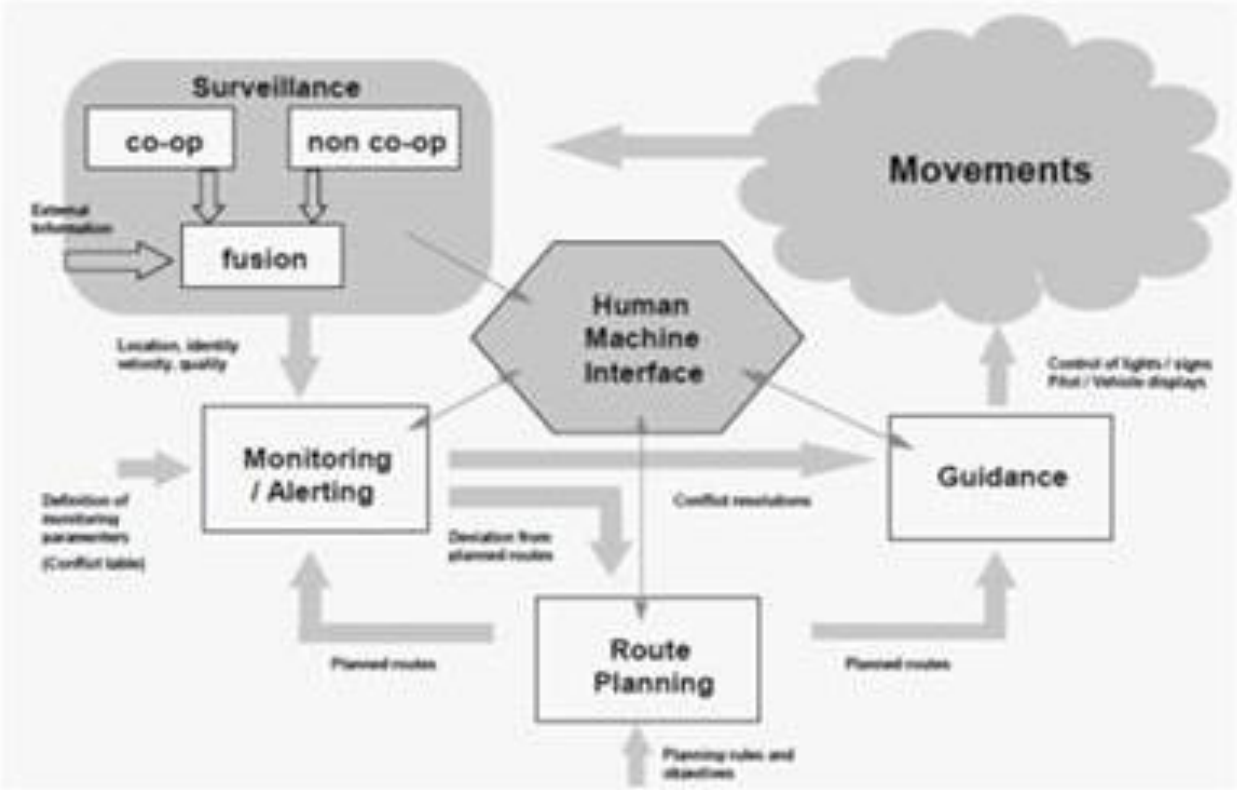


SITUATION AWARENESS IN LATIN AMERICA

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

ATC Perspective

Safety with no Prejudice do **Efficiency**

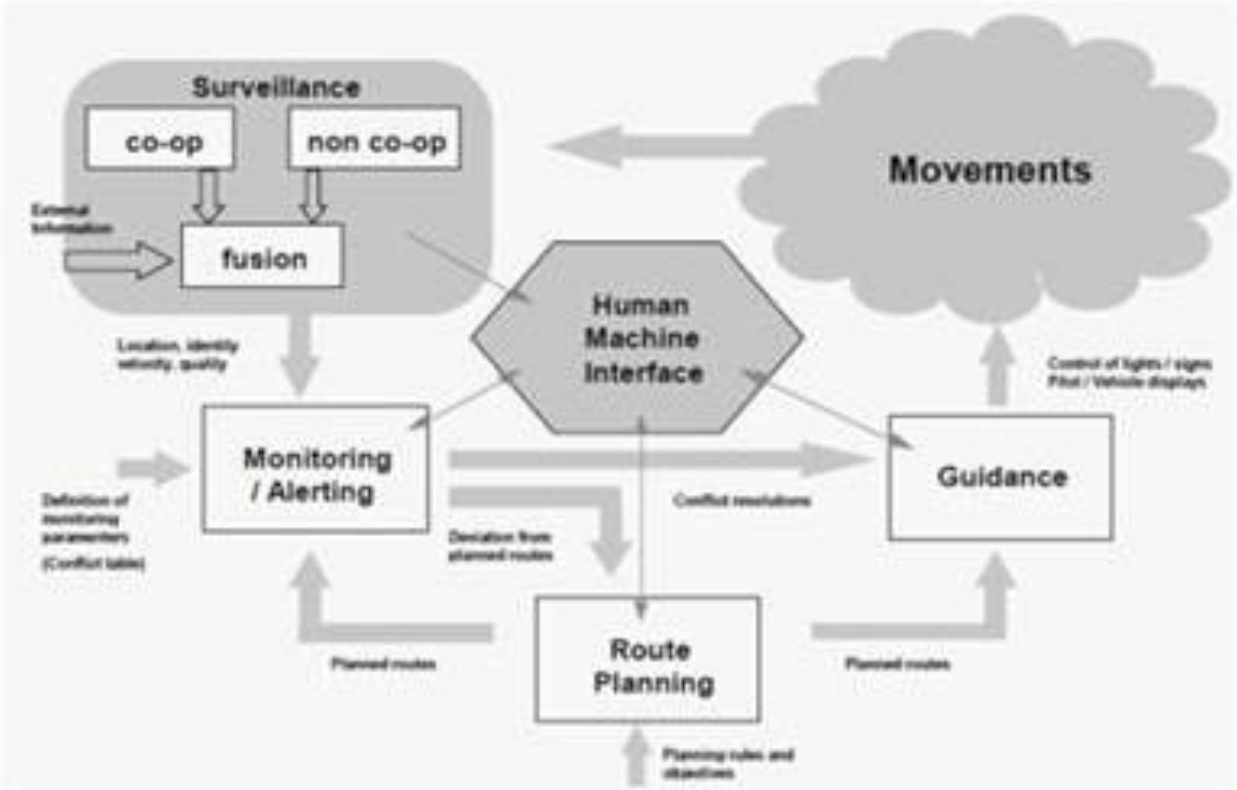
Airport Operator and Airlines´ Perspective

