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Airport Network Integration

Concept for establishment of an Airport Operations Plan (AOP)





AIRPORT NETWORK INTEGRATION

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<p>This document is a guideline on the principles and high-level requirements of how consolidated information is generated at local airport level to enable the Airport Operations Plan-Network Operations Plan (AOP-NOP) interaction processes, as a means of full integration of airports with the ATM Network.</p> <p>It establishes definitions and provides the distinction of what is an Actor, a Process and a Product. It further highlights what organisations or entities need to collaborate and commit to such collaboration for a successful implementation and execution.</p>			
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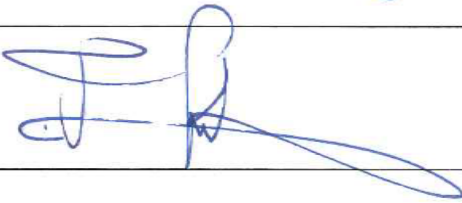
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1 Executive Summary

In SESAR 1, significant steps have been made to further develop concepts of the ATM Masterplan. One of its many aspects concerns the integration of the airports with the Network through the establishment of Airport Operations Centers (APOCs) and the Airport Operations Plan (AOP) that is to be linked with the Network Operations Plan (NOP) of the Network Manager (NM).

Not every airport will establish an APOC as defined by SESAR as it does not necessarily fit the local scope and size to justify such an investment. Therefore, this document describes the principles on the set-up of a local collaboration as to establish an AOP. This will be done following the principles of the Ground Coordinator Concept¹ and for the ease of reading be labelled APOC throughout the document, where it stands for collaborative actors.

All actors that have operations at and around airports increasingly recognise the need for transparent and collaborative processes and sharing of information.

Some of the elements of the APOC and AOP concept still require more refinement such as:

- How local airport stakeholders could and should coordinate, but the baseline is that it is based on collaborative decision making processes and, to be effective, also take into account the local specificities, and
- What information the network manager needs from those AOP and APOC in order to be able to fulfil its duties laid down in the Implementing Regulation on the Network Functions and as to consider the local needs in the network management process.

This Concept Document describes the 'who-how-what' of the Airport-Network integration with focus on:

- Agreed definitions
- Which stakeholders/actors are involved in the process
- What are their roles
- What are their tasks
- When do they have to take action

One key element of this Concept Document is the description of what relevant information an AOP needs to contain, how it is to be generated in terms of process and to ultimately exchange with the NM in order to fulfil its role. This will enable actors to compare and integrate the AOP and NOP and take appropriate action if so required.

¹ The Ground Coordinator is a concept developed by ACI-EUROPE with the aim of establishing a function at airports that oversees operational aspects at an airport and which is similar to the APOC concept but can go beyond it.



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Recommendation

It is pivotal and strongly recommended that the local partners develop an Airport Operations Plan based on collaborative decision making principles, including a process to plan and manage daily operations and maintain the AOP. As to ensure mutual understanding and commitment, it is recommended to develop and sign a Memorandum of Cooperation.



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2 Definitions

Clarifying terms is pivotal in any document, particularly when collaboration between different entities that often have their “own” terminology is essential. This section contributes to a simplified understanding of the various parties involved in establishing the AOP.

It is strongly recommended to read this section first before proceeding to the rest of the document.

Terminology may differ in some aspects from wording used in SESAR.

TERMINOLOGY	DEFINITION
ADVANCED ATC TOWER	<p>Airports that have no plans to implement the A-CDM process but still wish to integrate with the ATM network may do so as an Advanced ATC TWR Airport. Such an Airport provides a reduced set of DPI messages with a reduced set of advantages (compared to CDM Airports).</p> <p>An Advanced ATC TWR Airport provides Target Take-Off-Time (TTOT) estimations as well as Variable Taxi-Times (VTTs) and SIDs to the NMOC from the Actual Off-Block event onwards.</p>
AIR NAVIGATION SERVICE PROVIDER (ANSP)	Organisation responsible for the provision of traffic control and information services at airports and en-route. It includes control of air traffic at and around a controlled airport as well as local flow management.
AIRPORT COLLABORATIVE DECISION MAKING (A-CDM)	Operational concept, which starts with information sharing, taking capacity related decisions in a collaborative manner on the day of operations (D-0). It aims at improving the overall efficiency of airport operations by optimising the use of resources, and improving the predictability of events. It focuses especially on aircraft turnaround and pre-departure sequencing processes by using A-CDM milestones.
A-CDM DASHBOARD	A local pictorial view of the operational status and performance at the airport, focussed around the turnaround process of the visiting aircraft, based on A-CDM milestones.



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TERMINOLOGY	DEFINITION
ACTOR ²	<p>Participant in an action or process. This can be a person or a group of persons representing an organisation.</p> <p>(See also stakeholder definition)</p>
AIRCRAFT OPERATOR (AIRSPACE USER) / HANDLING AGENT (AO / HA)	<p>Aircraft Operator means any airline or other entity operating one or more aircraft at the Airport.</p> <p>The Handling Agent is representing the aircraft operator (airline) if the aircraft operator does not have an own facility / office at the airport.</p> <p>(For the purpose of this document we differentiate between the handling of aircraft and the ground handling services. Often the representation of an Airline Operator and the provision of Groundhandling services are combined.)</p>
AIRPORT COORDINATOR (AC)	<p>Independent Airport Slot coordination entity at coordinated airports (IATA level 3 airports).</p> <p>For the purpose of this document, the Airport Facilitator (IATA level 2 airports) is also considered to fall under this definition.</p>
AIRPORT OPERATIONS CENTER (APOC)	<p>A coordination arrangement at an airport, whereby operational stakeholders (actors) collaborate for the effective/efficient establishment and execution of an agreed operational plan, in a structured manner with agreed processes, either through physical or virtual interaction or a combination thereof.</p> <p>The APOC is the prime interface between the Airport and the Network Manager Operations Center (NMOC) established in the States within, and adjacent to, the ECAC area.</p> <p>(See also FMP and Ground Coordinator)</p>
AIRPORT OPERATIONS PLAN (AOP) ³	<p>A consolidated rolling airport operational plan containing all necessary data, contextual information, scenarios and KPIs to enable decision making in a collaborative manner.</p>

² Definition in Google Dictionary

³ REGULATION (EU) No 716/2014 of 27 June 2014 on the establishment of the Pilot Common Project supporting the implementation of the European Air Traffic Management Master Plan



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TERMINOLOGY	DEFINITION
AIRPORT OPERATOR	An airport operator is the managing body of an airport or a group of airports, administering and managing the airport facilities and coordinating and controlling the activities of the various operators present at the airport or within the airport system concerned.
AIR TRAFFIC CONTROL UNIT (ATC)	An ANSP unit that provides en-route air traffic control services, and/or services at an airport to manage approach/departure, the take-off/landing and manoeuvring of aircraft on the ground, where applicable.
AIRPORT TRANSIT VIEW (ATV)	The description of the "visit" of an aircraft to the airport. It consists basically of three separate sections: <ul style="list-style-type: none">-The final approach and inbound ground section of the inbound flight,-The turnaround process section in which the inbound and the outbound flights are linked,-The outbound ground section and the initial climb segment of the outbound flight.
AIRSIDE	The airside area includes all parts of the airport where aircraft are operated or serviced (runways, taxiways, apron, aircraft parking stands, de-icing facilities and dedicated maintenance areas.
APOC DASHBOARD	The APOC dashboard will rely on increasingly standardised data formats and agreed key performance areas/indicators (KPA/KPI), enabled by system-wide information management, as well as big data in order to show 'what has happened', 'what is happening' but importantly 'what is predicted to happen'.
ARRANGEMENT	A (written) agreement between two or more entities.
CONSOLIDATED INFORMATION	<p>Means that information about the status of operations or decisions for e.g. mitigation have been collaboratively defined and agreed upon before they are shared with other parties (e.g. NM).</p> <p>Data consolidation refers to the collection and integration of data from multiple sources into the AOP. During this collaborative process, different data elements and contextual information are put together collaboratively, are assessed and consolidated.</p>



