



## Adjusting A-CDM Implementation to Local Realities

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## Part A

- Need for A-CDM
- A-CDM - Aims
- A-CDM Partners
- Airport Operators – Strong Involvement

## Part B

- Practical Application
  - Airport Operations Control Center
  - Operational Efficiency
  - CDM Culture
  - Local Realities

# PART A: What is A-CDM?



- air passengers 12 billion (arr and dep) by 2031
- airports as 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**
- airports: operational efficiency and resulting infrastructure capacity is important objective for airports.
- airports need to constantly
  - **monitor operations,**
  - **identify and solve problems before they escalate into protracted disruptions and crises.**

# Challenges (1)

## Common situational awareness between the airport partners



# Challenges (2)

## Enhance predictability of airport operations

Partidas		16:16					
Hora	Estim.	Destino/Escala	Cia. Aérea	Voo	Term.	Portão	Status
16:10	16:25	São Luiz		AD 2474 AD 2474	1	8	Última Chamada
16:30	16:45	São Paulo - CGH		G3 5487 G3 5487	1	1	Embarque
16:45		São Paulo - GRU		AD 2415 AD 2415	1	4	Embarque
16:50		Uberlândia		AD 2528 AD 2528	1	R4	Dirija-se ao portão
16:55		Cabo Frio		AD 2822 AD 2822	1	R5	Dirija-se ao portão
17:00		Rio de Janeiro - SDU		G3 6865 G3 6865	1	R1	Dirija-se ao portão
17:05		São Paulo - GRU		G3 6795 G3 6795	1		
17:05		São Paulo - CGH		JJ 3122 JJ 3122	1		
17:10		Vitória		AD 5047 AD 5047	1		
17:15		Campinas		AD 4251 AD 4251	1		
17:30		São Paulo - CGH		AD 2677 AD 2677	1		Atrasado
17:35		Ipatinga		AD 2616 AD 2616	1		
17:35		Brasília		JJ 3844 JJ 3844	1		
17:40		Lisboa		TP 104 TP 104	3		

Chegadas		16:16				
Hora	Estim.	Origem/Escala	Voo	Term.	Situação	
13:00	17:10	Rio de Janeiro - GIG		AD 9602 AD 9602	1	Atrasado
13:55	18:17	Porto Seguro		JJ 9071 JJ 9071	1	Atrasado
15:55		Campinas		AD 2463 AD 2463	1	Última bagagem
16:00	16:10	Salvador		G3 2194 G3 2194	1	Entrega de bagagem
16:05		Vitória da Conquista		AD 2563 AD 2563	1	Entrega de bagagem
16:20	16:15	Rio de Janeiro - SDU		G3 6846 G3 6846	1	Pouso
16:25		São Paulo - CGH		AD 2676 AD 2676	1	Entrega de bagagem
16:25		São Paulo - CGH		JJ 3123 JJ 3123	1	
16:35		São Paulo - GRU		G3 6794 G3 6794	1	
16:45		Ilhéus		AD 5119 AD 5119	1	
16:55		Barreiras		AD 2465 AD 2465	1	
16:55		São Paulo - CGH		JJ 3202 JJ 3202	1	
17:00		São Luis		AD 4204 AD 4204	1	
17:20		Rio de Janeiro - GIG		G3 5881 G3 5881	1	

## Challenges (3)

### Optimise the utilisation of airport resources

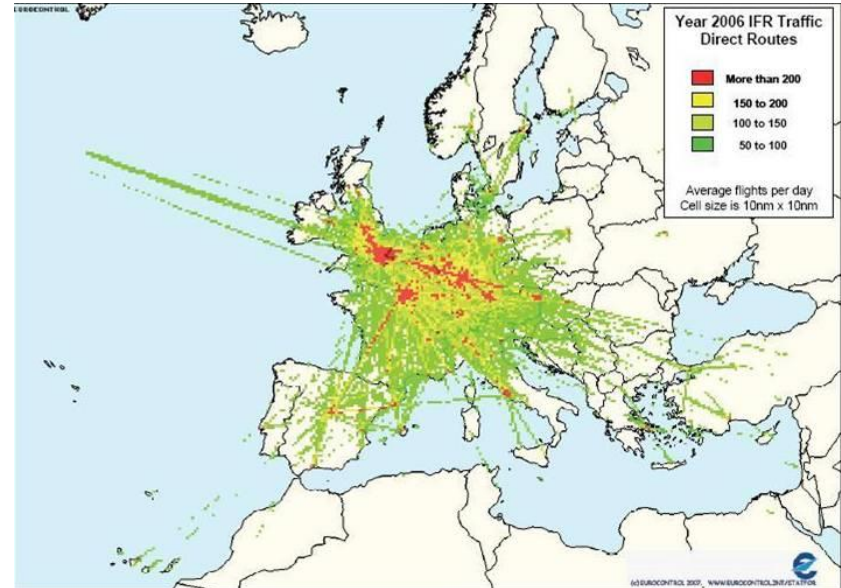
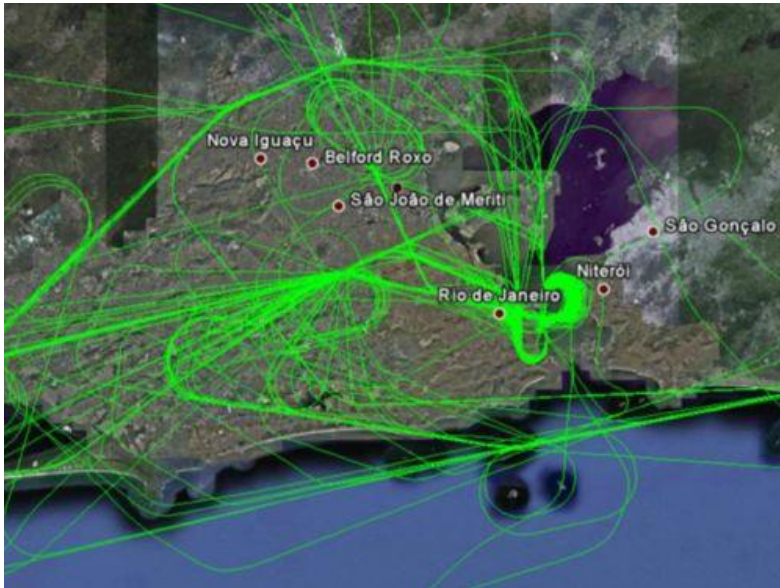


### Limit the environmental impact of airport operations





## Better integrate the airports into the ATM Network



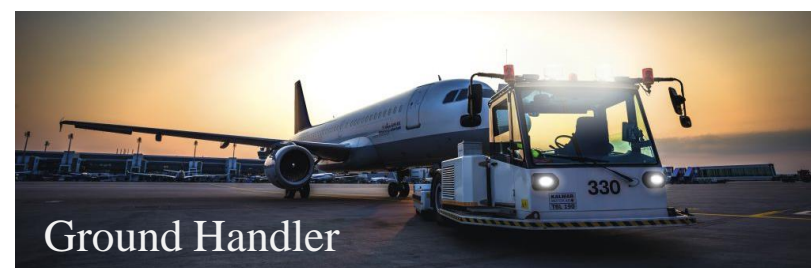
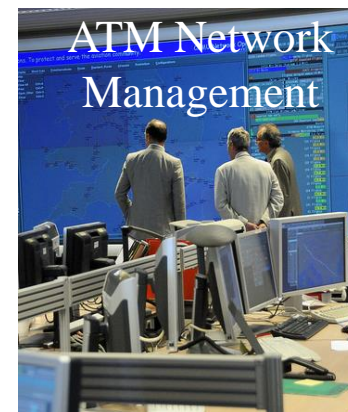
Airport-CDM improves operational efficiency by

- reducing delays
- Increasing predictability of progress of a flight
- optimizing the utilization of resources
- making most of existing capacity

Airport CDM will

- benefit irregular and adverse weather operations
- reduce kerosene consumption and both CO<sup>2</sup> and noise emissions