Efficiency with no Prejudice to **Safety**

Surface Surveillance Platform

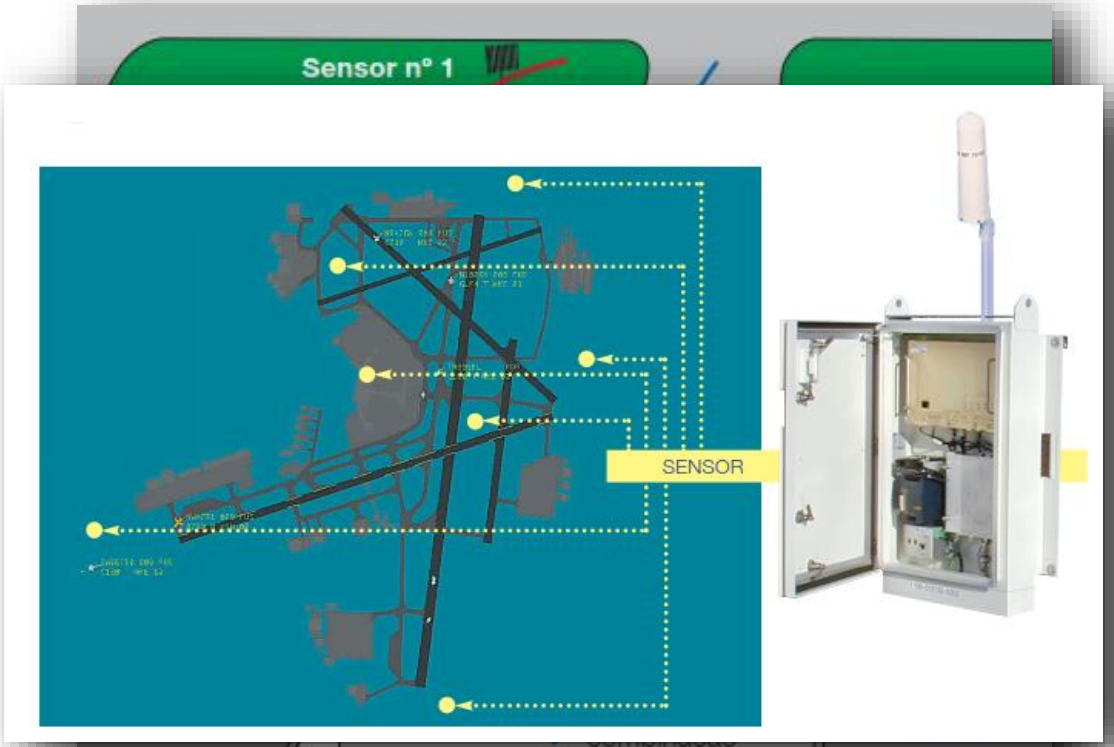
A-SMGCS

ICAO 9830 / Eurocae ED-117 C



SITUATION AWARENESS TOOLS

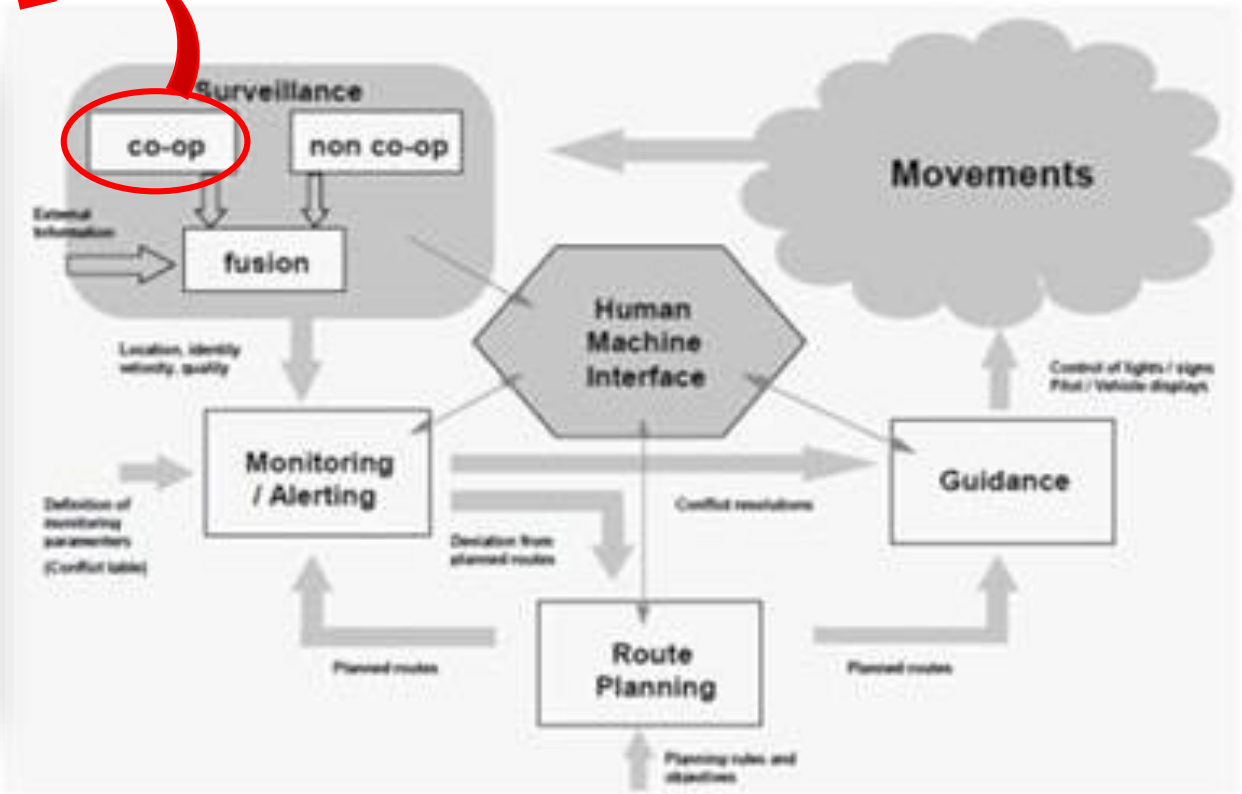
Multilateration



Surface Surveillance Platform

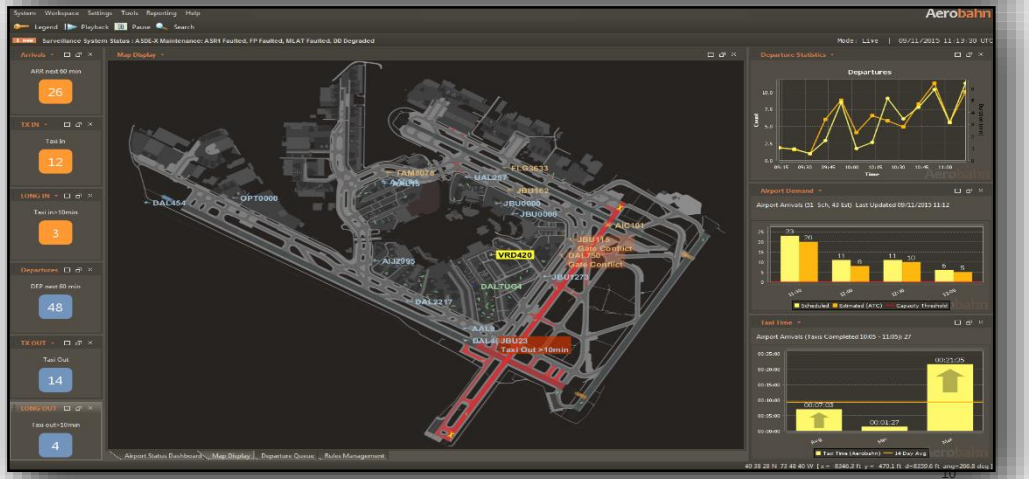
A-SMGCS

ICAO 9830 / Eurocae ED-117 C

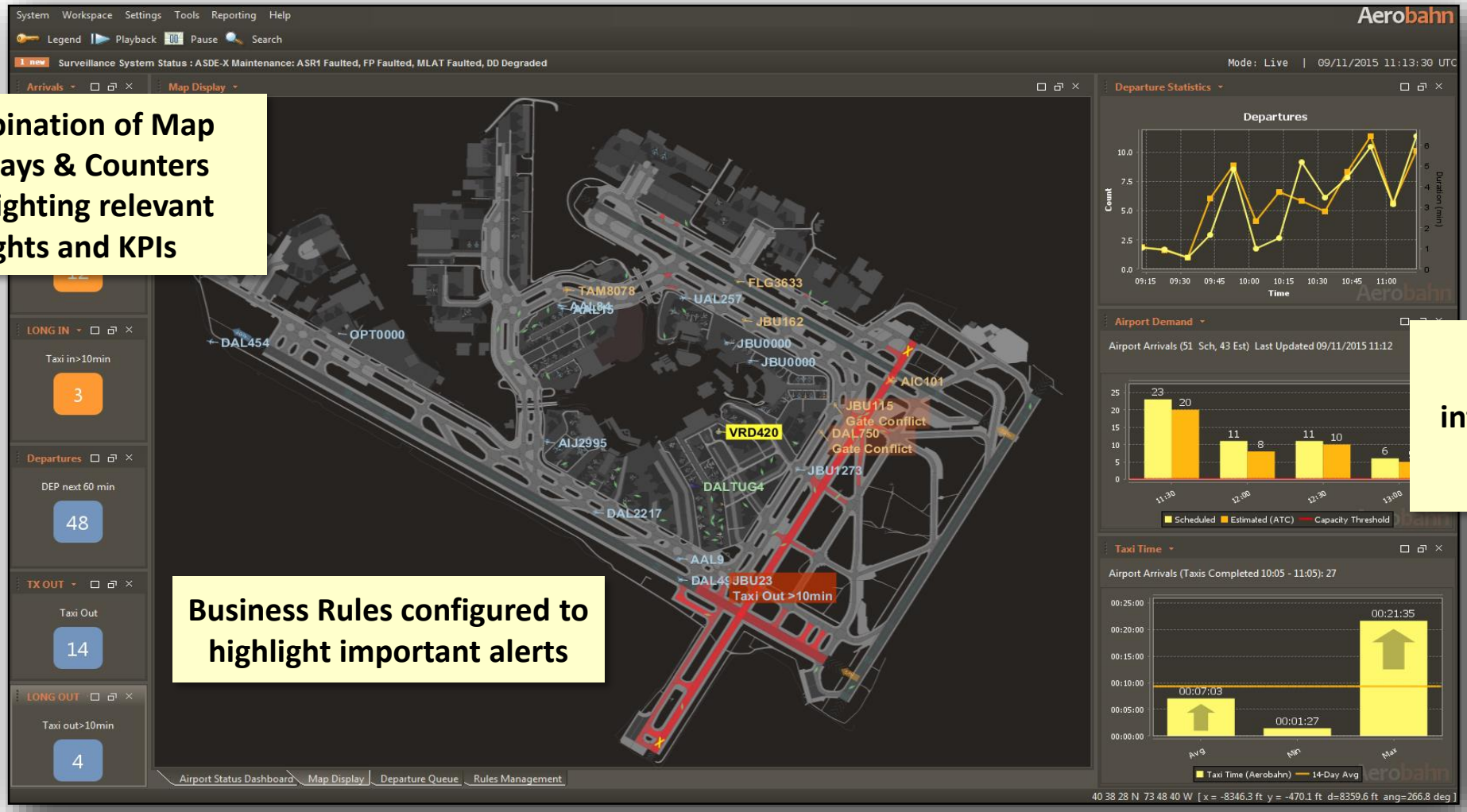


SITUATION AWARENESS TOOLS

- **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

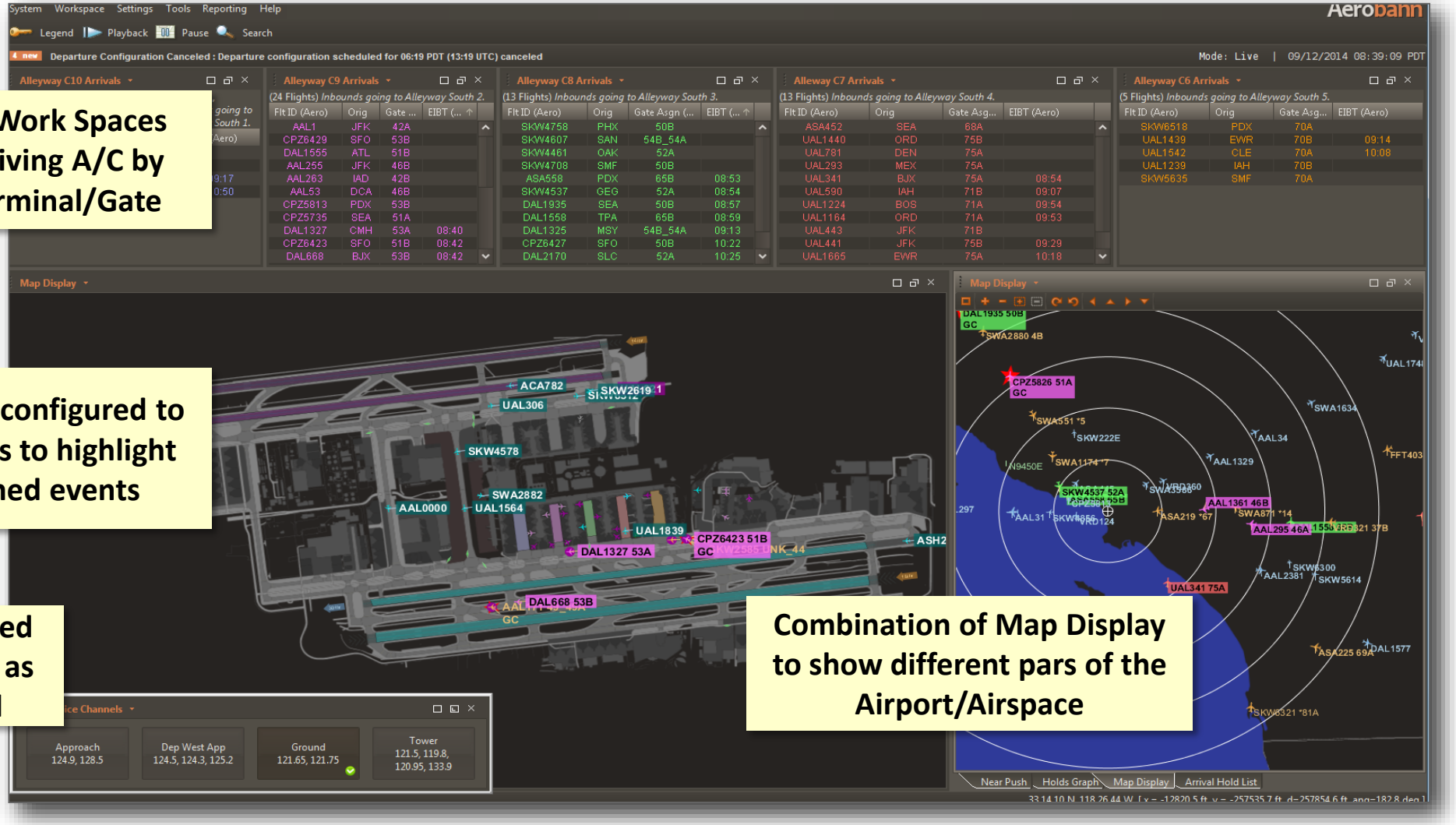
SITUATION AWARENESS TOOLS

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 ?

http://www.eurocontrol.int/sites/default/files/pressrelease/141105-A-CDM%20infographic-1.pdf