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TERMINOLOGY	DEFINITION
CONTEXTUAL INFORMATION	Information relevant to the understanding of a situation and/or data (e.g. needed to support decision-making and/or as input for human interaction).
DATA	Information in a defined format, especially facts or numbers, collected to be examined and used to support decision-making, or expressing an information or a change to information that can be processed by a machine.
DE-ICING	Preparation of an aircraft for take-off in winter conditions (e.g. de- and anti-icing). Depending on local arrangements, provided by either the Aircraft Operator, Handling Agent, Airport Operator or a dedicated de-icing company.
DEMAND-CAPACITY BALANCING (DCB)	The process of comparing traffic demand and available capacity in a defined timeframe, determining bottlenecks and assessing mitigation measures in order to find the optimum result in terms of minimising delays and costs. Crucial element in the AOP-APOC process.
ENTITY	A person, partnership, organisation, or business that has a legal and separately identifiable existence.
FLOW MANAGEMENT POSITION (FMP)	<p>An operational position established in appropriate air traffic control units to monitor traffic load for defined sectors (at en-route or at airport level) to ensure that defined traffic volumes can be safely managed by Air Traffic Controllers.</p> <p>The established FMP can operate at a Regional, Sub-Regional or Local level and, when required, applies appropriate ATFCM measures in coordination with the NMOC.</p> <p>The FMP is the prime interface between Air Traffic Control (ATC) and the Network Manager Operations Center (NMOC) established in the States within, and adjacent to, the ECAC area with regard to the “air” part of the airport.</p> <p>(See also APOC and Ground Coordinator)</p>
GROUND COORDINATOR (GC)	The Ground Coordinator is a local arrangement at an airport and ensures that it works towards consolidated operations of all actors that have operations at and around airports both landside and airside. The network product (as one of the many products that is



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TERMINOLOGY	DEFINITION
	<p>produced) of a Ground Coordinator is information that is shared and consolidated between local stakeholders and then shared with the NMOC.</p> <p>The Ground Coordinator can be materialised in different ways, APOC being one of them but other forms of GC arrangements can be possible, depending on local needs.</p>
GROUND HANDLER (GH)	A company or person appointed by the Aircraft Operator, Handling Agent or Airport Operator to service an aircraft while it is on the ground. It can also provide for the representation of an Airline Operator (see AO/HA definition)
KEY PERFORMANCE INDICATOR (KPI)	A set of quantifiable measures used to gauge or compare performance in terms of meeting the strategic and operational objectives.
LANDSIDE	<p>Landside is practically all that is not airside. The landside is an area where passenger transit from and to the airside is conducted.</p> <p>In this context, landside includes but is not limited to the terminal buildings (check-in, security, border control, passenger gates, etc.) as well as access facilities to the airport (e.g. car parking areas, trains, access roads, etc.)</p>
METEOROLOGICAL OFFICE or SERVICES (MET)	Unit responsible for providing aviation meteorological information / services at the airport
NETWORK MANAGER (NM)	The Network Manager is a function set up by the European Union in order to execute the network functions as they are laid down in the relevant Implementing Regulation on Network Functions, manage the flow of air traffic throughout Europe, ensuring cooperative decision-making between all operational stakeholders and providing for the overall view of the European ATM Network.
NETWORK MANAGER OPERATIONS CENTER (NMOC)	<p>The Network Manager Operations Center delivers core operational services across several domains:</p> <p>Flow and Capacity Management</p> <p>ATM Access Gateway and Flight Planning Operations</p> <p>Information Management Domain</p> <p>Crisis and Contingency Management</p>



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TERMINOLOGY	DEFINITION
	Post-operations analysis and reporting.
NETWORK OPERATIONS PLAN (NOP)	A rolling operational plan set up, maintained and shared by the Network Manager, containing expected traffic, available sector capacities provided by the ANSPs and expected or actual delay information.
PROCESS	A defined series of actions that are carried out in order to establish and maintain a product
PRODUCT	The result of a process, executed by actor(s).
PERFORMANCE	<p>The accomplishment of a given task measured against pre-defined known standards of accuracy, completeness, cost, and speed.</p> <p>In a contract, performance is deemed to be the fulfilment of an obligation, in a manner that releases the performer from all liabilities under the contract.</p>
PERFORMANCE REVIEW TEAMS	<p>Individuals and/or teams of the different operational stakeholders that are tasked to assess performance and identify means for improvement that are to be shared and discussed with operational actors.</p> <p>In this context, the defined actors may have their individual teams for post operational analysis and performance measurement. It is highly recommended that such teams collaborate, similar to the operational actors within an APOC.</p>
SCENARIO	Description of an imagined sequence of events, the conditions before and after these events, and the interaction with its environment, users, and products.
STAKEHOLDER	'Operational stakeholders' means the civil and military airspace users, civil and military air navigation service providers, airport operators, airport slot coordinators and operating organisations and any additional stakeholder groups considered relevant for the individual functions.
STRATEGIC PLANNING (TEAM)	Strategic planning is an organization's process of defining its strategy or direction, and making decisions on allocating its resources to pursue this strategy. It covers the strategic timeframe prior to operations as to provide the required input for transiting into the pre-tactical and tactical phase of

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TERMINOLOGY	DEFINITION
	operations. It is recommended that FMPs should form part of such teams within the ANSP organisation.
TOTAL AIRPORT MANAGEMENT (TAM)	Holistic approach which foresees closer integration of both landside and airside performance monitoring and management, combining data-derived trends for instance on meteorological conditions, flight prioritisation, runway traffic loads and turn-around times of aircraft, with data on baggage and passenger operations all leading to on time operations to improve the passenger experience.
WORLDWIDE SLOT GUIDANCE (WSG) ⁴	<p>The Worldwide Slot Guidelines (WSG) are published by IATA to provide the global air transport community with a single set of standards for the management of schedules facilitation and airport slots at coordinated airports and planned operations at facilitated airports.</p> <p>The management of airport slots is required at some airports where the available airport infrastructure is insufficient to meet the demand of airlines and other aircraft operators while the management of planned operations at facilitated airports allows a degree of scheduling flexibility within available airport infrastructure capacity.</p>

Table 1: Definitions

2.1 Abbreviations and Acronyms

Other abbreviations and acronyms used in this document are available in the EUROCONTROL Air Navigation Inter-site Acronym List (AIRIAL), that may be found here:

<http://www.eurocontrol.int/airial/definitionListInit.do?skipLogon=true&glossaryUid=AIRIAL>

In case an abbreviation found in the in the AIRAL is different from the one used in this document, the abbreviation / definition in this document is to be used.