# Airport-CDM Partners



# Benefits – 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

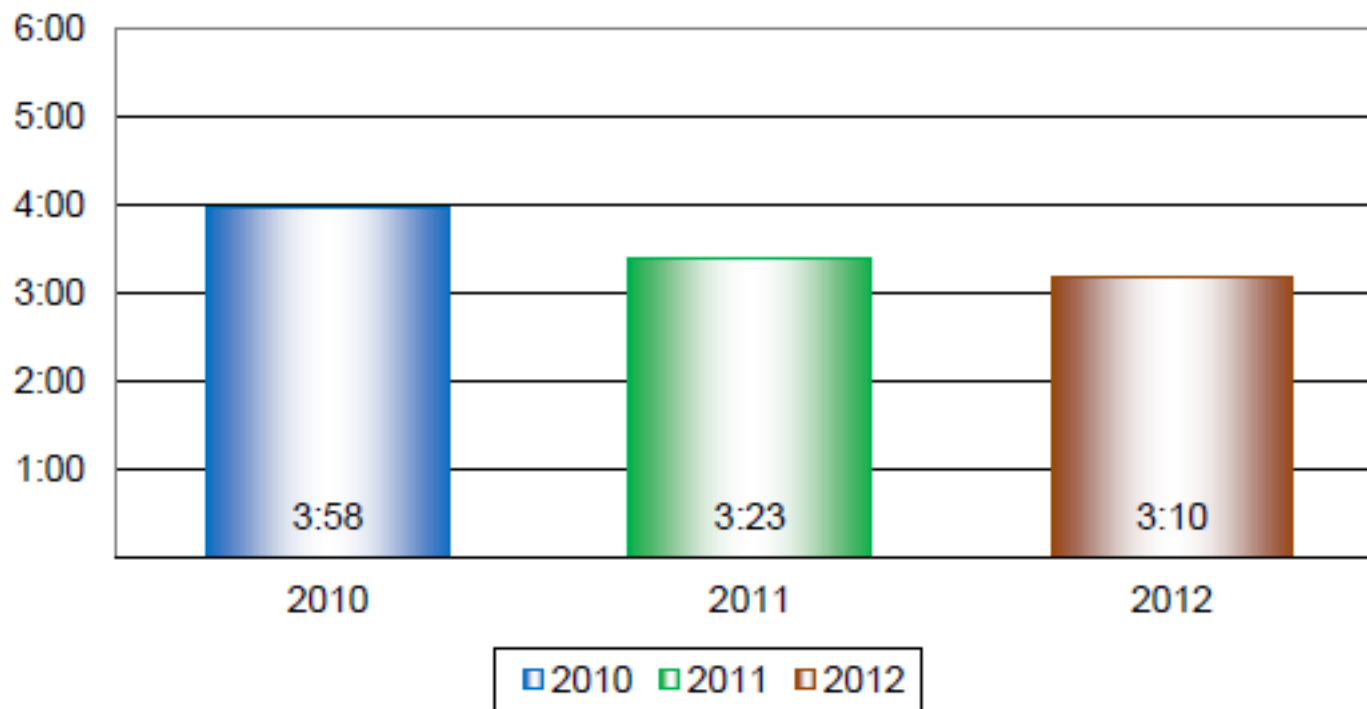
Table 2 Environmental Benefits

**Local ACDM Implementation**

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

# Benefits– Operational (MUC)

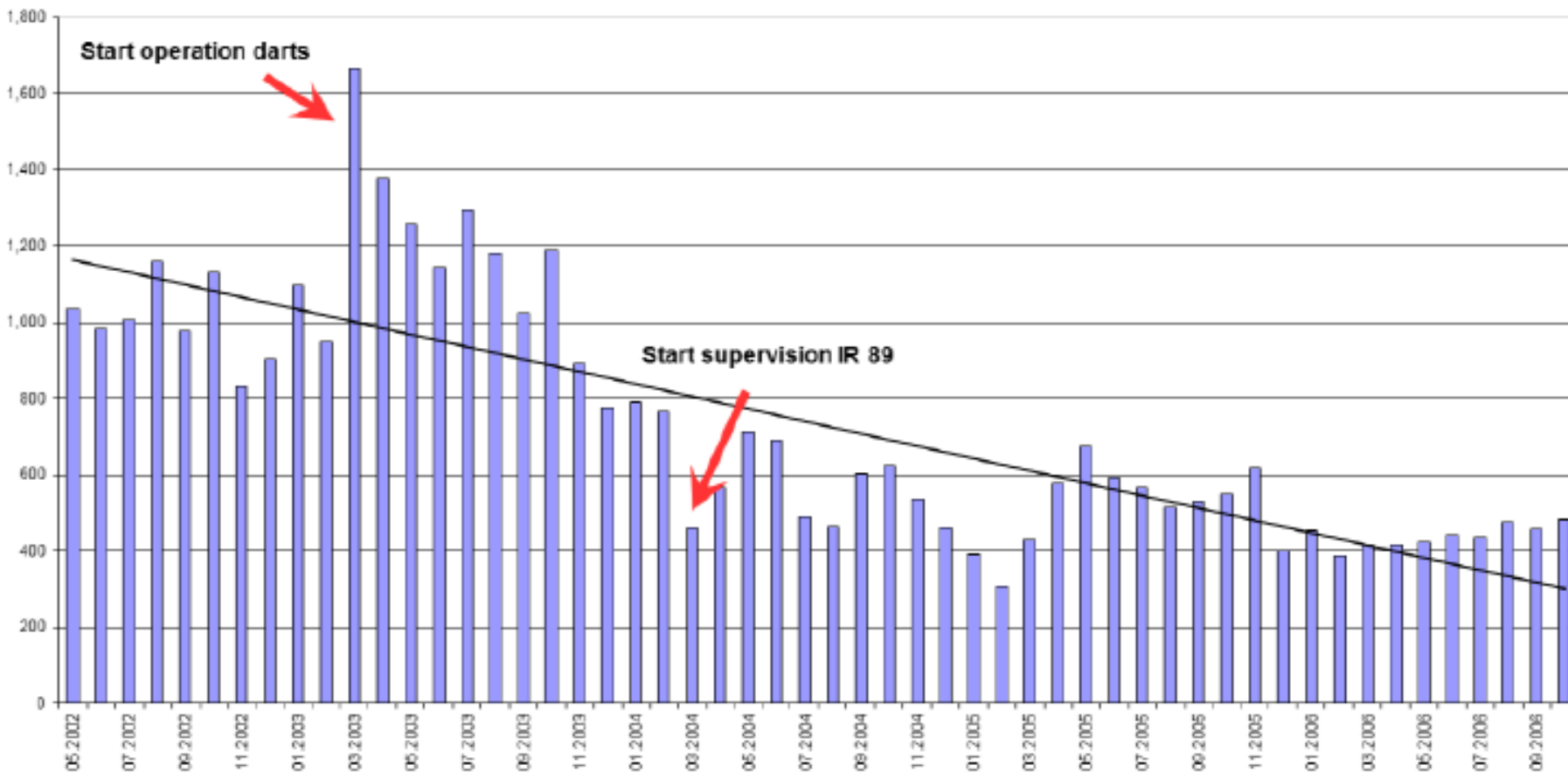
Average waiting time at the runway (minutes:seconds)



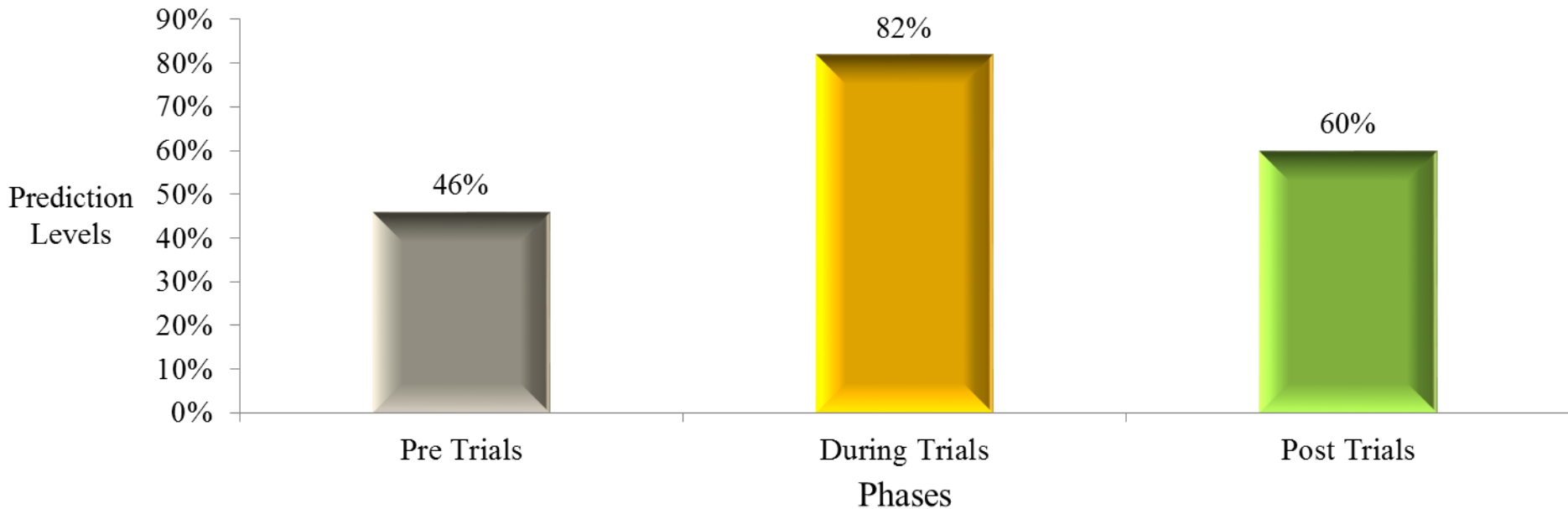
Graph: Courtesy DFS/Flughafen Muenchen GmbH

# Benefits– Operational (ZRH)

## Trend of Start-up delays at Zurich Airport

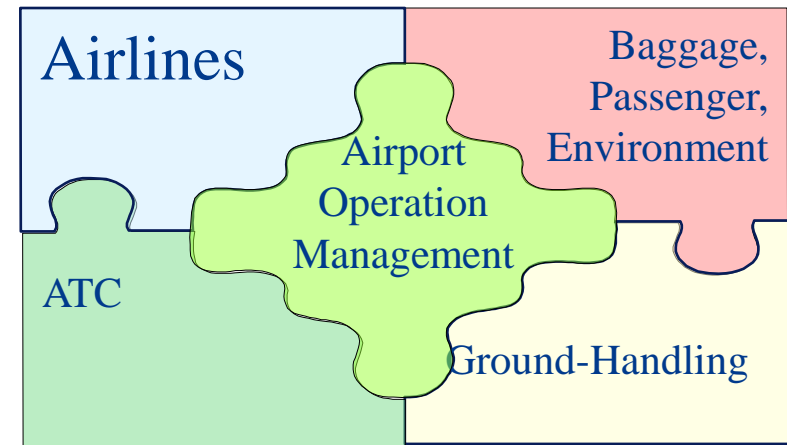


## Average TOBT Prediction Levels



Graph: Courtesy Kempegowda International Airport, Bengaluru

1. Overall responsibility for the airport performance
2. Most neutral view on all airport stakeholders interests
3. Comprehensive overview of the status of operation (stands, gate, baggage, safety, environment)
4. Provider and integrator of airport flight data



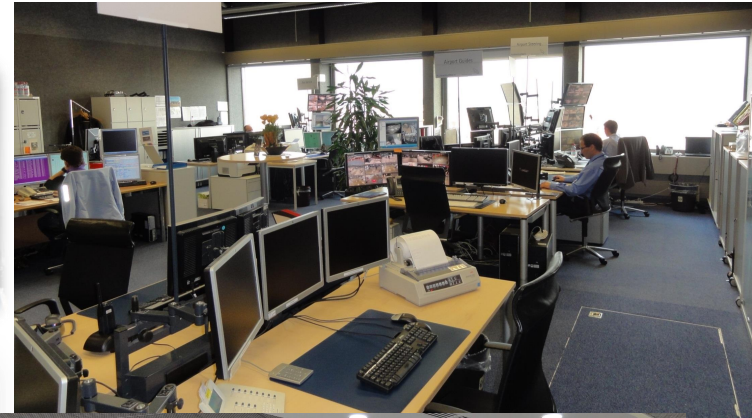


# PART B: Implementation

1. Airport  
Operations  
Control Center
2. Achieving  
Operational  
Efficiency
3. A-CDM Culture
4. Local Realities



# 1. Airport Operations Control Center



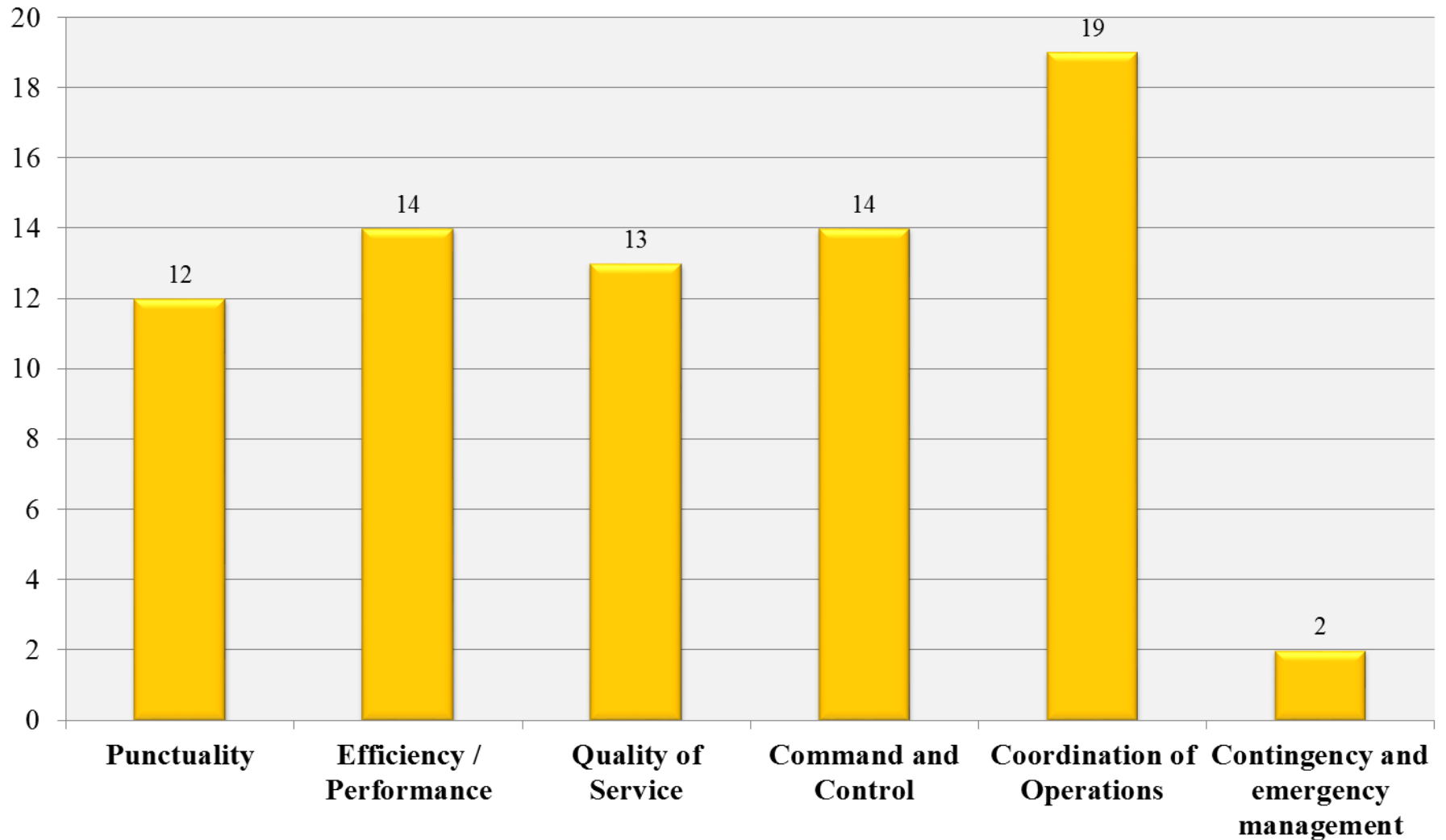
## The Airport Operations Centre (APOC)