WHY GO FOR A-CDM ?

NEW YORK JFK CASE STUDY

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

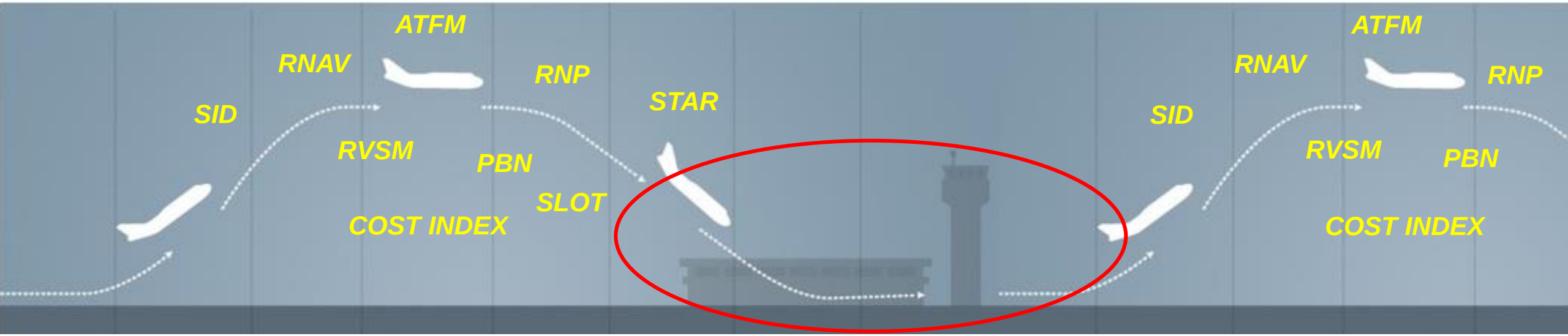
DEPARTURE SAVINGS PER MONTH

Savings Type	2012
Taxi-out Time	2,100 hours
Fuel	1.0 million kg
Fuel Cost	$1.0 million
CO_2 Emissions	3,200 metric tons
Take-off Delay	2,400 hours
Passenger Time	12,600 person-days
Passenger Time @ $30/hr	$9.0 million

ARRIVALS SAVINGS PER MONTH

Savings Type	2012
Taxi-in Time	700 hours
Fuel	0.3 million kg
Fuel Cost	$0.3 million
CO_2 Emissions	1,100 metric tons
Arrival Delay	700 hours
Passenger Time	3,700 person-days
Passenger Time @ $30/hr	$2.6 million

