



**ICAO A-CDM Seminar  
Sao Paulo, Brazil, 19-21  
October 2016**

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**ACI view on benefits and challenges of A-  
CDM implementation at airports**

**Daniel Bircher, Chief Operation Officer,  
Belo Horizonte International Airport**

**on behalf of ACI World**



# SCOPE OF PRESENTATION

## Part A

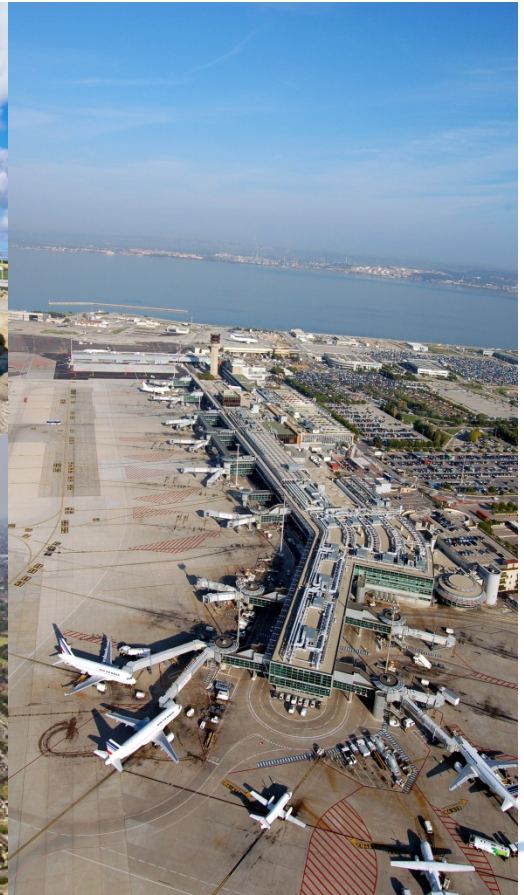
- Need for A-CDM
- A-CDM - Aims
- A-CDM Partners
- Airport Operators – Strong Involvement
- Co-operation with ICAO
- ACI View and Support

## Part B

- Practical Application
  - Operational Efficiency
  - Airport Operations Control Center
  - Information Sharing



# PART A: What is A-CDM





# Growth in Air Travel and Airports

- ■ ■ ACI forecasts that the number of air passengers will double to more than 12 billion (arr and dep) by 2031
- ■ ■ airports - the nodes of flight networks – are more and more becoming bottlenecks to the overall ATM-system
- ■ ■ as airports become busier:
  - ■ ■ real-time airport operations management gets more difficult
  - ■ ■ potential for disruption to normal operations and impact on passengers increases
- ■ ■ many airports that are increasingly facing capacity constraints are challenged with growing performance matters, thus enhancing the operational efficiency of existing aerodrome and terminal infrastructure is an important objective for airports.
- ■ ■ airports need to constantly monitor operations and identify and solve problems before they escalate into protracted disruptions and crises.

# Challenges (1)

- ■ ■ Improve common situational awareness between the airport partners



## Challenges (2)

- ■ ■ Enhance predictability of airport operations



Origin	Time	Remarks	Airline
London	10:11a	On Time	JL
London	8:08a	Arrived	SN
London	10:13a	Now 10:00a	EI
London	10:13a	Now 10:00a	C
London	12:20p	Now 12:10p	
London	12:20p	Now 12:10p	
Brussels, Belgium	11:25a	Now 11:59a	
Brussels, Belgium	12:00p	Now 11:45a	
Chicago O'Hare	12:00p	On Time	
Dublin	1:00p	On Time	
Dublin	1:00p	On Time	
Hong Kong	11:05a	On Time	
Hong Kong		On Time	

## Challenges (3)

- ■ ■ Optimise the utilisation of airport resources



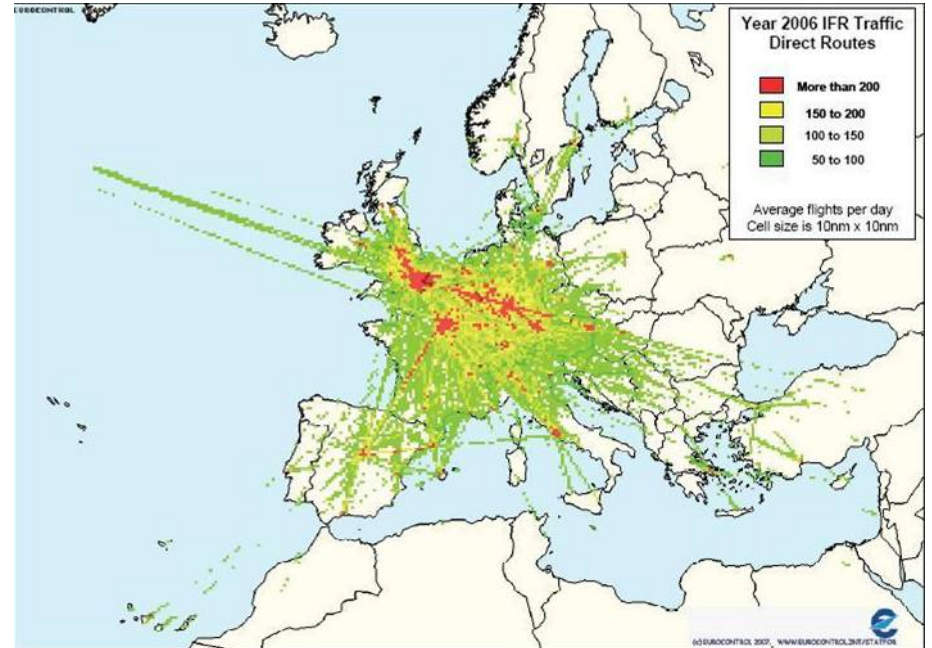
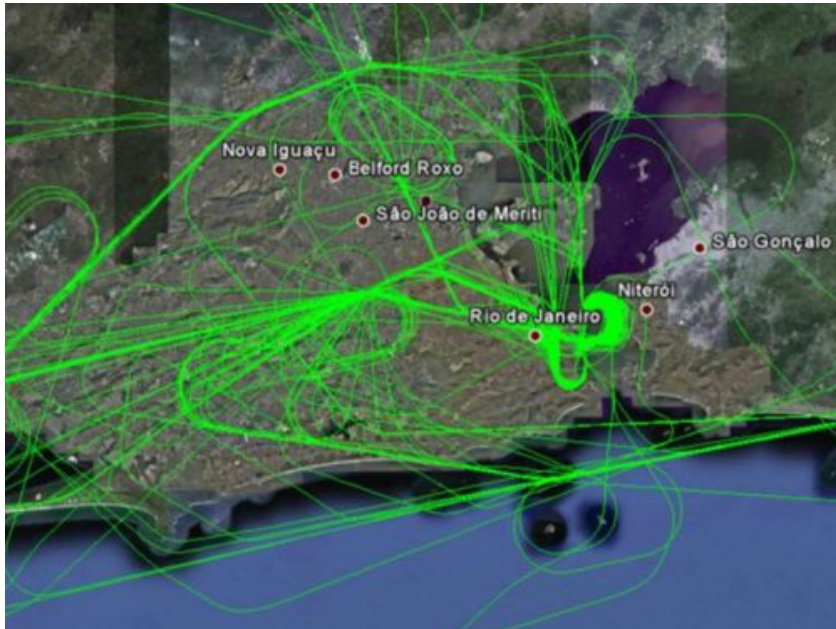
## Challenges (4)

- ■ ■ Limit the environmental impact of airport operations



# Challenges (5)

- ■ ■ Better integrate the airports into the ATM Network





## Need of the hour: A-CDM

- ■ ■ **Airport-CDM is about improving operational efficiency of all airport partners at aerodromes by**
  - ■ ■ reducing delays
  - ■ ■ streamlining the predictability of events during the progress of a flight
  - ■ ■ optimization the utilization of resources
  - ■ ■ making most of existing capacity and will
  - ■ ■ have major benefits during Irregular Operations (IROPS) and adverse conditions
  - ■ ■ reduce kerosene consumption and both CO<sup>2</sup> and noise emissions
  
- ■ ■ **Partnership between Airport-Operators, Air-Traffic Control, Aircraft-Operators, Ground-Handlers, which**
  - ■ ■ use a common platform for sharing flight information, thus creating a common situational awareness
  - ■ ■ agree on and stick to a set of operational rules, procedures and automated process

