OFA 05.01.01 Final OSED

Document information	
Project Title	The Airport in the ATM environment
Project Number	06.03.01
Project Manager	EUROCONTROL
Deliverable Name	OFA 05.01.01 Final OSED
Deliverable ID	D145
Edition	00.04.02
Template Version	03.00.00
Task contributors	
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Abstract

This document is the fourth and last edition `(Edition 4.0) of the Operational Services and Environment Description (OSED) related to the Airport Operations Management element (OFA05.01.01) of the SESAR operational concept.
The SESAR Solution #21 'Airport Operations Plan and AOP-NOP Seamless Integration' consists of a set of airport performance services and a suite of enabling applications to maintain performance in normal, adverse and exceptional operating conditions. The Solution is grounded in two new services: Steer Airport Performance - establish the performance goals and KPI thresholds - and Monitor Airport Performance - monitor current and forecast performance against the goals and automatically trigger a warning to ATM stakeholders if predefined thresholds are exceeded.
The full Airport Operations Management concept developed within OFA05.01.01 envisages two additional new services that have not yet reached maturity, namely the ability to Manage Airport Performance and to Perform Post-Operations Analysis. This OSED captures the future operating method and associated requirements pertaining specifically to Solution #21 as well as to the full airport operations management concept.
The OSED is divided into three separate documents (Part1a, Part1b and Part 2). This document represents Part 1a. Part1b groups the OSED requirements and Part2 the appendices.

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Rational for rejection
None

Document History

Edition	Date	Status	Author	Justification
00.03.02	01/08/2016	Working Draft part 1 – part 2	[redacted]	Initial draft
00.03.03	06/09/2016	Draft Part 1a, Part1b, Part 2		Internal review
00.04.00	30/09/2016	Final		Final Edition
00.04.01	09/11/2016	Final after SJU comments		Final edition after SJU comments clarification
00.04.02	25/11/2016	Final after SJU 2nd round of comments		Final edition after SJU 2nd round of comments clarification

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This deliverable consists of SJU foreground.

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Executive summary

This document is the last edition (Ed 4.0) out of four iterations of the Operational Services and Environment Description (OSED) related to the Airport Operations Management (OFA 05.01.01)[1] of the SESAR operational concept.

It defines the SESAR Step 1 operational services, operational methods, environments, scenarios, use cases and requirements for the operational concept element. This OSED edition refers to the SESAR Airport Step 1 DOD document[2] produced by the P6.2 project. It also contains additional information which should be consolidated back into the higher level SESAR concepts using a "bottom up" approach.

Previous Editions of the OSED have contained the entirety of the work of the OFA05.01.01 and reflecting the evolving maturity of the operational requirements covering the different concept elements. A number of those concept elements have now reached a V3 level of maturity and, importantly, form the content of SESAR Solution #21 'Airport Operations Plan and AOP-NOP seamless integration'. This OSED therefore simultaneously attempts to achieve two objectives:

- Describing the operating method and associated requirements forming the content of Solution #21
- Describing the operating method and those 'In progress' requirements that have been developed within OFA05.01.01 and for which further Research and Development is required in the framework of SESAR2020 Project PJ04.

Solution #21 supports airport operations with an increased scope and timescale of data shared between the Airport and the Network Manager, building upon the Pre-SESAR Airport Collaborative Decision Making (A-CDM) baseline[3]. It consists of a set of airport performance services and a suite of enabling applications to maintain performance in normal operations, adverse conditions due to meteorological phenomena with a negative impact such as thunderstorms and low visibility; and exceptional conditions due to *ad hoc* disruptive events such as runway closure or a terminal evacuation.

Solution #21 is strongly linked with SESAR Solution #18 'CTOT to TTA for ATFCM' and with Solution #20 'Collaborative NOP' due to the concept integration needed with the Airport Operations Plan (AOP). Information shared between the AOP and NOP building upon today's A-CDM message exchanges will be enabled by SWIM-based services contained in SESAR Solution #46 (Initial SWIM).

The Solution is grounded in two new services developed for dealing with normal, adverse and exceptional operating conditions:

- Steer Airport Performance – establish the performance goals and Key Performance Indicator (KPI) thresholds; and
- Monitor Airport Performance – monitor performance against the goals. The Monitor Airport Performance service analyses the current and forecast performance using the most recent data and compares it against the agreed performance metrics and targets. The monitoring system automatically triggers a warning or alert to ATM stakeholders if predefined thresholds are exceeded. The AOP is linked to the NOP and provides the data to facilitate these goals.

The new enabling tools and applications to support airport performance are:

- AOP – the Airport Operations Plan. A single, common and collaboratively agreed rolling plan that will form the single source of airport operations information shared bi-directionally with all airport stakeholders including the Network Manager. The AOP introduces automation in support of network and airport performance monitoring. Through the use of an AOP, airports stakeholders both generate and receive enhanced information and have better control over their operations through the Airport Transit View (ATV), which links business trajectories

[1] Falling under PAC 05 operational package (Integrated and Collaborative Network Management) and SPC05.01 Operational sub-package "Demand and Capacity Balancing Airports" (ref. "Operational Focus Area Programme Guidance document, [27]).
[2] Current DOD Step 1 document (version 00.01.01) is dated March 07, 2014.
[3] See Eurocontrol. IP1 CDM Implementation manual [9]

between inbound and outbound flights and enhances common situational awareness. Furthermore the AOP assists airspace users and airport operators in becoming active participants in the airport arrival management process (TTA) building on the A-CDM baseline concept.

- Landside Processes – the Solution extends beyond the airside operating environment and addresses processes within the terminal infrastructure that have a performance impact on flight predictability and efficiency, in this case monitoring the progress of passengers through the airport from check-in to the gate. Monitoring data is stored in the AOP and allows stakeholders to increase their confidence around TOBT accuracy and stability.
- Integration of MET data – a single consistent MET data source according to a standardised and agreed set of MET data parameters is a required input and probabilistic forecasting is introduced as a new methodology to enhance information and increase prediction accuracy. This data source and forecasting technique is introduced separately by Solution #35. However, new systems are provided in the context of Solution #21 allowing it to integrate with MET in order to provide enhanced sharing and visualisation of meteorological information, designed to support decision making and increasing common situational awareness. The display of MET information with associated alerts and warnings contributes to better predictability and more efficient decision making within the APOC organisational structure.