A-CDM, THE CONCEPT

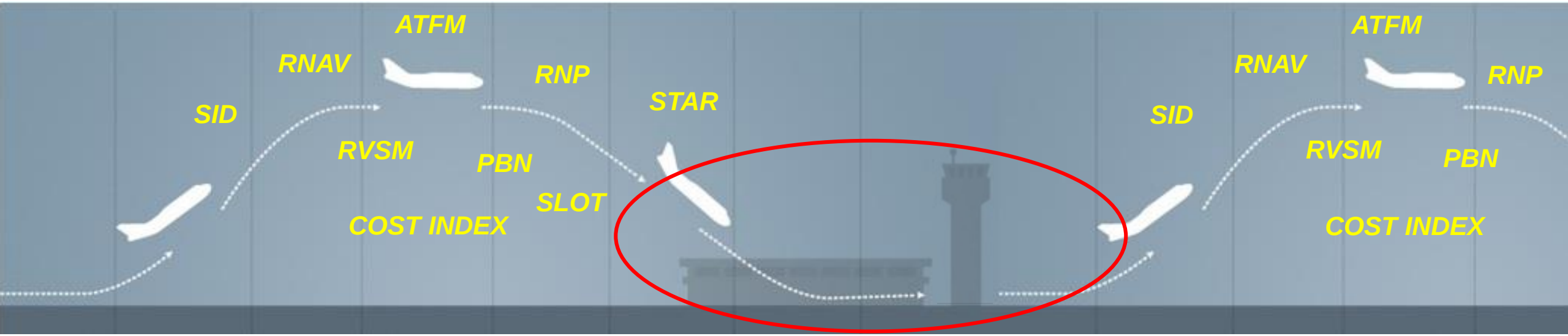


A-CDM, THE CONCEPT

Landside

- ✓ AODB
- ✓ RMS
- ✓ FIDS
- ✓ CUTE
- ✓ CUSS

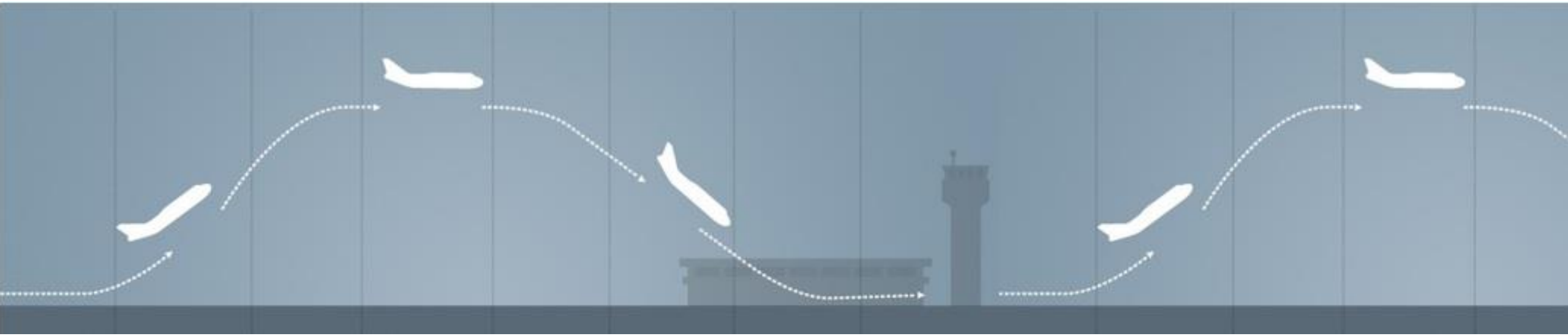
A-CDM, THE CONCEPT



- ✓ Approach Radar
- ✓ ATC Flight Plan System
- ✓ Electronic Strip
- ✓ Surface Movement Radar

ATC

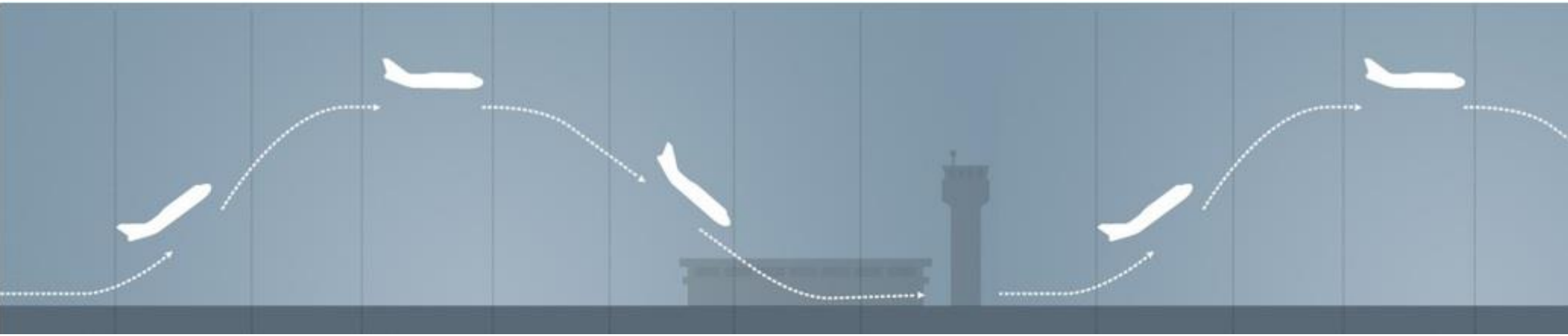
A-CDM, THE CONCEPT



Landside

ATC

A-CDM, THE CONCEPT

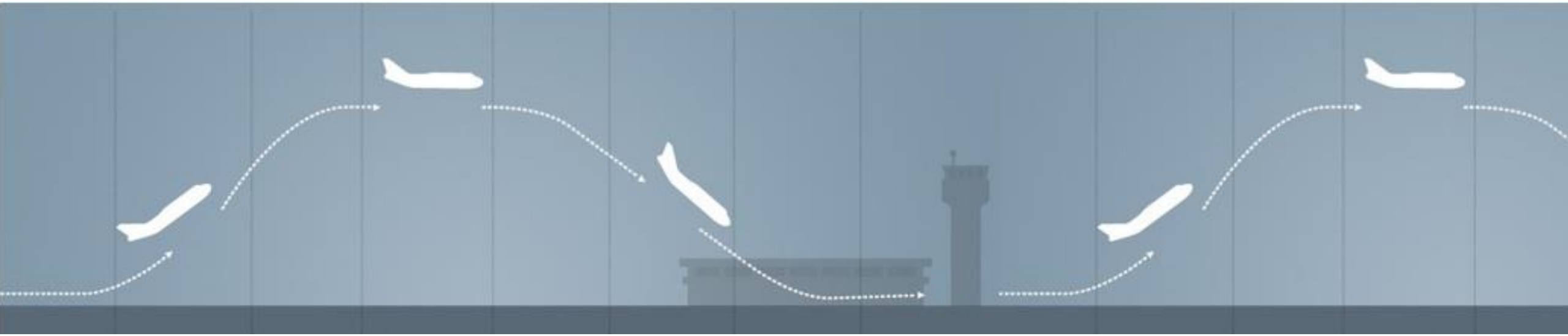


Landside

Fuel Waste / CO2 Emission

ATC

A-CDM, THE CONCEPT



Landside

Flight Delays

ATC

A-CDM, THE CONCEPT

Landside

ATC

A-CDM ELEMENTS

I. Data Sharing

a. *Stakeholders´* committment 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

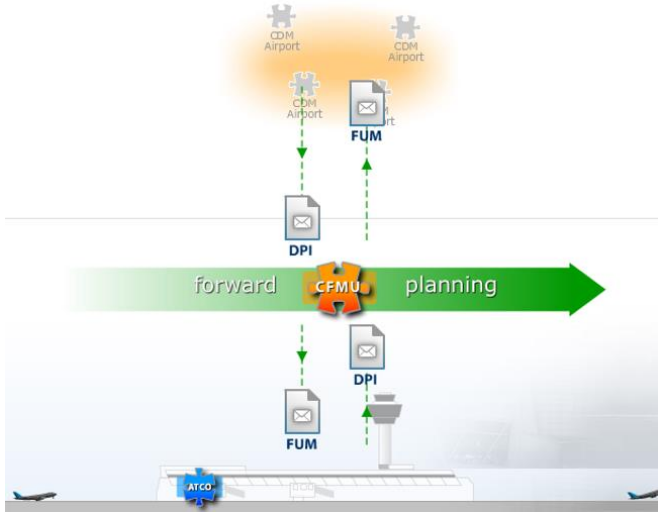
III. Departure Sequencing

a. Adoption (**by ATC**) of automated Departure Sequencing Tool

b. Variable Taxi Time

Permanent Integration between

Airports and Air Traffic Flow Management



- **FUM**s (*Flight Update Messages*) - ATFM > Airport on **Arriving flights**
- **DPI**s (*Departure Planning Information*) Airport > ATFM on **Departing flights**