3 Background

At the NDOP/16 meeting in March 2017, the NDOP agreed to establish a dedicated Taskforce, named the Airport Integration Taskforce (NDOP-APTI-TF), with the following objective:

“The NDOP-APTI-TF shall identify and document applicable changes in processes related to ATFCM that will support the better integration of airports with the network.

⁴ <https://www.iata.org/policy/slots/Pages/index.aspx>



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It shall assess and outline what changes are required in terms of roles and responsibilities between the main partners, defined as the ANSP flow management positions (FMP), local ATC (as an integral part of the Airport Operations Centre (APOC) concept), Airport Operators (as the driver for the APOC implementations) and the Network Manager Operations Centre (NMOC). As far as possible, the Task Force is to assess where existing rules, regulations and technical systems might be affected."

NM and ACI EUROPE had presented their views on the required changes to bridge the gap as described in the SESAR Solution # 21 "Airport Operations Plan and AOP-NOP seamless integration".

Feedback from stakeholders indicated that, whilst significant work has been performed at a technical level for the validation of emerging SESAR concepts, when it comes to practical implementation, it is the process/procedures level that remains unclear.

The establishment of an AOP is based on the Collaborative Decision Making principles and enlarges the concept in time and scope. This is different from the precisely described A-CDM that covers the airside ATM aspects on the day of operations only. The document will therefore also describe the impact on A-CDM.

It has to be understood that a successful establishment of an APOC/GC and the AOP requires the involvement of multiple partners from multiple organisations/companies at and around the airport.

This means a considerable investment needs to be made in terms of commitment, working towards equal partnership for all actors, change management, updating of processes, technology and resources. Only then will the expected benefits materialise.

The Task Force identified that, in order to deliver to its objective, i.e. identifying impact and required change to roles and responsibilities, it would be required to have a common understanding on how the AOP is generated and what are the functions of an APOC or a comparable concept that are needed for doing so.

4 Objectives and Scope

The key Objectives of this document are to:

- Serve as reference and guidance material on how to functions within an APOC or equivalent structure under e.g. the Ground Coordinator concept;
- Serve as reference and guidance material on how to establish and maintain an AOP;
- Identify what are Actors, Processes and Products and describe them;
- Describe the data and contextual information elements needed for the AOP (in different planning phases), and enable the Network Manager to integrate this information into the network processes;
- Enable the airport stakeholders in the wider sense (including the ANSP) to act as full network partners, support the management of the overall network and benefit from improved predictability of traffic equally.



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Established A-CDM (for the airside on the day of operations) and DCB processes are baseline requirements, in order to produce an Airport Operations Plan (AOP), which can effectively interchange with the Network Operations Plan (NOP).

The scope of this document is wider compared to the typical A-CDM processes (as this is only airside operations and only covering the day of operations) in terms of time and process management: the planning horizon will be substantially longer and an information exchange will be setup between AOP and NOP, involving other actors and introducing new processes.

This document does not describe in detail how the AOP interacts with the NOP, nor the role of the APOC/GC and NM as part of this interaction. This is (partly) described in other documentation and will be further developed as required. For example, operational procedures between and APOC or equivalent and the NMOC are not yet developed.

The document does not describe how an APOC needs to be set up but focuses on functionalities and more specific those that are needed to generate the data and information the NM needs to fulfil its role and to allow for a proper interaction between APOCs or equivalent and the NMOC.

The solution will depend on local needs (e.g. size and complexity of an airport, organization of different roles and responsibilities, available resources, etc.). Therefore, different APOC/GC solutions may be considered across the network, depending of the size and type of airport concerned. This does not matter, as long as the functional criteria to transfer data and information to the NM will be met and the APOC/GC contributes to managing the coordination process effectively.

Experience from the change management point of view has demonstrated that collaboration is more effective when operational decision makers are working in the same room physically, as the mutual understanding of the common goals and the situational awareness is established much quicker.

The document further describes the relationship with the current A-CDM process. Through this, it ensures that definitions are harmonised and understood from the start.

The document is not designed to provide detailed descriptions of data elements that are to be exchanged between the partners and/or the Network Manager. This work has already been performed under SESAR and/or the APOC/Contingency Task Force of the Airport Operations Team of EUROCONTROL.



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5 Actor-Process-Product (Overview)

In order to facilitate a proper understanding and easy reading, this Concept Document is based on three main pictorials:

- Actor-Process-Product overview (see Figure 1)
- AOP-APOC Process (see Figure 2)
- APOC/GC Actor Overview (see Figure 3)

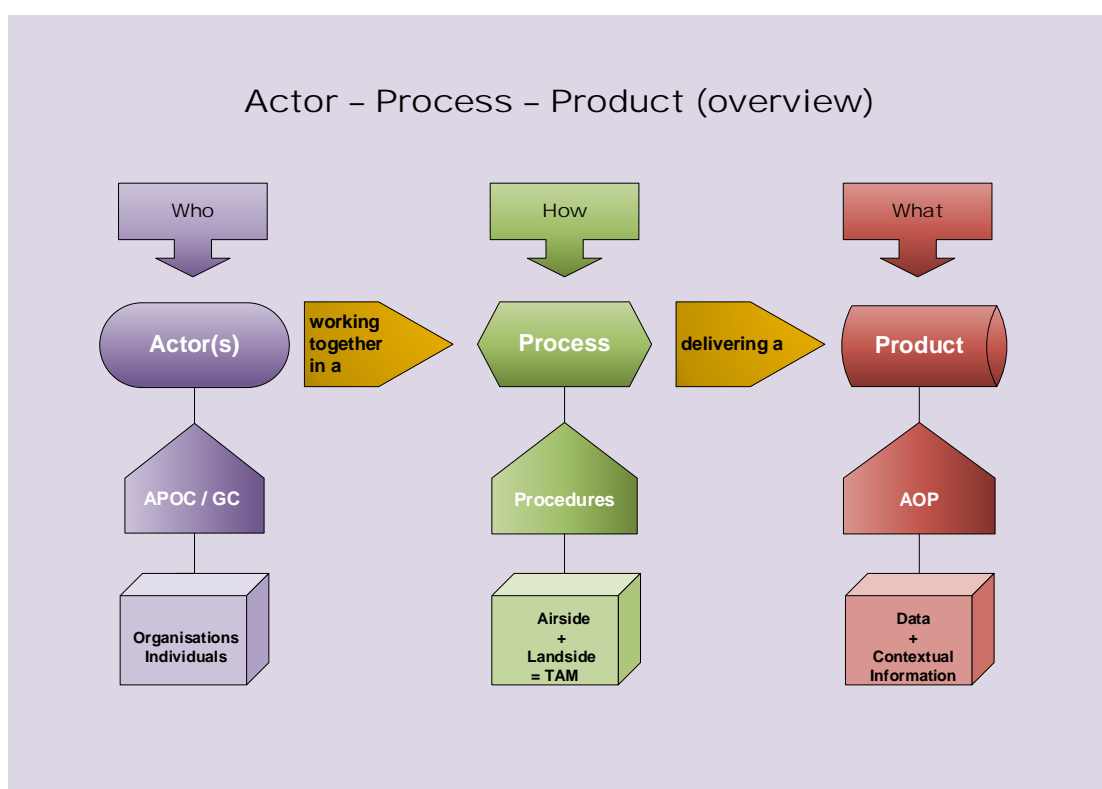


Figure 1: Actor – Process – Product

The above high-level overview can be summarised in one sentence:

‘Actors work together in a Process to deliver a Product called AOP’.