The full Airport Operations Management concept developed in SESAR 1 envisages two additional new services that have not yet reached maturity and will be deployed complementary to Solution #21 in the future, namely the ability to Manage Airport Performance and to Perform Post-Operations Analysis. The current 'state of the art' of these two services is also included in this edition of the OSED. These are intended to further enhance stakeholder situational awareness, decision making and to quicken recovery from deviations to planned activities. Further work is required in SESAR2020 and its associated validation exercises both to further refine the SESAR1 airport operations management concept and also to introduce new elements into the concept such as, for example, the monitoring of environmental performance indicators within the Airport Operations Plan.

In the domain of DCB the concept development and validation exercises focused solely on the runway as a capacity limitation. Further work is required in order to integrate other capacity bottlenecks into the overall DCB process.

In the domain of the APOC Processes and notably the multi-stakeholder decision making process, further work is required to streamline the exchange of information between different stakeholders so as to find a better balance between a 'formalised' approach and one which offers more flexibility, with the aim of converging more quickly to an agreed strategy between different stakeholders and supporting an efficient recovery to normal operations. Optimisation of APOC alert / warning thresholds will need further study, again to find the right balance between informal problem resolution and the more formalised impact assessment / solution message process. In particular the exercise VP-757 provided much valuable guidance to SESAR2020 in its validation report [26] but any potential changes to the OSED requirements are not yet considered to be at a sufficient degree of maturity or to have reached a sufficient degree of consensus amongst stakeholders to merit their inclusion in this current version.

In the domain of Performance Monitoring, the previous edition of the OSED defines a number of key performance indicators for display in the APOC. Whilst these indicators are highly valuable for the monitoring of the global airport situation, they are not always necessarily at a sufficiently detailed level of granularity to allow problem identification and resolution. A highly promising gaming exercise with Paris Charles de Gaulle airport employed a prototype performance dashboard, displayed as a 'video-wall' covering different aspects of the airport operation. This dashboard was specifically designed to allow 'fine grain' performance monitoring and management covering both airside and landside processes. The philosophy behind such a dashboard needs to be taken forward into SESAR2020 so that generic guidelines relating to the dashboard principles (both content and HMI) can be developed.

In a similar vein, a V3 validation exercise (VP-749) was performed as collaboration between P6.3.1 and P13.02.03 with a focus on Target Time Management and integration of the AOP and the NOP. The degree of concept maturity attained in this validation exercise has permitted the inclusion of a refinement in this edition of the OSED compared to the previous in the domain of target time

management. Again, further inter-project validation exercises in this domain will be performed in SESAR2020 and notably with the full involvement of the Network Manager.

One recurring theme in a number of validation exercises at both V2 and V3 levels, notably those linked to the APOC process (VP-547, VP-013, VP-757) was the importance of a 'what-if' decision-support tool. Essentially such a tool is designed to answer the question "what will be the impact of a given decision at certain time intervals in the future". Clearly the development of such a tool requires considerable research and validation. So whilst SESAR1 identified the importance of such a tool to the unanimous agreement of all APOC stakeholders, detailed concept development and validation activities will only commence in earnest in SESAR2020. Nevertheless, at the time of drafting this edition of the OSED, the final preparations are taking place for the testing of an initial 'what-if' capability via the integration of real-time and fast-time simulation techniques in collaboration with the airport of Madrid Barajas. For the eventual deployment of such a capability, it is likely that techniques related to big data analysis and machine learning will need to be employed. Activities aligned to this will be performed in SESAR2020. In addition, such techniques will also be relevant for the post-operations analysis phase and the 'closure of the loop' with the strategic performance steering.

In the domain of Cyber-security, an exploratory study has been performed during SESAR1 into cyber-security issues associated to an APOC and the Total Airport Management concept [22]. Whilst it is currently too early to generate requirements in this version of the OSED, the study did succeed in identifying a number of issues which will need to be considered in SESAR2020 as well as providing guidance material linked to the Risk Assessment activity within PJ04.

1 Introduction

1.1 Purpose of the document

The Operational Service and Environment Definition (OSED) describes the operational concept defined in the Detailed Operational Description (DOD) in the scope of its Operational Focus Area (OFA). It defines the operational services, their environment, scenarios and use cases and requirements.

The OSED identifies the operational services and is used as the basis for establishing requirements related to the airport operations management operational concept to be used by technical projects to develop systems and tools.

The OSED will be used as the basis for establishing operational, safety, performance and interoperability requirements for the related systems further detailed in the Safety and Performance Requirements (SPR) and Interoperability Requirements (INTEROP) documents.

The OSED identifies the operational services supported by several entities within the ATM community and includes the operational expectations of the related systems.

This OSED is a top-down refinement of the Airport DOD Step 1 document produced by the federating OPS 6.2 project. It also contains additional information which should be consolidated back into the higher level SESAR concepts using a “bottom up” approach.

The figure below presents the location of the OSED within the hierarchy of SESAR concept documents, together with the SESAR Work Package or Project responsible for their maintenance.