- ✓ Pro-actively manages the performance of airport operations (present and short-term)
- ✓ Provides a common operational overview of the airport to relevant airport stakeholders
- ✓ Allows them to communicate, coordinate and collaboratively decide on their progress

### Focal point for:

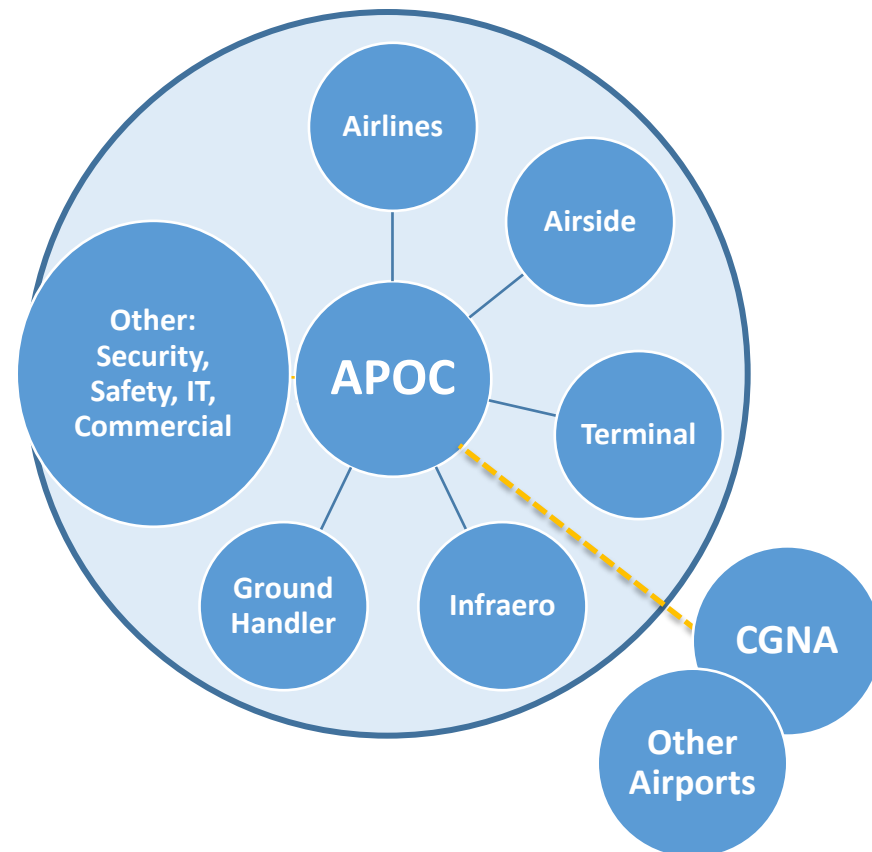
- ✓ Local multi-stakeholder collaborative decision making
- ✓ Coordination with the network (if established)
- ✓ Performance management.

# APOC Objectives (GVA Survey)



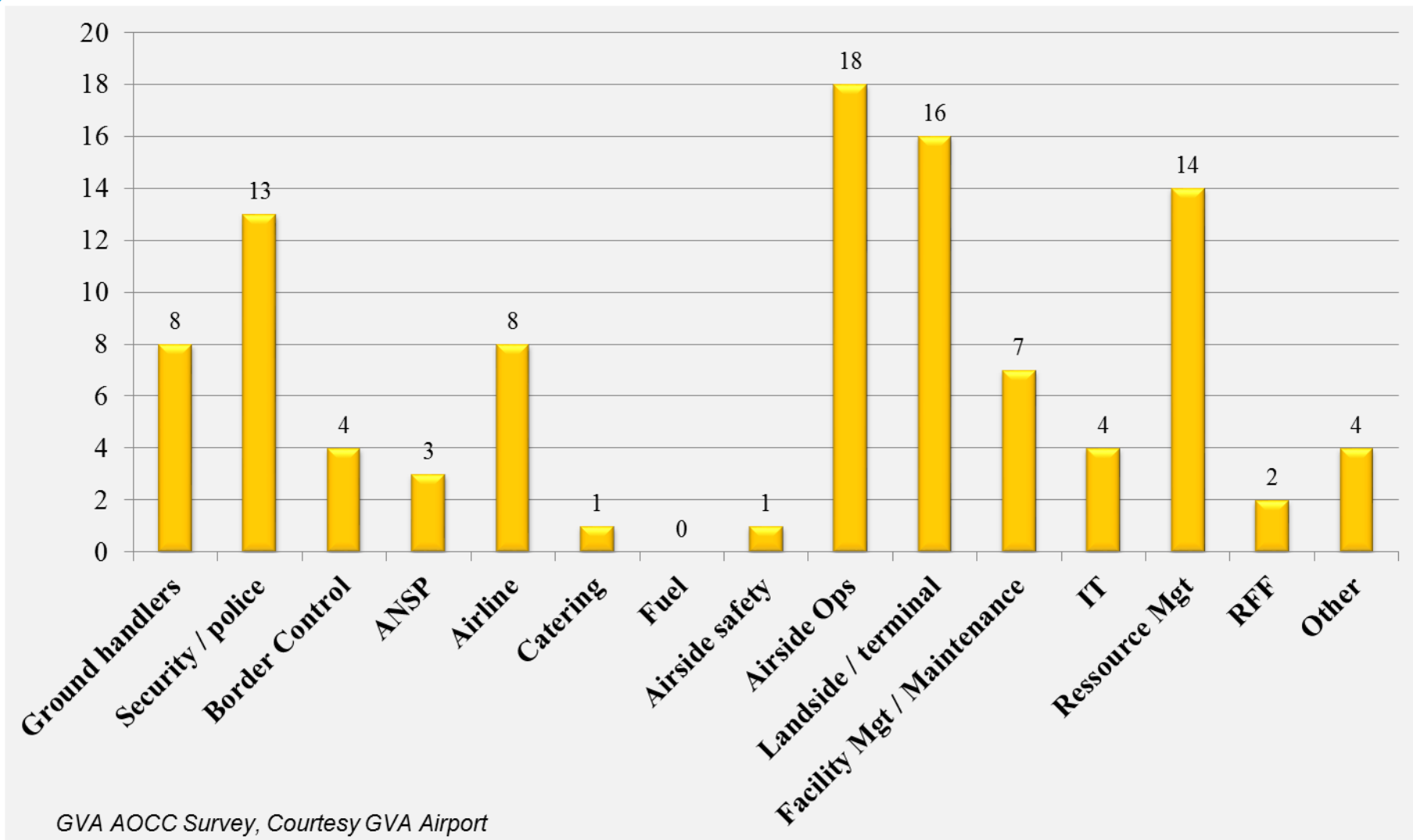
## Stakeholders

## Activities



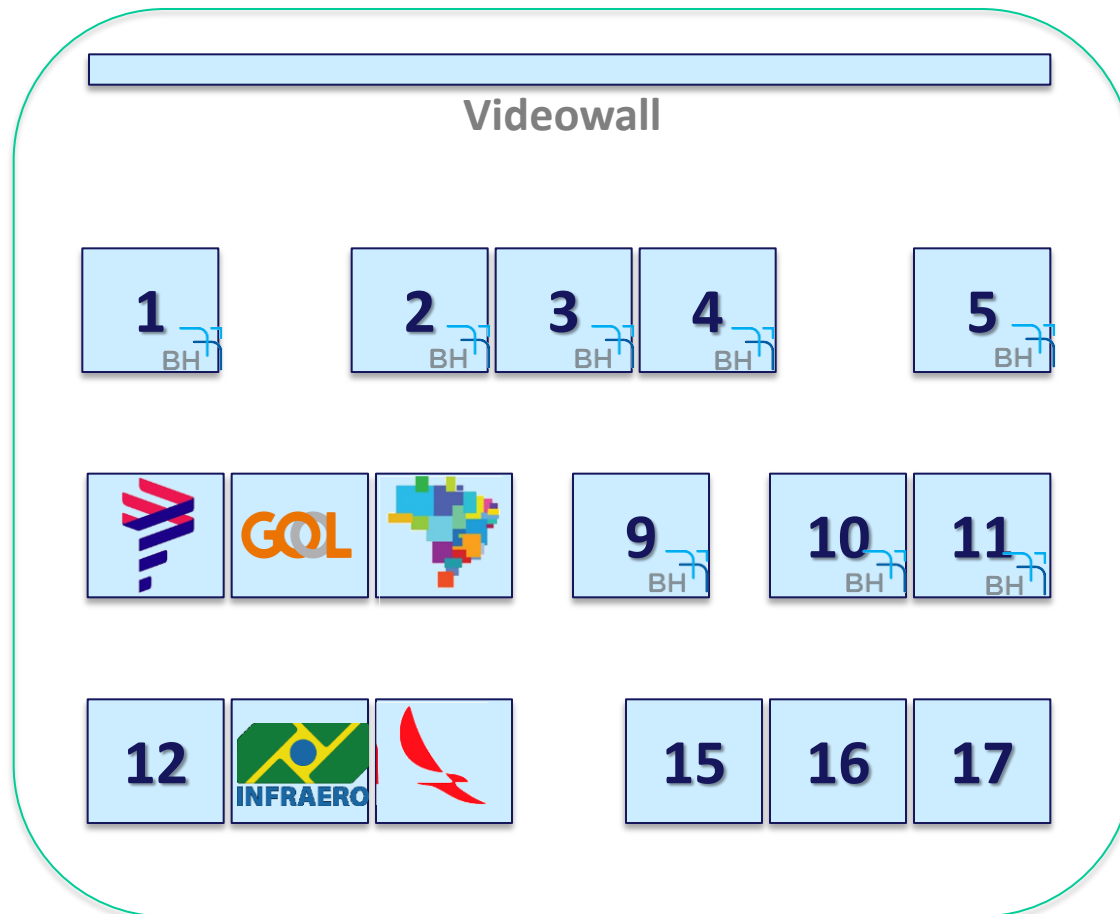
- Flight approval
- Planning of airport resources (positions, boarding gates, baggage belts)
- Monitoring of passengers, aircraft flows
- Activation and leadership of contingency plans
- Information management for the FIDS
- Communication with external stakeholders