Whereby:

- The Actor(s) are organisations and their individuals working in an APOC or GC arrangement.
- The Process is encompassing both Airside and Landside, details of which are further outlined in Procedures.
- The Product AOP consists of both Data and Contextual Information.

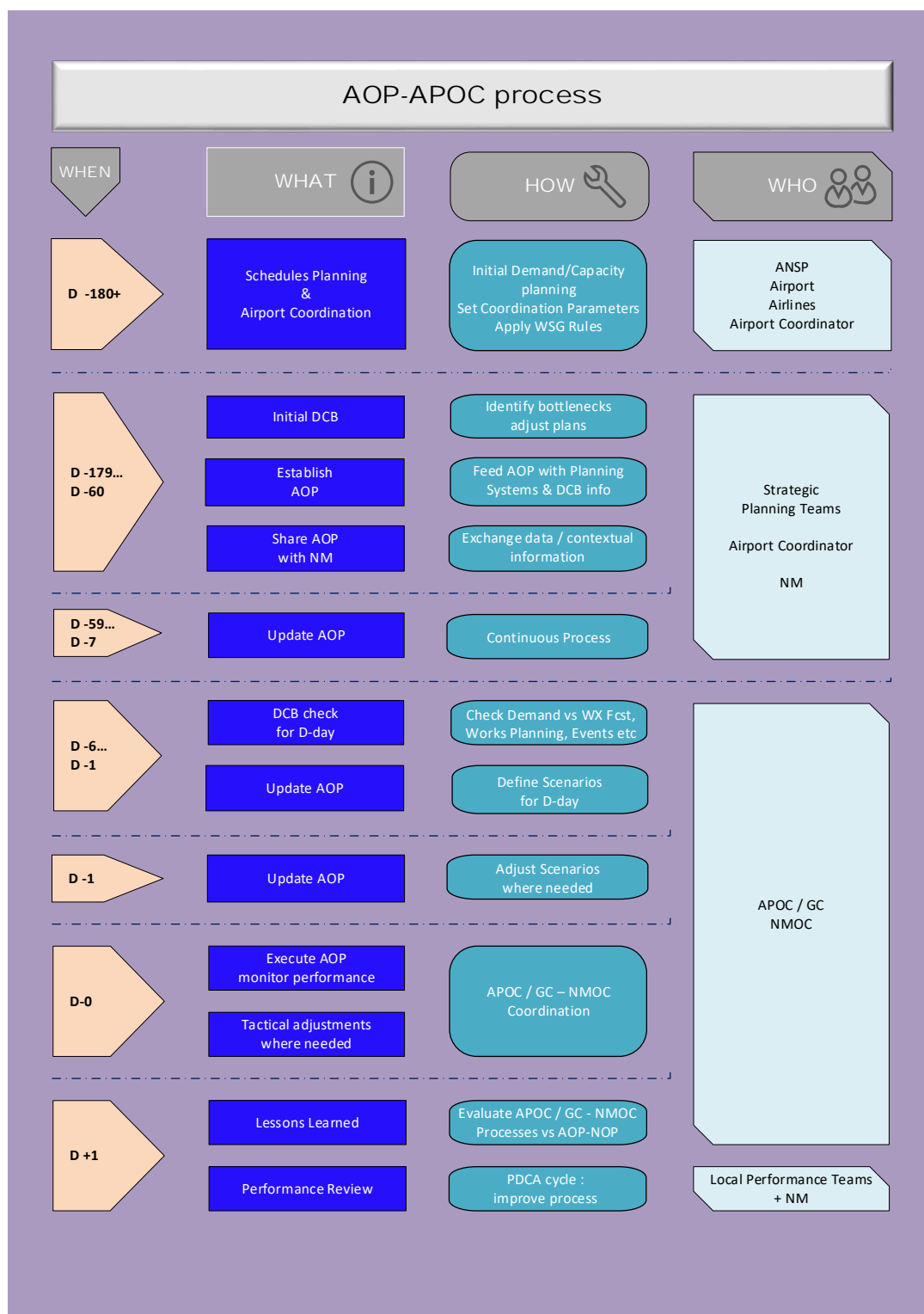
Further explanation and contextual information can be found in the relevant Chapter(s) and/or Annex(es).



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6 AOP-APOC Process as a means for interaction with Network Manager

6.1 Pictorial



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Figure 2: AOP-APOC process

6.2 Process Phases

In this section, a generic description is presented about the process in each phase. The role and responsibilities of the Actors are described in more detail in Chapter 7, and the AOP in Chapter 8.

6.2.1 Phase 1 (D-180+)



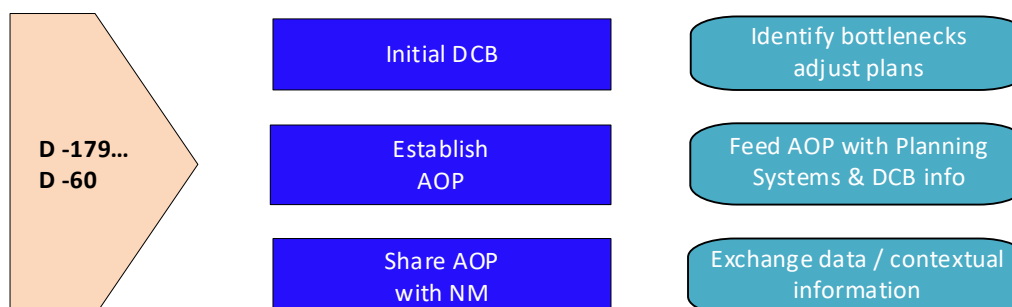
In this process phase, the actors from the ANSP / Airport / Airlines / Airport Coordinator will provide the available medium term / seasonal planning containing both capacity and demand elements needed to initiate an AOP. The Airport Coordinator will distribute and publish the available slots, based on WSG rules.

The airport operator will collect all data / contextual information, make the first Demand/Capacity planning and share this with the relevant actors.

This step facilitates early exchange of information that may have an impact on planned operations (e.g. maintenance plans, construction works, ..) to be discussed in order to identify the available capacity, the capacity impact and mitigation options.

- Input: agreed demand and capacity elements
- Process: collect capacity and demand elements from all actors
- Output: draft demand and capacity planning

6.2.2 Phase 2 (D -179...D-60)



In this process phase, the actors from the Strategic Planning Teams, NM and the Airport Coordinator will verify and provide the most updated planning



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information available, perform the first DCB cycle, identify/verify bottlenecks and adjust plans accordingly. Once collaboratively agreed upon, the (initial) AOP will then be established, ensuring the data / contextual information provided is consolidated. The AOP is shared with the actors, including the Airport Coordinator and NM. Multiple updates may follow the initial establishment of the AOP, whenever information is available that will trigger a new assessment.

