4th Regional A-CDM Seminar

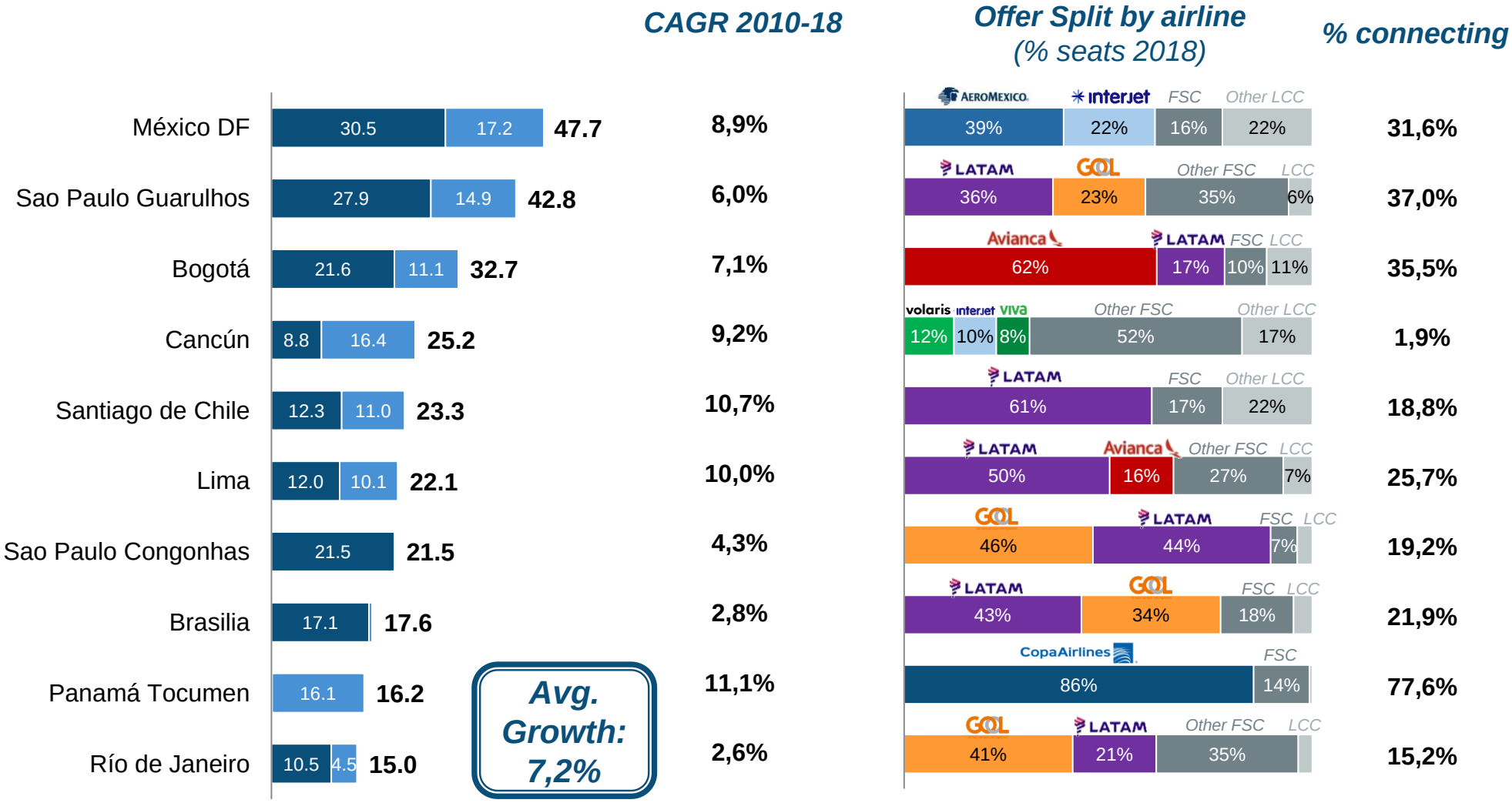
Need and experiences of A-CDM in the SAM Region

Lima, November 13th 2019

ALG by Indra

Main airports in LatAm have experienced high growth in the last decade, challenging their ability to adapt capacity to the boom in demand

TOP 10 Airports in LAC (Mpax 2018)



And this tendency will continue, almost doubling during the next decade bringing airports to a level of development similar to Europe today

Air transport main facts: Latin America vs Europe

LatAm 2018 → **LatAm 2030**

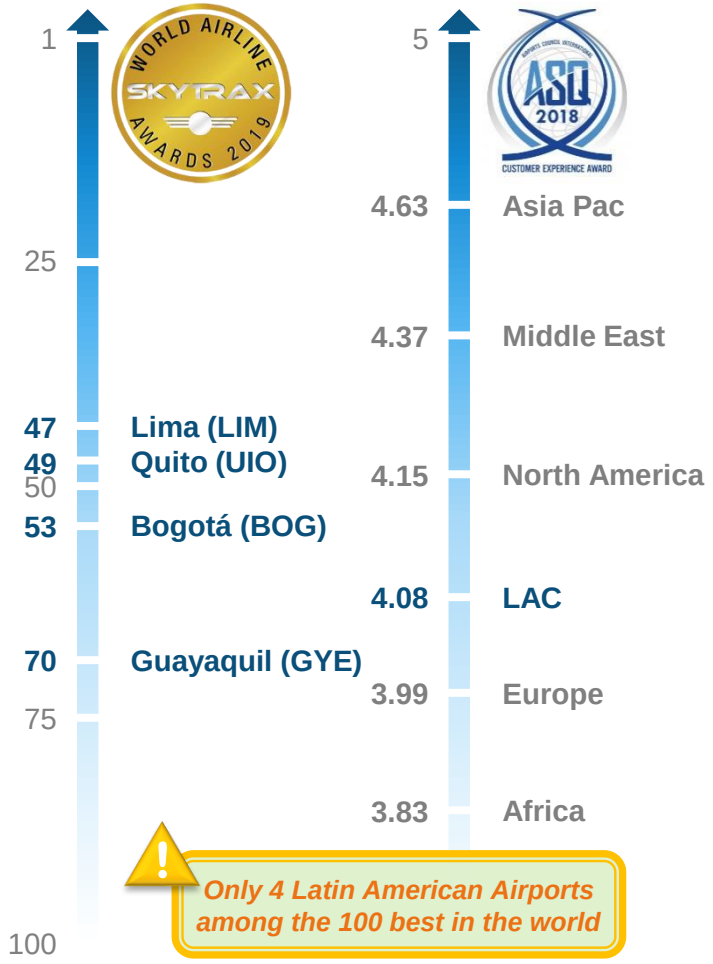
Europe 2018

	LatAm 2018		LatAm 2030	Europe 2018
Traffic	**644** Mpax	x1.7 (4.6% CAGR)	**1,100** Mpax	**2,336** Mpax (1,100 Mpax in year 2005)
Aircraft in operation	**1,351** aircraft	x1.7	**2,282** aircraft	**4,651** aircraft