# APOC Composition (GVA Survey)

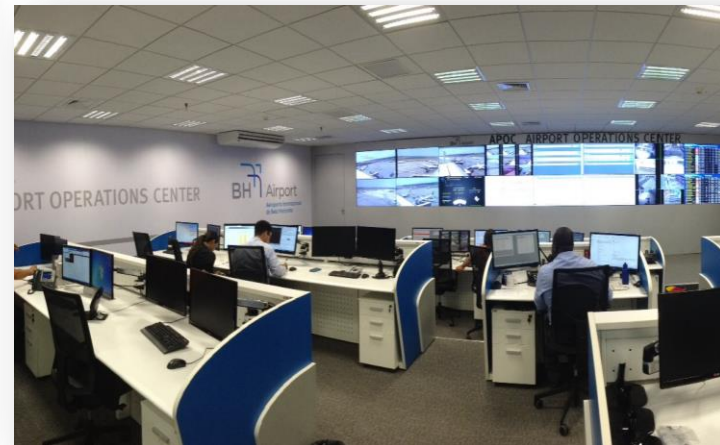


GVA AOCC Survey, Courtesy GVA Airport

# Composition of CNF APOC

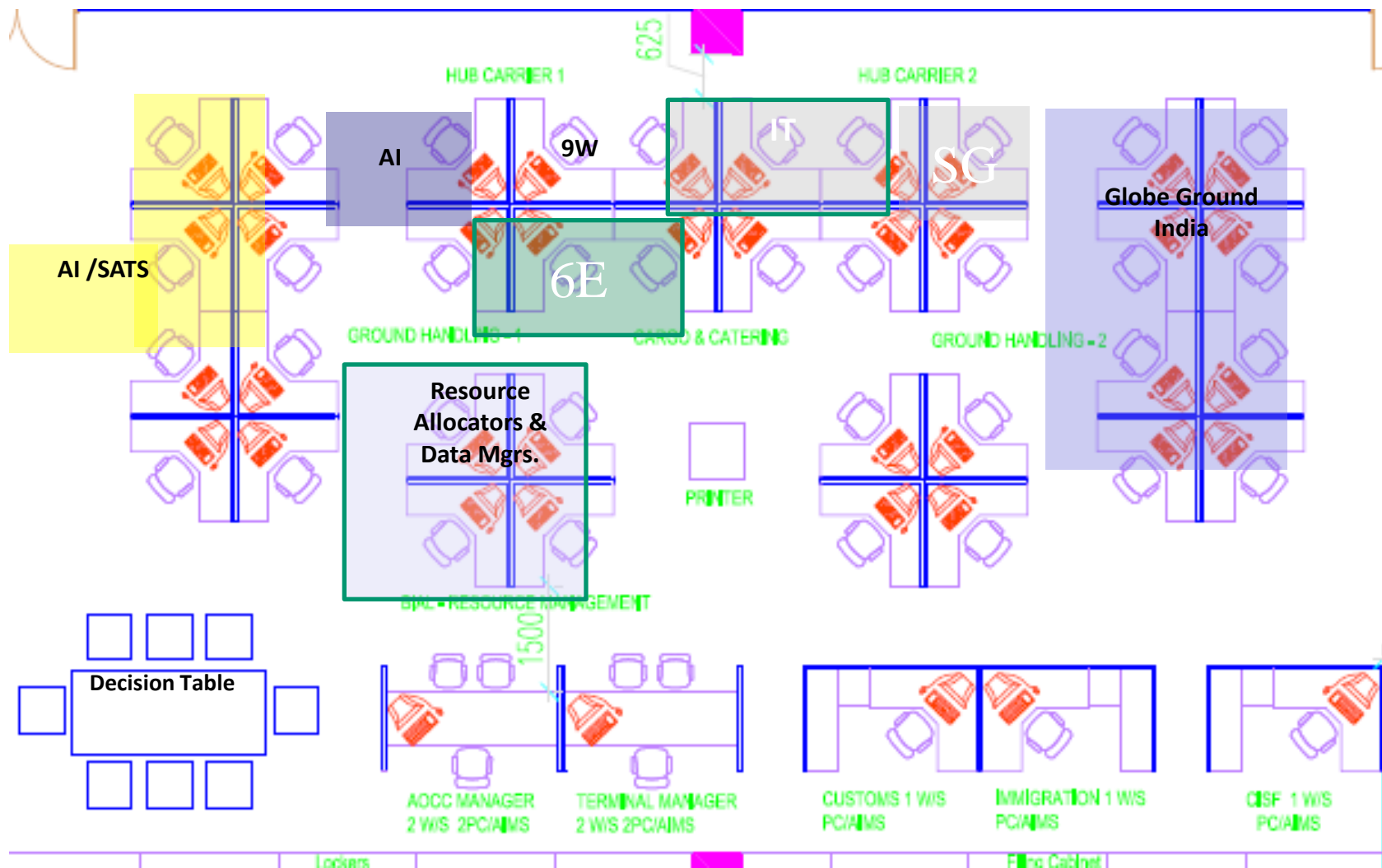


1. IT
2. APOC
3. APOC
4. APOC
5. SECURITY
6. LATAM
7. AZUL
8. GOL
9. DUTY MANAGER
10. AIRSIDE
11. LANDSIDE
12. -
13. INFRAERO
14. AVIANCA
15. -
16. -
17. -





# Composition of BLR AOCC

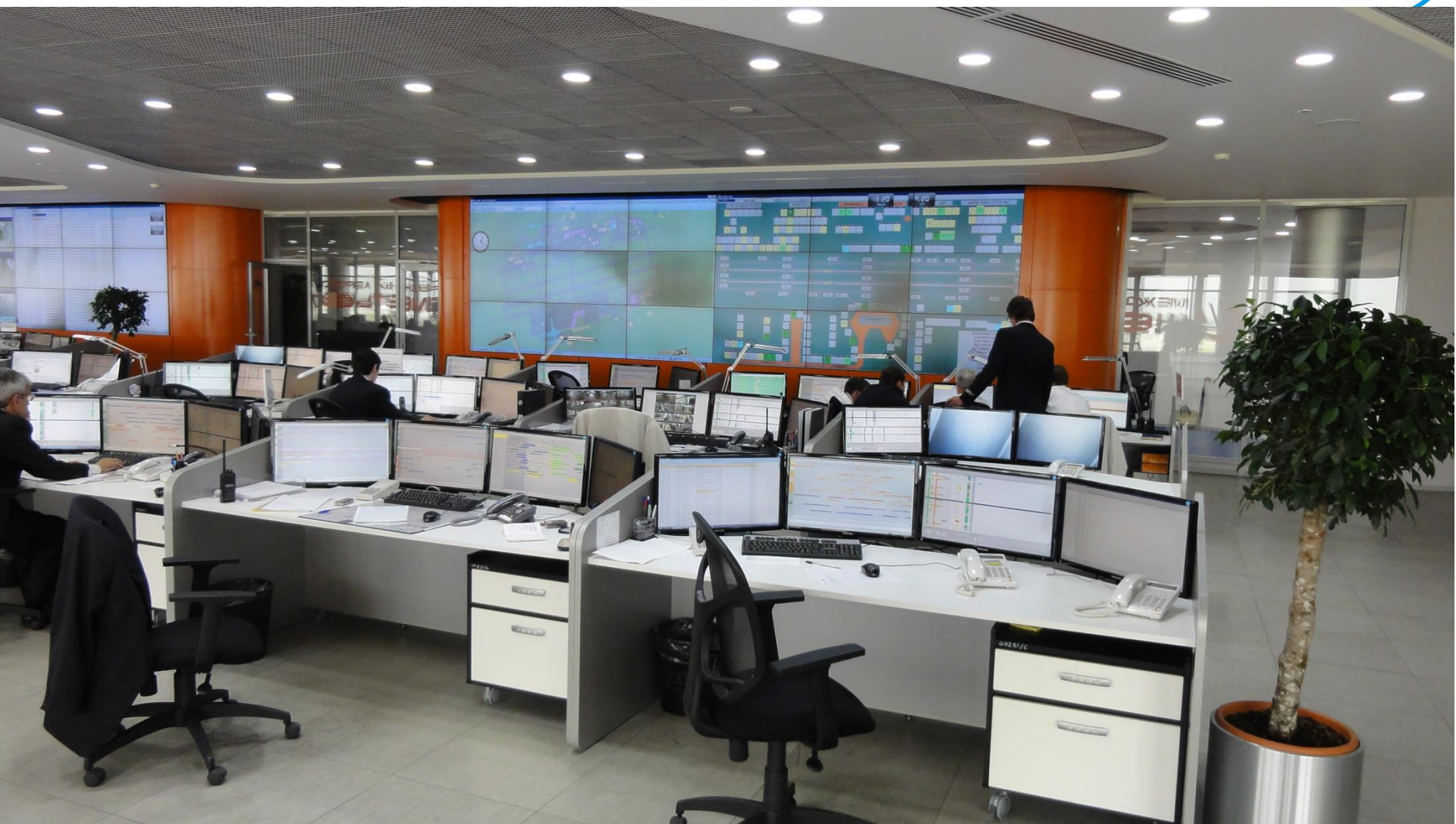


# Airport Steering Zurich Airport, Switzerland





# Moscow Sheremetyevo, Russia



# Duesseldorf, Germany



Picture: Courtesy GVA Airport

# Indianapolis, United States

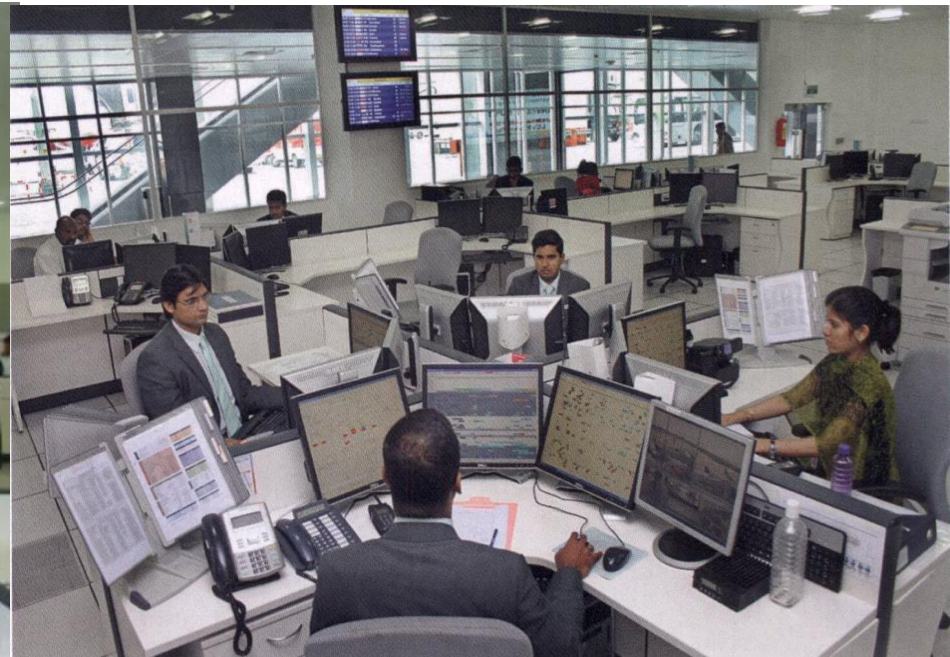


# Geneva Airport, Switzerland



*Picture: Courtesy GVA Airport*

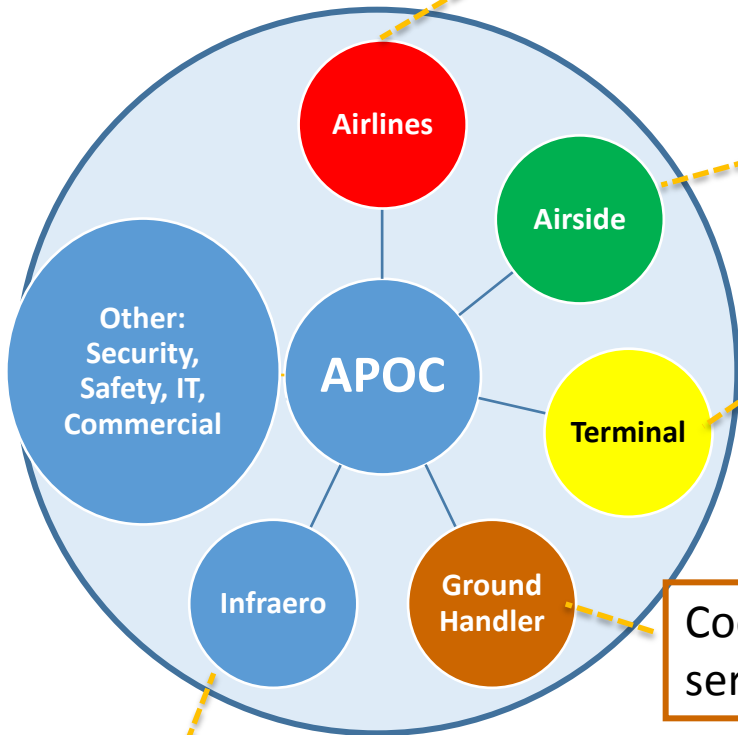
# Bengaluru International Airport, India