- Input: updated planning information from phase 1
- Process: initial DCB cycle, identify bottlenecks, adjust plans, feed planning systems, establish AOP, share with Actors
- Output: (initial) AOP

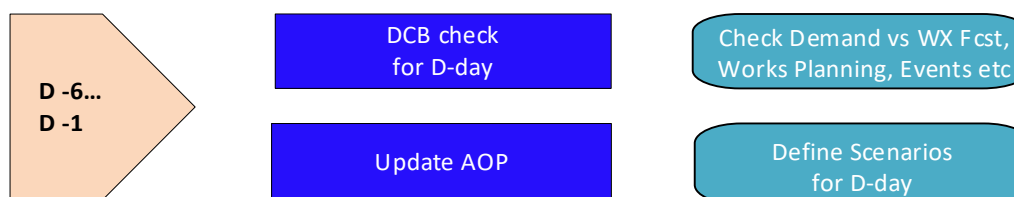
6.2.3 Phase 3 (D-59...D-7)



In this process phase, the actors from the relevant Strategic Planning Teams, NM and the Airport Coordinator will assure and verify the AOP is being kept updated regularly (continuous process). Preferably via an automated process, but regular meetings might be required as well to keep track of changes, make impact assessments, discuss various scenarios and update the AOP where deemed necessary. To update an AOP, it is imperative that all actors will be timely involved in order to ensure the consolidation (update of) the AOP that and can/will be communicated to the relevant stakeholders.

- Input: (initial) AOP
- Process: update AOP (continuous process)
- Output: updated AOP

6.2.4 Phase 4 (D-6...D-1)



In this process phase, the actors from the APOC/GC and NMOC will perform a DCB check for D-0, taking into account factors like weather forecast, works planning, available equipment & resources, planned events, risks etc. Based on this information, the scenario(s) for D-0 are defined in a collaborative manner and the AOP updated / shared accordingly.

- Input: AOP
- Process: DCB check for D-0
- Output: updated AOP



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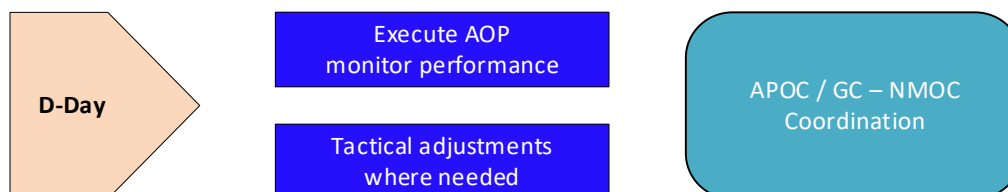
6.2.5 Phase 5 (D-1)



In this process phase, the actors from the APOC/GC and NMOC will perform (again) a DCB check for D-0, verify and adjust the chosen scenario(s) where needed and update the AOP/NOP. This phase is comparable with phase 4, except that the time horizon has become shorter, the available information is more reliable and consequently change(s) of scenario(s) might be required. This phase shall include the assessment of and decisions on required ATFM measures for D-0 that will then be shared with the NMOC for network impact assessment.

- Input : AOP
- Process : DCB check, confirm/change scenario(s) for D-0
- Output : updated AOP

6.2.6 Phase 6 (D-0)



In this process phase, the actors from the APOC/GC and NMOC execute the AOP as planned, using the appropriate scenario and monitoring the airport performance closely (KPIs). Tactical adjustments may be required when deviating from the AOP and/or exceeding predefined parameters (KPIs). These adjustments are performed via a coordinated and collaborative process (APOC/GC arrangement) and stakeholders will be kept informed.

- Input: AOP including chosen scenario(s)
- Process: execute AOP using chosen scenario(s), make tactical adjustments where needed, inform stakeholders.
- Output: operations as per (updated) AOP & scenario.



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6.2.7 Phase 7 (D+1)



In this process phase, the actors from the APOC/GC, Local Performance Teams and NMOC/NM evaluate the quality of the AOP and chosen scenario(s), the processes and if the performance has been within the predefined KPI parameters. Feedback from actors and stakeholders are collected and discussed, and lessons learned used for process improvements.

- Input: D-0 information including AOP, scenario(s) used, performance.
- Process: evaluate AOP/scenario adherence, AOP-NOP processes and actual performance vs KPIs.
- Output: Performance review, lessons learned.



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7 Actors

7.1 Pictorial

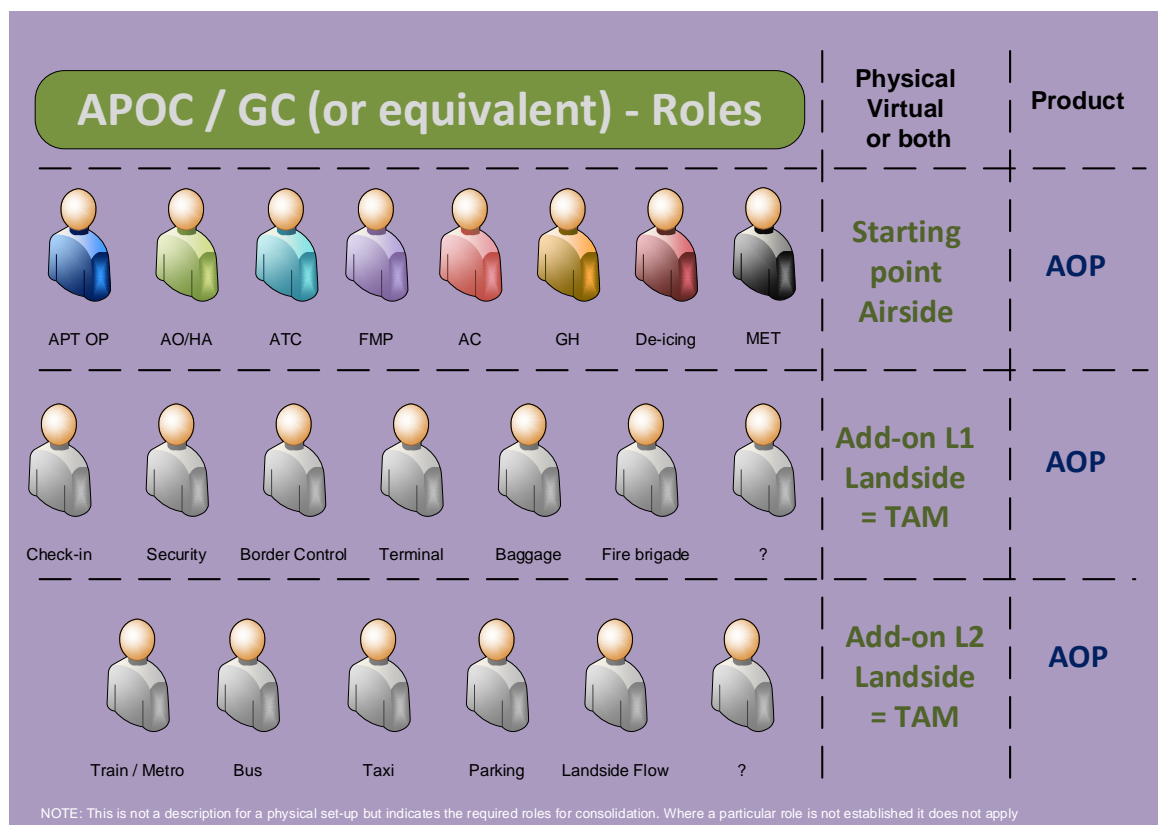


Figure 3: APOC/GC set-up overview in terms of roles

It is pivotal and strongly recommended that local stakeholders establish a written arrangement comprising all actors involved in the AOP/APOC process, including ATC/FMP.