A-CDM: DATA SHARING

- Common-use Data Platform

Data gruped by Aircraft Registration

A-CDM Flight State

Call Sign Inb	AIR	FNL	Flt ID (Aero)	AC Type (Aero)	Dest	Reg	EOBT (Aero)	TOBT (Aero)	AOBT (Aero)	TSAT (Aero)	TTOT (Aero)	CTOT	ATOT (Aero)	IBK	BRD	OBK	DEP
DAL556			DAL450	B738	STI	N3730B	13:34	13:30	13:34	14:04	14:12		13:52				
DAL1830			DAL461	B752	SXM	N670DN	13:36	13:30	13:36	13:54	14:05		14:13				
DAL722			DAL484	B738	AUA	N391DA	13:36	13:31	13:36	14:10	14:20		14:18				
DAL2455			DAL493	B738	SDQ	N3741S	13:37	13:30	13:37	13:55	14:05		14:07				
DAL2652			DAL437	A319	BDA	N345NB	13:40	13:38	13:40	14:17	14:29		14:23				
DAL948			DAL465	B752	STT	N672DL	13:46	13:45	13:46	13:57	14:05		14:33				
DAL780			DAL489	B738	PUJ	N387DA	16:00	15:55		16:00	16:08						
DAL312			DAL426	B738	LAS	N3760C	16:04	15:59		16:04	16:13						
DAL2464			DAL2824	B712	RDU	N991AT	16:05	16:00		16:05	16:12						
DAL2058			DAL2792	MD88	MCO	N996DL	16:05	16:22		16:05	16:12						
DAL782			DAL453	B738	SLC	N3733Z	16:05	16:00		16:05	16:14						
DAL1947			DAL2456	B738	FLL	N379DA	16:15	16:10		16:15	16:24						
DAL931			DAL2311		MIA	N317NB	16:33			16:33	16:39						
DAL2032			DAL2593		TPA	N315NB	16:45			16:45	16:51						
DAL1162			DAL458		LAX	N718TW	16:45			16:45	16:54						
DAL408			DAL473	B772	NRT	N860DA	17:03			17:03	17:12						
DAL500			DAL487	B738	SDQ	N3765	17:04			17:04	17:13						
DAL326			DAL438		SJU	N807DN	17:09			17:09	17:22						
DAL475			DAL2600		FLL	N346NB	18:35										
DAL2068			DAL2799		MCO	N318NB	18:35										
DAL1112			DAL452		STI	N380DA	19:00										
DAL2510			DAL43		SJU	N3742C	20:00										
DAL217			DAL429		SDQ	N374DA	20:04										
DAL2810			DAL2827		PBI	N3773D	20:05										
DAL1947			DAL2152	MD88	FLL	N978DL	20:43										
DAL1264			DAL436		SLC	N706TW	20:53										

Airport Systems
(AODB, FIDS, CUTE, etc.)

Airlines´ and Ground Handlers´ Systems

Meteorological Information

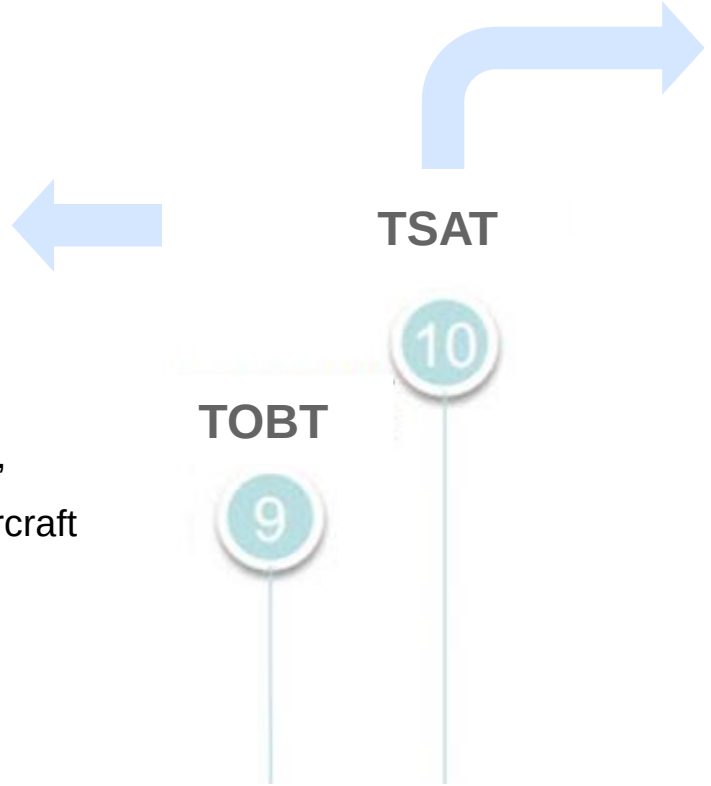
Surface Surveillance A-SMGCS

A-CDM: MILESTONE APPROACH

Link between Landings and Takeoffs

Target Off-Block Time

- ✓ Specific for each departing flight
- ✓ Continous update (Airline´s responsibility)
- ✓ Impacted by multiple *stakeholders* (Cleaning, Catering, Refueling, Passenger Boarding, Aircraft Airworthiness, etc.)