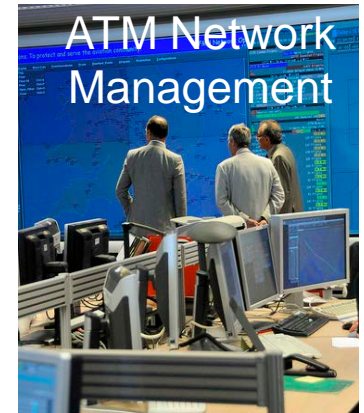
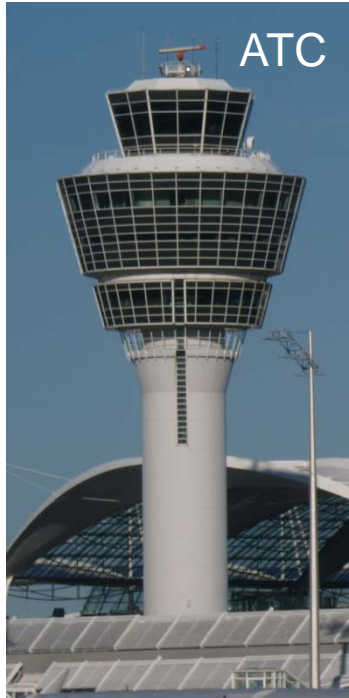


## A-CDM Aims

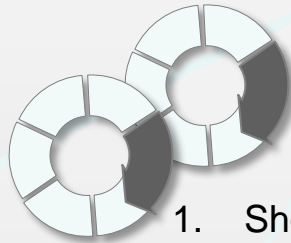
- ■ ■ Collaborative set-up of a pre-departure sequence taking into account aircraft operators preferences and operational constraints
- ■ ■ Achieve a common situational awareness by tracking the progress of a flight from planning to take-off
- ■ ■ Creation of a accurate Target Take Off Time
- ■ ■ Departure Planning Information messages (DPIs) into the network management and flight update messages (FUMs) from the network management to the airports, thus improving en-route and sector planning as well as airport turn-round planning
- ■ ■ Complements en-route CDM and Air Traffic Flow Management (ATFM) across a country or region.
- ■ ■ Longer-term aim is to extend the reach of A-CDM into landside operations, including ground handling and airport passenger and baggage processes



# Airport-CDM Partners



# Benefits



## AIRPORT PERFORMANCE

1. Improved Punctuality
2. Improved Predictability of operations
3. Better Information Sharing
4. Better fixed resources' utilization
5. Improved slot adherence
6. Reduced Congestion

## ENVIRONMENTAL BENEFIT

1. Reduction in Fuel Emissions > reduction in Co2 emissions and Footprints
2. Benefit to entire local community

## AIR TRAFFIC CONTROL

1. Better Pre-Departure Sequencing
2. Improved predictability of Traffic
3. Reduction in error and work load

## AIRLINES

1. Shorter Taxi Times; reduction in fuel wastage > cost savings
2. Growing Traffic
3. Improved turn around time, hence better fleet utilization > cost savings
4. Reduced delays > cost saving > customer satisfaction
5. Seamless Transit of the Passengers

## GHAs

1. Better Planning and use of resources > less cost > more profit
2. Improved customer satisfaction



# Benefits Example 1– Environmental (ZRH)

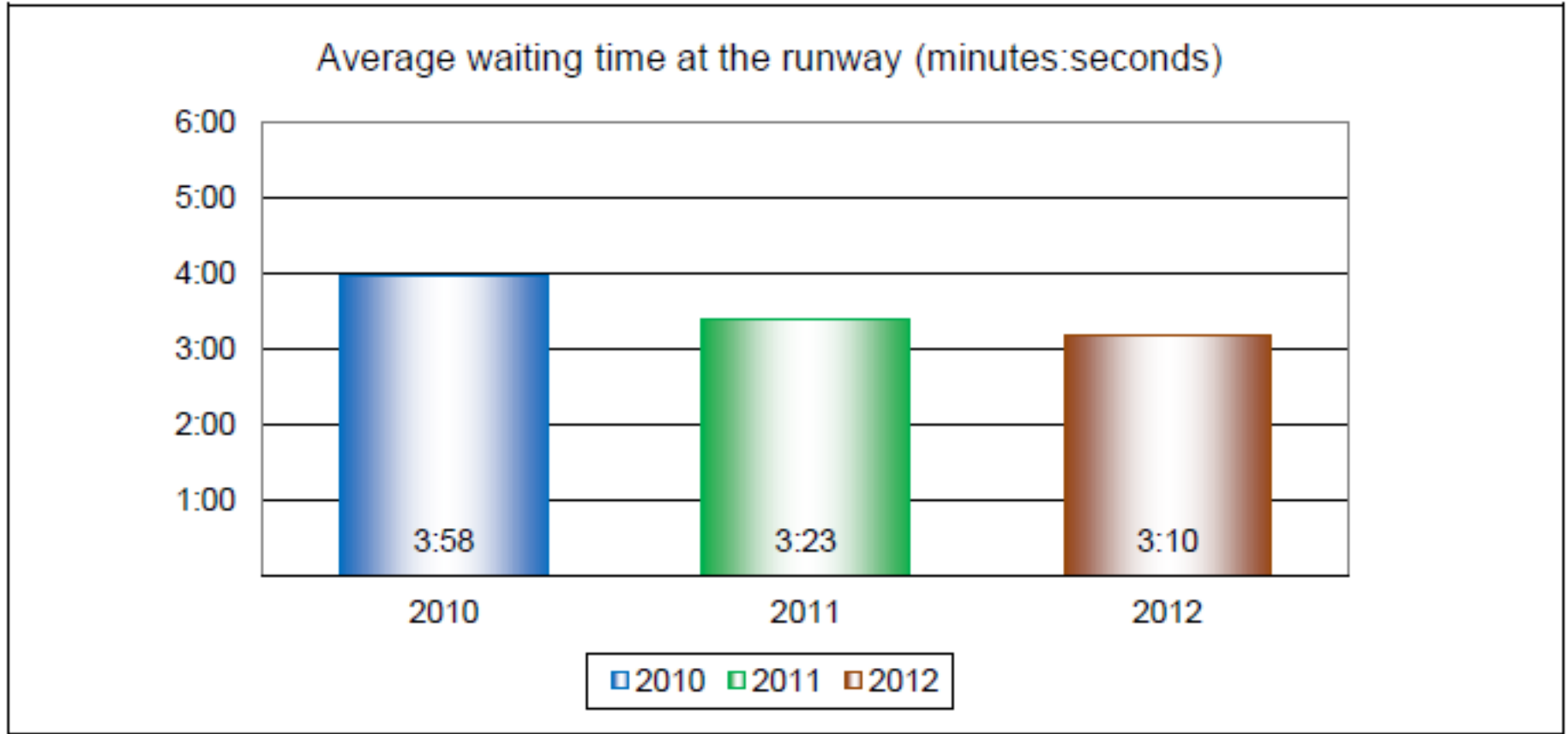
Emission Reductions	DARTS 2004	A-CDM 2014	% of all taxi-emissions	Cumulative Benefits
Reduction of CO <sub>2</sub>	3,620 t	3,680 t	1.4%	7,300t
Reduction of NOx	4 t	4.8 t	0.5%	8.8 t
Reduction of HC	4 t	4.4 t	3.0%	8.4 t
Reduction of CO	34 t	34.9 t	3.0%	78.9 t
Reduction of PM	na	0.1 t	1.1%	na