Explanatory note 1:

Figure 3 displays roles and functions, not organisations or companies as those may vary from airport to airport and State to State. The described roles are what the Network Manager believes would be the ideal set up. However, some of the roles may be combined at smaller airports. In case an airport is not coordinated, the AC role would not apply but the APOC or equivalent would be considered as fulfilling the minimum set-up.

Explanatory note 2:

The Strategic Planning- and Local Performance Team(s) are Actors, but not actively participating in the APOC. Therefore, they have been left out of the AOP-APOC pictorial. Their roles have been described in Para 6.2 (Process Phases).



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7.2 APOC/GC description

An **Airport Operations Center (APOC)** is one form of a ground coordination (GC) arrangement at an airport, whereby operational stakeholders (actors) collaborate for the effective/efficient implementation of an agreed operational plan, in a structured manner with agreed processes, either through physical or virtual interaction

The **Ground Coordinator (GC)** is a local arrangement at an airport that can be established with or without an APOC, and ensures that consolidated information under collaborative decision-making (CDM) is shared between local stakeholders and with the NMOC.

The type of coordination arrangement (APOC or GC) depends on the local needs and the expected benefits, and should therefore be fit for purpose.

Regardless the ground coordination arrangement chosen, the following principles always apply:

- APOC and GC (where established) should be considered as a collective actor
- The roles and responsibilities should be agreed upon
- The APOC/GC has to ensure that the AOP is being established and kept updated from D-6 up to and including D-0.
- The APOC/GC is responsible execution of the AOP on D-0, and take corrective action when deviating from the plan and/or KPIs are expected not to be met.
- The APOC/GC will be the focal point for NM related to information from operations at and around airports. The APOC/GC therefore will need to ensure the AOP will contain the most up-to-date information, and share this with all relevant operational stakeholders and NM.
- It is a shared responsibility of APOC/GC and NM to share AOP and NOP data with stakeholders, ensure the information provided is consolidated and collaborate in order to optimise network and local traffic flows.

The relationship between NM, FMP and APOC/GC is visualised in the pictorial on the next page:



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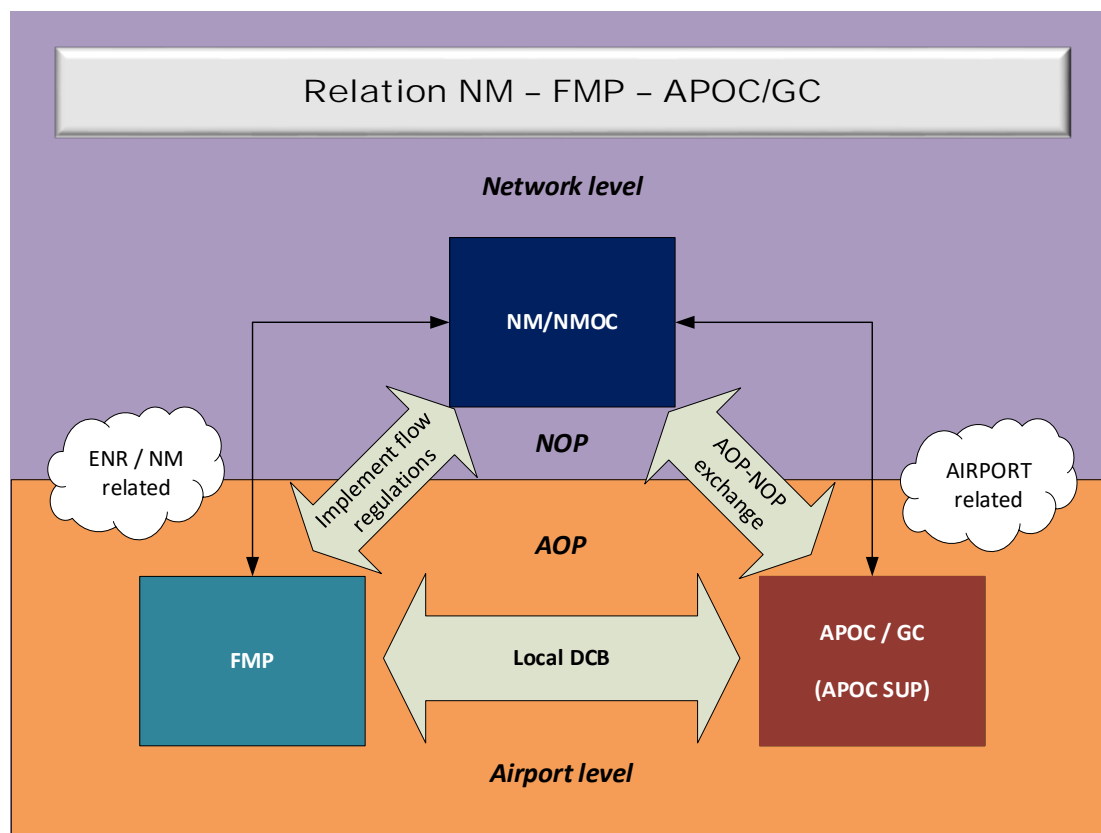


Figure 4: Relation NM-FMP-APOC/GC

7.3 Level 1 – Airside actors

The following Actors are considered **essential** by the NM in order to set up an effective APOC and produce an effective collaborative decision making and the consolidated AOP.

ACTOR	ROLE
AIRPORT OPERATOR	<p>Coordinates and potentially chairs APOC meetings, and act as a referee (APOC supervisor role)</p> <p>Oversees that AOP will be established and executed as agreed upon, chosen scenario(s) followed by all actors, and KPIs adhered to.</p> <p>Coordinates with all relevant Actors to make tactical adjustments where needed (including change of AOP/Scenario), facilitate APOC meetings</p> <p>Liaise with all operational stakeholders to ensure that consolidated ground capacity information of the airport will be communicated to the NM (NMOC) vice versa.</p>



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ACTOR	ROLE
	Communicates AOP including changes, airport scenario, performance and scenario/capacity outlook with stakeholders (dashboard).
AIRCRAFT OPERATOR/ HANDLING AGENT	Provides timely and precise information regarding change in flight schedules (inbound/outbound), type of aircraft and number/type of passengers (via A-CDM platform, where applicable)
ATC	<p>Liaises with the FMP to ensure consolidated air flow related information to/from the airport is communicated to the NM (NMOC) vice versa.</p> <p>Liaises with APP/DEP, TWR, GND (in case not part of the TWR) and other local ATC units concerning the approach/departure flows, the runway capacity and the expediting of the aircraft in the manoeuvring area.</p>
FMP	<p>Monitors traffic loads for the ENR/TMA part around the airport, and ensures that the traffic volumes can be safely managed by ATC controllers at the airport.</p> <p>Liaises with the APOC to ensure that a consolidated "flow" related information to/from the airport will be communicated to the NM (NMOC) vice versa. .</p> <p>Takes part in the APOC process and the local DCB.</p> <p>When required, applies appropriate ATFCM measures in coordination with the NMOC.</p>
AIRPORT COORDINATOR	<p>Monitors that flights are executed in accordance with issued airport slots (within parameters)</p> <p>Takes part in the DCB and adjusts number of ad-hoc airport slots when operationally required</p>
GROUND HANDLER	<p>Ensures TOBT information is updated for all departing flights (where A-CDM is implemented)</p> <p>Manages the required resources for the handling of assigned flights</p> <p>Facilitates relocation of aircraft to ensure efficient use of the airport infrastructure, upon airport operators' request.</p> <p>Handles diverting aircraft upon request of APOC supervisor.</p>
DE-ICING	<p>Communicates de-icing scenario to APOC stakeholders (Airport operator and ATC)</p> <p>Manages required resources for the handling of flights requesting anti- and/or de-icing treatment, and</p>



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ACTOR	ROLE
	updates the TOBT information as early as possible if so required. Handles diverting aircraft upon request of APOC supervisor.
MET	Provides aviation meteorological information relevant for the in-/outbound traffic, operations in the manoeuvring area and de-icing/snow clearing operations. Provides meteorological updates (H24) for the APOC for any weather related information that may have an impact on the AOP and/or safety. Provides weather outlook up to 3-7 days in advance, enabling stakeholders to update the AOP and facilitate in determining AOP scenario(s).