*Picture: Courtesy Kempegowda International Airport, Bengaluru*



**Stakeholders**



Feed and update flight information such as landing and departure time, passengers quantity, communication.

Manage Apron activities with airlines and ground handlers, remote operations

Manage passenger terminal operations and act immediately in order to eliminate any issue that shows up

Coordinate with airline and APOC to assure that all services are delivered on time

Guarantee the information exchange between BH Airport and Infraero airports

APOC CNF aims at working side by side with the key Airport stakeholder (Airlines, GHA, Authorities, AD Operator) to ensure that everyone has the same information and Works towards the same objective.

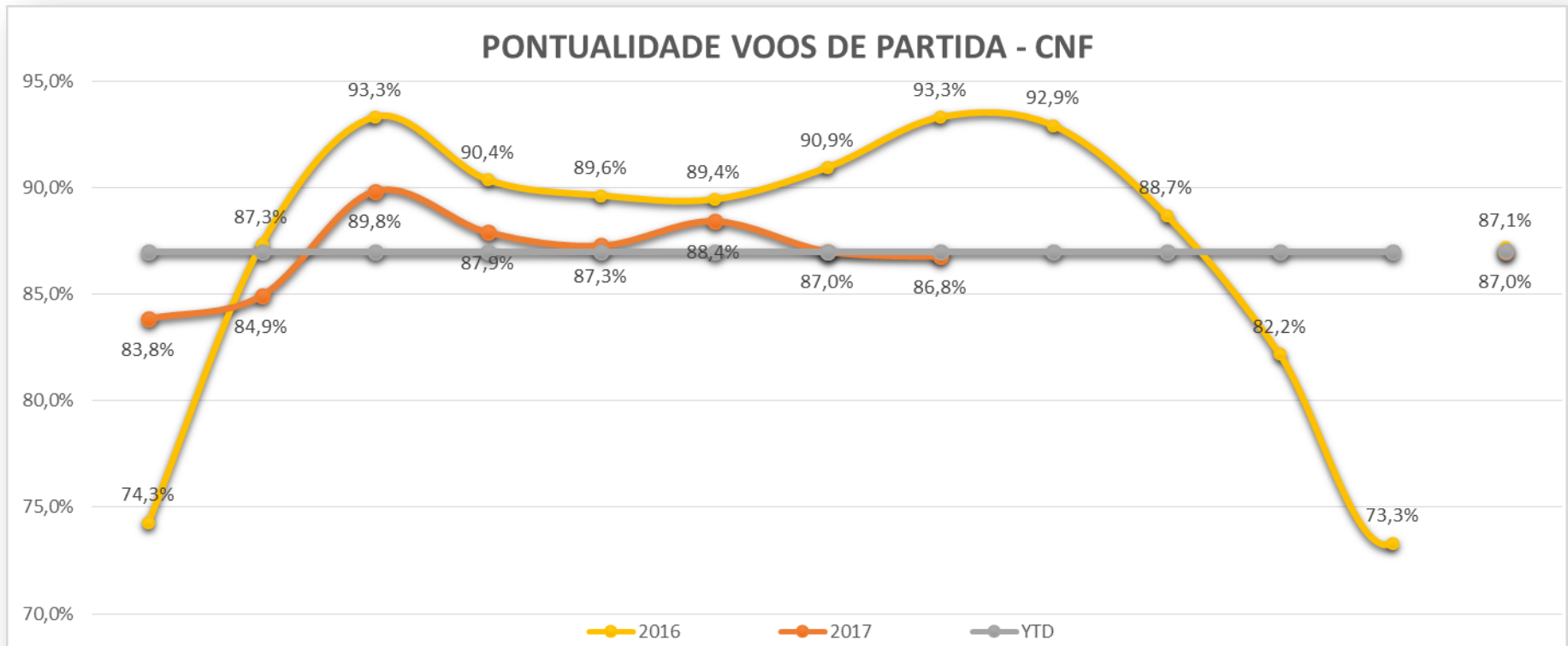
## Daily Coord. Meeting



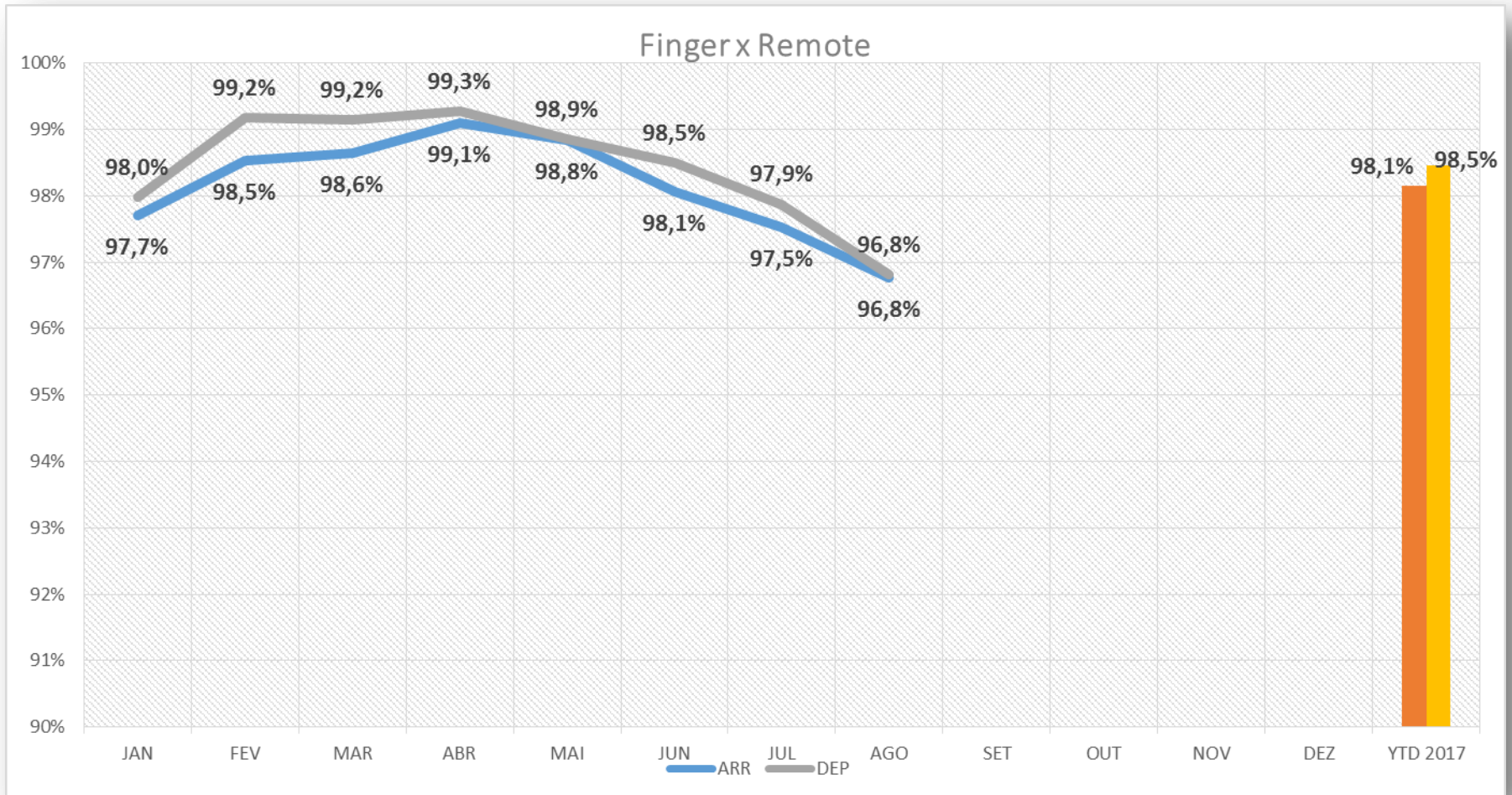
**Focus:** Share information about Weather (local,national), planned movements and pax numbers, events (Sports, VIP, Strikes....)