Source: ACI, Airbus GMF 2018-2037, Boeing CMO 2018-2037

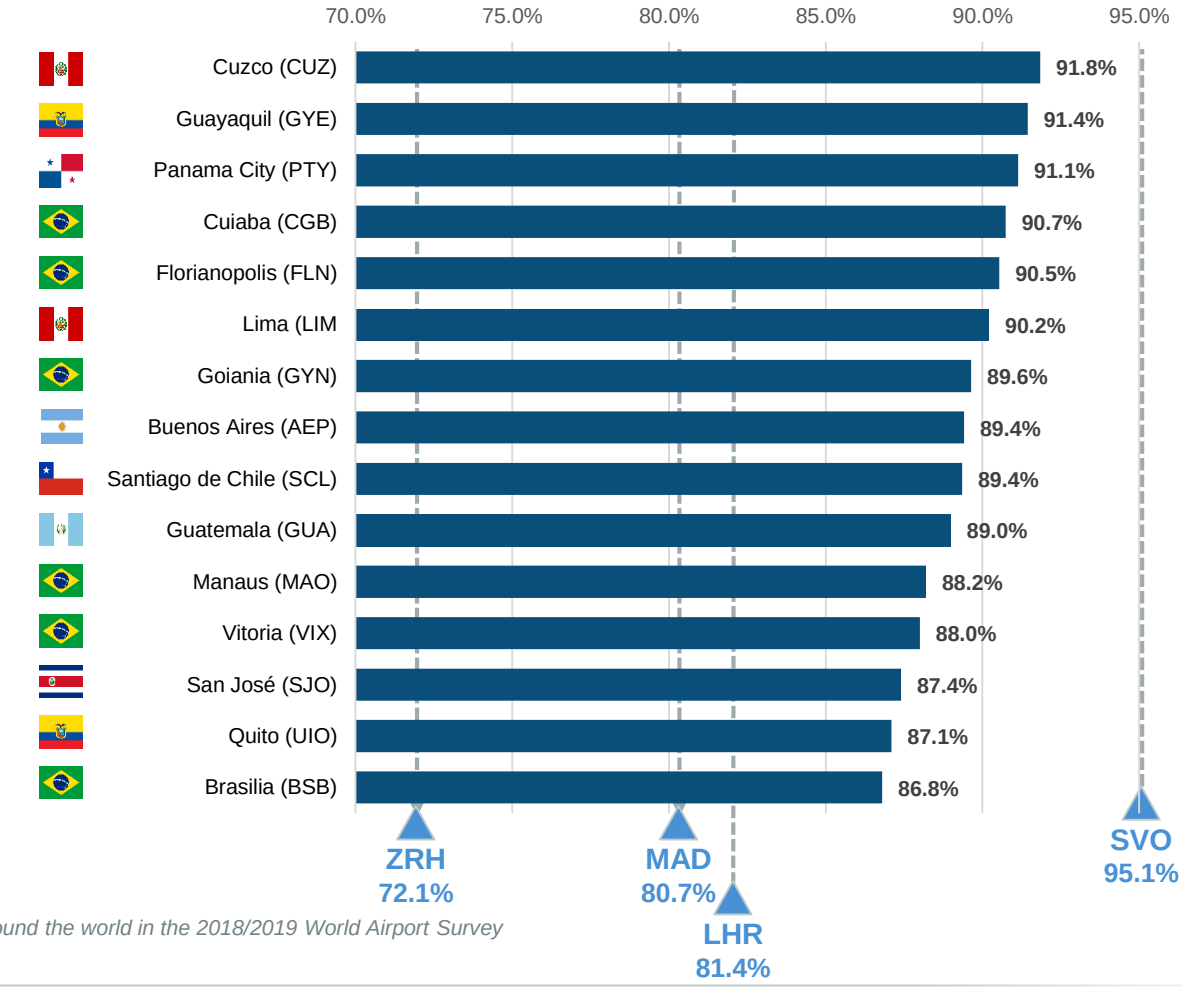
According to global quality rankings, Latin American airports performance is good in punctuality and average in terms of quality

World's Top 100 Airports 2019(1)



ACI's ASQ FY 2018 – Customer Experience Award

TOP 15 most punctual LatAm airports in April 2019

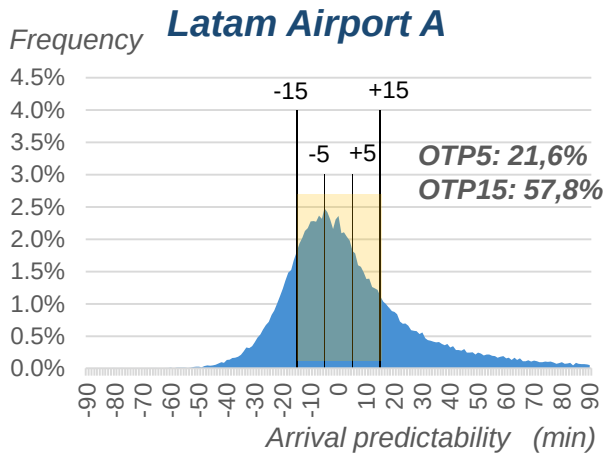


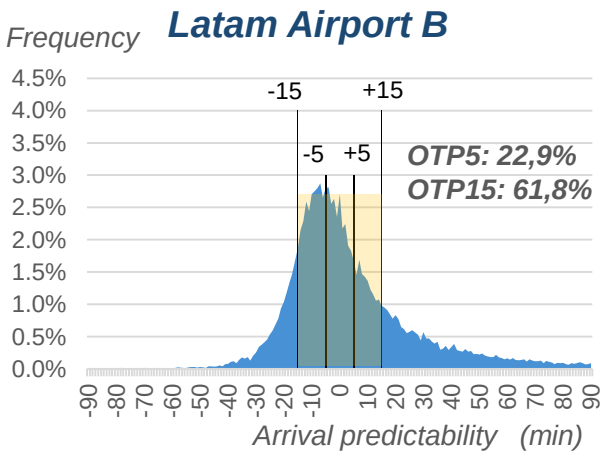
(1) Rating of the world's Top 100 Airports for 2019, as voted by air travellers around the world in the 2018/2019 World Airport Survey

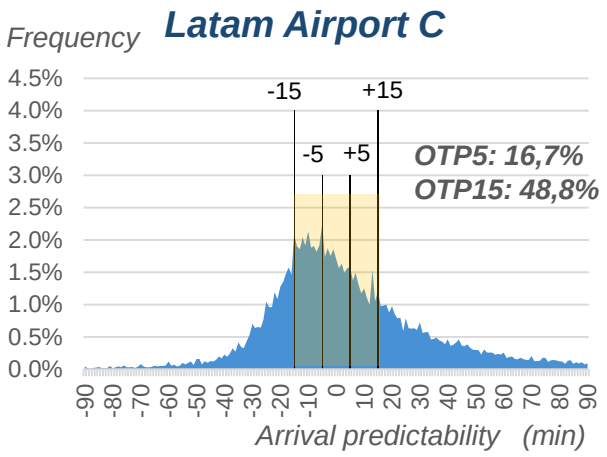
Source: SKYTRAX, ACI

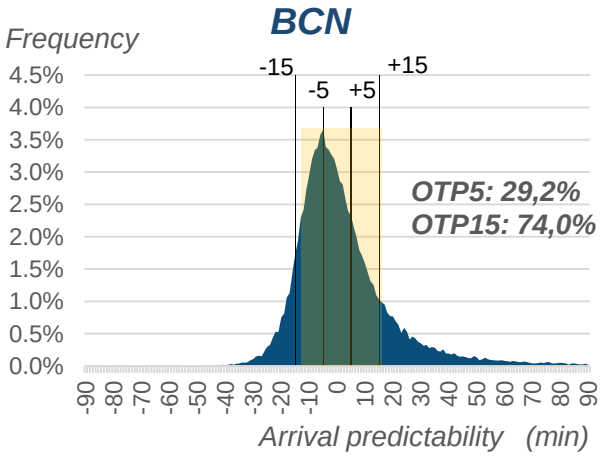
However, a wider analysis reveals big room for improvement, especially in optimizing processes and increasing operations predictability (1/3)