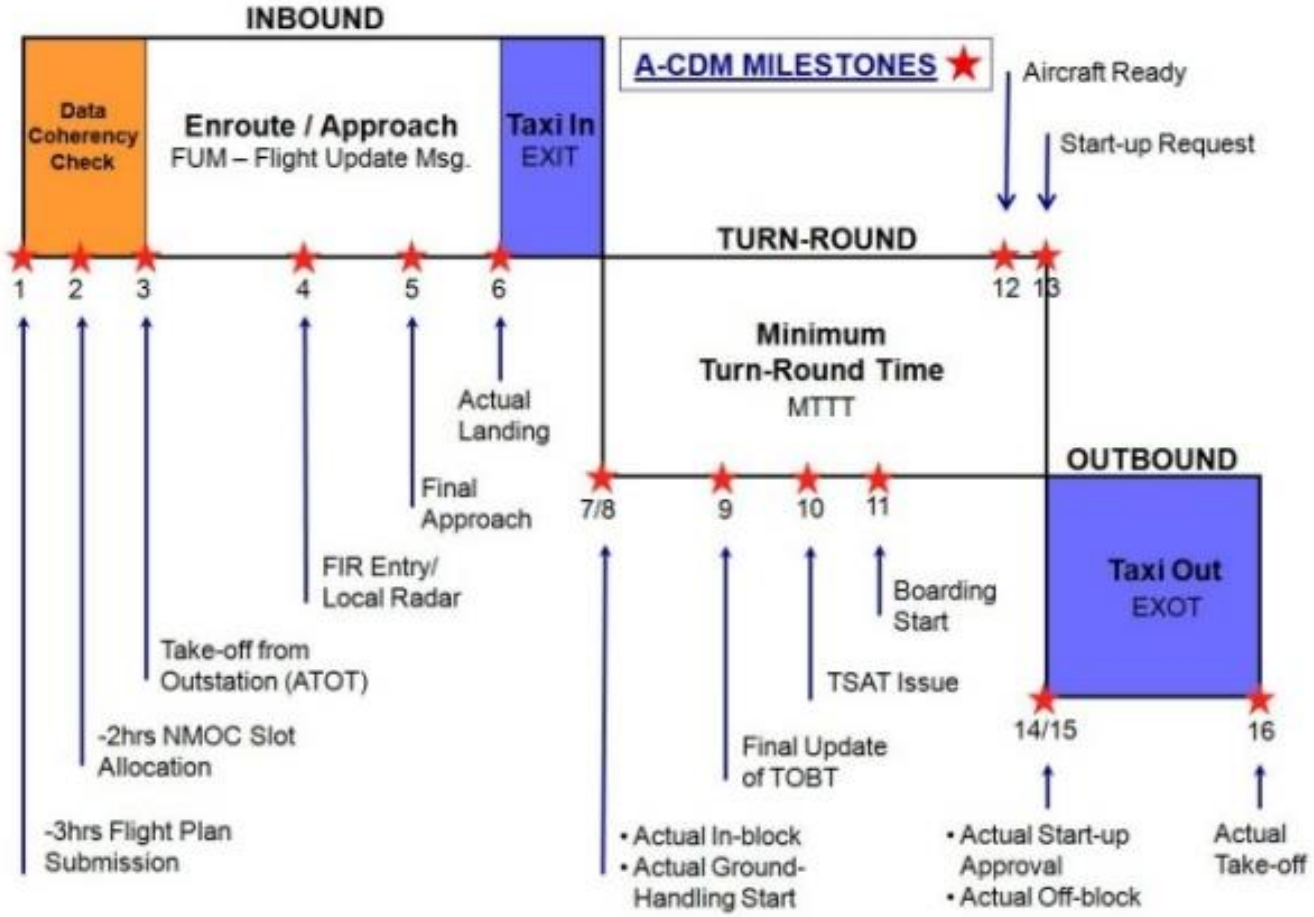


Target Start-up Approval Time

- ✓ 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

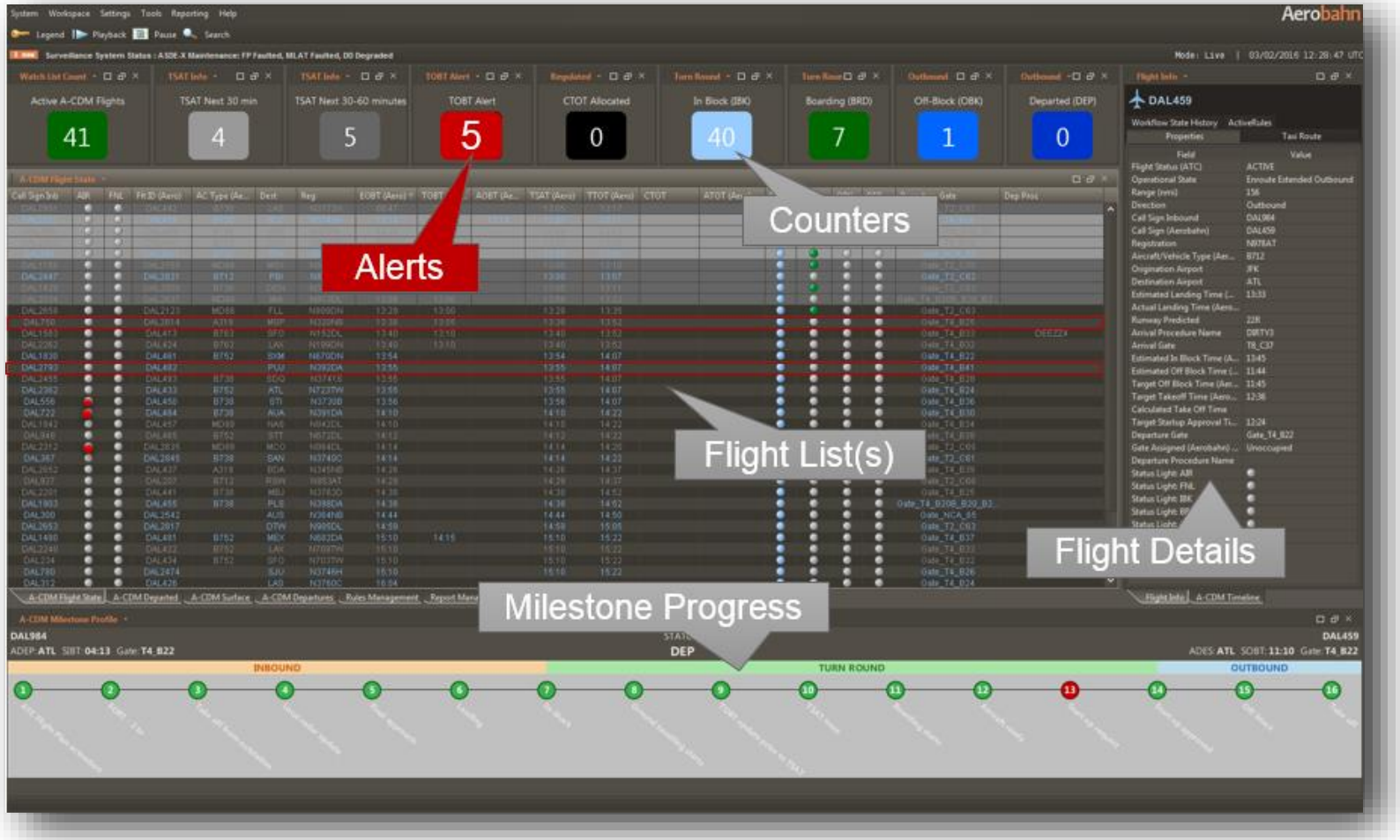
A-CDM: MILESTONE APPROACH

Link between Landings and Takeoffs



A-CDM: MILESTONE APPROACH

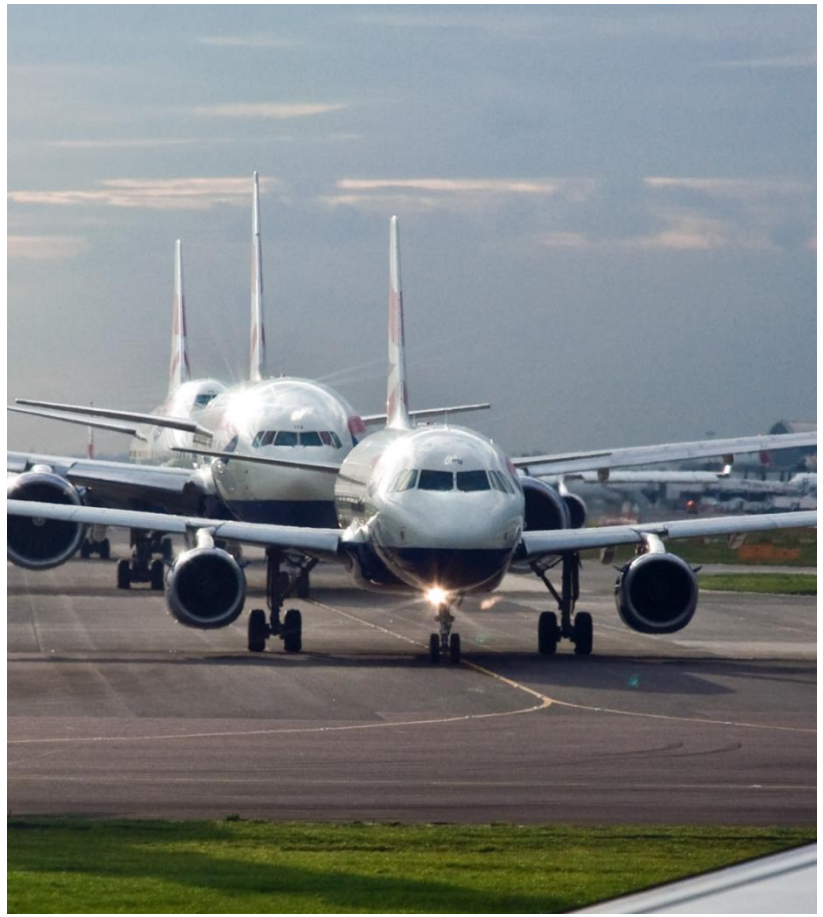
Link between Landings and Takeoffs



A-CDM: DEPARTURE SEQUENCING

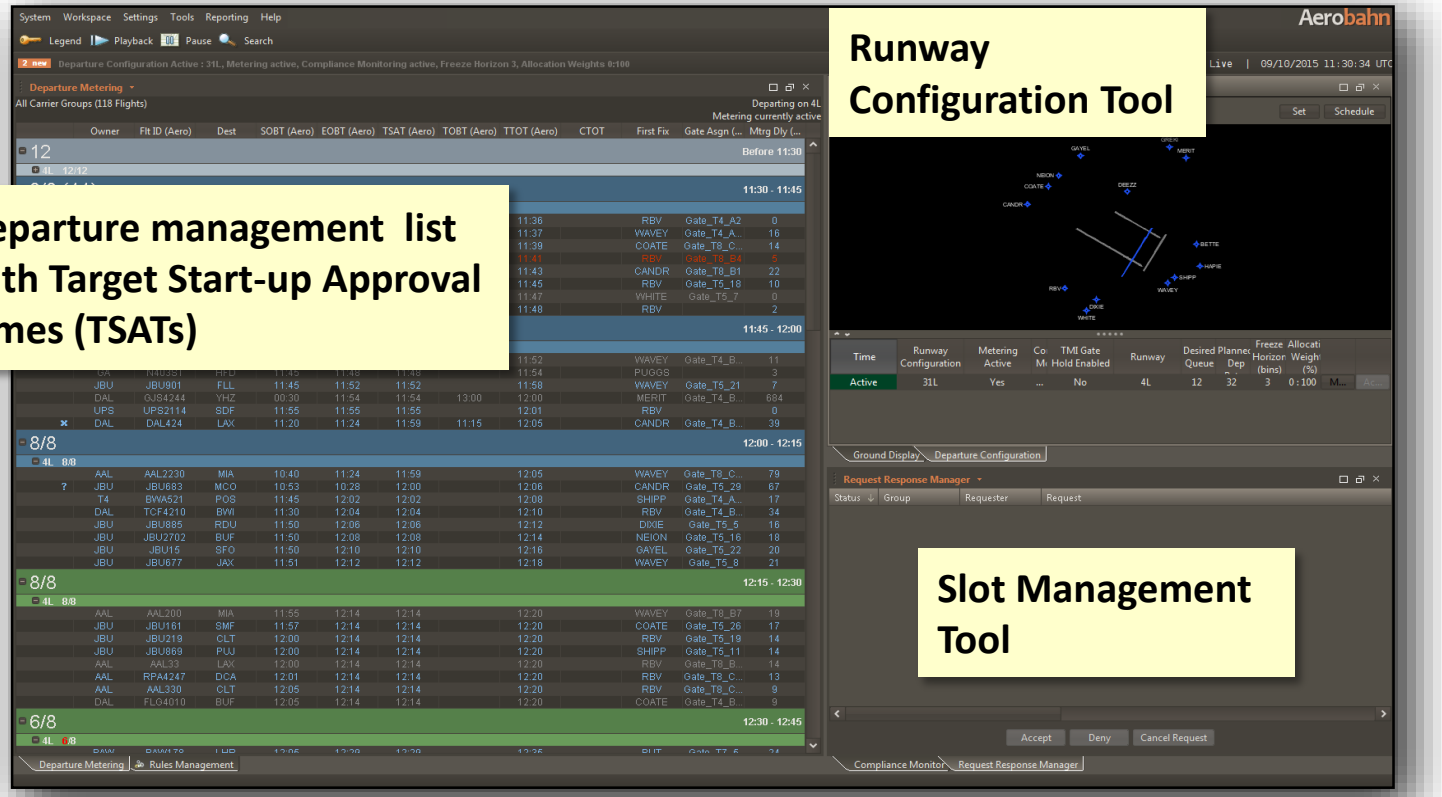