**Participants:** BH Airport (Ops, Security, Maintenance, IT), Airlines, ATC, Flow Management

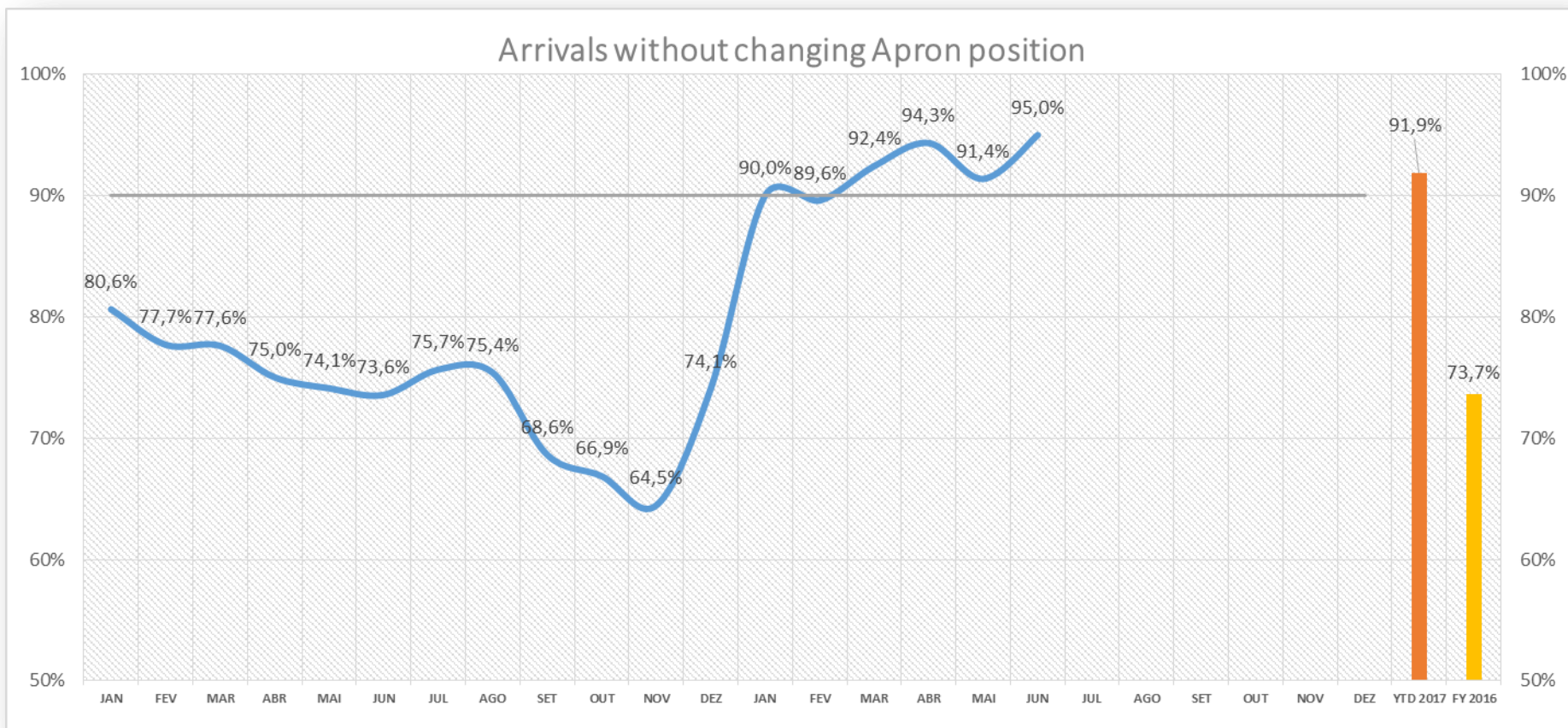
## Punctuality



## Finger x Remote Operations



## Arrivals without changing Apron position



## 7-Days Meeting



**Focus:** Weekly Meeting analysing indicators and relevant facts of the previous 7 days and the upcoming 7 days such long-term weather forecast (local e national), planned movements, events, planned Works other other interventions







**Participants:** Mid-level Managers (BH Airport - OPS, Security, Safety, IT, Airlines, Control Tower, other partners as required)

## Collaborative Decision Making (CDM) project with key domestic airlines

Objectives: identify efficiency and customer service improvements by better planning processes, aligned key performance indicators and pilot projects



## KPIs - APOC

Indicadores	Metodologia	Baseline (YTD 2016)	Meta	YTD 2017	
Pontualidade - Partidas	Intervalo -15'<STA>+15'	89%	87%	87%	
Alocação das Aeronaves (excluindo ATR)	% voos no <i>finger</i> e remota	96%	91%	99%	
Pontualidade geral de CNF	EA	TBD			
Atrasos de Infraestrutura Aeroportuária	EA	TBD			
Recuperação de Malha	EA	TBD			
Qualidade das informações: informações de voo	ANAC	3,96	4,20	4,33	
Qualidade das informações: sistema sonoro de aviso aos passageiros	ANAC	3,90	4,20	4,16	
Aderência ao Silent Airport	% de voos que realizam até 3 chamadas de som	--	95%	62%	
Troca de posição de pátio	Troca de posição de pátio para chegadas com menos de 20 min para o pouso	76,3%	90%	91,1%	



# KPIs - ACDM GOL – BHAirport I



## Categoria

## Indicadores

## Responsável

1

### Punctuality

1.1

Pontualidade Chegada 15'



1.2

Pontualidade Partida 15'



1.3

Pontualidade 0' / Load Factor / Conectividade



1.4

Principais atrasos 15'



1.5

Chegadas Antecipas e Atrasadas 15'



1.6

Voos Ofensores de Partida 15'



1.7

Taxiamento



2

### Infrastructure

2.1

Alocação de voos no finger





## Categoria

## Indicadores

## Responsável

3

**Handling**

3.1

Extravio de Bagagem (AHL)



Linhas aéreas inteligentes

3.2

Danificação de bagagem (DPR)



Linhas aéreas inteligentes

3.3

Restituição de bagagem



Linhas aéreas inteligentes

4

**Customer Experience**

4.1

Canais de Atendimento



Linhas aéreas inteligentes

4.2

Pesquisa de Satisfação Gol



Linhas aéreas inteligentes

4.3

Pesquisa de Satisfação Infraero SAC



5

**Safety**

5.1

Ocorrências com fauna



Linhas aéreas inteligentes

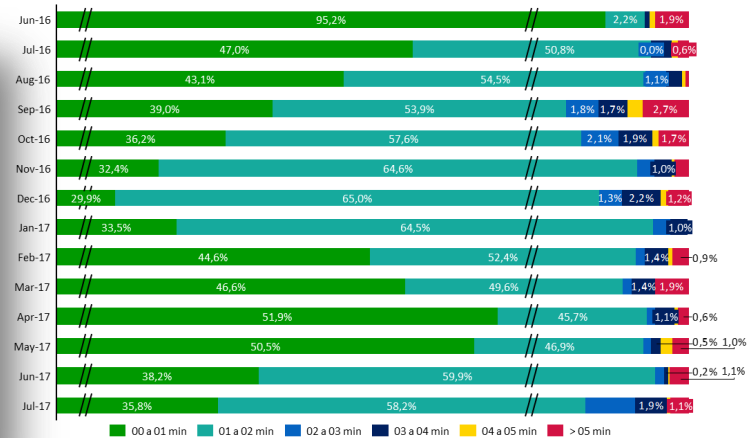
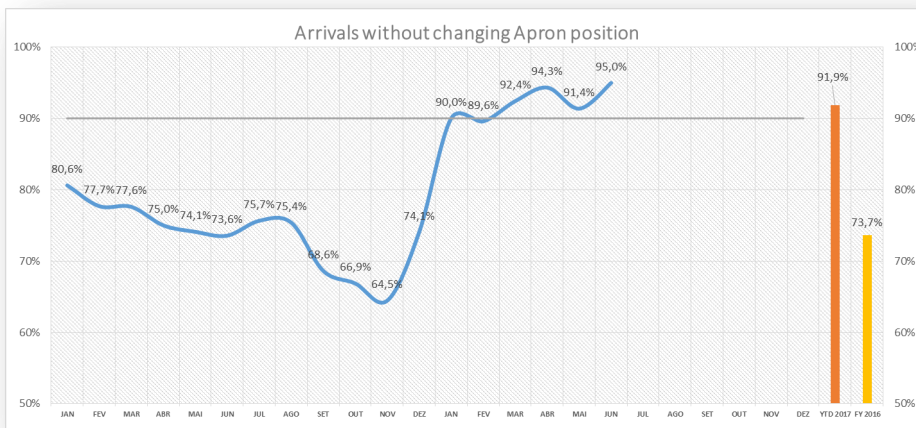
# 2. Achieving Operational Efficiency

## Cockpit – Mensal

MOVIMENTAÇÃO	Mês	YTD	SECURITY	Mês	YTD	SAFETY	Mês	YTD
Passageiros	●	●	Teste AVSEC	●	●	Colisão Avião	NA	●
Aeronaves	●	●	SME	●	●	Ocorrências de Solo	NA	●
Receita Cargas	●	●	Bombeiros	●	●	Ocorrências de Rampa	NA	●
QUALIDADE DO SERVIÇO	Mês	YTD	RESTITUIÇÃO DE BAGAGEM	Mês	YTD	Incidente	NA	●
Pontualidade (Partidas)	●	●	Doméstico ponte – 1ª bag	●	●	GESTÃO DE PESSOAS	Mês	YTD
Tempo de fila – 5 min	●	●	Doméstico ponte – última bag	●	●	FTE	●	NA
Tempo de fila – 15 min	●	●	Doméstico remota – 1ª bag	●	●	Afastamentos	●	●
Credenciamento – Espera	●	●	Doméstico remota – última bag	●	●	FINANCEIRO	Mês	YTD
Credenciamento – Atendimento	●	●	Internacional C – 1ª bag	●	●	Receita Aeronáutica	●	●
Tempo importação – Aéreo	●	●	Internacional C – última bag	●	●	Custos e Contratos	NA	●
Tempo importação – Rodov.	●	●	Internacional D E – 1ª bag	●	●	Contratos	NA	●
Tempo de liberação	●	●	Internacional D E – última bag	●	●			



← voltar início →



← voltar início →

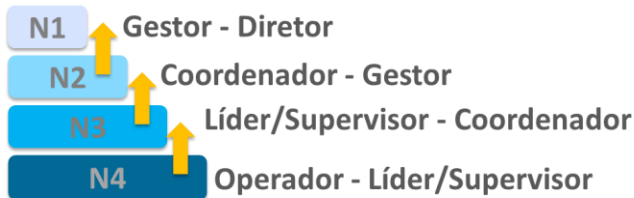
## A) Regular Reports

- **Daily:** summary of daily ops
- **Monthly:** monthly KPI report



## B) Performance Dialogs

### Internal:



- **External:** monthly with contractors (e.g. Cleaning) and partners (e.g. GHA)

## C) Facilitation Meeting:

### Monthly

- Key Figures;
- Performance Indicators
- Customer Surveys ANAC e SAC;
- Work group results



# A) Regular Reports

## APOC Daily Report

## Operations Monthly Report

### Cockpit – Mensal



MOVIMENTAÇÃO	Mês	YTD	SECURITY	Mês	YTD	SAFETY	Mês	YTD
Passageiros	●	●	Teste AVSEC	●	●	Colisão Avião	NA	●
Aeronaves	●	●	SME	●	●	Ocorrências de Solo	NA	●
Receita Cargas	●	●	Bombeiros	●	●	Ocorrências de Rampa	NA	●
						Incidente	NA	●
QUALIDADE DO SERVIÇO	Mês	YTD	RESTITUIÇÃO DE BAGAGEM	Mês	YTD	GESTÃO DE PESSOAS	Mês	YTD
Pontualidade (Partidas)	●	●	Doméstico ponte – 1ª bag	●	●	FTE	●	NA
Tempo de fila – 5 min	●	●	Doméstico ponte – última bag	●	●	Afastamentos	●	●
Tempo de fila – 15 min	●	●	Doméstico remota – 1ª bag	●	●			
Credenciamento – Espera	●	●	Doméstico remota – última bag	●	●			
Credenciamento – Atendimento	●	●	Internacional C – 1ª bag	●	●			
Tempo importação – Aéreo	●	●	Internacional C – última bag	●	●			
Tempo importação – Rodov.	●	●	Internacional D E – 1ª bag	●	●			
Tempo de liberação	●	●	Internacional D E – última bag	●	●			

- *Acima da Meta*
- *Entre a Meta e o mínimo estabelecido*
- *Abaixo do mínimo estabelecido*

← voltar início →

← voltar início →

## B) Performance Dialog: Example APOC I

Indicator	Mês	YTD	Mês	Ano
Departure Punctuality	87,1%	87,0%	↓	↓
Alocation at Aerobridges (Arr)	97,5%	98,3%	↓	↑
Alocation at Aerobridges (DEP)	97,9%	98,7%	↓	↑
Gate Changes before landing (<20min ETA)	91,1%	92,0%	↓	↑