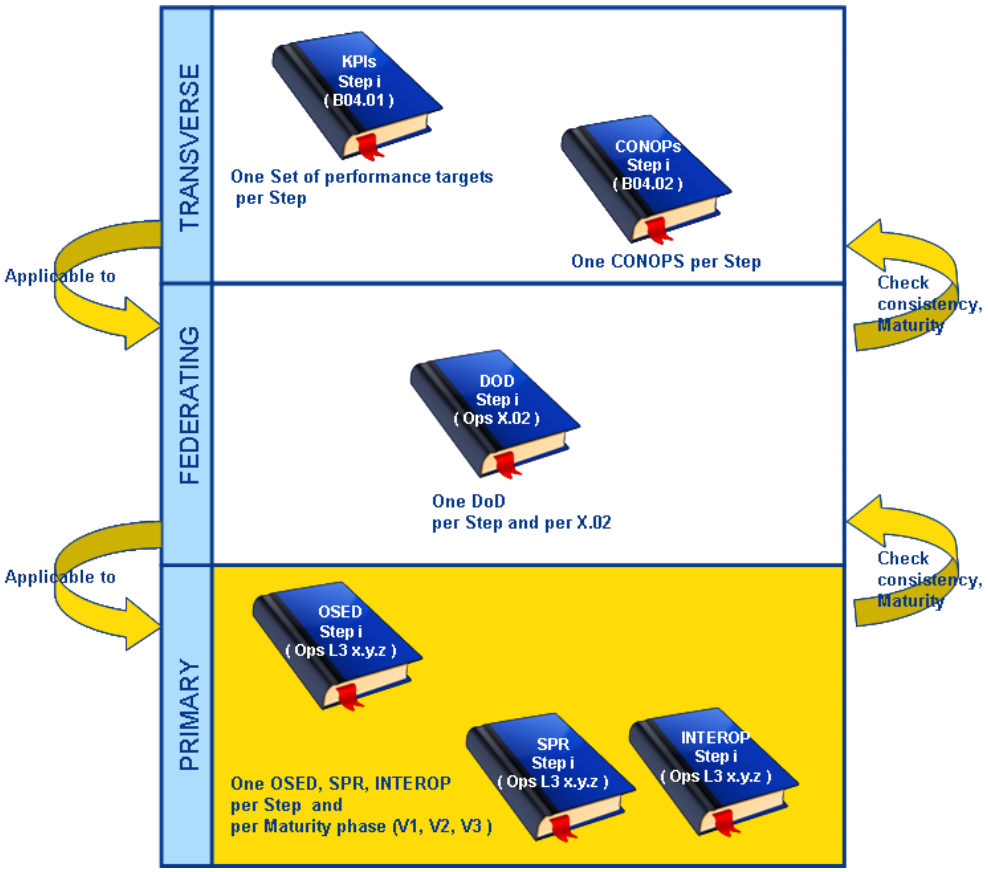

Figure 1: OSED document with regards to other SESAR deliverables

In Figure 1, the Steps are driven by the OI Steps addressed by the project in the Integrated Roadmap document [7] .

Four main iterations of this OSED will be produced during the lifecycle of OFA 05.01.01 (Airport Operations Management).

This document is the fourth and last edition (Ed 4.0) of the Operational Services and Environment Description (OSED) related to the Airport Operations Management in the SESAR operational concept, based on OSED edition 00.03.01 issued in March 2015.

1.2 Scope

The contents of this document reflect the work of 7 primary projects, namely:

- P6.5.1: Airport Operations Plan Definition
- P6.5.2: Airport Operations Plan Validation
- P6.5.3: Airport Capacity and Flow Management
- P6.5.4: Airport Operations Centre (APOC) Definition
- P6.5.5: Integration of MET data into APOC processes
- P6.6.1: Operations in adverse weather or exceptional operating conditions / recovery management
- P6.6.2: Integration of airport - airline / ground handlers – ATC processes (including turnaround) in ATM
- P6.3.1: The airport in the ATM environment

Previous Editions of the OSED have contained the entirety of the work of the OFA05.01.01 and reflecting the evolving maturity of the operational requirements covering the different concept elements. A number of those concept elements have now reached a V3 level of maturity and, importantly, form the content of SESAR Solution #21 'Airport Operations Plan and AOP-NOP seamless integration'. This OSED therefore simultaneously attempts to achieve two objectives:

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1.3 Intended readership

The intended audience for this document are other project team members involved in the Step1 development, P6.6.X and P6.5.X primary operational projects within the OFA, WP8 (Information Management), WP7 (Network Operations), P6.2 and P12.1.7 (OFA 05.01.01 federating projects), WPB, as well as mirror technical projects from WP12.

More precisely, the process dealing with OSED refining and updating in the frame of SESAR Step 1 involves the following primary operational projects:

06.05.01	Airport Operations Plan Definition
06.05.02	Airport Operations Plan Validation
06.05.03	Airport Capacity and Flow Management
06.05.04	AirPort Operations Centre (APOC) definition
06.05.05	Integration of MET Data into APOC processes
06.06.01	Operations in adverse weather and/or exceptional operating conditions/recovery management
06.06.02	Integration of airport - airline/ground handlers - ATC processes (incl. turnaround) in ATM
06.03.01	The Airport in the ATM environment

Table 1. Primary projects involved in the OFA 05.01.01

Mirror technical projects -focusing on Airport Systems definition and development- must build a traceability matrix between the OSED, SPR and their system requirements, making it possible to check the coverage level with regard to the Conops: P12.6.2 ("The Airport Operations Plan (AOP), decision support tools and conflict detection tools to be integrated in APOC for managing the overall performance of the airport"), P12.06.08 ("Introduction of the UDPP and collaborative departure

sequence") and P12.07.03 ("Airport Performance Assessment and Management Support Systems") shall use the deliverable for developing a pre-industrial prototype.

More precisely, the process dealing with OSED refining and updating in the frame of SESAR Step 1 involves the following technical projects:

12.02.01	Runway Management Tools
12.04.01	Baseline for airport controller tools
12.06.02	The Airport Operations Plan (AOP), decision support tools and conflict detection tools to be integrated in APOC for managing the overall performance of the Airport
12.06.03	Enhanced MET-systems with CDM
12.06.07	AMAN, SMAN, and DMAN fully integrated into CDM processes
12.06.08	Introduction of the UDPP and collaborative departure sequence
12.06.09	Integration of CDM in the SWIM environment
12.07.03	Airport Performance Assessment and Management Support Systems
12.07.05	Improved weather information systems
12.06.08	Introduction of the UDPP and collaborative departure sequence
12.06.09	Integration of CDM in the SWIM environment
12.07.03	Airport Performance Assessment and Management Support Systems
12.07.05	Improved weather information systems

Table 2. WP12 primary projects involved in OFA 05.01.01

Projects P8.1.10 and P8.3.6, whose domain purpose is overarching to capture information from Operational WP6 to develop Airport ATM Information Services, will use data exchange information when building information services.

At a higher level, OFA 05.01.01 coordinating federating projects -P6.2 and P12.1.7-, other federating projects P7.2 (the focal point to consolidate the NOP issues addressed by P6.2) and WPB are expected to have an interest in this document.

1.4 Structure of the document

Since the OFA OSED is a very large document, it was decided to divide the documents into two parts. Meanwhile as Part 1 was still large compared to Part 2, again Part 1 is now divided in two new parts.

- Part 1a (this document) provides the description of the entire process including services, methods, scenarios/use cases
- Part 1b provides the requirements
- Part 2 addresses all appendices, including initial airport performance framework, rules engine, warning/alerts codes, detailed use cases, elements to be shared between AOP and NOP, description of Airport DCB concept, de-icing concept a trace table of changes made to the requirements

Section 1 of this document provides a high level description of the document, indexes, glossary, acronyms, dependencies and other short introductory information.

The purpose of the following sections is to establish clear relations between actors, processes, services and application/information services (section 2, section 3), methods (section 4) and scenarios/use cases (section 5). Methods applied to different use cases may generate specialised sets of requirements which will then enter the validation process.