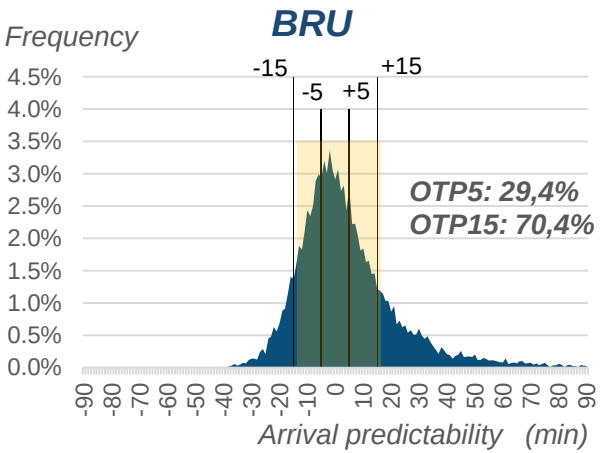
Arrival time predictability

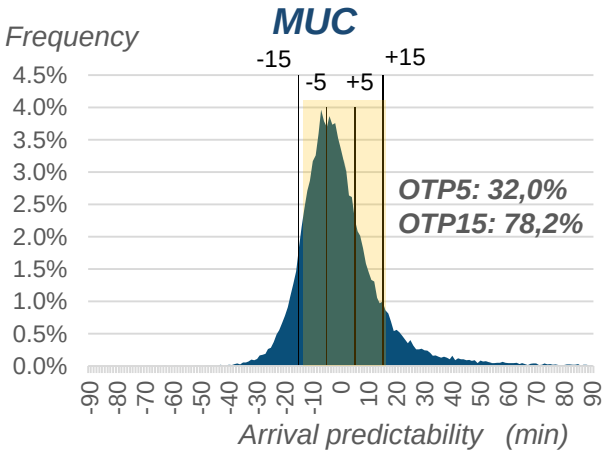










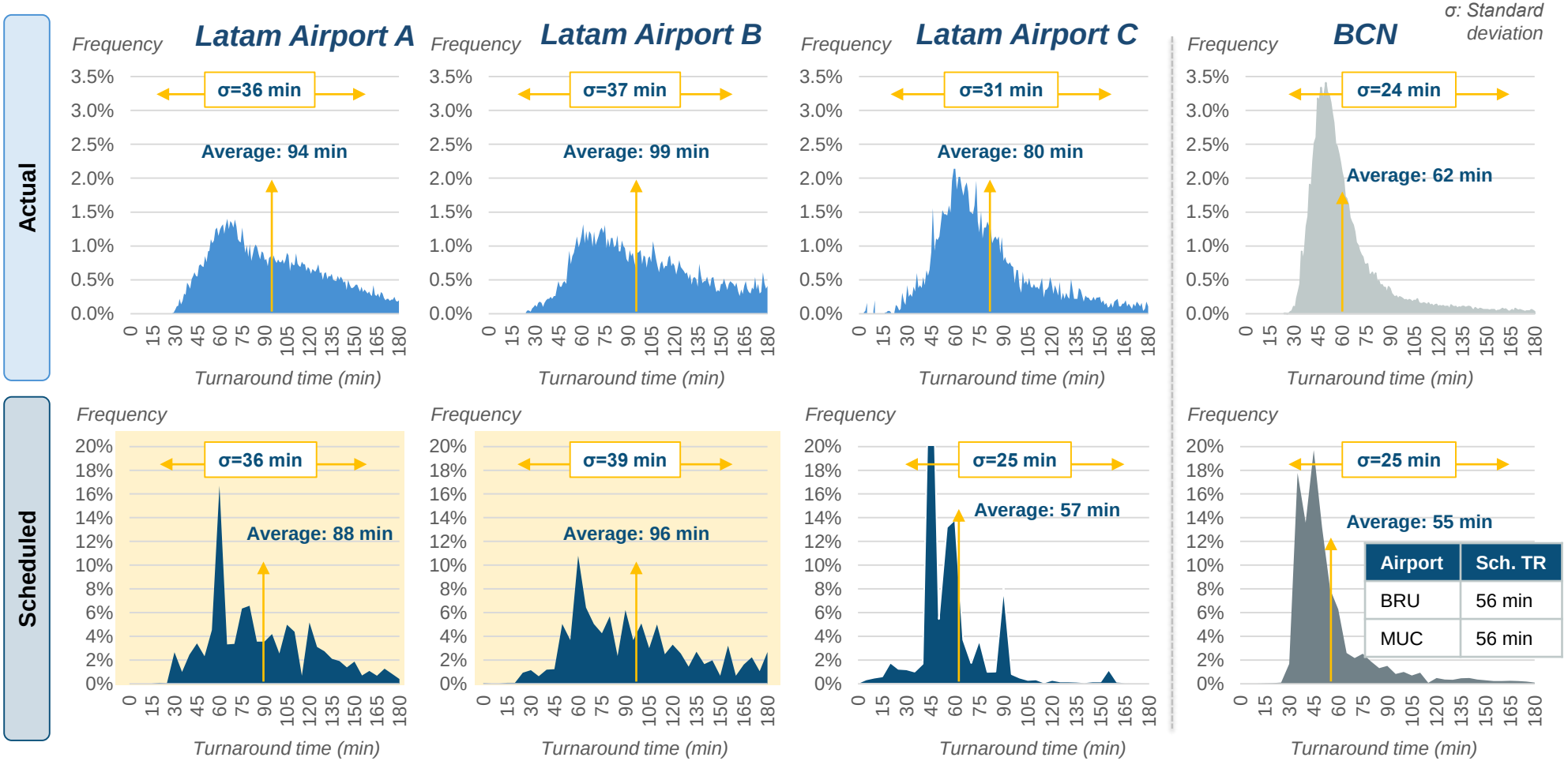


** Arrival time predictability for Type C aircraft*

However, a wider analysis reveals big room for improvement, especially in optimizing processes and increasing operations predictability (2/3)

Actual vs Scheduled turnaround times

σ: Standard deviation



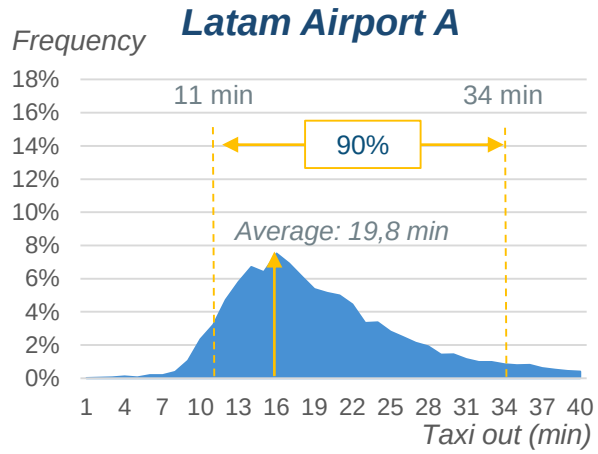
Scheduled turnaround between 2h and 3h

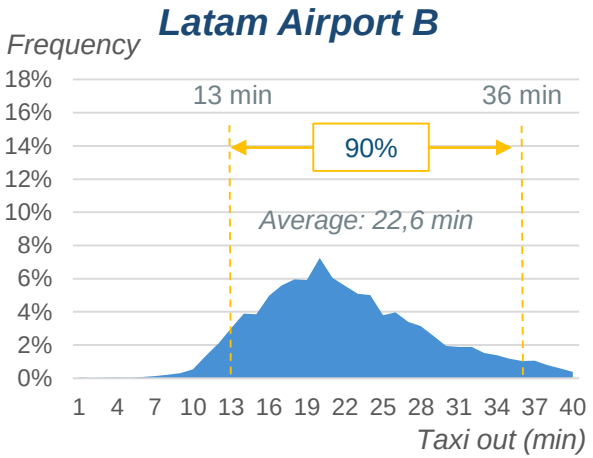
18% *22%* *3%*

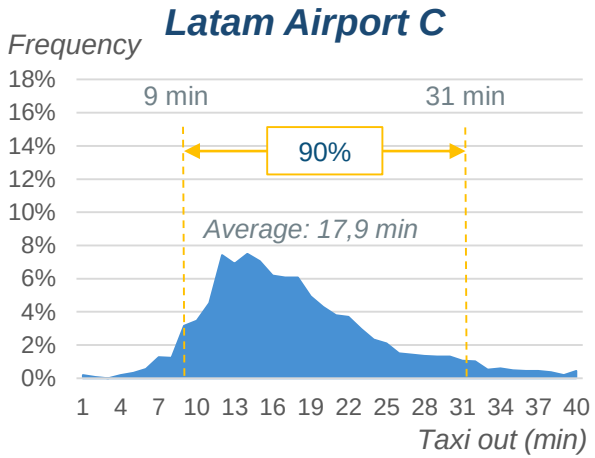
* *Turnaround times for Narrow aircraft in INT-INT operations*
* *Including scheduled turnaround up to 3h*
* *LatAm data: 2017-2019 / EU data: 2014-2015*

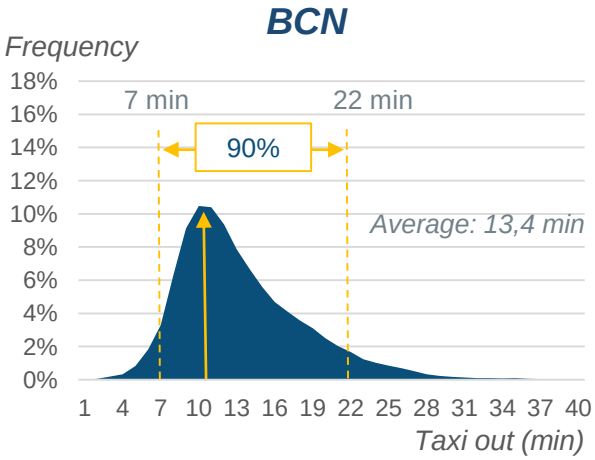
However, a wider analysis reveals big room for improvement, especially in optimizing processes and increasing operations predictability (3/3)

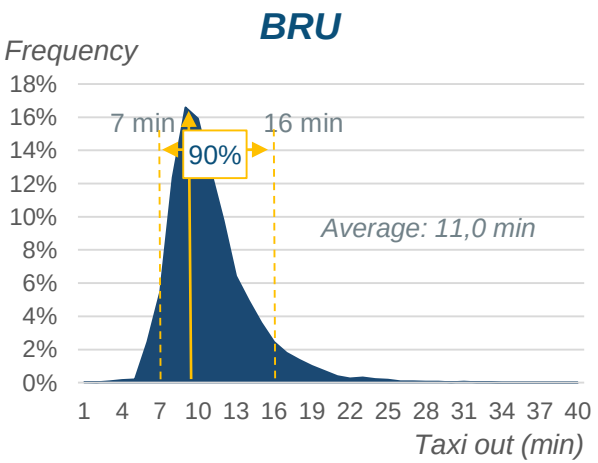
Taxi-out times

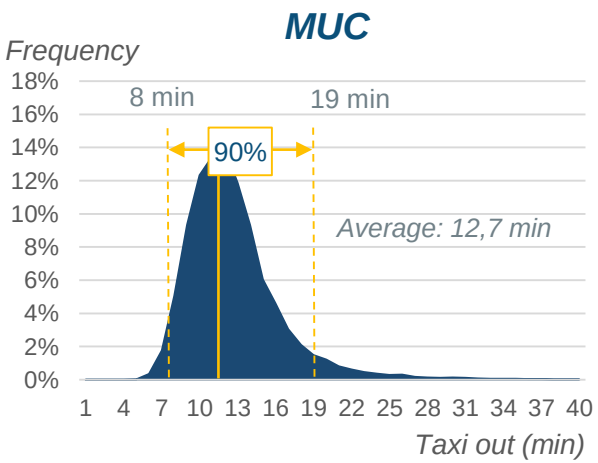












** Taxi times for Type C aircraft*

Solutions to improve operational efficiency are applicable starting from strategic phase to post-ops