Acima da meta e  
tendência positiva



Acima da meta e  
tendência negativa

**ND** Não disponível



Abaixo da meta e  
tendência positiva

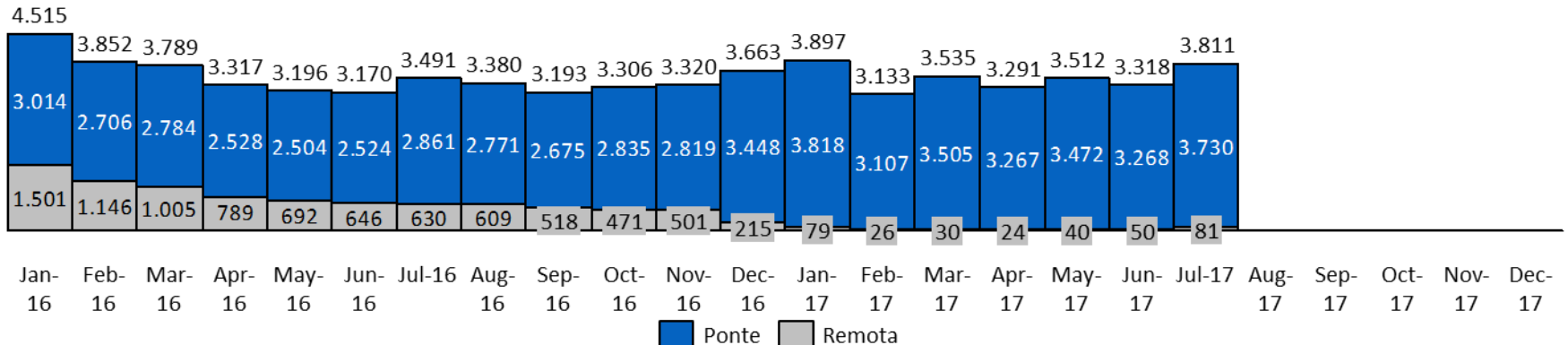
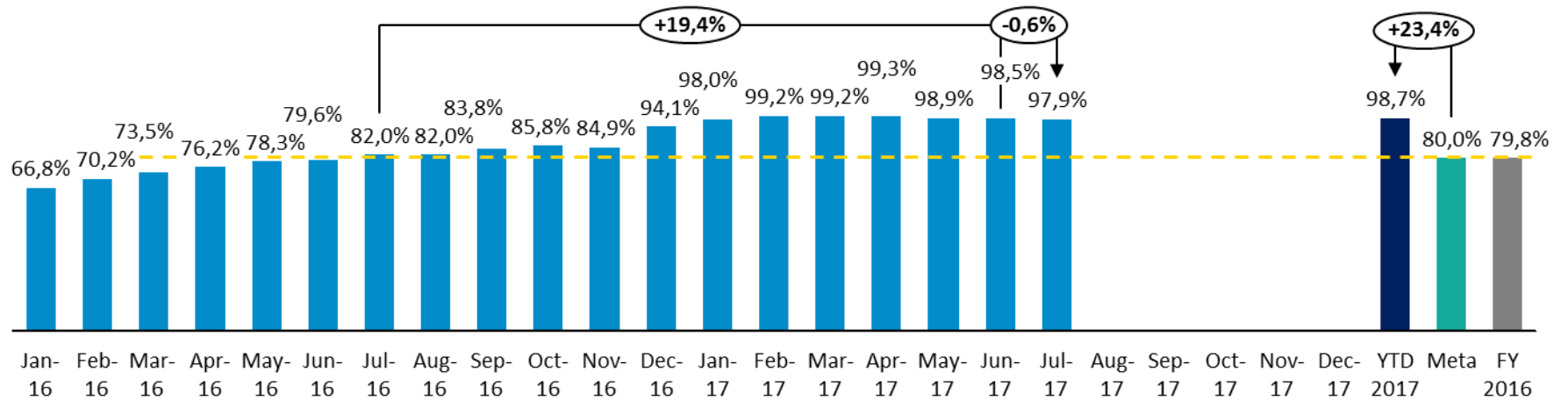


Abaixo da meta e  
tendência negativa

**NA** Não aplicável

# B) Performance Dialog: Example APOC II

## Allocation at Aerobridges (DEP)



## B) Performance Dialog: Example Airside Ops I

Indicador	Mês	YTD	Meta	Mês	Ano
<b>Time to couple the boarding bridge (ARR)</b>	94,1%	96,9%	95,0%	↓	●
Tempo de desacoplagem da ponte de embarque	99,7%	99,6%	95,0%	↑	●
Disponibilidade de fiscal de pátio	98,0%	97,0%	90,0%	↑	●
Disponibilidade de equipamentos das ESATAS	100,0%	99,8%	90,0%	↑	●
Disponibilidade de ônibus para embarque	94,8%	94,4%	90,0%	↓	●
Disponibilidade de ônibus para desembarque	95,5%	95,4%	90,0%	↓	●
Tempo médio de restituição da 1ª bagagem em ponte - Doméstico	00:10:06	00:09:07	00:09:00	↓	●
Tempo médio de restituição da última bagagem em ponte - Doméstico	00:18:15	00:16:51	00:19:00	↓	●
Tempo médio de restituição da 1ª bagagem em remota - Doméstico	00:14:16	00:11:57	00:12:00	↓	●
Tempo médio de restituição da última bagagem em remota - Doméstico	00:18:23	00:15:20	00:22:00	↓	●
Tempo médio de restituição da 1ª bagagem em ponte - Internacional ANV CAT C	00:09:04	00:08:52	00:15:00	↓	●
Tempo médio de restituição da última bagagem em ponte - Internacional ANV CAT C	00:21:35	00:20:59	00:25:00	↓	●
Tempo médio de restituição da 1ª bagagem em ponte- Internacional ANV CAT D - E	00:12:07	00:09:30	00:15:00	↓	●
Tempo médio de restituição da última bagagem em ponte - Internacional ANV CAT D - E	00:37:12	00:36:53	00:40:00	↓	●
Colisões entre veículos e equipamentos (Ocorrências de Solo)	0,011%	0,002%	0,002%	●	●
Colisões entre veículos, equipamentos e aeronaves (Ocorrências de Rampa)	0,000%	0,003%	0,005%	↓	●

↑ Acima da meta e  
tendência positiva

↓ Acima da meta e  
tendência negativa

**ND** Não disponível

↑ Abaixo da meta e  
tendência positiva

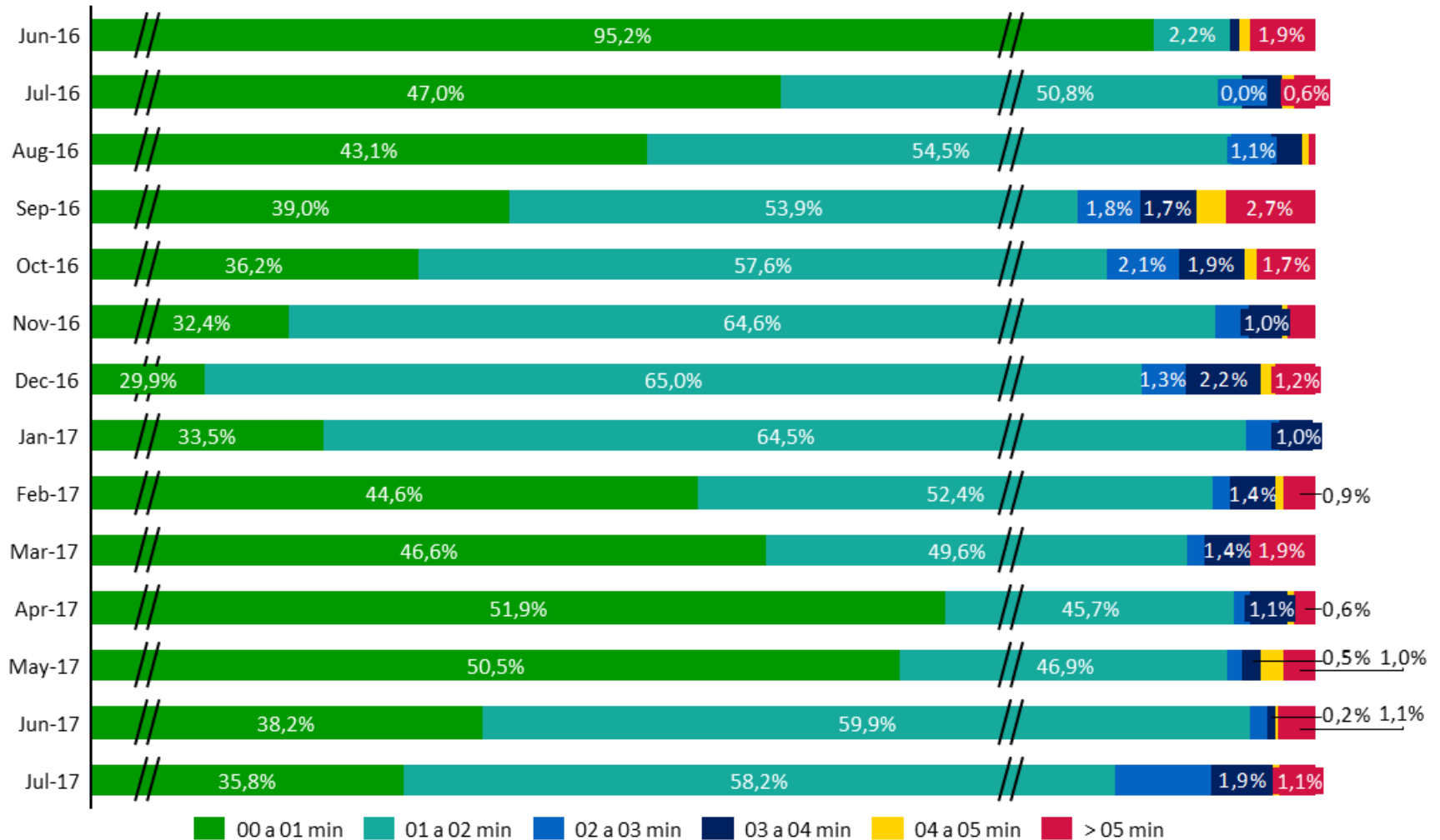
↓ Abaixo da meta e  
tendência negativa

**NA** Não aplicável



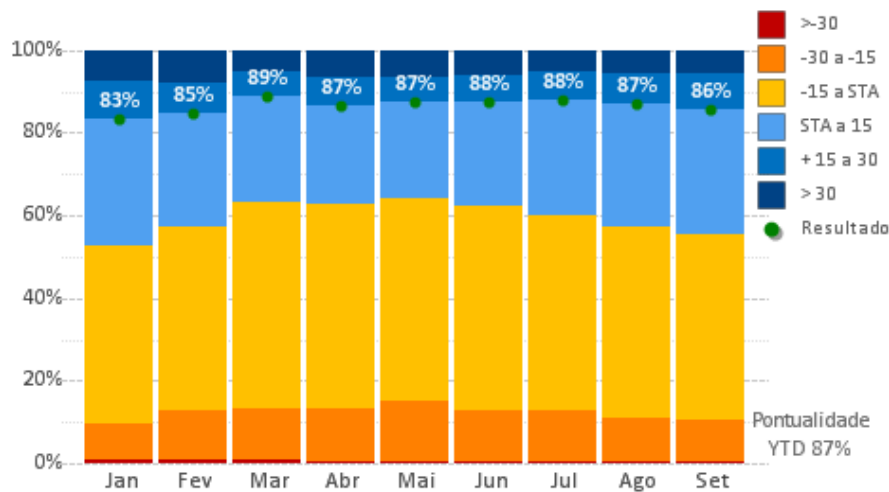
# B) Performance Dialog: Example Airside Ops II