Table 2 Environmental Benefits

Local ACDM Implementation

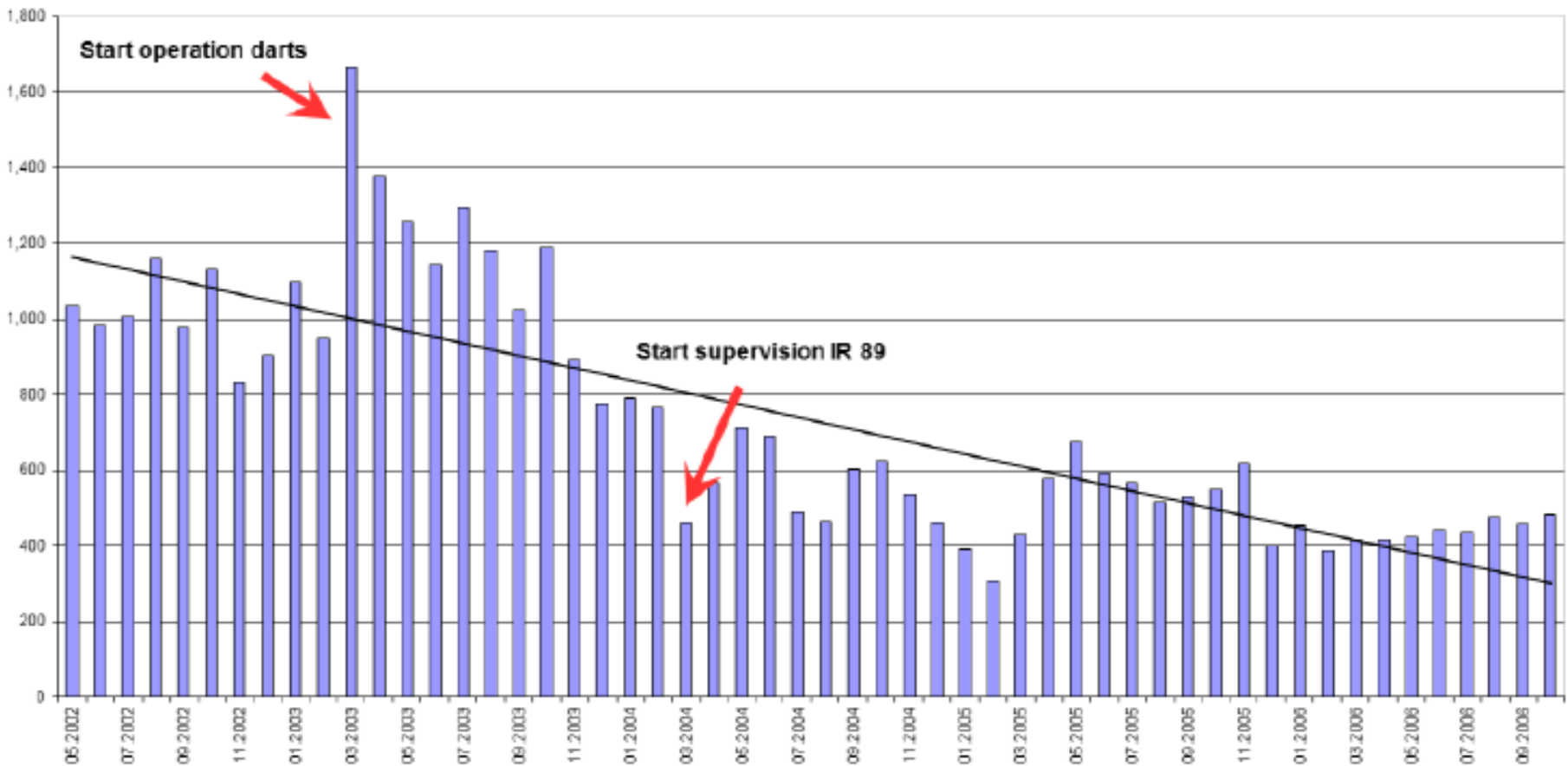
Full ACDM Implementation  
(-40sec avg. taxi time)

# Benefits Example 2- Operational (MUC)



# Benefits Example 3 – Operational (ZRH)

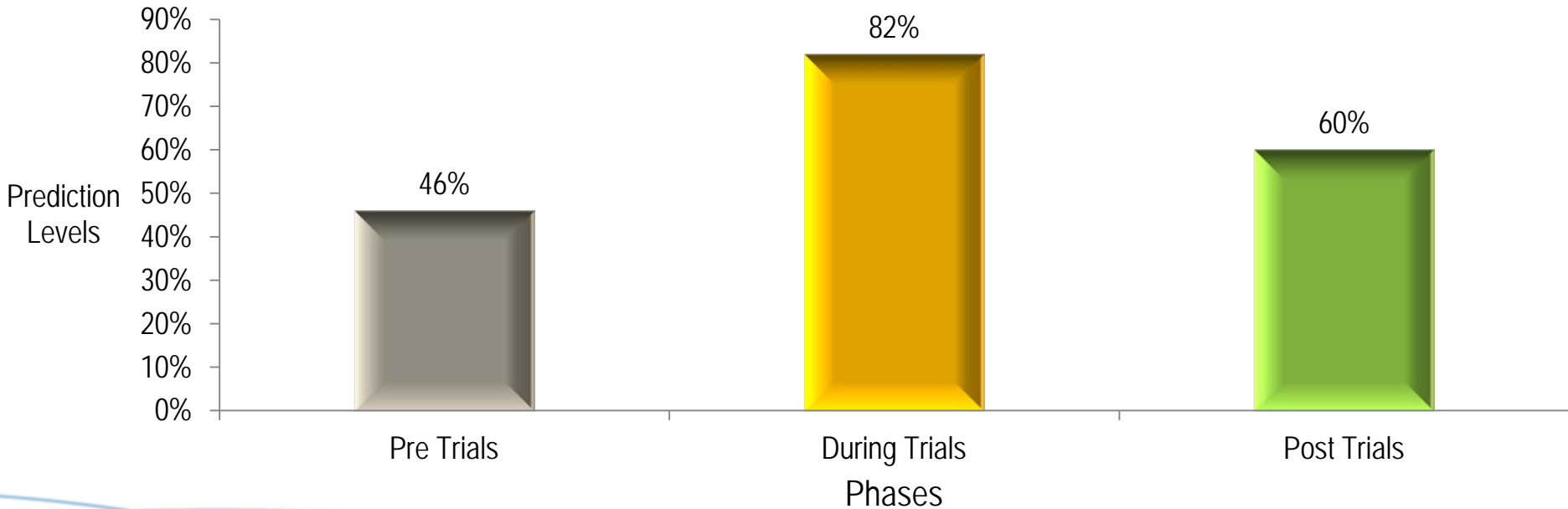
## Trend of Start-up delays at Zurich Airport





# Benefits Example 4 – Predictability (BLR)

### Average TOBT Prediction Levels

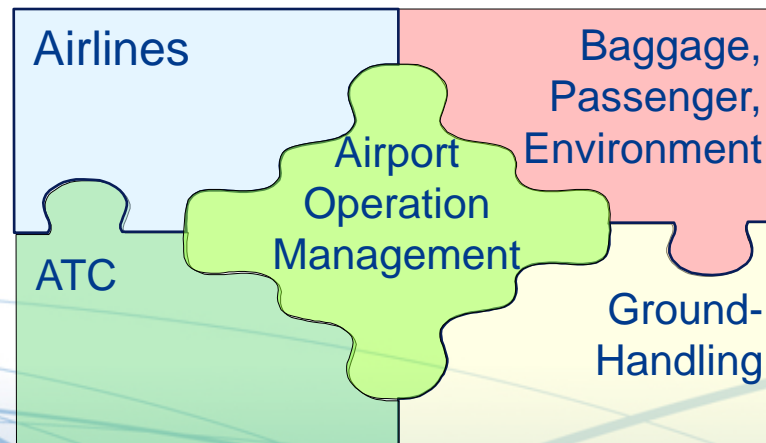


Graph: Courtesy Kempegowda International Airport, Bengaluru



## Airport Operators – Reasons for strong involvement

- ■ ■ Airports are the overall owner and responsible body for the airport performance
- ■ ■ As ground coordinators they have the most neutral view on all airport stakeholders interests
- ■ ■ They have the most comprehensive overview of the overall status status of operation (stands, gate, baggage, safety, environment, etc.)
- ■ ■ Airports are the airports flight data integrator and provider

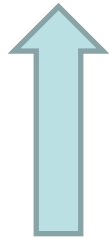




# CDM Evolution and Integration

Example

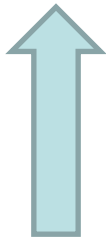
Inter-Continental



**Inflight CDM**  
**ICAO - System Wide**  
**Information Management**  
**(SWIM)**

ICAO  
Aviation System  
Block Upgrades

Regional



**Inflight CDM**  
**Regionally**  
**integrated A-CDM**

EUROCONTROL  
ACI EUROPE  
A-CDM

NEXT GEN  
(US)

Airport

**Stand-alone A-CDM**  
**Airside**

**Landside / Airside**  
**integration**

Local ACDM  
projects








# Eurocontrol's concept of A-CDM elements


- ■ ■ Milestones
- ■ ■ Variable taxi time
- ■ ■ Pre-departure sequencing
- ■ ■ Adverse conditions
- ■ ■ Flight updates

## Airport CDM Concept Elements


(Airport CDM) Information Sharing is essential in that it forms the foundation for all the other elements and must be implemented first.  

**5**  Collaborative Management of Flight Updates enhances the quality of arrival and departure information exchanges between the Network Operations and the CDM airports.

**4**  (CDM in) Adverse Conditions achieves collaborative management of a CDM airport during periods of predicted or unpredicted reductions of capacity.