Automated Construction of Departure Sequence

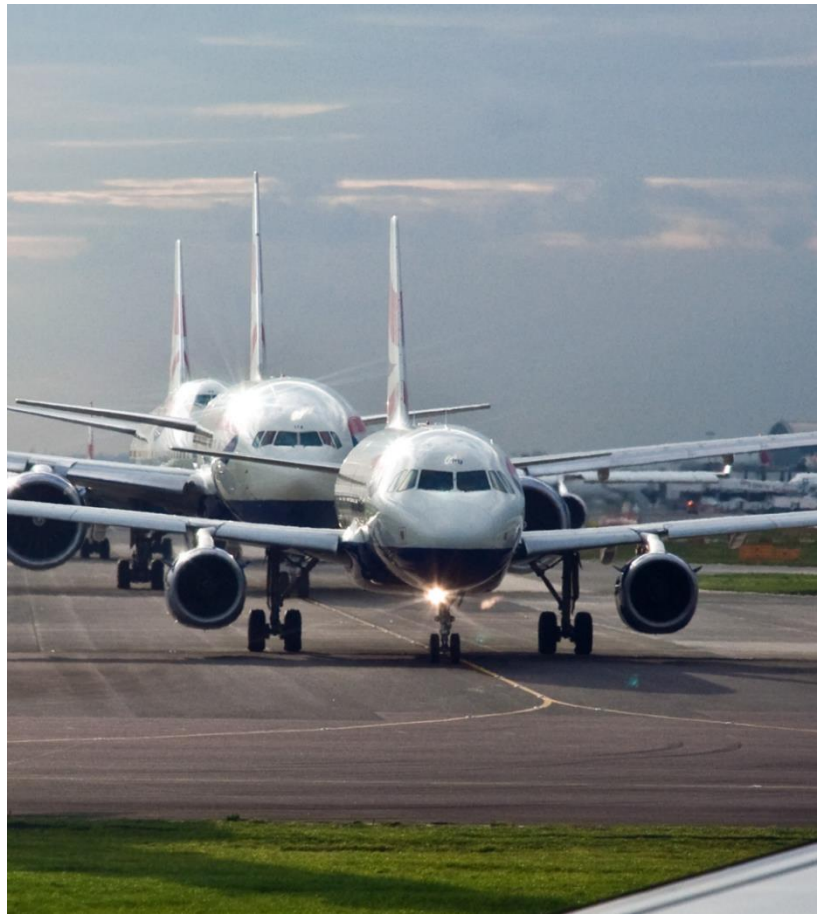
- **Maximization** of RWY usage
- **Configurable** Parameters
  - RWY in use
  - RWY Capacity
  - Maximum Takeoff cue length
- Allows airlines to **re-sequence their own flights** prior to TSAT issue
- Adoption of **Variable Taxi Times**
- Considers operational restrictions and limitations (**Wake Vortex**,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