## Time to couple aerobridge (ARR)

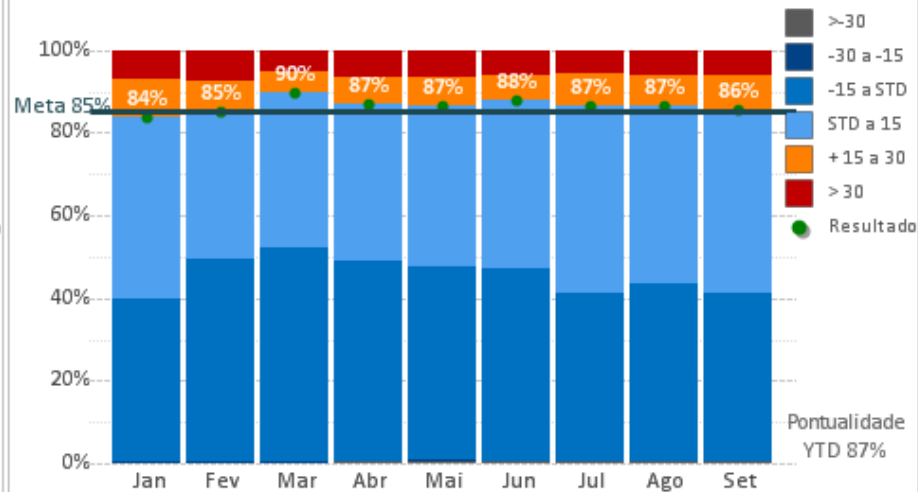


# Punctuality – Key indicator for efficiency is monitored daily, monthly and annually

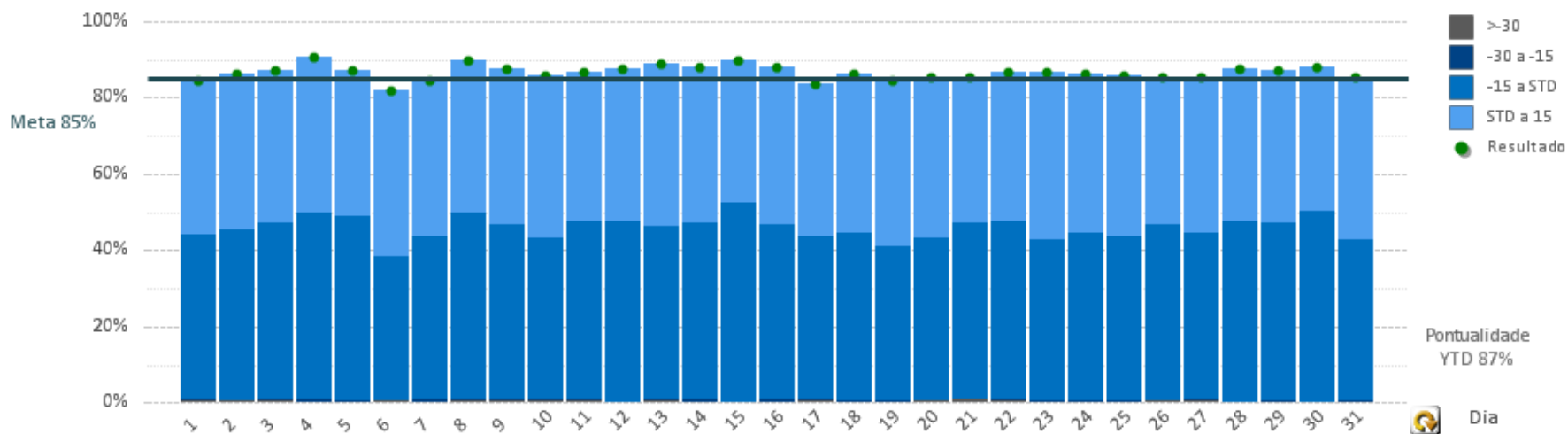
Chegada



Partida



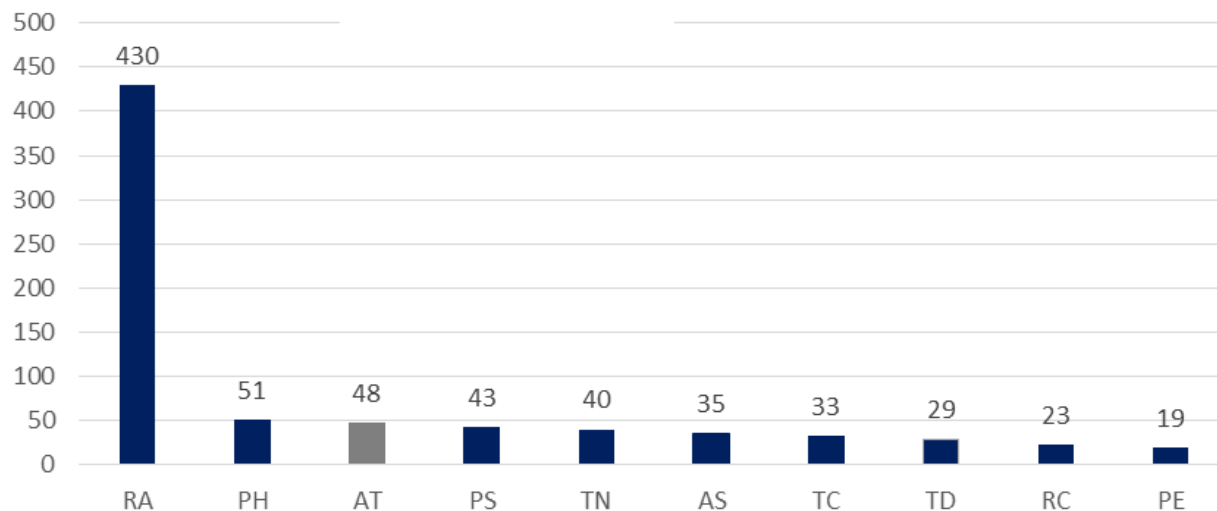
Partida



# Delay Code Analysis (Ex CNF)

Atrasos por tipo

2017



RA	Trilho da aeronave	AS	Segurança Mandatoria
PH	Embarque, discrepancias, passageiro com check-in perdido	TC	Troca de aeronave, por motivos técnicos
AT	Ger. fluxo de traf. devido demanda/capac. do contr. de traf. aer	TD	Defeitos na aeronave
PS	Embarque PNAE	RC	Escala de tripulação
TN	Manutenção não programada	PE	Check-in erroneo

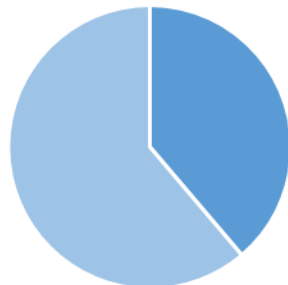
# Analysis of repeatedly delay flights

## Delay Arrival

Voo	Atrasos	Oper.	% atrasos
AD5045	9	11	81,8%
AD4251	5	10	50,0%
AD4423	4	10	40,0%
AD9286	3	8	37,5%
AD2465	3	8	37,5%
AD2529	4	13	30,8%
AD6417	3	10	30,0%
AD2581	3	10	30,0%
AD2816	2	8	25,0%
AD4217	2	10	20,0%

### ARR ATRASADAS AZUL

Demais  
atrasos:  
61%



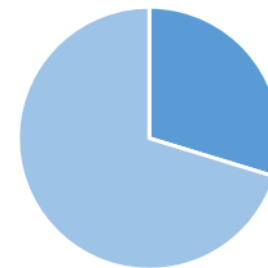
Top 10:  
39%

## Early Arrival

Voo	Antec.	Oper.	% antec.
AD2410	11	13	84,6%
AD5702	8	10	80,0%
AD5251	4	7	57,1%
AD8761	9	16	56,3%
AD4951	6	11	54,5%
AD2456	6	12	50,0%
AD2557	6	12	50,0%
AD4421	5	10	50,0%
AD5759	3	6	50,0%
AD2678	5	11	45,5%

### ARR ANTECIPADAS AZUL

Demais  
antec.:  
70%



Top 10:  
30%

# Delay Code Analysis (Ex BLR)

Delay contributors	Delay in mins- Mar 2012	Delay in mins- Apr. 2012	Difference
16-passenger inconvenience	347	286	Marginal Decrease
32-loading/unloading	411	349	Marginal Decrease
41-aircraft defects	724	4644	Major Increase
43-Non Schedule Maintenance	47	297	Major Increase
46-aircraft change	123	553	Major increase
63-departure procedures/late crew boarding	603	513	Marginal Decrease
64-flight deck crew shortage	414	27	Major Decrease
72-destination station - below ops limit	11	327	Major Increase
88-Restrictions at Destination Airport	8	529	Major Increase
91-Load connection	153	395	Major Increase
93-aircraft rotation	22479	28783	Major increase
95 - Crew Rotation	1130	524	Major Decrease
96-operation control	6799	5771	Major Decrease

# CNF: Most Punctual Brazilian Airport 2016

## - And 4 most punctual world-wide

OAG Punctuality League – Annual on-time performance results for airlines and airports

Airports: medium category  
5–10m departing seats per annum

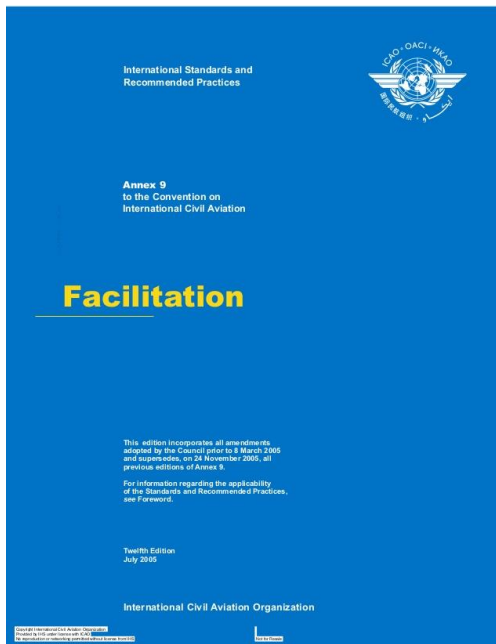
Table 9: Top 20 medium airports by OTP

Rank	Coverage	Name	Airport Code	OTP 2016
1	97.1%	Birmingham	BHX	91.28%
2	94.4%	Osaka	ITM	89.68%
3	95.7%	Panama City	PTY	89.56%
4	85.4%	Belo Horizonte	CNF	88.49%



# C) Facilitation Meeting

1. Promoto the continuous improvement of Airport Operations and Customer service:
  - a. Performance Monitoring (Punctuality, Baggage Delivery, Ressource allocation);
  - b. Specific Working groups



# 3. A-CDM Culture





# A-CDM (Project) Team Events



# Table for Collaborative Decision Making



Picture: Courtesy Kempegowda International Airport, Bengaluru

# Creating an Identity





## MEMORANDUM OF UNDERSTANDING

30.1.2009

6/050/2009

1 (7)

### 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 Oyj
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.

## Possible Content of an ACDM MOU

- 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

# 4. Local Realities

- Culture of collaboration (APOC, Meetings, Dialog)
- Availability of flight data and positive attitude towards data sharing
- Stability of Turnaround Process to predict flight readiness
- IT Integration and Support
- Willingness to make investments (systems, manpower, infrastructure, time, training)
- Urgency of operational and network challenges
- Type of Airport/Airline Operation (Hub, O/D, Regional)

# Summary

## **A-CDM is:**

- ✓ An important cultural change
- ✓ Bringing benefits to Airlines, Airports, ATM & ATM network
- ✓ Harmonization of data
- ✓ Continuous operational improvements

## **A-CDM is not:**

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

**A culture of collaboration and joint decision making (e.g. through APOC) and measuring of the airport performance (KPIs) are the basis for a successful A-CDM implementation.**

### Aeroporto Internacional de Belo Horizonte

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BH Airport

Aeroporto Internacional  
de Belo Horizonte