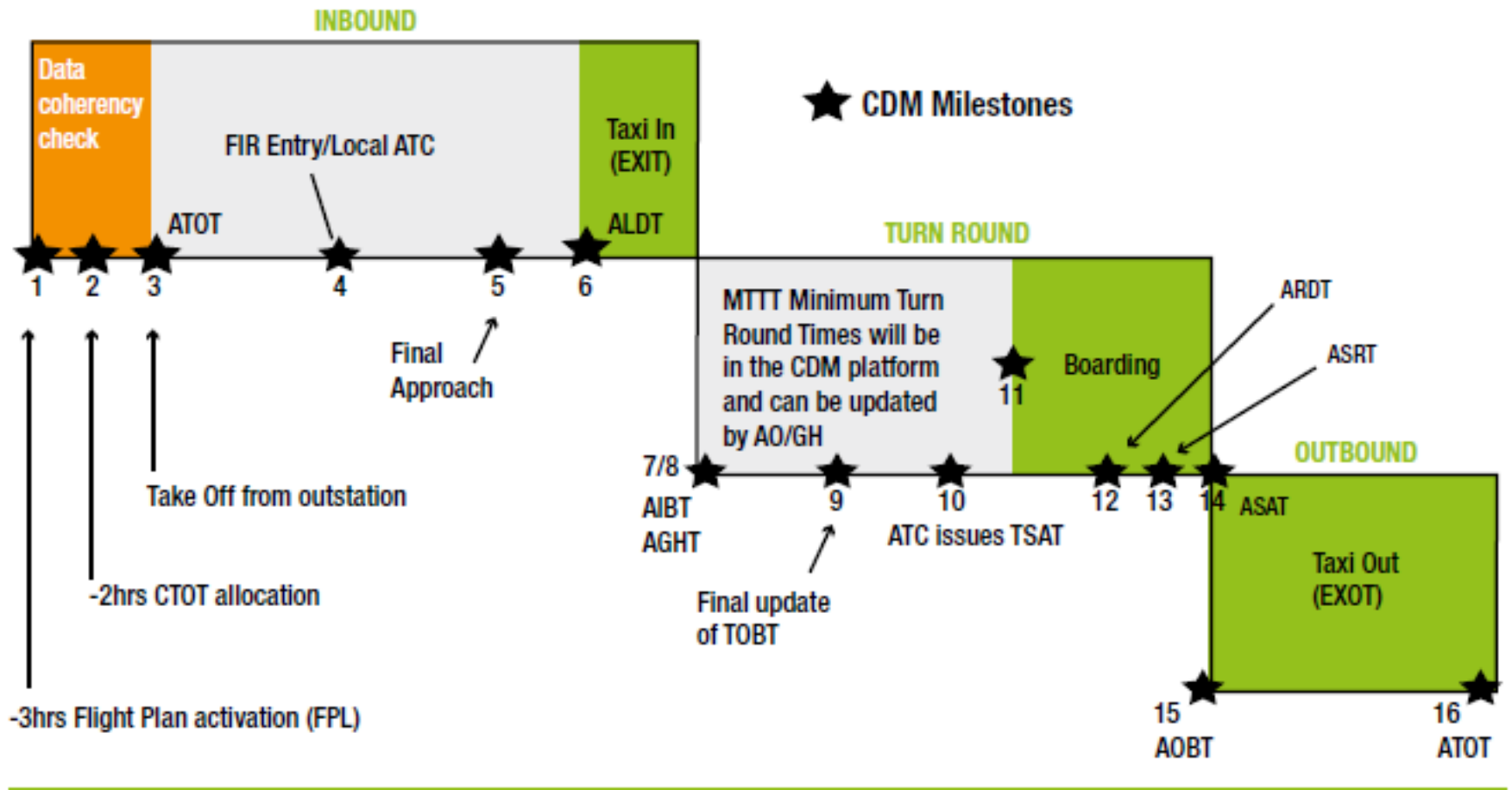
**3**  (Collaborative) Pre-departure Sequence establishes an off-block sequence taking into account operators preferences and operational constraints.

**2**  Variable Taxi Time is the key to predictability of accurate take-off in block times especially at complex airports.

**1**  The Milestones Approach (Turn-Round Process) aims to achieve common situational awareness by tracking the progress of a flight from the initial planning to the take off.



# Milestones in a typical airport turnround





# Eurocontrol Milestone approach

Number	Milestones	Time Reference	Mandatory / Optional for Airport CDM Implementation
1	ATC Flight Plan activation	3 hours before EOBT	Highly Recommended
2	EOBT – 2 hr	2 hours before EOBT	Highly Recommended
3	Take off from outstation	ATOT from outstation	Highly Recommended
4	Local radar update	Varies according to airport	Highly Recommended
5	Final approach	Varies according to airport	Highly Recommended
6	Landing	ALDT	Highly Recommended
7	In-block	AIBT	Highly Recommended
8	Ground handling starts	ACGT	Recommended
9	TOBT update prior to TSAT	Varies according to airport	Recommended
10	TSAT issue	Varies according to airport	Highly Recommended
11	Boarding starts	Varies according to airport	Recommended
12	Aircraft ready	ARDT	Recommended
13	Start up request	ASRT	Recommended
14	Start up approved	ASAT	Recommended
15	Off-block	AOBT	Highly Recommended
16	Take off	ATOT	Highly Recommended



## Co-operation with ICAO

- ... ICAO has developed Aviation System Block Upgrade modules on A-CDM: B0 –A-CDM (Surface management) and B1 – A-CDM (Total airport management)
- ... ICAO (at ACI's suggestion) agreed on the need for global guidance material and technical standards for A-CDM
- ... ICAO set up a task force on A-CDM and requested the industry organizations to join it to write worldwide guidance material
  - ... ACI agreed to participate
  - ... IATA, CANSO, China, Eurocontrol, FAA joined the task force
- ... Draft manual is finished - to be published by end of 2016



## ACI - Support

- ■ ■ promote global minimum standards relating to A-CDM (as per the ICAO A-CDM Manual)
- ■ ■ Promote a globally standardized data interchange technical framework for A-CDM between airlines, ANSPs, airport operators and ground handlers – this can be ACI's ACRIS (Airport Community Recommended Information Services)
- ■ ■ Support further work with ICAO on the Aviation System Block Upgrade (ASBU) Modules which deal with A-CDM
- ■ ■ Collect best practices for implementation and assist members on request



## Summary

- ■ ■ Airport-CDM is about improving **operational efficiency** of all airport partners at aerodromes by
  - ■ ■ reducing delays
  - ■ ■ streamlining the predictability of events during the progress of a flight
  - ■ ■ optimization the utilization of resources
  - ■ ■ making most of existing capacity and will
  - ■ ■ have major benefits during Irregular Operations (IROPS) and adverse conditions
  - ■ ■ reduce kerosene consumption and both CO<sup>2</sup> and noise emissions
- ■ ■ **Partnership** between Airport-Operators, Air-Traffic Control, Aircraft-Operators, Ground-Handlers, which
  - ■ ■ use a common platform for sharing flight information, thus creating a common situational awareness
  - ■ ■ agree on and stick to a set of operational rules, procedures and automated process



## PART B: Examples

- ■ ■ Operational Efficiency
- ■ ■ Airport Operations Control Center
- ■ ■ Information Sharing
- ■ ■ A-CDM Culture



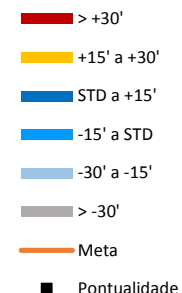
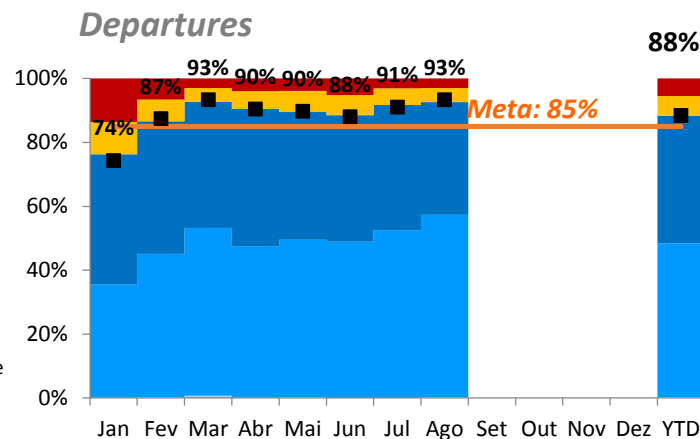
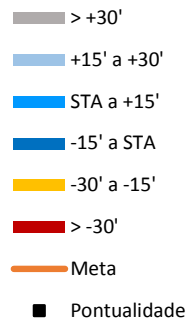
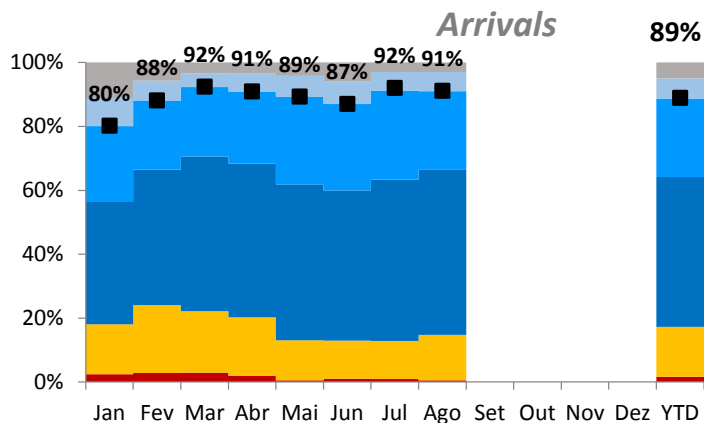