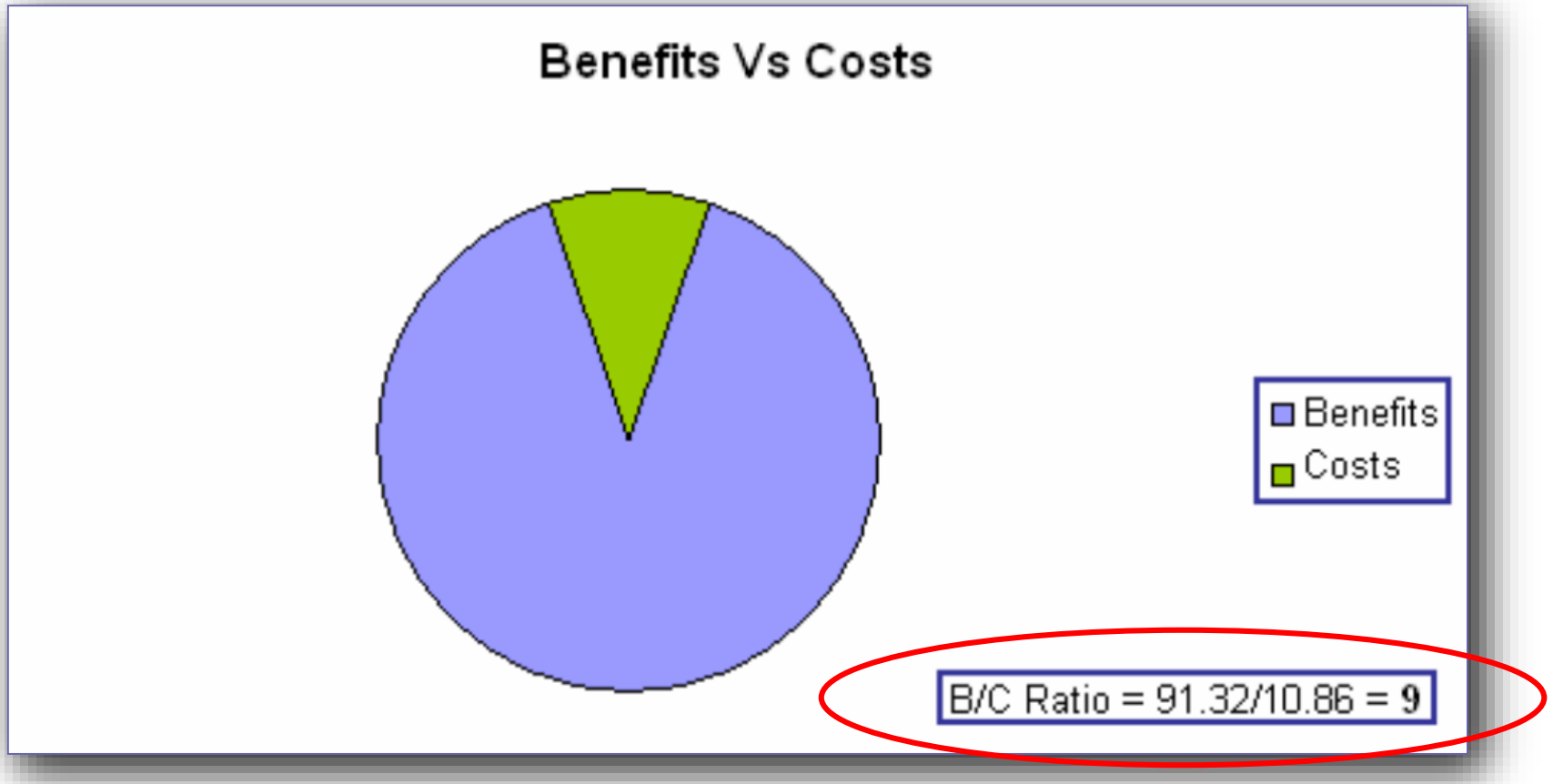
A-CDM: DEPARTURE SEQUENCING

Automated Construction of Departure Sequence





A-CDM, INDUSTRY RESULTS



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

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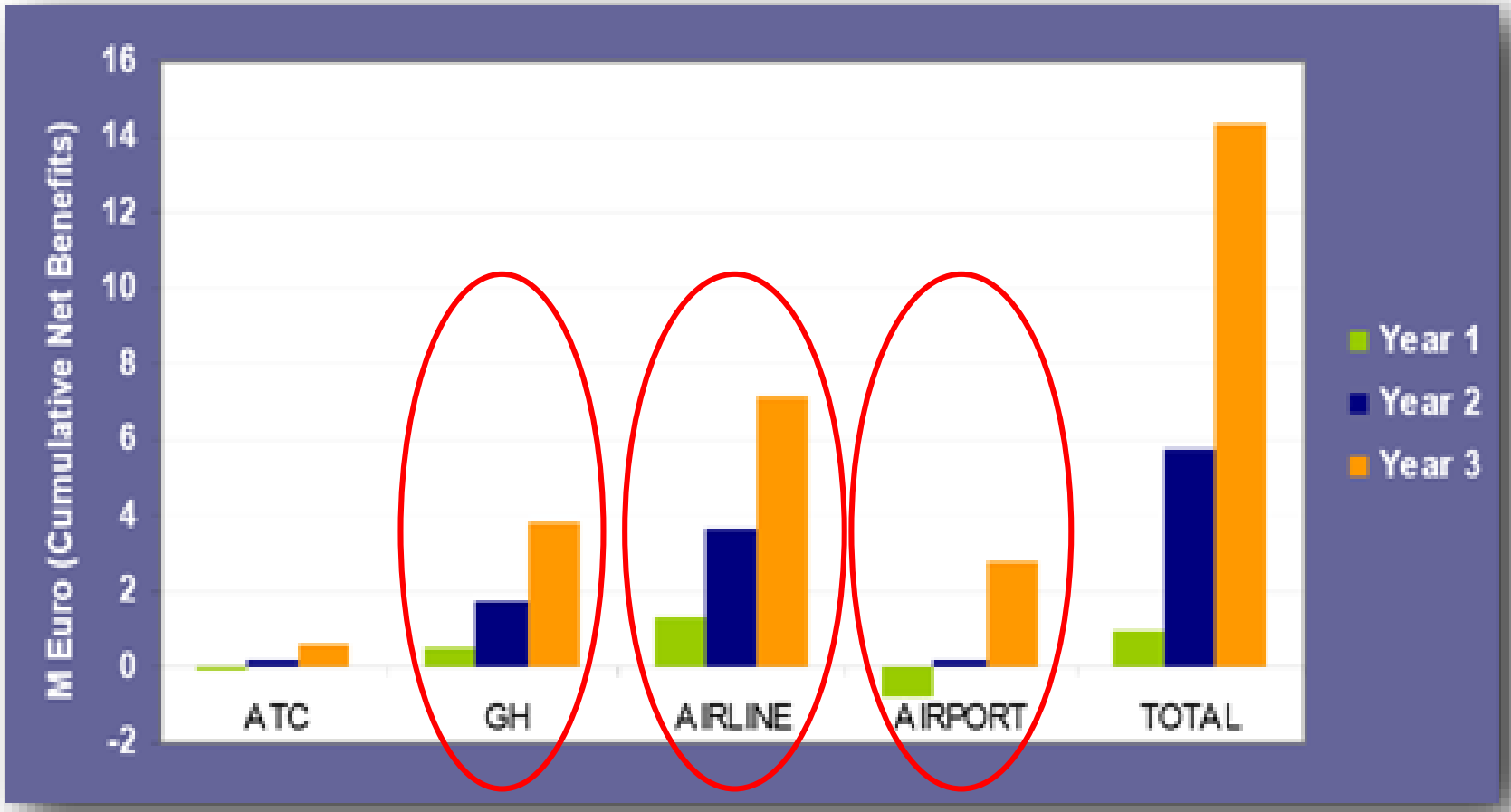


https://www.eurocontrol.int/sites/default/files/content/documents/nm/airports/acdm-cba.pdf

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

SURFACE 3000 AESA RADAR (15 MTOPS)

A-CDM (15 MTOPS)

(Max 6M/year)

ASDE-X

Airport Surface Detection Equipment

Mode X

35 Airports

+ 9 to be implemented !

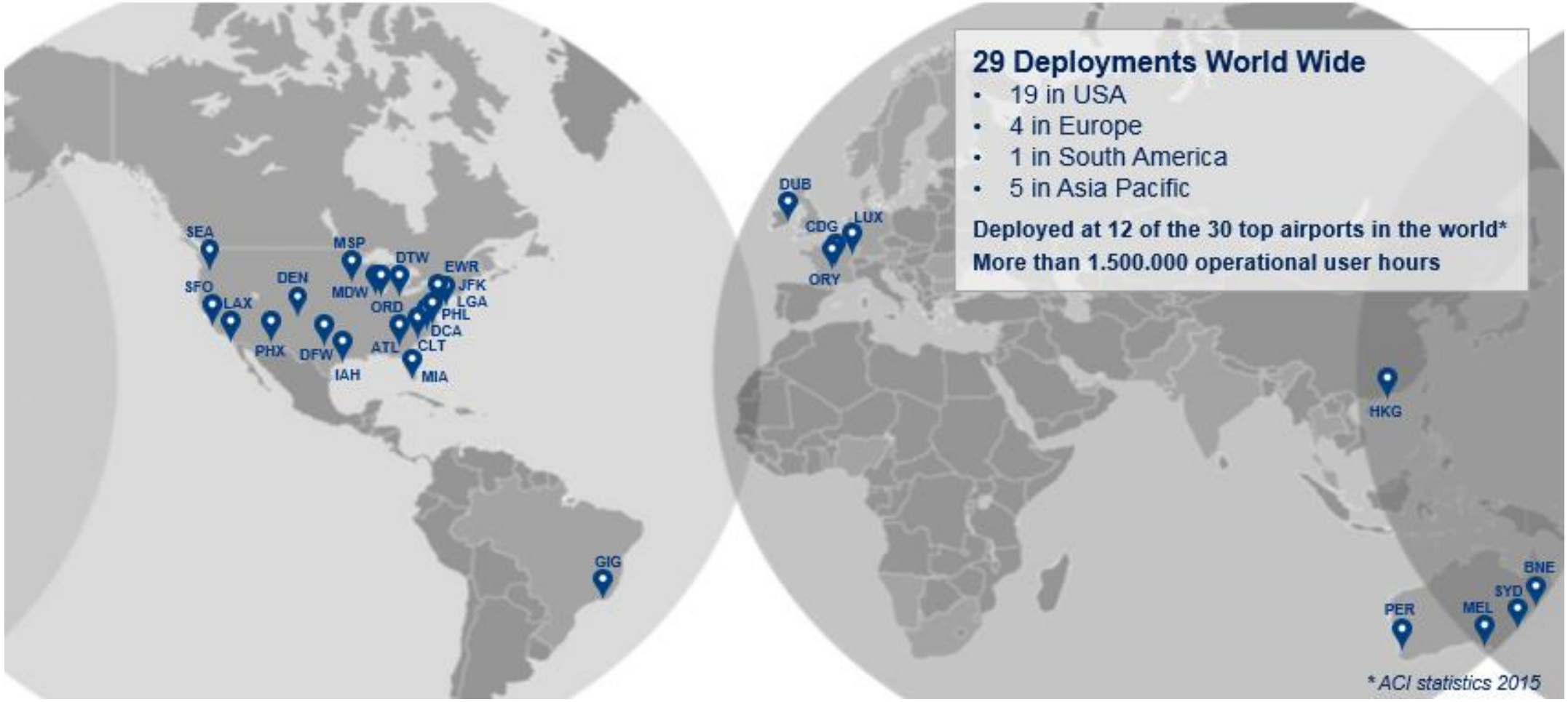
SAAB - SITUATION AWARENESS & A-CDM, WORLDWIDE

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

AEROBAHN A-CDM PLATFORM



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