Section 6 is the repository of the requirements. This section will feed emanating documents such as SPR, INTEROP, which will be developed further on.

Section 7 lists applicable and reference documents.

1.5 Background

A large number of programmes, projects and initiatives will provide input to the project. Main inputs are listed hereafter.

- SESAR definition phase documentation:
  - The SESAR performance framework (D2)
  - The SESAR Concept of Operations (ConOps): T222
  - The description of scenarios developed: T223
  - The list of operational improvements allowing to transition to the final concept: T224
  - The definition of the implementation packages: T333
  - The list of performance assessments exercises to be carried out to validate that the concept delivers the required level of performance: T232
  - The ATM performance framework, the list of Key Performance Indicators, and an initial set of performance targets: T212
- SJU B4.2 documentation:
  - Actors & Roles
  - Processes & Services
  - High level Scenarios
  - Trajectory management document
- Eurocontrol IP1 A-CDM Implementation Manual [9].
- V2 and v3 deliverables related to OFA 05.01.01 from P6.5. / P6.6 / P6.3.1 primary projects.

1.6 Glossary of terms

Term	Definition	Source
Actual In-block Time (AIBT)	*The actual date and time **when the parking brakes have been engaged at the** parking position*	*ATM Lexicon*
Actual landing time (ALDT)	*The actual date and time when the aircraft has landed (touch down)*	*ATM Lexicon*
Actual Off-Block Time (AOBT)	*The actual date and time the aircraft has vacated the parking position (pushed back or on its own power).*	*ATM Lexicon*
Actual Start Up Approval Time (ASAT)	*Time that an aircraft receives its start-up approval.*	*ATM Lexicon*
Actual Take Off Time (ATOT)	*The time that an aircraft takes off from the runway (Equivalent to ATC ATD – Actual Time of Departure, ACARS = OFF)*	*ATM Lexicon*

Term	Definition	Source
Ad-hoc Post Operations Analysis report	*This type of Post Operations Analysis report is a dedicated report that has been triggered based on a specific occurrence and decided by any airport stakeholder which defines the content and all necessary parameters. Airport stakeholders may comment individually or after a common analysis which may be triggered, depending on the complexity and sensitivity of the report.*	*Section 3.2.5.*
Adverse conditions	*Any event within the operational envelope of the airport, which has a significant negative impact on operational performance unless appropriate actions are organised.* *Note:* *This definition encompasses adverse weather conditions.* *In most cases, the airport capacity will be affected. However, other Key Performance Areas may also be impacted (e.g. the predictability of operations may decrease). The consequence of adverse conditions at an airport may be arrival and departure delays and / or flight cancellations. In many cases, the ATM Network will also suffer from the disruption.*	*ATM Lexicon*
Adverse weather conditions	*Degraded weather condition: a condition which might have a significant negative impact on airport performance unless a proper response is organized (i.e. the selection of an airport operating mode to respond to given degraded conditions and eventually the use of additional airport resources such as de-icing/anti-icing services). This would be the case when visibility is poor and/or in case of freezing conditions, precipitations, etc.*	*ATM Lexicon*
Air Traffic Control Clearance	*Authorization for an aircraft to proceed under conditions specified by an Air Traffic Control Unit.*	*ATM Lexicon*
Air Traffic Control instruction	*Directives issued by Air Traffic Control for the purpose of requiring a pilot to take specific action.*	*ATM Lexicon*
Airport CDM Information Sharing Platform (ACISP)	*The Airport CDM Information Sharing Platform (ACISP) is a generic term used to describe the means at a CDM Airport of providing Information Sharing between the Airport CDM Partners The ACISP can comprise of systems, databases, and user interfaces*	*Airport CDM Implementation*

Term	Definition	Source
Airport Collaborative Decision Making (Airport CDM or A-CDM	*Airport Collaborative Decision Making is the concept which aims at improving Air Traffic Flow and Capacity Management (ATFCM) at airports by reducing delays, improving the predictability of events and optimising the utilisation of resources.* *Implementation of Airport CDM allows each Airport CDM Partner to optimise their decisions in collaboration with other Airport CDM Partners, knowing their preferences and constraints and the actual and predicted situation.* *The decision making by the Airport CDM Partners is facilitated by the sharing of accurate and timely information and by adapted procedures, mechanisms and tools.* *The Airport CDM concept is divided in the following Elements:* • *Information Sharing* • *Milestone Approach* • *Variable Taxi Time* • *Pre-departure Sequencing* • *Adverse Conditions* • *Collaborative Management of Flight Updates*	*EUROCONTROL IP1 A-CDM Implementation Manual*
Airport Operations Plan	*The AOP (Airport Operations Plan) is single, common and collaboratively agreed rolling plan used by all involved stakeholders whose purpose is to provide common situational awareness. It requires individual stakeholders to make changes within their own sphere of operations. The AOP interacts with a number of services, systems and also external stakeholders (e.g. network).*	*ATM Lexicon*
Airport Performance Baseline	*An Airport Performance Baseline (APB) is the set of target values for the KPIs in the Airport Performance Framework. The structure and hierarchy is identical as for the Airport Performance Framework. The baseline is established by the Steer airport performance service and used as guidance for airport operations by the airport management service.*	*P6.5.1*
	It includes: • *KPIs target values.* • *PDIs target values.* • *Thresholds values.*	*Section 3.2.2.1*
Airport Performance Board (APB)	*Seasonal scheduled board that produces high level steering parameters (relevant KPIs and target performance values).*	*Section 3.2.2.2*