Table 2: Airside Actors and roles

All APOC/GC actors should actively monitor the AOP and the adherence thereof, and inform / liaise with other APOC/GC actors when deviation from the Plan is being observed/anticipated, and/or KPI's cannot be met. When deviation concerns the own KPI(s), appropriate and timely action should be taken and APOC members informed accordingly. This is true for all APOC / GC levels.

An APOC dashboard will assist in sharing the AOP, the scenario(s) run, the present situation / performance at both airport and network level, the airport status and the (24H) outlook (amongst other relevant DCB information).

7.4 Level 2 and 3 – adding the landside elements for establishing TAM

The following Actors are typically involved in the TAM process, and should be seen as a **desired / valuable addition to the APOC arrangement**.

7.4.1 Level 2: Landside/TERMINAL

ACTOR	ROLE
CHECK-IN	Monitors and shares check-in throughput (KPIs)
SECURITY	Monitors passenger peak times, resources and throughput times at security gates (and at other process-critical locations), taking into account KPIs (departures, arrivals and transfers).



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ACTOR	ROLE
BORDER CONTROL	Monitors passenger peak times, resources and throughput times at border control gates, taking into account KPIs (departures, arrivals and transfers).
TERMINAL	Monitors peak times, resources, systems and throughput times in the Terminal, taking into account KPIs (departures, arrivals and transfers) Informs other TAM actors and APOC supervisor when KPIs cannot be met.
BAGGAGE	Monitors peak times, resources, systems and baggage handling performance, taking into account KPIs (departure, arrival and transfers)
FIRE BRIGADE	Informs TAM actors when airport throughput is affected due to fire safety measures. Usually also covers airside.
?	...

Table 3: Landside actors and roles level 2

If a TAM actor observes/anticipates a deviation from the AOP, and/or own KPI's cannot be met, appropriate and timely action should be taken, and other TAM actors informed accordingly.

7.4.2 Level 3: LANDSIDE+

The following Actors can be considered as an add-on to the APOC/TAM level 1 and 2 arrangement, expanding and completing the scope of TAM.

ACTOR	ROLE
TRAIN / METRO	Monitors train/metro schedules, disruptions, systems and crowd levels in the train/metro network and stations.
BUS	Monitors bus schedules, disruptions, systems and crowd levels in the bus network and stations.
TAXI	Informs other TAM actors when taxi availability is affected, and/or demand exceeds capacity.



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PARKING	Monitors parking occupancy, systems and traffic flow near parking facilities.
LANDSIDE FLOW	Monitors traffic flow affecting airport access for arriving/departing passengers.
?	...

Table 4: Landside actors and roles level 3

8 Product AOP

8.1 Description

As is outlined in Chapter 6 (AOP-APOC process), the AOP needs to be established in Phase 2 (D-179...D-60), preceded by an initial DCB calculation.

Subsequently, bottlenecks can be identified, mitigation measures be considered and planned for, taking into account historical data where available.

All this consolidated information shall be fed into a rolling plan, which constantly needs to be updated with the latest and most relevant information available in order to ensure the highest possible prediction quality. Where possible and desirable, these update processes should be automated ensuring an up-to-date AOP with only minimal manual input.

Since A-CDM focuses mainly on the tactical issues (day-of-operation, D-0), the AOP can be seen as a necessary enabler for A-CDM. It aims to provide an early and complete turnaround picture from months in advance until D-1, where it seamlessly integrates into the A-CDM systems that enable the execution of the plan. Like A-CDM, it is essential that available information and data are provided and shared as early as possible, and ensured that information is consolidated before communicated. This necessitates a close collaboration between local stakeholders.

Explanatory note on AOP and A-CDM as an integral part of it:

AOP	A-CDM
Is a Product Is an Operational, rolling Plan Contains DCB checks Works with Scenarios Extended in time and scope compared to A-CDM Interacts with NOP (as being a rolling plan) beyond A-CDM	Is a Process Focusses on turnaround processes Commences at EOBT -3hrs on D-0 Feeds Departure Planning Information (DPI) to the NOP

Table 5: Explanatory note AOP and A-CDM



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An AOP can be organised and shared in different ways, depending on local needs. Regardless how an AOP will be set up, it should always contain:

- Data (numbers and/or pre-defined data elements, e.g. DPI)
- Qualitative information (contextual description, background information)

Qualitative information is useful to **monitor performance**, whereby contextual information is of added value to **understand (complex) situations** which is often the case when the AOP cannot be maintained.

The two types of information combined in an AOP paves the way for an effective collaboration in an APOC/GC arrangement, and exchange relevant elements with the NOP/NM (and vice versa). An overview of the Data and the Contextual Information can be found in the next paragraph.

The kind of information and quality thereof depends of the AOP Phase; it is obvious the shorter the time left towards D-0, the more and better-quality information will be available.

Although this document focuses on processes and the role of their actors, it is worth mentioning that the SESAR OFA 05.01.01 Data list for AOP-NOP exchange served as input to the Work Package 1 of the APOC/CONTINGENCY TF.

The objective was to prioritise and cluster the extensive 500+ elements data list into packages for short term, medium term and long-term implementation, based on five use cases provided by the Task Force members. The data use cases were grouped in the categories "Demand", "Capacity", "DCB" process" and "Situational Awareness".

The Analysis concluded that when it comes to implementation priorities for existing use cases to move to B2B, the order looks like:

- Airport Events;
- De-Icing Information (for non A-CDM airports);
- Runway Capacity Plan.

Priorities for data elements pertaining to new concepts use cases look like this:

- TTA (Target Time of Arrival);
- API (Arrival Planning Information);
- Extension of A-CDM time horizon.

The full report of the WP1 of the APOC/CONTINGENCY TF can be made available by NM on request.

It should be noted that the APOC Contingency TF focussed on the short-term (contingency) management of the airport processes including recovery. The AOP has an expanded time horizon and focuses on the establishment and maintenance of an Operational Plan, including normal operations.

8.2 Data and Contextual Information

Following table provides an overview with the assumed requirements for both data and contextual information to be incorporated in an AOP, and when this



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information should be provided. Variations may be seen depending on the local needs.