# 1. Operational Efficiency

- ■ ■ A-CDM will improve operational efficiency by
  - ... Defining Key Performance Indicators
  - ... Capturing and Analyzing Delay Data
  - ... Receiving advanced information on flight delays
  - ... Sharing operational data with all stakeholders
  - ... Improving predictability of target take-off times



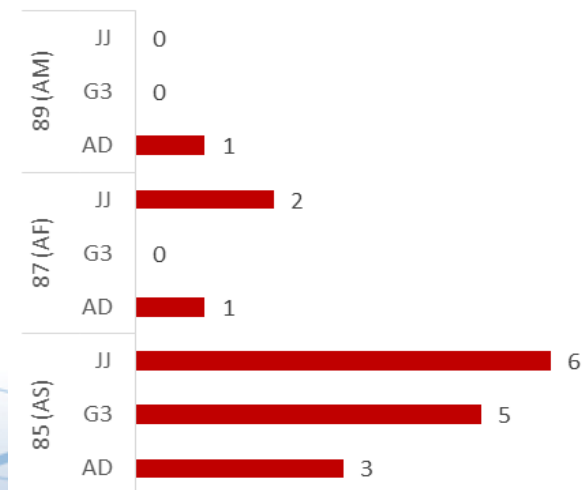
# Example: Airport Punctuality



## Delay Reasons

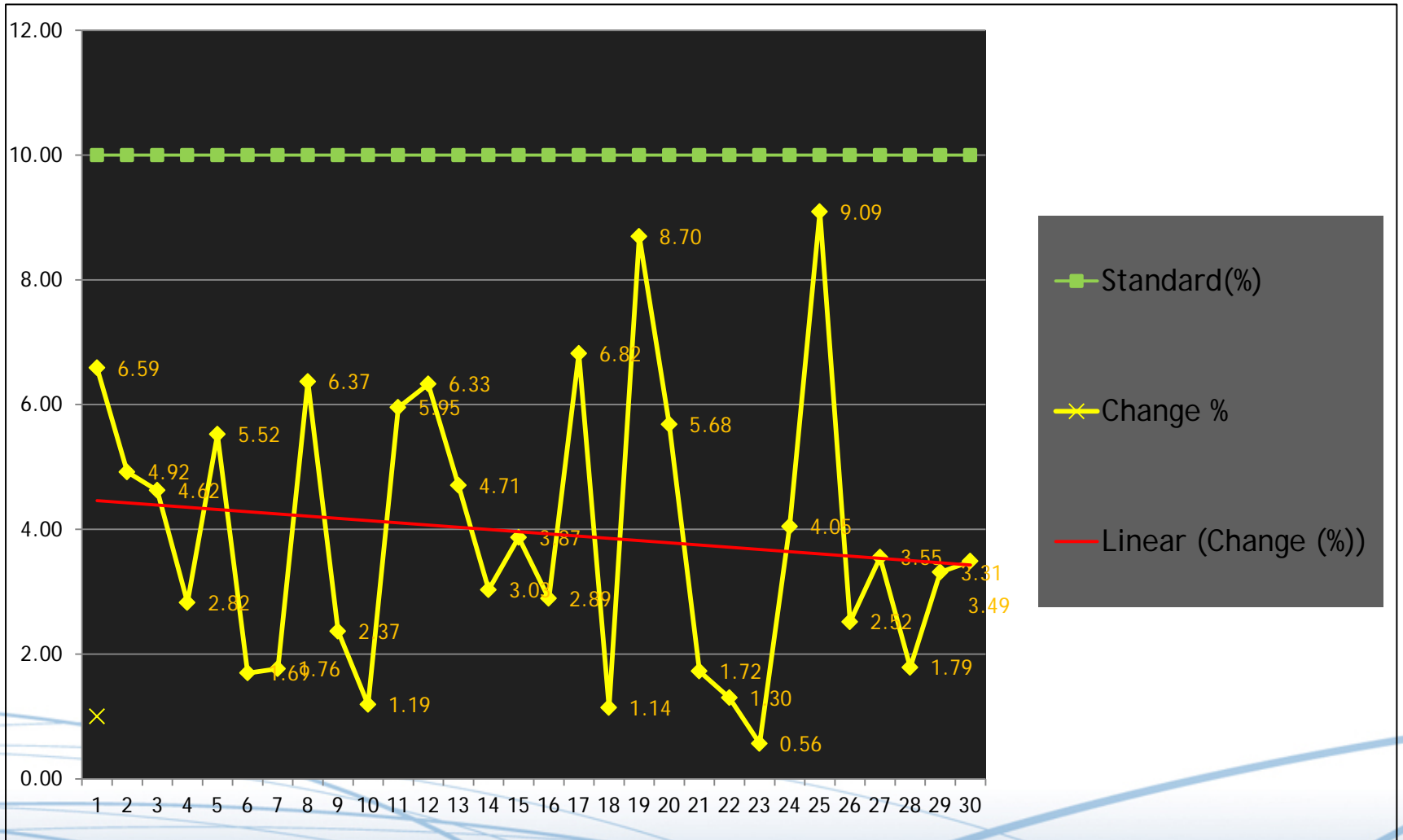
RA Origem da rota	TC Troca de aeronave por motivos técnicos
TN Manutenção não programada	TD Defeitos na aeronave
PH Processo de embarque do PAX	AS Segurança Mandatória
AT Ger. fluxo de traf. devido demanda (ATFM)	WT Estação de destino
WO Estação de partida	TM Manutenção programada, liberação tardia

## Airport-related Delay Codes





# Example: Stand Changes (e.g. < 30 min prior to ETA)





# Defining Common Performance Indicators

## AOCC Quality Matrix

Month/Year	OTP (%)		Baggage delivery performance (min)				Contact stand usage		Contact stand Planning (%)	Bay change ETA minus 30 min (%)	Delay due airport restrictions (%)		Airport resources downtime (HH:mm)		Change of baggage belt after ATA (%)
Jan-12	Base Flights	Departures	Int'l first bag	Int'l last bag	Dom first bag	Dom last bag	Domestic	International			Code 87	Code 89	RWY	Check-in	
STATUS															
STANDARD	95%	82%	8	45	8	20	35	15	80%	10%	5%	5%	18:30	115	0%
ACTUAL	<b>79</b>	<b>76</b>	<b>7</b>	<b>29</b>	<b>7</b>	<b>16</b>	<b>45</b>	<b>20</b>	<b>93</b>	<b>4</b>	<b>0.02</b>	<b>0.46</b>	<b>17:12</b>	<b>118</b>	<b>0.5</b>
DEVIATION															

### MONTH @ A GLANCE

95% BASE punctually	10 DAYS	Zero cancellation	G8, 6E	MAXIMUM FLIGHTS IN CONTACT BAY / date	54 / 25th (D)	MAXIMUM USED RESOURCES			
Max flight movements in an hour (Average)	26 (0900 hrs)				24 / 23rd (I)	BELT TWO / 95122 PAX (D) SIX / 54848 PAX (I)			
Best OTP for month				Highest Departure OTP		Avg OTP			
Arrival	6E	78%	QR, UL	100%	Zero	131 flts on 27th	76% on 27th	61%	
Departure	9W	83%	SQ, TG, TR	100%	15 min	151 flts on 13th	88% on 3rd	75%	
Non Schedule Flight movement <b>49</b>				Max cancelled flights on 26th: 17 Arr & 15 dep			Out of 58 International arrival flights bag delays, 33 flights delayed due to customs and 25 flights due late arrival of pax to BCA from Immigration; slow screening, late opening of the hold & more no. of pieces		
122 flights delayed, 3 flights held on TWY & later return TWY, 18 flights diverted & 75 arrival flights delayed due FOG							TOTAL FLIGHT CANCELLATIONS		
Pax Load	113457/Int'l		434998/ Dom		Average Flight Movement per day	Arr 168	Min avg time for First Bag	G8 / 6 min	256 arrivals
					Dep 167	Min avg time for Last bag	AI, IT, 9W / 14 min	224 departures	



## 2. Airport Operational Control Center

- Centralized management of resources
- Integration of land-and airside operations
- Monitoring and dissemination of information
- Optimisation of resources
  - Fixed resources, e.g. boarding bridges
  - Mobile Resources, e.g. baggage trolleys
  - Human Resources, e.g. security personnel
- Anticipate the impacts of changes in the schedules of flights to and from the airport