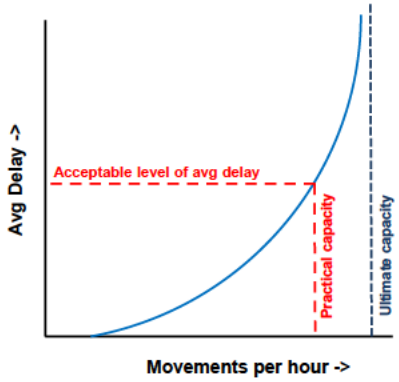
Term	Definition	Source
Airport Performance Framework	*The Airport Performance Framework is the set of definitions and terminology describing the building blocks used by a group of the Airport community (i.e., airport stakeholders) to collaborate on performance management activities. This set of definitions includes the levels in the airport performance hierarchy, the key performance areas, a set of process capability areas, focus areas, performance objectives, indicators, targets, supporting metrics, lists of dimension objects, their aggregation hierarchies and classification schemes. The framework is in line with the ICAO 9883 standard document.*	*P6.5.1*
	It includes: • *KPIs metrics* • *PDIs metrics* • *Thresholds type (minimum, maximum or both) and number of threshold levels (1, 2, 3, ...levels)* • *Rules (trade-off criteria, priorities...)* • *Alerts type* • *Warning type*	*Section 3.2.2.1*
	CURRENT AIRPORT PERFORMANCE FRAMEWORK: Airport Performance Framework + Airport Performance Baseline. *ACTUAL AIRPORT PERFORMANCE FRAMEWORK: It includes the actual figures of the KPIs and PDIs included in the Airport Performance Framework after the execution of the plan.* *INITIAL AIRPORT PERFORMANCE FRAMEWORK: It is the starting perspective for the very first Airport Performance Board. It is the Airport Performance Framework as defined in SESAR Project 6.5.1 Deliverables D05/D06 and assessed in Deliverable D07.*	*Section 3.2.2.1*
Airport Transit View (ATV)	*An Airframe Airport Transit View (ATV) is the description of the 'visit' of an aircraft to the airport. It consists of three separate sections:* • *the final approach and arrival and departure ground section of the inbound flight* • *the turn-round process section in which the inbound and the outbound flights are linked* • *the 'surface-out' ground section and the initial climb segment of the outbound flight* *In other words, ATV is the local set of data describing the path and operations linked to an aircraft during its "visit" to the airport. It starts at the Initial approach fix (STAR) and includes the descent, the landing, the surface-in segment, the turn round processes form the airspace user, the surface-out segment, the take-off and initial climb and ends with the handover to the TMA departure controller at the SID.*	*ATM Lexicon*

Term	Definition	Source
APOC/AOP Supervisor	*The APOC supervisor (short term and execution phases) will liaise with all APOC participants for the purpose of coordination and arbitration between actors in the management of the Airport Operations Plan (AOP). He will act as a final decision maker in case of issues for which no consensus has been reached. The following roles and responsibilities are identified:* • *Liaison between airport operations and Network* • *Liaison between airport stakeholders* • *Ensures that total airport overview and information is available to all relevant stakeholders* • *Initiates UDPP when appropriate* • *Coordinate with the relevant AOP stakeholders on the feasibility of specific airport scenario's* • *Ensures that agreed actions are taken by the appropriate stakeholder(s)* • *Monitors that expected benefits from agreed actions are reached and coordinates any new operational measure if appropriate* • *Acts as arbitrator in case mutual agreed decision cannot be made in time* • *Updates the AOP with information within the AOP sphere of responsibility* • *Solves the inconsistencies between the different sources of information* *Note: in long term and medium term planning phases, this role refers to AOP supervisor.*	*P6.5.4*
Airport Operations Centre (APOC)	*A platform / operational structure which pro-actively manages the performance of present and short-term airport operations, giving relevant airport stakeholders a common operational overview of the airport, and allowing them to communicate, coordinate and collaboratively decide on their progress.*	*ATM Lexicon*
Airport Performance Monitoring Platform	*"Smart" systems supporting the automated processes in the Monitor Airport Performance Service. The Airport Performance Monitoring Platform contains a calculation/prediction capability defined by its Rules Engine, in order to make comparisons with agreed warning/alert levels and to generate and distribute warning/alert messages to the corresponding stakeholders and to publish/update those calculations/predictions (values) in the AOP (and hence, to the appropriate database).* *It is important to differentiate between the AOP and the Airport Performance Monitoring Platform. The first one is the principal source of information used by all the airport stakeholders whereas the second one is a tool that supports the monitoring of the actual airport processes and performance, showing information from different sources (the main one is the AOP) in order to provide alerts/warnings to the assigned stakeholders and to enhance the common situation awareness.*	*P6.5.4*

Term	Definition	Source
Responsible Stakeholder	*The stakeholder to whom alerts and warnings are assigned to. He is the one responsible to deal with these alerts and warnings and the one best placed to solve the problem and to take action.* *By default, the responsible stakeholder is either the APOC supervisor or, depending on the type of event, a pre-defined stakeholder within the APOC. Depending on the process or event the responsible stakeholder may change if needed.*	*P6.5.4*
Central Management Unit (CMU)	*A centralised unit providing air traffic flow management services within a specified area of responsibility.*	*ATM Lexicon*
(Calculated Take Off Time) CTOT	*A time calculated and issued by the appropriate Central Management Unit, as a result of tactical slot allocation, at which a flight is expected to become airborne.*	*ATM Lexicon*
Declared Capacity	*Declared Capacity is the basis for allocating airport slots. It is comprised of values for declared total capacity, declared maximum arrival capacity and declared maximum departure capacity taking into account airport infrastructure, typical situations and political issues. Declared capacity can vary throughout the day accounting for Inbound or outbound peak periods, off-peak periods or night-time.*	*P6.5.3*
De-icing Coordinator	*A function or a person responsible for coordinating the de-icing operations performed by De-icing Unit Operators.*	*P6.6.2*
Departure Clearance	*Instructions which specify the aircraft identification, clearance limit; route of flight; level(s) of flight for the entire route or part thereof and changes of levels if required, any necessary instructions or information on other matters such as SSR transponder operation, approach or departure manoeuvres, communications and the time of expiry of the clearance (cancelled if the flight has not been started) and in addition runway and Standard Instrument Departure (SID).*	
Departure Manager (DMAN)	*A planning system to improve departure flows at one or more airports by calculating the Target Take Off Time (TTOT) and Target Start Up Approval Time (TSAT) for each flight, taking multiple constraints and preferences into account.*	*ATM Lexicon*
European ATM Enterprise Architecture (EAEA)	*Description of the ATM related structure and behaviour of the ATM related organisation's processes, functions, information systems, personnel and organisational sub-units, aligned with the Organisation's performance goals and strategic directions as defined in the SESAR program.*	*ATM Lexicon*
Estimated In Block Time (EIBT)	*The estimated time that an aircraft will arrive in-blocks. (Equivalent to Airline/Handler ETA – Estimated Time of Arrival).*	*ATM Lexicon*
Estimated Landing Time (ELDT)	*The estimated time that an aircraft will touchdown on the runway (Equivalent to ATC ETA–Estimated Time of Arrival = landing).*	*ATM Lexicon*