Airside/aircraft optimization levers

Infrastructure Planning	***ConOps concept***	High-level document to develop decisions and agreements that provide end-to-end linking between operational needs and the infrastructure performance, safety and efficiency requirements
Strategic Phase	***Slots management and coordination***	Supervision of the operations in accordance with the approved slots, identification of possible problems related to the incorrect use of slot, analysis of off-schedule operations and application of regulatory penalties
Tactical And Pre-tactical Phase	***Airport Collaborative Decision Making (A-CDM)***	**Definition and implementation of an A-CDM program in order to enhance the common situational awareness and operational predictability through information sharing and resources allocation optimization**
	Airport Management Center (AMC)	Creation of an Airport Management Center concept for the management of the airport operations and resources allocation in real-time, exercising as maximum airport authority in real-time and unplanned situations
	Total Airport Management (TAM)	Definition and implementation of an TAM program in order to create an environment enabling airport partners to maintain a joint plan – the Airport Operations Plan – thus working towards dynamically agreed goals in order to get full CDM benefits
Post-ops analysis	***Performance monitoring***	Creation of an Airport Performance Committee to focus in the adoption of an airport operations management model to be performance-based. Through periodic meetings, establish a common airport performance framework and discuss results, issues and success cases around the region

A-CDM enhances the common situational awareness and operational predictability through information sharing and optimizes overall capacity…

A-CDM Concept

A-CDM** aims to improve **Airport Operational Efficiency

1. **Information sharing** between airport operators, aircraft operators, ground handlers and air traffic control
2. Adapted **operational procedures**, automatic processes and user friendly tools
3. Facilitating the **involvement of all partners** in Airport Decision Making Processes

Airport Management is improved by **reducing delays,** improving the **predictability of events** during the progress of a flight and **optimizing** the utilization of **resources**

A-CDM does not…

- × Resolve capacity issues
- × Resolve Traffic peaks
- × Resolve Airline Punctuality objectives

A-CDM provides…

- ✓ Enhanced Predictability of flight events
- ✓ Efficiency for resource utilization

A-CDM is not…

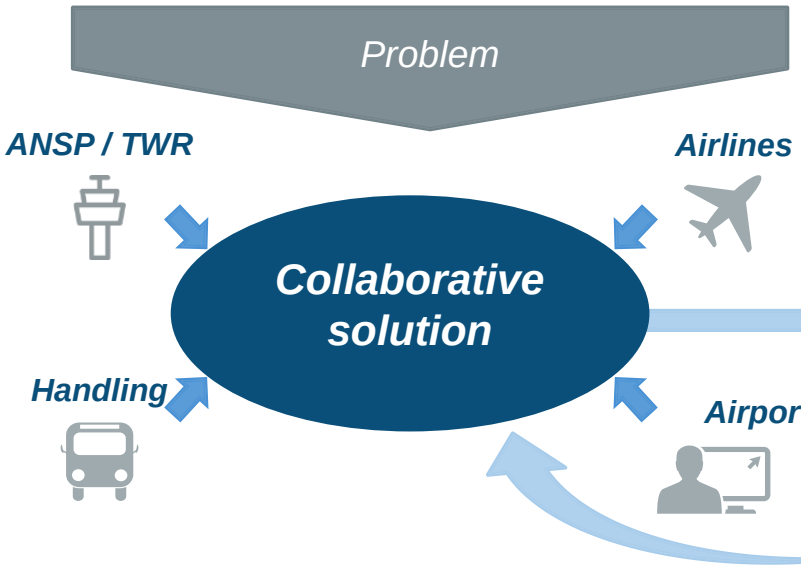
- A technical system that can be acquired to plug and play
- A solution you can buy and achieve immediately maximum benefit

A-CDM is …

- A **concept of operation** to predict traffic movements
- A change from First Come First Serve to **Best Planned Best Served**
- **Culture Change** within airport community

… by implementing collaborative decision making processes, improving also resource management and allowing faster recovery from disruptions

A-CDM Concept



¿What is A-CDM?

The A-CDM concept is used to facilitate decision making at an airport, carrying it out in a collaborative way between all stakeholders so that the common good of operations prevails

Post-operational performance analysis of the solution

***Post-operational analyses** will help in improving similar future decisions by **providing insight into what happened in the past** with the solutions that were then taken*

¿How can A-CDM help?

The CDM model solves congestion problems at the airport through collaborative planning and real-time management, and enables incidents to be detected immediately and their consequences anticipated

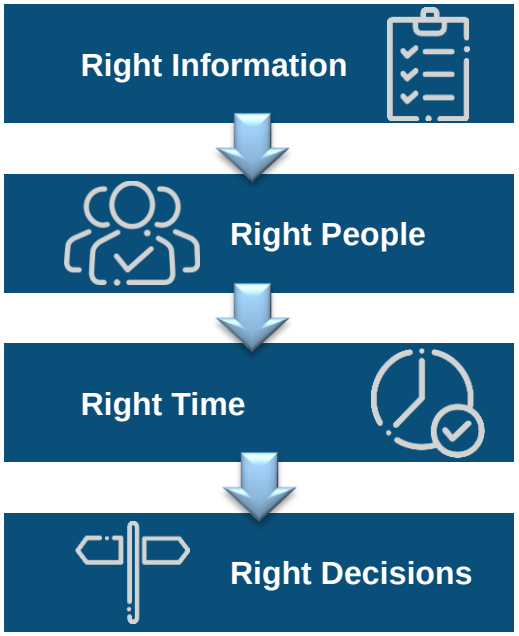
If landside management and the planning phase are added to the CDM concept, we turn to the **TAM concept (*Total Airport Management*)**

A-CDM is already a reality in European airports and is a growing trend in large airports in the Middle East, Asia and Latin America, where it is beginning to be introduced in some of **the major airports in the region**

A-CDM in essence aims to allow the right people to have the right information at the right time so that they can make the right decisions

A-CDM in a nutshell

'enhanced common situational awareness and operational predictability through info sharing, resulting in the optimization of airport & air traffic capacity'