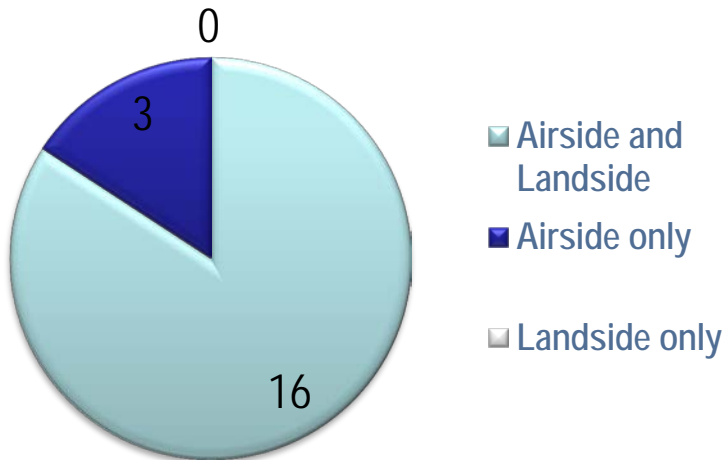


... And an ideal platform of information Exchange  
between all A-CDM stakeholders

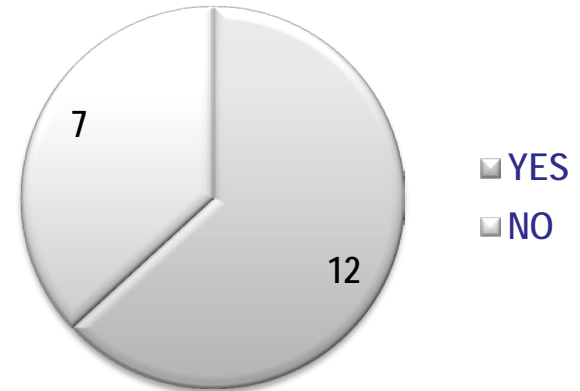


# Airport Operations Center: General

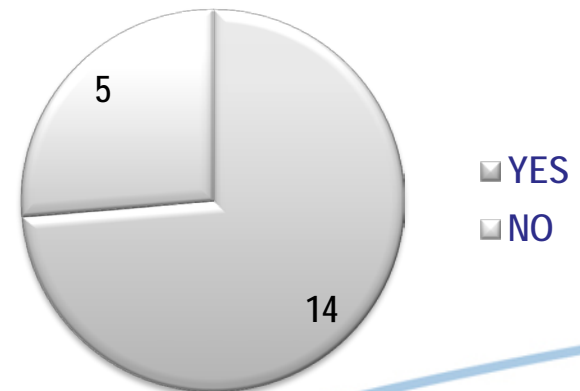
### Scope of AOC



### Open to external stakeholders



### Type of occupation (Permanent or non-permanent)

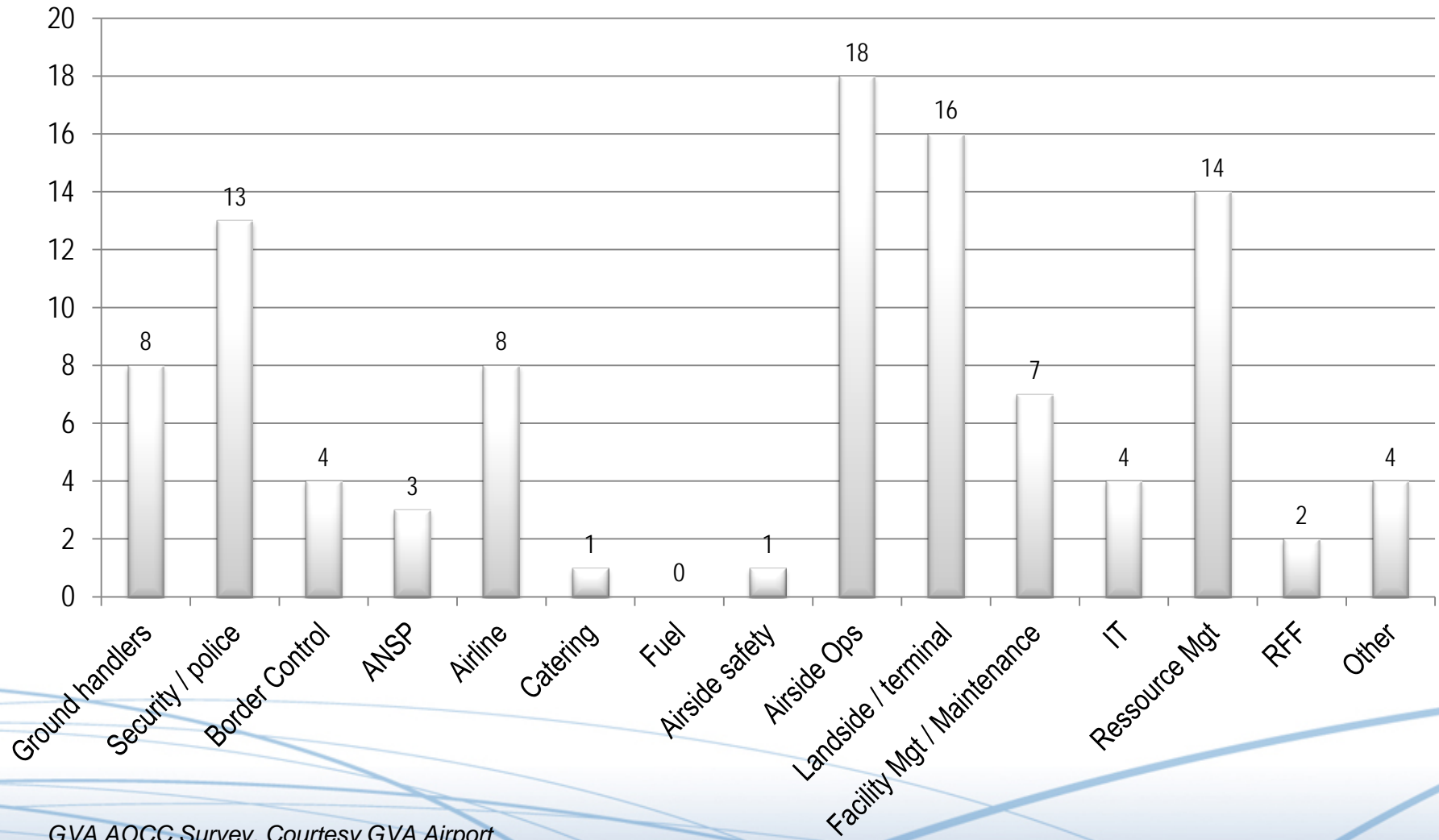


On average, there are 4 stakeholders in the AOC. The highest is 9 stakeholders

Some AOCs are only staffed during peak hours of operations or during irregular operations.