Term	Definition	Source
Estimated Off Block Time (EOBT)	*The Estimated Off-Block Time (EOBT) is the estimated time at which the aircraft will start movement associated with departure (ICAO).*	*ATM Lexicon*
Estimated Take Off Time (ETOT)	*Forecast of time when aircraft will become airborne taking into account the EOBT plus EXOT*	*ATM Lexicon*
Estimated Taxi In Time (EXIT)	*The estimated taxi time between landing and in-block.*	*ATM Lexicon*
Estimated Taxi-Out Time (EXOT)	*The estimated taxi time between off-block and take-off. This estimate includes any delay buffer time at the holding point or remote de-icing prior to take off.*	*ATM Lexicon*
Event Reports	*An Event Report is not a non-standardized message issued directly by a stakeholder via any means of communication to inform the APOC of a problem*	*Section 3.2.4.3.3*
Ground System(s)	*The ground part of the ATM System (also termed ground-based system(s)) opposite to the Aircraft system.*	
Hold Over Time (HOT)	*Estimated time during which the de-icing/anti-icing fluid will prevent the formation of frost or ice and the accumulation of snow on the protected surfaces of an aeroplane during specified weather conditions.*	*AEA Recommendations for De-icing / Anti-icing Aeroplanes on the Ground*
IATA Schedules Conference	*The Schedules Conference is a working conference. As part of the scheduling process, the purpose of this voluntary assembly of both IATA and non-IATA airlines worldwide is to provide a forum for the allocation of slots at fully coordinated airports (Level 3), and for the reaching of consensus on the schedule adjustments necessary to conform to airport capacity limitations (Level 2). The bi-annual (June and November) Schedules Conference is IATA's largest event. The Conference operating procedures are published in the Worldwide Scheduling Guidelines.*	
Information Service	*An **information service** is a service delivering information or data to actors and/or systems without transformation of the underlying data. Information services can include filtering and/or combining of information. They are the only responsible for system data exchange, they can be considered as interfaces among systems.*	
Landing Clearance	*Instruction which specifies the runway, surface wind, (visibility), the actual runway conditions and the clearance to land on this runway; communication may be either via Data Link or via voice communication (R/T): the selection being dependent upon ICAO SARPS and local procedures (if an aircraft is still airborne, the ATM system may uplink the planned "exit" and "taxi routing" data to the flight deck).*	
Minimum Turn-round Time (MTTT)	*The minimum turn-round time agreed with an AO/GH (aircraft operator/ground handler) for a specified flight or aircraft type.*	*ATM Lexicon*

Term	Definition	Source
Network Manager	*The Network Manager's function is to optimise the aviation network's performance. The Network Manager is responsible for network capacity planning. It must ensure that air traffic capacity is made available and used in the best possible way in the pan-European network's daily operations.*	*EUROCONTROL*
Network Operations Plan (NOP)	*A set of information and actions derived and reached collaboratively both relevant to, and serving as a reference for, the management of the Pan-European network in different timeframes for all ATM stakeholders, which includes, but is not limited to, targets, objectives, how to achieve them, anticipated impact.*	*ATM Lexicon*
Operational Process	*A process is composition of activities that are triggered by an event and transforms a specific input into a meaningful output.*	
Operational Service	*An operational service is a product of a sequence of operational processes on request of an actor to another actor who will execute the service with clear identification of an output.* *A service is offered by an operational entity, (i.e. an organisational actor (e.g. ANSP) or a human actor (e.g. ATCO).* *There are several levels of operational service, depending on the level of granularity required.* *At lower level an operational service can be supported by:* • *Information service(s) to carry out information needed by the operational service without transforming the information, and/or* • *Application service(s) to use this information in order to provide an output via automation / computation, i.e. with transformation of the information*	
Operational Steering Board (OSB)	*Regularly (monthly) scheduled board that produces detailed steering parameters (KPIs and PDIs for the KPAs defined in the APB and performance values that should trigger warnings and alerts).*	*Section 3.2.2.2*
OSB agreed parameters	*It refers to same concept as Current Airport Performance Concept.*	*Section 3.2.2*
Performance Driver Indicator (PDI)	*A Performance Driver Indicator (PDI) is a measure that directly affects an outcome or achievement of a Key Performance Indicator (KPI). PDI is a performance metric that is associated with a preceding step in a value stream or business process. It will contribute directly to a KPI and may be a component in the way the KPI is calculated.*	*P6.5.1*

Term	Definition	Source
Post Operations Analysis platform	*System and procedure to perform analysis of the airport performance during the Post Operations Analysis phase based on the OSB Agreed Parameters defined by the Steer Airport Performance service for providing the standard Post Operations Analysis reports; it contains also the parameters for provision of ad hoc reports.*	*Section 3.2.5*
Practical Capacity	*The Practical Capacity is the number of aircraft operations during a specified time period corresponding to a tolerable level of average delay.*  *Practical Capacity is always lower than Ultimate Capacity. By having a planning buffer relative to the Ultimate Capacity the risks of creating over demand and additional delay is reduced because the delay effect of demand bunching will not be as severe. The size of the buffer depends on the level of average delay accepted.*	*P6.5.3*
	Adjusted Demand *The adjusted demand contains the times at which aircraft are requested to arrive at the runway, in inbound or outbound as adapted to the available capacity.*	*P6.5.3*
	Airport Capacity *Airport capacity is the number of arrivals, departures and total aircraft movements, taking into account the composite effect of airside taxiway and landside constraints. It therefore includes more than just runway capacity. The airport capacity communicated in the AOP is the outcome of the Airport DCB management process.*	*P6.5.3*
	Cumulative Demand *The Cumulative Demand is composed of the Intentional Demand assigned to a time interval plus the over-demand from the preceding time interval. It reflects how many aircraft will want to use the runway in that interval based on the capacity decisions taken in the previous time interval. It has to be based on the smallest possible time period.*	*P6.5.3*
	Effective Throughput *The effective throughput is the number of flights that have actually used the runway. It can be expressed for different reference periods.*	*P6.5.3*