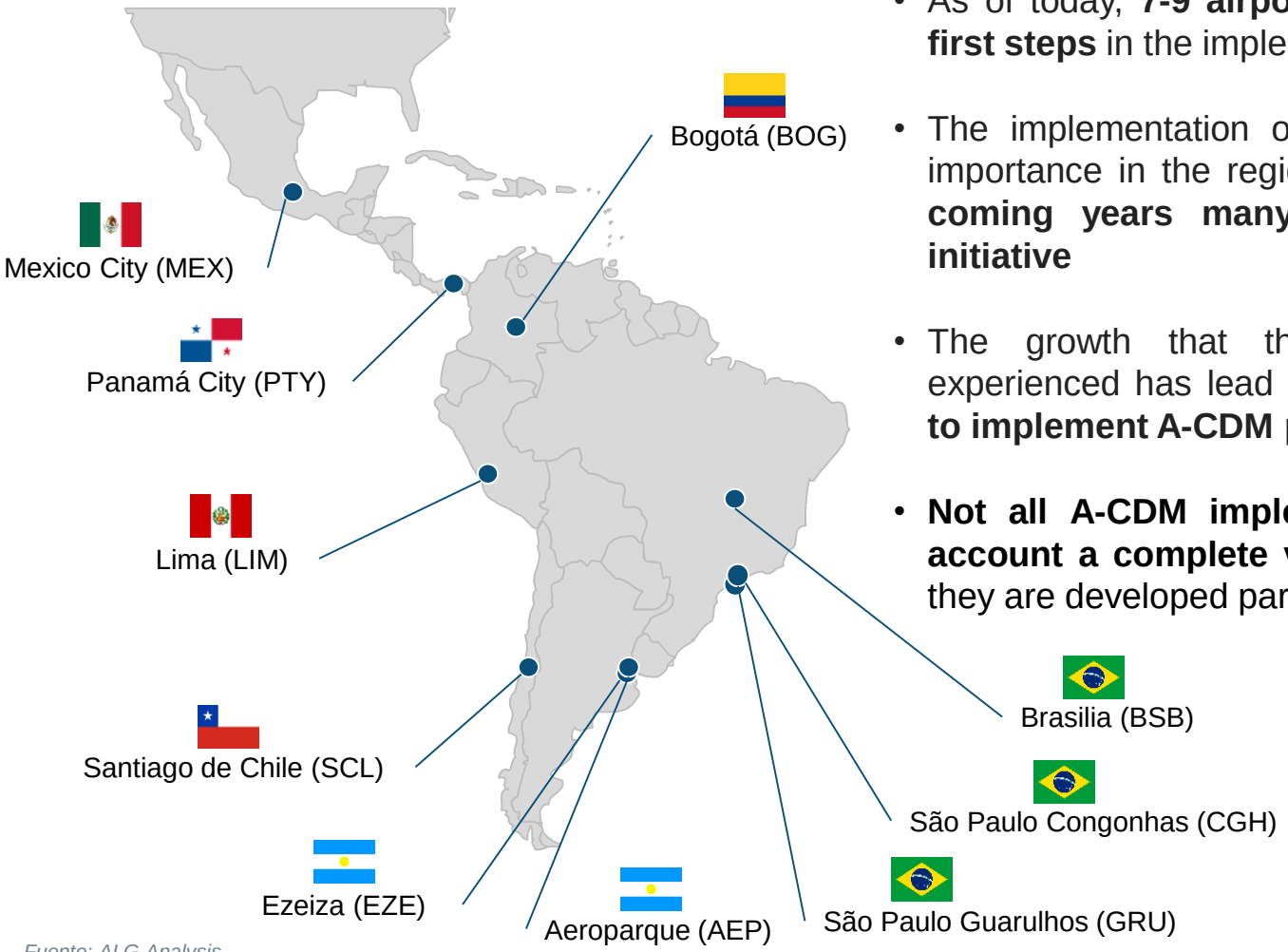


- Origin: US CDM, focusing on adverse weather & en-route restrictions
- Foundations: European ATM Strategy 2000+
- Airport Collaborative Decision Making, steered by Eurocontrol
- European 'network dimension', as opposed to US & MEA initiatives
- Single European Sky: A-CDM as WP6.6 in SESAR development
- ACI and CANSO collaborated in the definition of A-CDM concepts
- IATA has a working group to define guidelines for airlines implementing A-CDM
- ICAO has adopted CDM concepts and principles in Air Traffic Management in a wider scope than only Airports, being its implementation in airports one of the more mature examples of its success
- The interest in A-CDM in LatAm has grown in the past years due to the benefits achieved in Europe, beginning its implementation in major hubs

CDM emerged in the US to tackle adverse weather conditions and en-route restrictions and was adapted to all operating conditions in Airports by EUROCONTROL, **supported by the main industry associations**

The growth that the main LatAm airports have experienced is leading to the fact that local initiatives to implement an A-CDM program have started

Identification of A-CDM programs in LatAm



- As of today, **7-9 airports in the region are taking the first steps** in the implementation of an A-CDM program
- The implementation of the A-CDM is taking on great importance in the region, and it is expected that **in the coming years many more airports will join this initiative**
- The growth that the main LatAm airports have experienced has lead to **the launch of local initiatives to implement A-CDM programs and operations**
- **Not all A-CDM implementation programs take into account a complete vision of the concept**, but rather they are developed partially and in different phases

Fuente: ALG Analysis

These initiatives developed in different LatAm airports are progressing in an isolated way, and there is no an A-CDM concept harmonization as a region

A-CDM initiatives and implementation programs

A-CDM initiatives performed in LatAm airports

There are different ACDM implementation programs in the region, each with a different scope and concept of what ACDM is and how it should be implemented

- **KPIs measuring and monitoring**: As an initial step to start a collaborative environment, most of the airports have developed a KPIs measuring and monitoring model to analyze the operational performance of the airport in collaboration with the different local partners of the airport (GRU, MEX, LIM, BOG, EZE)

- **Airport management center**: Other initiatives are being developed associated with the creation of an airport management center, similar to an OCC, where real-time management of the airport is carried out and a global and complete vision of the airport operation is offered (GRU, MEX, LIM)

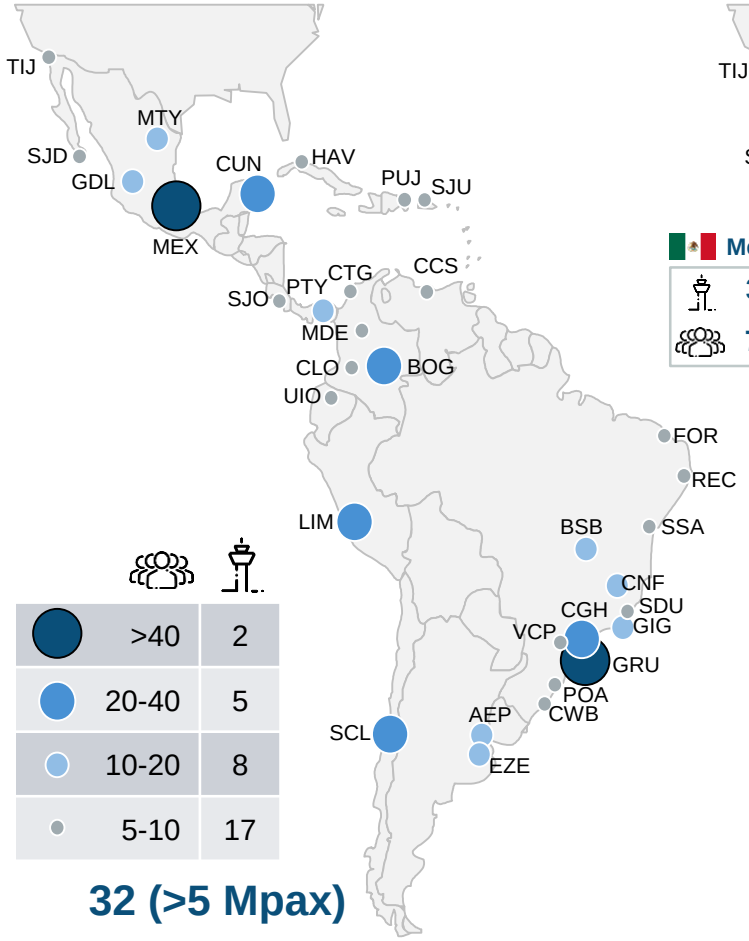
- **Working groups**: Most of the initiatives have created local working groups to initiate the ACDM implementation processes and to optimize the operations, but the lack of knowledge about the A-CDM concept, the culture of collaborative decision, conception and joint development among the stakeholders is slowing down the progress (GRU, MEX, LIM, BOG, EZE, SCL, PTY)

- **A-CDM procedures and systems**: Only a few initiatives are working in the development of operational procedures and systems related with the A-CDM concepts, such as information sharing, milestone approach, variable taxi times, pre-departure sequence and adverse conditions (MEX, LIM, BOG)

Traffic forecasts are predicting a sustained growth for the coming years that could lead to many more airports joining the A-CDM wave

Prevision of future A-CDM programs in LatAm

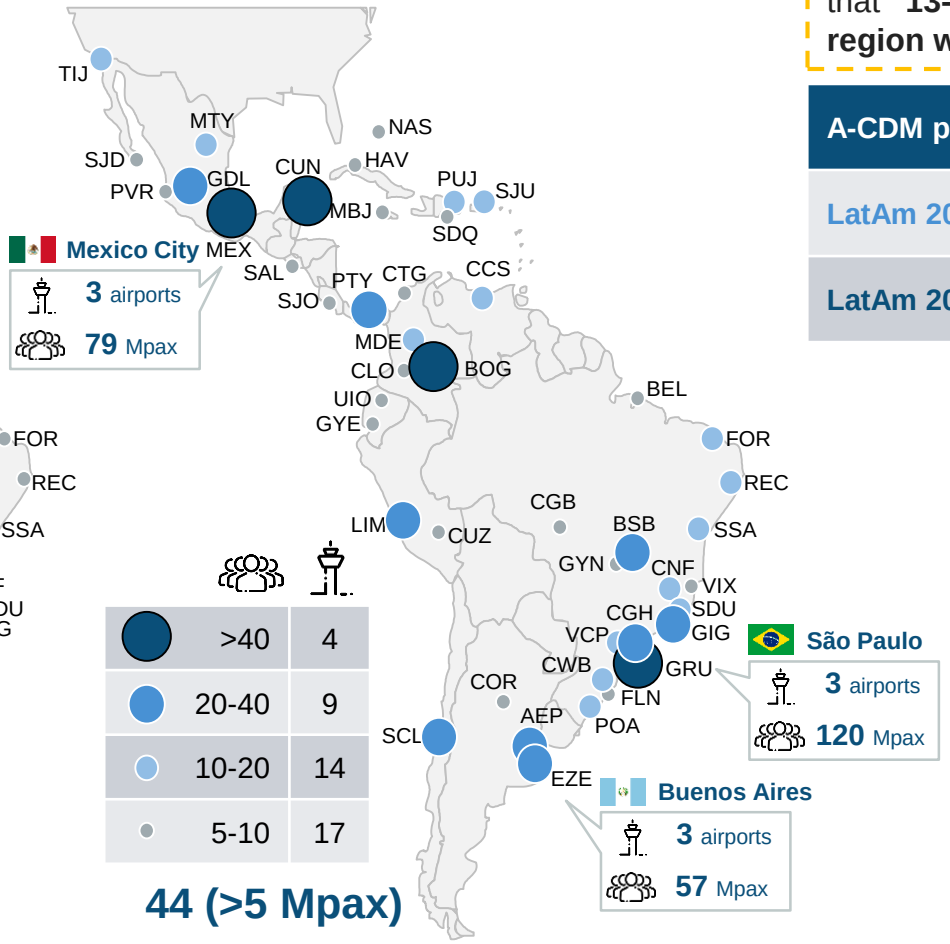
LatAm 2018



>40	2
20-40	5
10-20	8
5-10	17

32 (>5 Mpax)