WHEN	DATA	CONTEXTUAL INFORMATION (*)
D-180+	Opening hours (curfew) global ENR capacity (seasonal planning) RWY capacity (mov/hr) Parking stands (cat) Terminal peak capacity Baggage handling capacity (nominal, peak) Airport car parking capacity Public transport schedules Maintenance Programme (airside, terminal, landside) Projects with capacity impact (airside, terminal, landside) Summer/Winter Schedule, Slot Capacity/Allocation	Environmental/political constraints Explanation projects: why needed, what does it mean for AOP (capacity) Explanation maintenance programme: what will be done, capacity impact Mitigation options (decided, under review) Capacity decision deadlines, by whom
D-179... D-60	Aircraft types (airlines), number of seats Passenger type (OD and transfer) Initial DCB - Bottlenecks on what dates (inbound / turnaround/ outbound)	Major Events (e.g. international conferences, sport events) with impact on airport capacity Backup capacity (e.g. systems) Outcome Performance Impact Assessment (KPI's) Identified most limiting element(s) Capacity-related decisions (mitigation measures)
D-59... D-7	Abovementioned items - consolidated, plus: DCB - Bottlenecks (period/days/time blocks)	Handling capacity (resources, peak times, potential bottlenecks) Status mitigation measures
D-6... D-1	Aircraft stand Allocation (planning) Passenger numbers (per flight)	Wx forecast, consequences for maintenance/works planning, Events etc. De-icing probability



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WHEN	DATA	CONTEXTUAL INFORMATION (*)
	<p>DCB check for D-0 summary > Capacity Bottlenecks (day, hour)</p> <p>AOP data - updated</p>	<p>Snow clearing probability</p> <p>Resources</p> <p>Mitigation options (incl. cancellation requests)</p> <p>Scenario options + considerations</p> <p>Most likely scenario (Plan A + B)</p> <p>Mitigation measures</p> <p>Delay forecast (KPI's)</p> <p>Cancellation requests (if applicable)</p> <p>Decision deadlines (what, by whom, communication)</p>
D-1	<p>RWY assignment, capacity details ARR/DEP (mvt/hr)</p> <p>SIDs & STARs</p> <p>Expected TWY routes (Considering capacity/delays expected)</p> <p>Aircraft stand allocation, updated</p> <p>Passenger numbers (per flight), updated</p> <p>AOP key data published (A-CDM platform)</p> <p>Diversion capability, updated if different from standard</p>	<p>24H weather forecast, probability, impact, consequences.</p> <p>D-icing probability, scenario</p> <p>Snow clearing probability, scenario</p> <p>Outcome pre-tactical meeting(s)</p> <p>Scenario confirmation (Plan A + B) incl. DCB summary</p> <p>Schedule disruptions, consequences</p> <p>Delay forecast (KPI's)</p> <p>Resources update (all stakeholders)</p> <p>Mitigation measures</p> <p>Cancellation requests (if applicable)</p> <p>Decision deadlines (what, by whom, communication)</p>
D-0	<p>AOP planned vs AOP performance (dashboard with key parameters (RWY, TWY, Stands, Terminal throughput, baggage, airport access - landside)</p> <p>Performance triggers</p> <p>Delays ARR/DEP, actual + outlook H24</p> <p>Diversion capability update (if requested by NMOC)</p>	<p>Weather actual, forecast, consequences</p> <p>D-icing (status, forecast)</p> <p>Snow clearing (status, forecast)</p> <p>Outcome tactical meeting(s)</p> <p>Involvement NMOC (if applicable (what, how)</p> <p>Reason for delays (ENR, ATC, WX, APT)</p>



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WHEN	DATA	CONTEXTUAL INFORMATION (*)
	Desired sequencing (TTA once available)	Outlook H24-H48-H72 Next tactical meeting, when will update be communicated
D+1	Planned vs Actual Capacity / Demand records KPI adherence	Evaluation AOP performance (period D-6...D-1 vs D-0) Evaluation Scenario chosen Evaluation decision making process, roles & responsibilities, communication effectiveness Lessons learned, feedback to actors / stakeholders

Table 6: Data and contextual information

Above data and contextual information elements are relevant for the AOP, and therefore should be incorporated in the AOP as much as possible. It needs to be further developed which of this information needs to be shared with NM and/or other stakeholders, and how this should be organized (process). This is out of scope of this document.

9 Impact on A-CDM

The AOP is a product delivered and maintained through the APOC process. A-CDM is a process as well for managing the aircraft turnaround on D-0 and is, therefore, an integral part of the APOC process (see 6.1).

However, the impact on A-CDM is not fully assessed at the time of writing this document and will only be known once the more detailed interaction has been developed and described. This assessment is not within the scope of this document.

As described in section 8.1, the AOP expands the time horizon and scope of the ATV whereas A-CDM remains an integral part of the APOC process. The AOP is:

- A rolling operational plan, containing DCB information, capacity measures, scenarios and airport performance information.
- Expanding the time horizon (from D-0 up to 180+ days before)
- Including improved arrival (sequence) information in order to supplement the departure information already available via A-CDM.

The improved quality of arrival information is required to enable an accurate DCB process and feeds into the A-CDM process (arrival-turnaround-departure) and is in line with the ATV principle.

The Predicted Departure Planning Information (P-DPI) is currently under validation and will become operationally available as from 2019/2020 onwards.



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This enables the provision of earlier (planned) departure information before the time horizon of the current A-CDM (EOBT -3hrs) and feeds into the A-CDM process.

The future use of Target Times for Arrival can be delivered through the Arrival Planning Information (API) that is already available. However, related processes still need to be developed to operational maturity. The API follows same principles as DPI. The result of a Target Time process will feed into A-CDM with improved landing time predictions. It will, however, not impact the A-CDM as such.

10 Conclusions

This section lists key elements of the Concept Document.

This document is designed to support operational stakeholders and their management in establishing the process and required local collaboration as to enable the establishment of an AOP and consequently the AOP-NOP interaction.

It is pivotal and strongly recommended that local stakeholders establish a written arrangement comprising all actors involved in the AOP/APOC process, including ATC/FMP.

In line with the NF IR the current role of the FMP should evolve towards stronger involvement in the airport Demand-Capacity Balancing process.

The FMP Liaises with the APOC to ensure that consolidated “flow” related information to/from the airport will be communicated to the NM (NMOC) and vice versa.

Since this document does not describe how the AOP interacts with the NOP, a subsequent concept document may be needed to outline this process (AOP-NOP exchange).

Appropriate training for all actors is essential to facilitate a proper understanding of the AOP-APOC process, the need for changes, the benefits and the role of various actors.



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11 References

EU Regulation 255/2010 (Common Rules on ATFM)

<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32010R0255&qid=1534852263007&from=EN>

EU Regulation 677/2011 (Implementation of ATM Network Functions)

<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32011R0677&qid=1534851538882&from=EN>

NB: Planned to be repealed and replaced by next version Q4/2018. Draft available.

EU Regulation 716/2014 (PCP supporting implementation of ATM Master Plan)

<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0716&from=EN>

SESAR Solutions Catalogue (page 43, 68, 83, Annex 2/page 99, 103, 104, Annex 3 (glossary)

https://www.sesarju.eu/sites/default/files/solutions/SESAR_Solutions_Catalogue_Ed2_2017.pdf

OFA 05.01.01 / Solution #21 ([SJU homepage](#))

APOC/Contingency TF WP1 deliverable (available on request)



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