Term	Definition	Source
	Estimated Demand *Estimated Demand is comprised of a mix of scheduled times, estimated times and target times. Estimated times replace schedule times and target times replace estimated times when available. It presents a view on which demand is likely to exist at a given point in time assuming that target times will be met. Estimated times and target times can already be the result of applied control measures.*	*P6.5.3*
	Intentional Demand *The Intentional Demand (ILDT/ITOT) comprised of milestone times that reflect the preference of each individual flight as long as constraints or irreversible control measures have not already overridden this preference. It can be expressed for different reference periods*	*P6.5.3*
	KPA Capacity *This KPA addresses the ability of the airport to cope with air traffic demand (in number and distribution through time and space). It relates to the throughput of that volume per unit of time, for a given safety and quality level.*	*P6.5.3*
	Monitor *"A monitor is an instrument or device used for observing, checking or keeping a continuous record of a process or a group of processes. A monitor may alert the operator in case certain thresholds (predetermined and agreed) are exceeded or in case a negative development for one or more indicators is detected" (see: [7] P06.05.01 D09 – Airport Performance Monitoring Edition 00.01.06, 3.1.1 Objective).*	*P6.5.3*
	SBT Demand *The SBT Demand is the coordinated Expected/Intentional Demand between schedule release and AOP release.*	*P6.5.3*
	Ultimate Capacity *Ultimate capacity is the maximum number of aircraft operations that an airfield can accommodate during a specified time period when there is continuous demand for service. It is used in execution phase only by tactical planning tools in order to avoid wasting capacity.* *Ultimate Capacity can be calculated per runway and traffic type (arrival/departure).*	*P6.5.3*
Pre-defined solution table	*Table containing a set of data providing guidance to the airport stakeholders involved in the management of adverse conditions.* *A pre-defined solution table is built on past experience (post operations analysis), on situations when a similar solution was adopted and allowed a successful and efficient management of the disruption and an expeditious return to normal operations.*	*P6.6.1*

Term	Definition	Source
Pre-departure Information	*The Pre-departure information is delivered during the pre-departure phase and contains the designated runway (potentially the SID), and the most recent information regarding airport conditions, weather forecasts, SIGMETs (if any) and NOTAMs. This information is available through the D-ATIS:*	
Push-Back	*Movement of an aircraft on the ground consisting of leaving the parking area in reverse motion as far as alignment on the taxiway.*	
Push-back/start up Approval	*The push-back/start up approval is issued by Tower Ground Controller (or Apron Manager) and indicates that flight crew is now allowed to push-back and move the aircraft following the push-back path delivered with the approval. The authorisation to move is restricted to this movement only.*	
Runway Exit	*A designated turn-off or high speed turn-off from the runway, that leads the aircraft out of the runway and out of the runway safety strip to the apron areas of an airport.*	
Runway Pressure	*The Runway Pressure represents the maximum number of flights allowed to wait at the last holding point for take-off.*	
Saturation Capacity	*The expected ("average") number of runway operations (take-offs and landings) that can be performed in one hour without violating ATC rules, assuming continuous aircraft demand. It can be calculated per runway and traffic type (arrival/departure).*	
SID	*The Standard Instrument Departure (SID) represents the departure route of the aircraft to the ACC entry point.*	
Scheduled Off Block Time (SOBT)	*The time that an aircraft is scheduled to depart from its parking position.*	*ATM Lexicon*
Standard Post-Operations Analysis report	*A standard Post Operations Analysis report is a performance report produced and recorded according to predefined rules and parameters provided by the Operational Steering Board through the OSB Agreed Parameters. Production is triggered by a specified set of rules defined in the OSB Agreed Parameters, using the predefined template and list of addresses.*	*Section 3.2.5*
STAR	*A designated Instrument Flight Rule (IFR) arrival route linking a significant point, normally on an Air Traffic Service (ATS) route, with a point from which a published instrument approach procedure can be commenced.*	*ATM Lexicon*
Target Off Block Time (TOBT)	*The time that an Aircraft Operator or Ground Handler estimates that an aircraft will be ready, all doors closed, boarding bridge removed, push back vehicle available and ready to start up / push back immediately upon reception of clearance from the Tower Controller.*	*ATM Lexicon*

Term	Definition	Source
Target Start-up Approval Time (TSAT)	*The time provided by ATC taking into account TOBT, CTOT and/or the traffic situation that an aircraft can expect start-up / push-back approval.*	*ATM Lexicon*
TSAT Window	*A time-frame of +/- 5 minutes around the TSAT, in which a Start-Up and Push-Back approval may be issued.*	
Target Time of Arrival (TTA)	*An ATM computed arrival time. It is not a constraint but a progressively refined planning time that is used to coordinate between arrival and departure management applications.*	*ATM Lexicon*
TTOT	*Time taking into account the Target Start Up Approval Time (TSAT) plus the Estimated Taxi-Out Time (EXOT).*	*ATM Lexicon*
Taxi clearance	*The Taxi clearance is issued by TWR Ground Controller after Push-back and indicates that the flight crew is now allowed to move the aircraft following the Taxiing plan (describes the taxi route) delivered via data link.*	
User Driven Prioritisation Process (UDPP)	*A process during periods of reduced capacity in which the service provider declares the available capacity and users, interacting collaboratively and collectively with the provider, propose specific flights to fill it.*	*ATM Lexicon*
Variable Taxi Time (VTT)	*The estimated time that an aircraft spends taxiing between its parking stand and the runway or vice versa.* *Variable Taxi Time is the common name for inbound (EXIT) and outbound (EXOT) taxi times, used for calculation of TTOT or TSAT.*	*ATM Lexicon*

Table 3. Glossary of terms

1.7 Acronyms and Terminology

A list of the important terminology and acronyms used in this document is presented below; they are taken, when available, from the SESAR ATM Lexicon, as a reference.

Term	Definition
A/C	Aircraft
A-CDM	Airport Collaborative Decision Making
AAS	Administrator Airport System
AAST	Airport Arrival Slot Time
ACARS	Aircraft Communications Addressing and Reporting System
ACC	Area Control Centre
ACISP	Airport CDM Information Sharing Platform
ACGT	Actual Commencement of Ground Handling Time
ACZT	Actual Commence of De-icing Time
AD	Arrival Deviation
ADD	Architecture Definition Document
ADEP	Airport of Departure
ADES	Airport of Destination
ADIP	Assigned De-icing Position
ADIV	Airport of Diversion (ICAO)
ADS-B	Automatic Dependant Surveillance – Broadcast
ADST	Airport Departure Slot Time
ADIT	Actual De-icing Time
AEGT	Actual End Ground Handling Time
AEZT	Actual End of De-icing Time
AFAT	Actual Time at the Final Approach
AHOT	Actual Hold over time
AIAT	Actual Initial Approach fix Time
AIBT	Actual In Block Time
AIMA	Airport IMpact Assessment
AIP	Aeronautical Information Publication
ALDT	Actual Landing Time
AMAN	Arrival Manager
ANS	Air Navigation Service
ANSP	Air Navigation Service Provider
AOBT	Actual Off-Block Time
AOC	Airline Operations and Control Centre
AODB	Airport Operational Database
AOP	Airport Operations Plan
APB	Airport Performance Board
APET	Actual Push-back End Time
API	Arrival Planning Information
APOC	AirPort Operations Centre
APST	Actual Push-back Start Time
APZT	Actual Positioned for De-icing Time
ARBT	Actual Ready Boarding Time
ARDT	Actual Ready Time
ARR	ARRival
ARZT	Actual Ready for De-icing Time
ASA	Airport Steering Administrator
ASAS	Airborne Separation Assistance System
ASAT	Actual Start up Approval Time
ASBT	Actual Start Boarding Time
ASET	Actual Stack Entry Time