LatAm 2030



Mexico City
3 airports
79 Mpax

São Paulo
3 airports
120 Mpax

Buenos Aires
3 airports
57 Mpax

>40	4
20-40	9
10-20	14
5-10	17

44 (>5 Mpax)

LatAm 2030, it is estimated that **13-15 airports in the region will join the initiative**

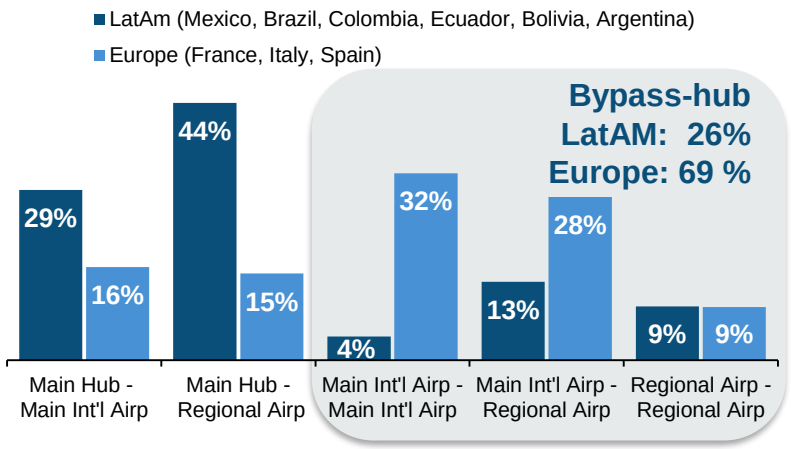
A-CDM programs	
LatAm 2018	7-9
LatAm 2030	13-15

Source: CAPA, Airbus GMF 2018-2037

Although secondary airport network contributions in Latam are still limited, tendency is that these airports will become key in the future landscape

A-CDM in the secondary airport network

Domestic air traffic in LatAm and Europe by route type



- Currently, 74% of the Air Connections are from/to a Hub from/to the main airport of the country, **only 26% transversal routes or by pass hub.** In Europe, these connections represent less than 30-35% of the total
- Brazil and Mexico are the most developed countries for bypass routes with 65% & 38% respectively, showing that mature markets tend to grow in this part of the network

- A-CDM was first created to provide situational awareness of operations at airports, and increasing efficiency of planes entering ATC network
- This situational awareness is incomplete if a **big number of flights have partial or non-existing visibility** as they fly to/from a non A-CDM airports
- With the aim of integrating secondary airports, Eurocontrol defined initially **Advanced Tower concept**
- **Regional A-CDM is under development** and is a reduced version of A-CDM implementation

Advanced Tower Concept
Concept aimed at airports not willing to deploy A-CDM but still wanting to connecto to ATFM network. Reqs:
- *AOBT*
- *Taxi Times*
- *SID's*

Regional A-CDM
Reduced concept of the milestone approach with a limited number of milestones and automatically calculated TOBT's

Future

Under development

Some smaller airports in SAM region have already showed interest in A-CDM

Typically A-CDM implementation lasts around 18 to 24 months and all airport stakeholders need to be involved in the different organization levels

Key program phases

18 – 24 months

Start-Up Phase

- Gap Analysis & Organization set up
- Business Case & Key Performance Indicators
- Commitment & MOU CEO level

Implementation Phase

- Full Time Program with project teams
- Steering & Execution, development, training and performance monitoring

Operation Phase

- Transition to Line Management
- Steer, Monitor, Manage, Post-Operation Analysis

Stakeholders and organization of A-CDM

Key Stakeholders to be involved

- Airport
- ANSP (TWR, APP, ATFM)
- Major Airlines
- Ground handlers

Program organizational structure

Steering Board — Operations Directors

Program Manager — Manager from leader organization

Program Board / Working Group — Senior Business Analists Project Managers

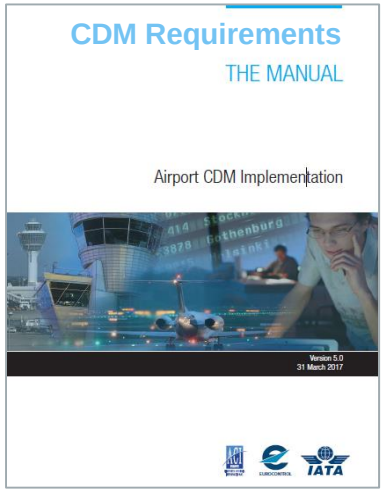
Sub-groups — Specialists of each area Sub-groups are launched on demand to cover program needs

- Performance Review Unit
- Project Training
- Project Development
- ...

A start-up phase provides an overview of the implementation planning and CBA which allows making the decision to implement A-CDM

Key program phases: Start-Up phase

A-CDM GAP Analysis



- Processes
- Actors' working practice
- Information sharing
- Information management & integration systems
- CDM Platform Integration Requirements

Diagnosis and current state of the airport

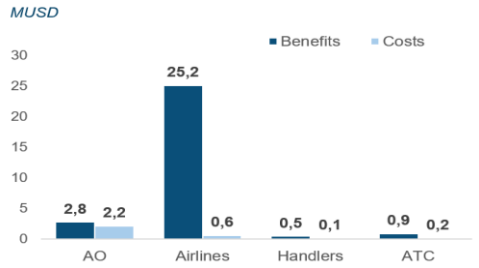
Modifications needed to implement each conceptual element

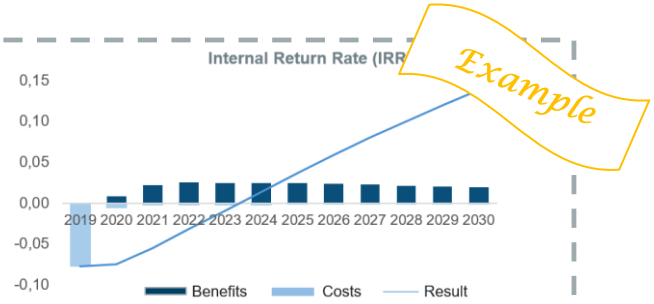
Proposal for impact assessment and change management

Implementation Plan and ConOps

Cost-Benefit Analysis

It is necessary an identification of expected benefits and required investment of each stakeholder as well as any assumption needed to assess them





In addition to setting the baseline for the A-CDM implementation at the airport, the analysis phase is accompanied by a stakeholder management strategy and engaging activities

The signature of a MoU is one of the main challenges of an A-CDM program and allows to ensure the involvement of all partners

Key program phases: Start-Up phase

Objectives of MoU

- To ensure technical mechanisms allowing the information sharing
- To implement procedures increasing the traffic predictability
- To promote the information exchange between the local Airport CDM project and the Network Operations
- To set up monitoring mechanisms processing the proposals for improvements

Partners obligations

- To ensure active participation, recognizing the project leadership
- To cooperate in all functional specifications
- To ensure the interaction between their systems and the local Airport CDM Platform
- To provide the necessary information to the platform and ensure its quality
- To guarantee a representative along the different phases of the project to support and control its development, as well as the implementation of the adopted solutions

***Confidentiality** is necessary to create a **feeling of trust** between all airport partners*

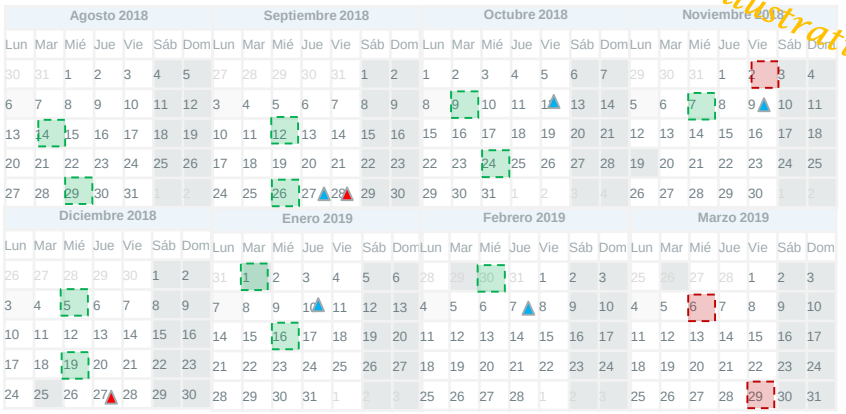
Signing a Memorandum of Understanding (MoU) means an agreement between all partners concerned in the program, which involve declarations of will to act with a common objective

It is necessary to develop a clear roadmap with defined objectives and deadlines for the success of an A-CDM program implementation