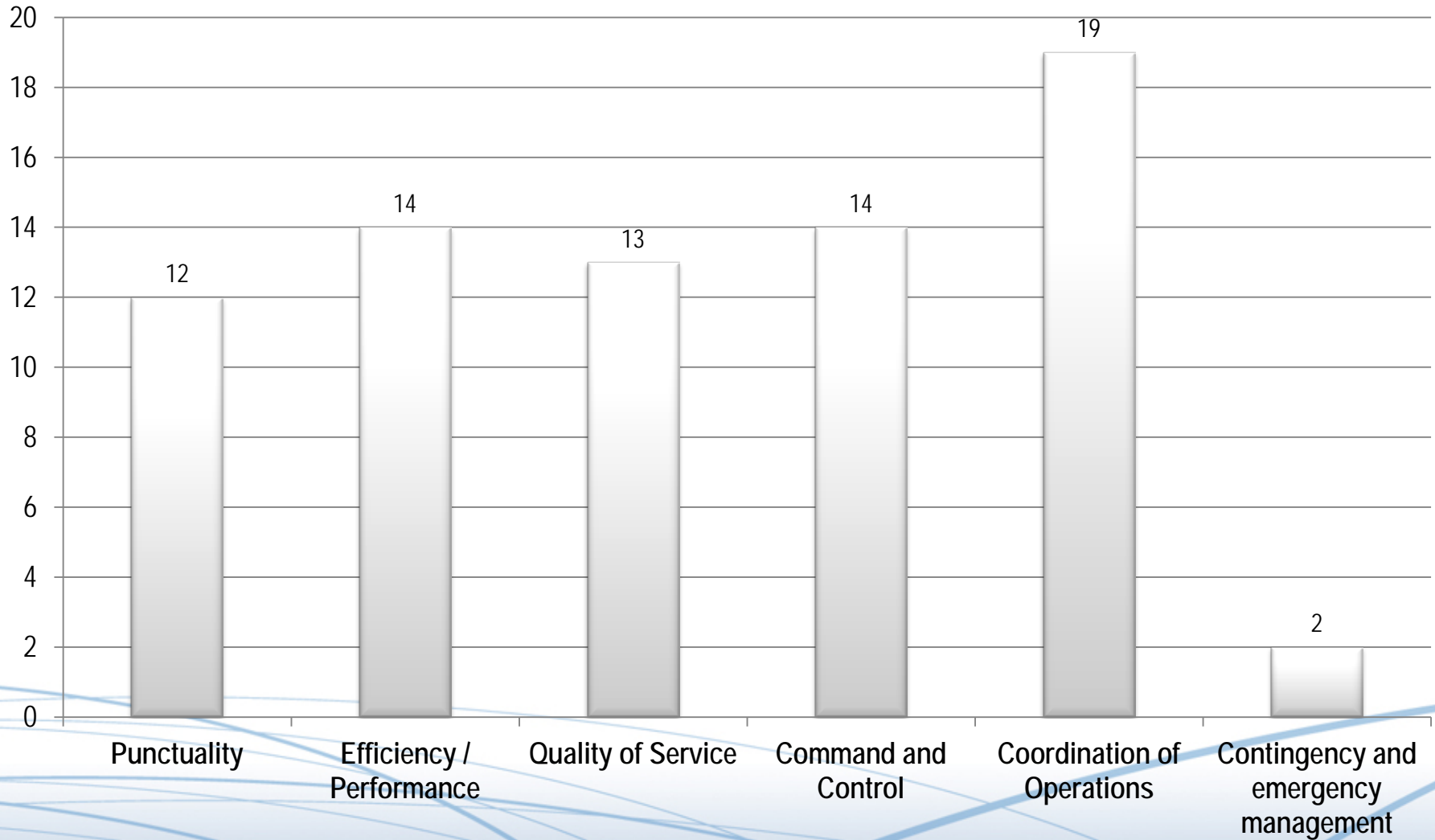


# Airport Operations Center: Key Stakeholders





# Airport Operations Center: Objectives





# Zurich Airport, Switzerland





# Johannesburg, South Africa





# Moscow Sheremetyevo, Russia





# Duesseldorf, Germany



Picture: Courtesy GVA Airport

ACI Confidential



# Indianapolis, United States



Picture: Courtesy GVA Airport



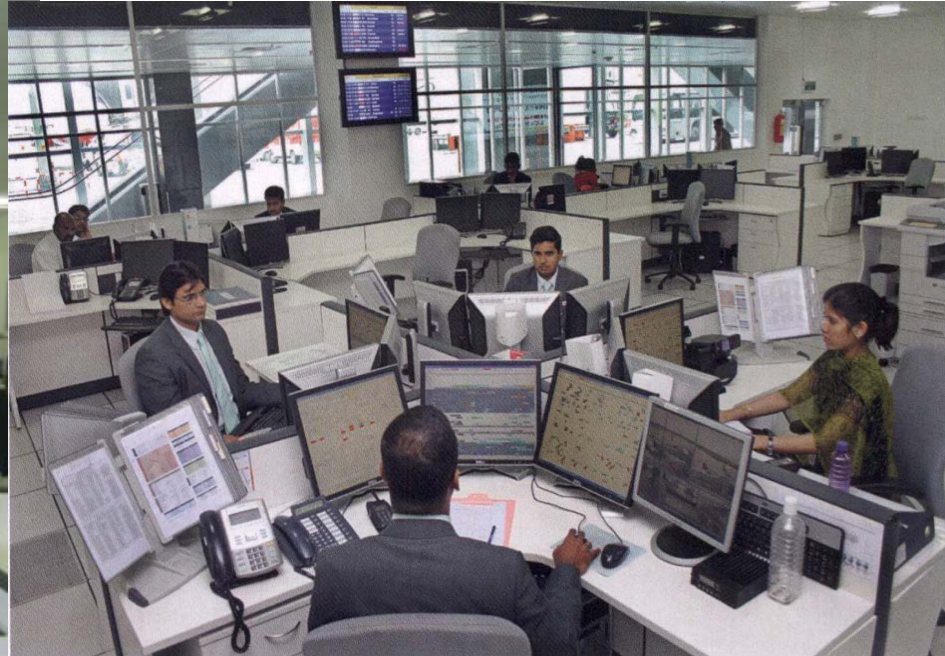
# Geneva Airport, Switzerland



Picture: Courtesy GVA Airport



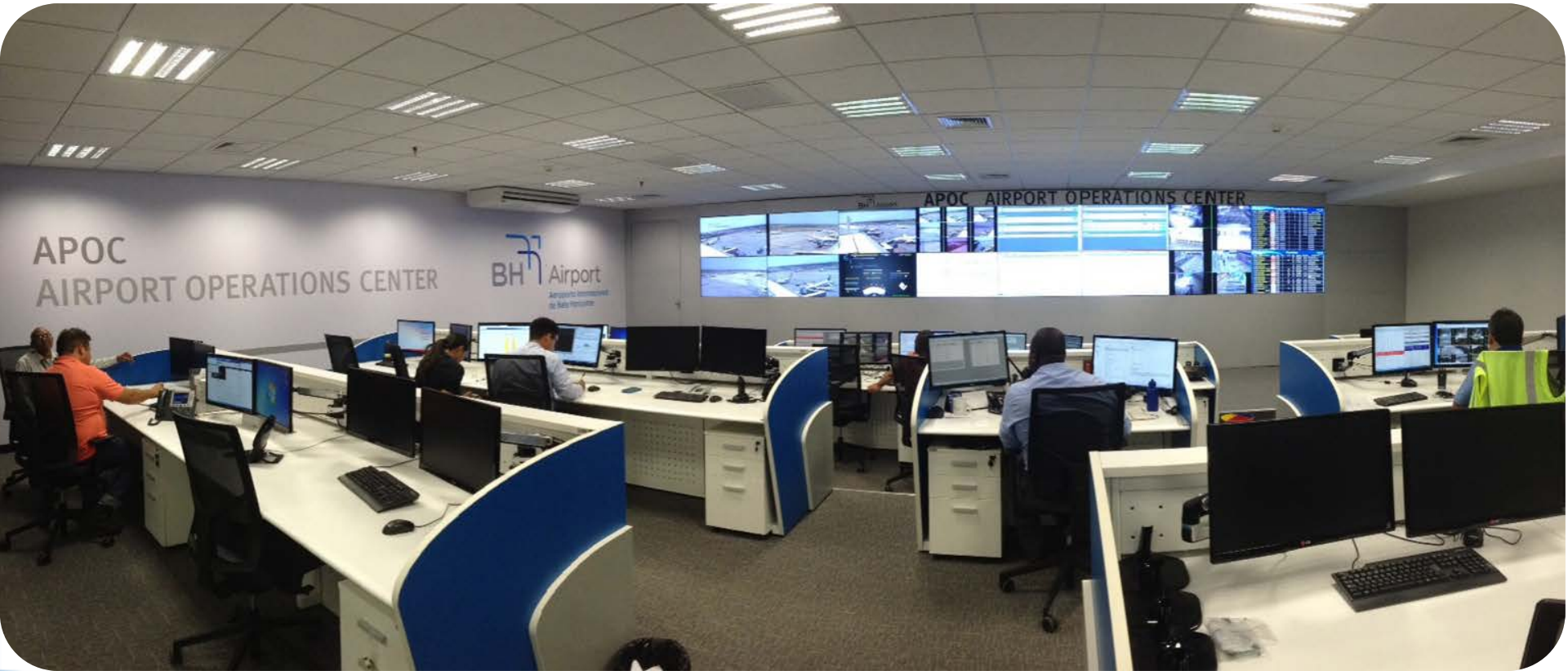
# Bengaluru International Airport, India



*Picture: Courtesy Kempegowda International Airport, Bengaluru*



# Belo Horizonte International Airport, Brazil



Picture: Courtesy BH Airport

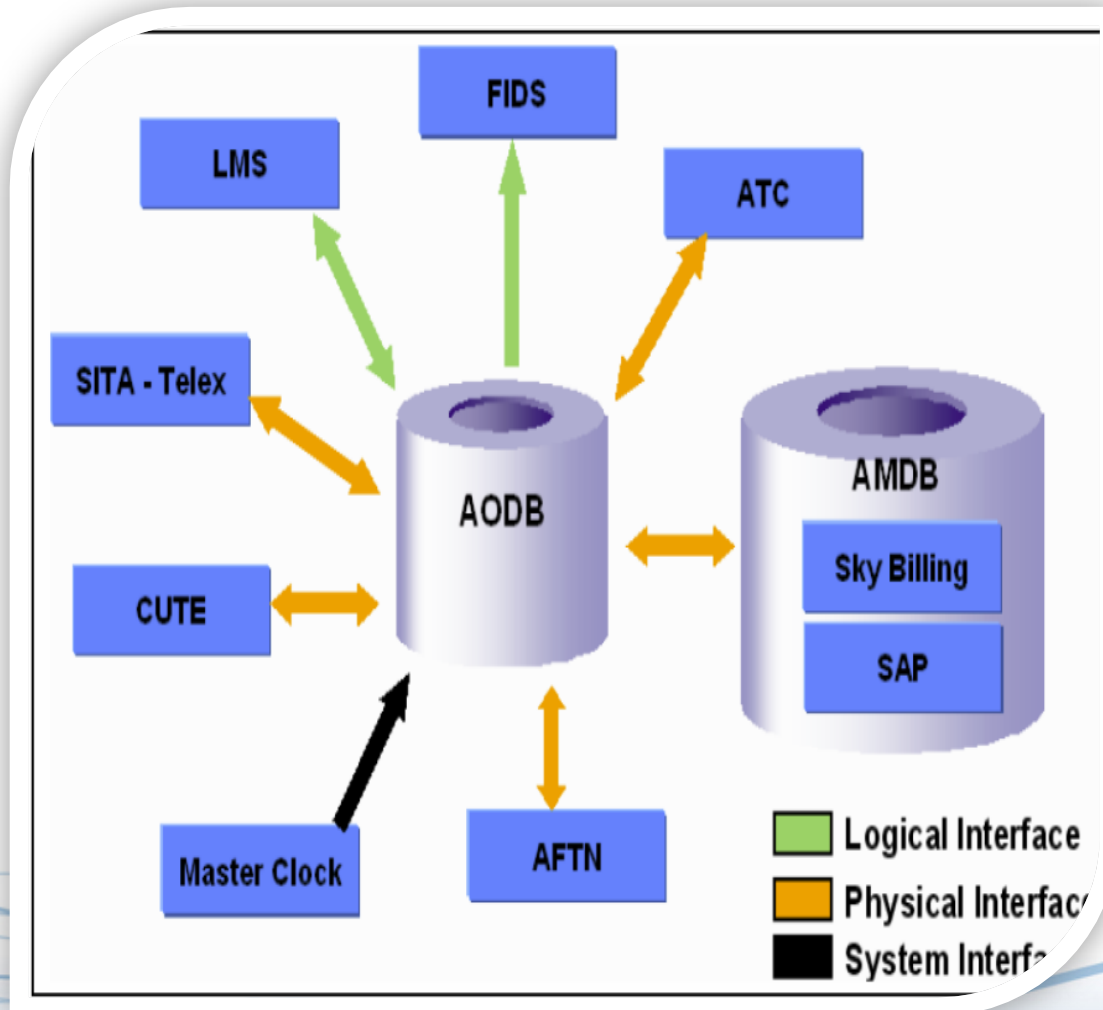


### 3. Information Sharing

- ■ ■ The Information Sharing Element defines the sharing of accurate and timely information between the Airport CDM Partners in order to achieve common situational awareness and to improve traffic event predictability
- ■ ■ The Airport CDM Information Sharing Platform (ACISP), together with defined procedures agreed by the partners, is the means used to reach these aims
- ■ ■ Information Sharing is the core Airport CDM Element and the foundation for the other Airport CDM Elements. It needs to be implemented before any other Concept Element



# System Architecture





## Information Sharing Principles

- Providing a single, common set of data describing the status and intentions of a flight;
- Connecting A-CDM Partners data processing systems; and
- Serving as a platform for information sharing between partners.



# Local Information Sharing within AODB

08:28		A-CDM PAGE										11/06/12		P 0905	
ARR FLIGHT	S/E/AIBT	MTTT	A/C IATA	DEP FLIGHT	TO IATA	GAT - S	SOBT	IRR	SAD	TOBT	AOBT	TAR	ATOT		REM
	A/C MOVE		A/C ICAO	CALLSIGN	TO ICAO		EOBT			TSAT	ASRT	ASAT	RWY	TTOT	ATC-SLOT
LH 1182	0534 A	0035	733	LH 1183	FRA	A62 C	0620					0620 A03	0628		
			B733	DLH3C	EDDF		0620			0621	0620	0619	28	0628	
AB 8650	0551 A	0040	737	AB 8651	TXL	B36 C	0635					B36			DNA
			B737	BER928K	EDDT		0635			0637				0650	
4U 764	0558 A	0030	319	4U 765	CGN	A71 B	0640					A49			AAS
			A319	GW13H	EDDK		0640			0642				0652	
AB 8524	0558 A	0045	320	AB 8525	DUS	B38 B	0645					B38			DNA
			A320	BER959S	EDDL		0645			0645				0657	1 0655 0710
LX 1197	0518 A	0030	AR1	LX 460	LCY	D31 B	0645					B31			
			RJ1H	SWR60M	EGLC		0645			0645				0658	1 0655 0710
F7 121	0543 A	0030	S20	F7 120	GOA	A57 A	0655					I97			
			SB20	DWT120	LIMJ		0655			0655				0704	
OL 270	0553 A	0035	100	OL 271	DRS	B03 B	0655					D11			AAS
			F100	OLT271	EDDC		0655			0655				0708	
FHE 6795	0424 A	0050	320	FHE 7000	EPL		0700					T52			DNA
				FHE9C						0700					
HG 8150	0616 A	0030	E90	HG 8151	VIE	A82 A	0700					A15			AAS
			E190	NLY8151	LOWW		0700			0700					
LX 1639	0558 A	0030	AR1	LX 1188	NUE	A53 A	0700					I96			
			RJ1H	SWR1188	EDDN		0700			0700					
LH 1184	0624 A	0035	319	LH 1185	FRA	A66 A	0705					A09			
			A319	DLH1C	EDDF		0705			0705					



# Information Sharing

## ACRIS – Airport Community Recommended Information Services

Aviation industry has:

✓ Recommended Process Definitions (flow descriptions)

- i.e. Airport CDM milestones

✓ Recommended Data Descriptions (envelopes)

- i.e. AIDX – Aviation Information Data Exchange

- XML schema approved by ACI and IATA

... but we need:

⇒ Recommended 'web-service' interfaces that show:

- WHAT data is available,
- HOW this data can be exchanged, and
- HOW this data can be (re)used in an efficient way.



This is what the ACI ACRIS WG is focusing on

ACRIS RP (ACI502A10) approved by the ACI World Governing Board





## 4. Creating the Culture





# Table for Collaborative Decision Making



Picture: Courtesy Kempegowda International Airport, Bengaluru



# Creating an Identity





# MOU for A-CDM

## Possible Content of an ACDM MOU



MEMORANDUM OF UNDERSTANDING

1 (7)

30.1.2009

6/050/2009

HELSINKI-VANTAA AIRPORT CDM (AIRPORT COLLABORATIVE DECISION MAKING) PROJECT, MEMORANDUM OF UNDERSTANDING

### 1. PARTIES

Ilmailulaitos - Finavia Helsinki-Vantaa airport P.L 29 01531 Vantaa	Finnair Oy
SAS / Blue1	Finnish Commuter Airlines Oy
Northport Oy	Oy Nordic Airport Services Ab
Airpro Oy	Servisair Finland Oy
Inter Handling Oy	Oy Air Finland Ltd

### 2. BACKGROUND

Helsinki-Vantaa Airport in collaboration with EUROCONTROL and a variety of companies operating at Helsinki-Vantaa completed two of the four phases of CDM concept between years 2002 and 2004. Since the project initially ceased in the end of 2003 the CDM concept has developed well ahead and some airports around Europe have implemented it into daily operational use.

A wide scale of operational analyses was carried out 2002-2003 and a first model of turn-round process (milestone approach) was generated. As the high fuel price, other economical issues and the environment aspects require further enhancements to the ATC procedures, airport operations and to the airline and de-icing/handling company operations itself Finavia Helsinki-Vantaa has decided to implement the CDM concept to Helsinki-Vantaa airport during the next two years.

- 1) Description of the project
- 2) Objectives of the MoU
- 3) Partners obligations
- 4) Organisation
- 5) Costs
- 6) Responsibilities of partners providing data
- 7) Confidentiality
- 8) Dispute resolution
- 9) Amendments
- 10) Signatures of contracting partners

Sources: ICAO, Finavia



## Summary

### A-CDM is about:

- ✓ An important cultural change
- ✓ Bringing benefits to Airlines, Airports, ATM & ATM network
- ✓ Harmonization of non-commercially sensitive data
- ✓ Implementing the foundation steps ("milestones")
- ✓ Free local choice of additional A-CDM steps
- ✓ Rapid benefits and high return on investment
- ✓ Important operational benefits

### A-CDM is not:

- Doing things the old way
- Implementing a new system
- An obligation to share commercially sensitive data
- Only providing financial benefits



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*Points of Contact:*

[dgamper@aci.aero](mailto:dgamper@aci.aero)

[daniel.bircher@bh-airport.com.br](mailto:daniel.bircher@bh-airport.com.br)