Key program phases: Implementation phase

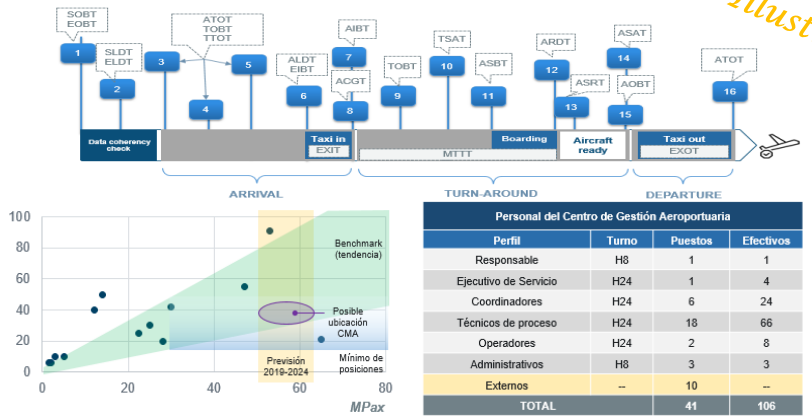
Full Time Program with project teams

Illustrative



Collaborative Operational procedures

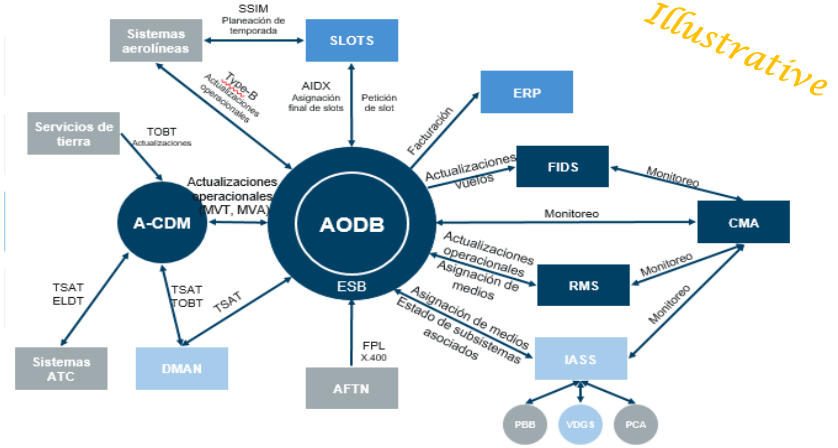
Illustrative



Personal del Centro de Gestión Aeroportuaria			
Perfil	Turno	Puestos	Efectivos
Responsable	H8	1	1
Ejecutivo de Servicio	H24	1	4
Coordinadores	H24	6	24
Técnicos de proceso	H24	18	66
Operadores	H24	2	8
Administrativos	H8	3	3
Externos	--	10	--
TOTAL		41	106

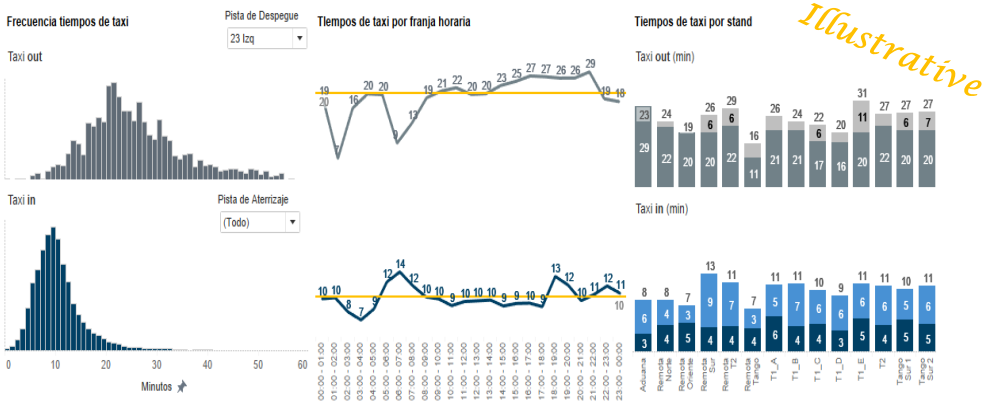
A-CDM platform and systems

Illustrative



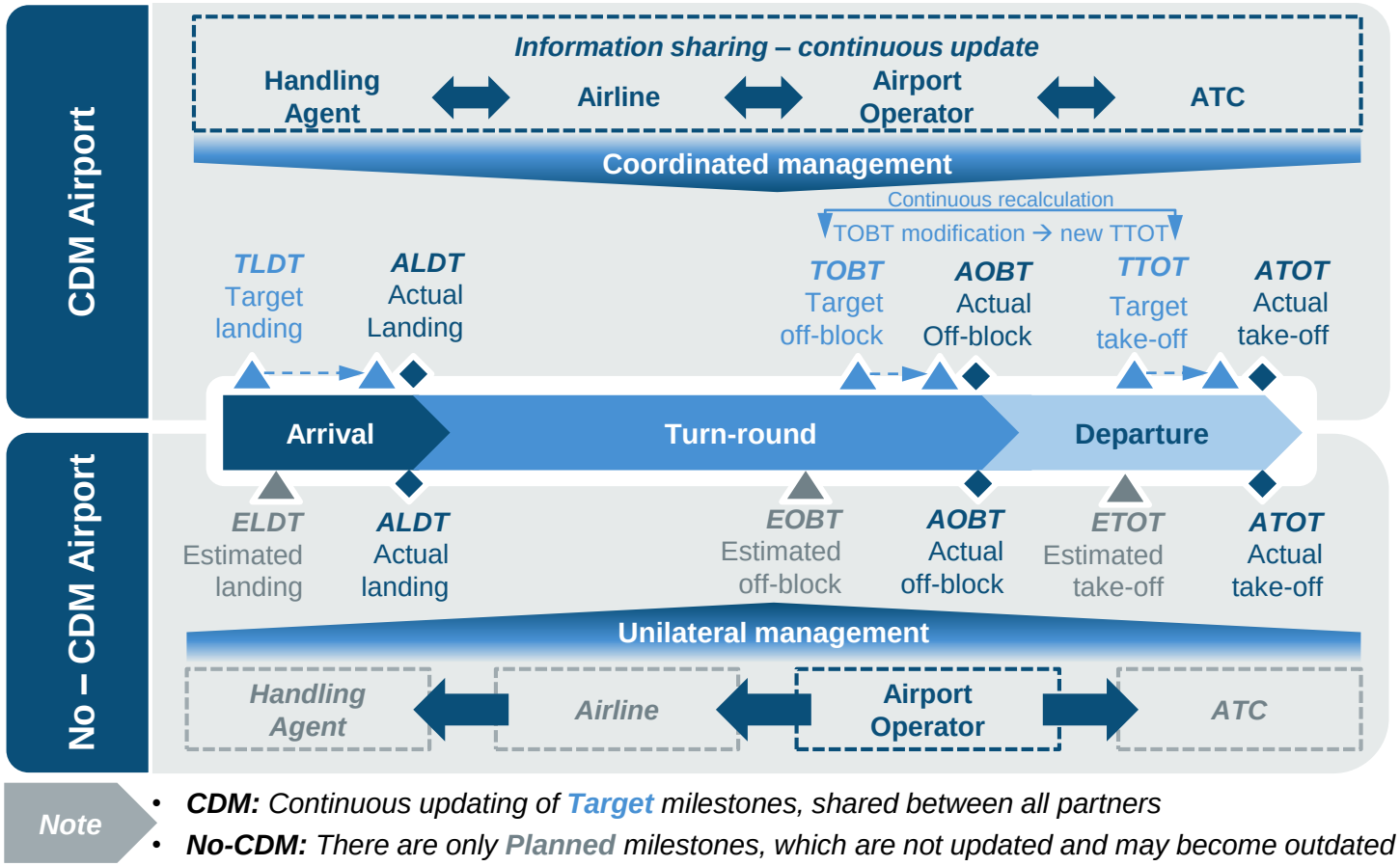
Performance monitoring and training

Illustrative



The milestone approach of A-CDM allows anticipating to the effect of a delay, managing it and avoiding its impact on other flights

Key program phases: Implementation phase



Note

- ***CDM:*** *Continuous updating of **Target** milestones, shared between all partners*
- ***No-CDM:*** *There are only **Planned** milestones, which are not updated and may become outdated*

Main Improvements

- **Efficient use of available capacity**
- **Common situation awareness**
- **Improved predictability**
- **Optimal flow management**

The CDM model significantly increases predictability in operations, enabling improved efficiency in resource use and operation management

Performance measuring allows to identify program objectives and monitor its achievement during the implementation process

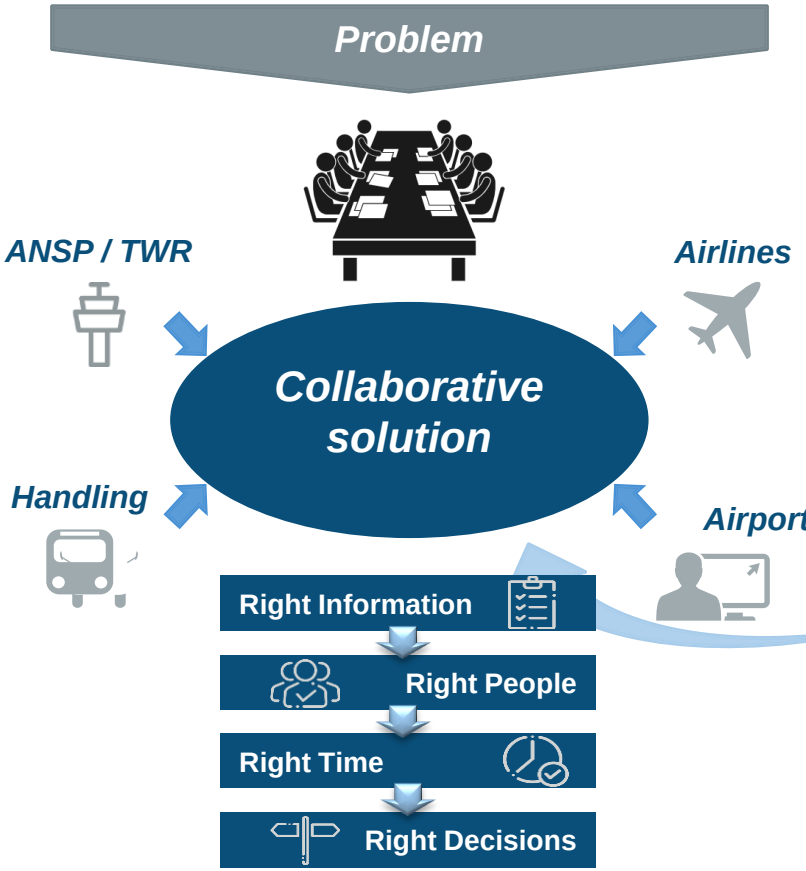
Key program phases: Implementation phase

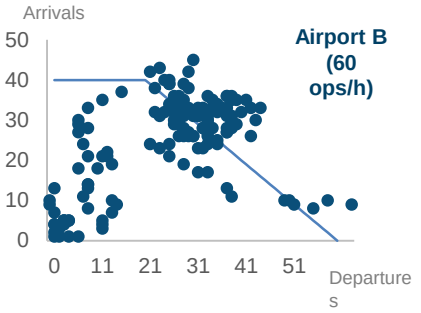
Illustrative

Area	Indicator	Rationale
Enhance Predictability	TOBT accuracy	To detect flights with an 'unmanaged' TOBT and visualise trend. Identifies resource issues at handlers
	TOBT stability	To determine the stability of TOBT before EOBT/SOBT. Identifies unforeseen disruptions in operational process
Enhance Robustness of Capacity	Taxi out and taxi in time accuracy	To detect flights that actually taxied for a significantly longer time period than planned. Identifies constraints on taxiways which may lead to less TTOT adherence, congestion and impact ARR rate
	Airport slot adherence	Aircraft operating off-slot have a immediate negative effect on stand/gate & runway capacity, leading to slot wastage. Measuring SOBT adherence helps mapping behaviour and defining mitigation
Improve Punctuality	Start-up process efficiency	Detects inconsistencies in the start-up process (aircraft going OB later than expected), allowing proper mitigation. Identifies apron congestion, which may eventually compromise TTOT quality
	Arrival punctuality	To visualize the behaviour of arrival flights in terms of schedule adherence, enabling assessment of the impact on terminal capacity. Identifies deviations from planned ops and triggers to reconsider stand planning (for late & early ARR) and review downstream DEP A-CDM processes (for late arrivals)
	Departure punctuality	To visualize the behaviour of departing flights in terms of schedule adherence. Identifies deviation from planned ops and indicate knock-on delay (when ARR are late as well) or issues in turnaround and/or start-up process, allowing proper mitigation
Improve Efficiency for Resource Utilisation	Accuracy of declared capacity	To detect a gap between the actual operational capacity and the declared capacity. Early detection of demand exceeding capacity allows stakeholders to timely reschedule resources.
	# of last-minute stand & gate changes'	Last-minute stand/gate changes have a negative effect on passenger experience and resource planning. Better arrival predictability should lead to less last-minute changes

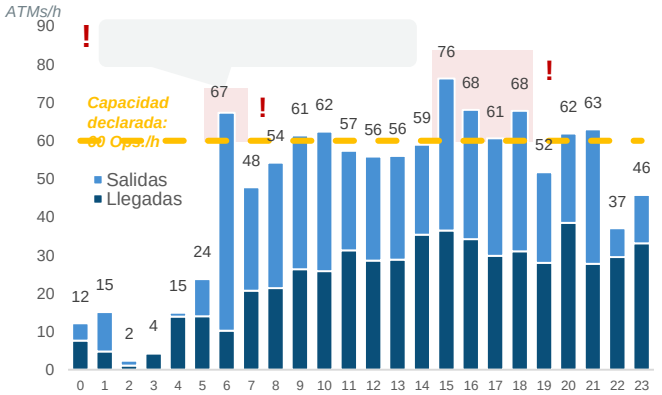
The cultural change that A-CDM implies needs a transition time to ensure the success of the implementation and full involvement of stakeholders

Key program phases: Operation phase





Post-operational performance analysis of the solution



ACDM is not a system or a tool, but it is a process that needs a transition time for its correct implementation in the airport and the partner involved in the program

Based on regional experiences and lessons learned in deployments in Europe, some key elements must be considered in A-CDM implementation

A-CDM program key success factors

Program management

- Thorough **change management strategy & training**
- **CBA is required** as it favors the commitment: managers love numbers
- External consultancy and **experience is a must**
- **Talk, talk and talk**, and when you have finished talking, then talk again!

Personnel

- First step is to set the **organization** & get the **Memorandum of Understanding signed**
- Stimulate knowledge development and **involve all stakeholders** → they are now partners!
- **Allocate necessary resources**: A-CDM is a full-time job

Processes

- **Monitor performance from day 0**: performance framework enables sharing culture and increases the sense of belonging of all partners
- When concept is operational, **continue to propose improvements**: there is always room for improvement

Systems

- Perform a **GAP Analysis** on operations and systems **of all airport partners**
- Get **systems people on-board** as early in the project as possible
- **Systems are tools to support the operation**, not the other way around: don't let them limit your Conops too much

A-CDM is about changing the way people interact and as a result you will change the operation
Focus on people

Why A CDM in the top 20 LAC airports?; Having at least 13-15 airport fully implemented in next 5 years?

Prevision of future A-CDM programs in LatAm

- All airports are unique, but **all have room for efficiency enhancement**
- **Traffic growth** means **less spare capacity**. More infrastructure is expensive and not always is possible.
- Operations improvements means **more quality operation** and **efficiency** in airport operation and more capacity without expansion investment
- **Successful experience in Europe** and other regions proved A-CDM as a key driver to operational transformation (procedures, governance, culture, IT systems,..) and the sought after improvement of operations performance.
- A-CDM **enables discussions between stakeholders** (Airport, ATM, Airlines, Ground Handler) and contributes to establishing a **collaborative culture.**

- **México DF**
- Guadalajara
- Monterrey
- Cancún
- Panamá -Tocumen
- **Bogotá**
- Medellín
- Cali
- Santiago de Chile
- **Lima**
- Buenos Aires-Aeroparque
- Buenos Aires. Ezeiza
- **Sao Paulo GRU**
- Sao Paulo VCP
- Sao Paulo CGH
- Rio Janeiro GIJ
- Brasilia
- Recife
- El Salvador
- Belo Horizonte
- San Jose Costa Rica
- Quito
- San Juan Puerto Rico

In summary, there is a lack of harmonization between the different A-CDM implementation programs in the region

Common issues in LatAm A-CDM projects

- Depending on the country and the local circumstances of the airport (regional, hub, other), the **initiative to implement an A-CDM program comes from a different collaborator** and in different formats
- **A-CDM concept and scope vary greatly among the different implementation programs**, moving away from the concept created and developed in Europe sometimes missing key elements or activities that impact the implementation
- In general, the **implementation of an ACDM program has not caught the attention of all key participants** across different initiatives, slowing down or totally stopping project developments

Required working areas

- It is necessary to **harmonize the LatAm ACDM concept**, especially for the process of implementation, data sharing between partners, terminologies, data formats and quality and framework among systems
- The creation of a **multidisciplinary working group with the objective of establishing an A-CDM implementation plan in the region**, unifying criteria, raising awareness about expected benefits and monitoring the different processes is a key element for success
- The **implication of international organizations as ICAO, CANSO, IATA, ALTA** and external collaborators could **encourage the involvement of stakeholders** and improve the implementation of the program

This could be mitigated by the establishment of an A-CDM working group to harmonize concepts and develop a LatAm A-CDM program

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