Term	Definition
A-SMGCS	Advanced Airport Surface Movement Guidance and Control System
ASRT	Actual Start up Request Time
ASXT	Actual Stack eXit Time
ATC	Air Traffic Control
ATD	Actual Time of Departure
ATFM	Air Traffic Flow Management
ATFCM	Air Traffic Flow and Capacity Management
ATIS	Automatic Terminal Information Service
ATM	Air Traffic Management
ATMAP	ATM Airport Performance
ATOT	Actual Take Off Time
ATS	Air Traffic Service
ATSU	Air Traffic Services Unit
ATSAW	Airborne Traffic Situational Awareness
ATV	Airport Transit View
ATYP	Aircraft Type
AU	Airspace User
AUP	Airspace
AUO	Airspace User Operations
AWI	All Weather Operations
AXIT	Actual Taxi-in Time
AXOT	Actual Taxi-out Time
AXOT-D	Actual Taxi-out Time to remote de-icing pad
BT	Business Trajectory
CAA	Civil Aviation Authority
CAT II/III	Category
CAVOK	Clouds and Visibility OK
CB	Cumulonimbus (thunderstorm)
CCTV	Closed Circuit Television
CDA	Continuous Descent Approach
CDM	Collaborative Decision Making
CFMU	Central Flow Management Unit (EUROCONTROL)
CONOPS	Concept of Operations
CPDLC	Controller Pilot Data Link Communication
CTA	Controlled Time of Arrival
CTOT	Calculated Take Off Time
DCB	Demand and Capacity Balancing
DCBM	Demand & Capacity Balancing Management
DEP	DEParture
DEST	Destination
DIA	De-Icing Agent
DIMT	De-Icing Management Tool
DIV	Airport of Diversion (IATA)
DIWT	De-Icing Wait Time
DMAN	Departure MANager
DOD	Detailed Operational Description
DOF	Date of scheduled Flight
DoO	Day of Operation
DPI	Departure Planning Information message
D-OTIS	Data-link Operational Terminal Information Service
D-TAXI	Data-link TAXI clearance delivery
EAEA	European ATM Enterprise Architecture
EASA	European Aviation Safety Agency
E-ATMS	European Air Traffic Management System
ECAC	European Civil Aviation Conference
ECZT	Estimated Commence of De-icing Time

Term	Definition
EDIT	Estimated De-icing Time
EEZT	Estimated End of De-icing Time
EHOT	Estimated Hold Over Time
EIAT	Estimated Initial Approach fix Time
EIBT	Estimated In-Block Time
ELDT	Estimated Landing Time
EOBT	Estimated Off Block Time
E-OCVM	European Operational Concept Validation Methodology
EOFB	Estimated Off Block Best time
ERDT	Estimated Ready Time
ERZT	Estimated Ready for De-icing Time
ETA	Estimated Time of Arrival
ETOT	Estimated Take Off Time
EUACA	European Airport Coordinators Association
EXIT	Estimated Taxi-In Time
EXOT	Estimated Taxi-Out Time
EXOT-D	Estimated Taxi Out Time to remote De-icing pad
FAB	Functional Airspace Block
FDPS	Flight Data Processing System
FIBT	Forecasted In-block Time
FIFO	First In First Out
FLDT	Forecasted Landing Time
FL ID	Flight Identification
FMS	Flight Management System
FMP	Flow Management Position
FOBT	Forecasted off-block Time
FTOT	Forecasted Take Off Time
FUM	Flight Update Message
GBAS	Ground Based Augmentation System
GUFI	Global Unique Flight Identifier
HMI	Human-Machine Interface
HOT	Hold Over Time
IAF	Initial Approach Fix
IATA	International Air Transport Association
ICAO	International Civil Aviation Organisation
IDH	Indefinite Holding
IER	Information Exchange Requirement
IFPS	Initial Flight plan Processing System
ILDT	Intentional Landing Time
ILS	Instrument Landing System
INTEROP	Interoperability
IMC	Instrument Meteorological Conditions
IP	Implementation Package
IR	Implementing Rule
IRS	Interface Requirements Specification
ITOT	Intentional Take Off Time
IWIS	Improved Weather Information System
KPA	Key Performance Areas
KPI	Key Performance Indicator
LVC	Low Visibility Conditions
LVP	Low Visibility Procedures
MCT	Minimum Connecting Time
MET	Meteorological
METAR	METeorological Aerodrome Report
MLS	Microwave Landing System
MoU	Memorandum of Understanding

Term	Definition
MTTT	Mininum Turnaround Time
N/A	Not Applicable
NOP	Network Operations Plan
NOTAM	Notice to Airman
OCD	Operational Concept Description
OFA	Operational Focus Areas
OI Step	Operation Improvement Step
OIM	Overall Impact Message
OSB	Operational Steering Board
OSED	Operational Service and Environment Definition
P&S	Process and Services
PDI	Performance Driver Indicator
P-RNAV	Precision RNAV
PRU	Performance Review Unit
R/T	Radio Telephony
RBT/RMT	Reference Business Trajectory / Reference Mission trajectory
REQ	Requirement
RLDT	Reference Landing Time
RMAN	Runway Management Tool
RNAV	Area Navigation
ROT	Runway Occupancy Time
RPL	Repetitive Flight Plan
RTOT	Reference Take-Off Time
RVR	Runway Visual Range
RWSL	Runway Status Lights
RWY	Runway
SARPS	Standards and Recommended Practices
SBT/SMT	Shared Business Trajectory / Shared Mission Trajectory
SEAC	SESAR Airport Consortium
SESAR	Single European Sky ATM Research Programme
SESAR Programme	The programme which defines the Research and Development activities and Projects for the SJU
SIBT	Scheduled In-Block Time
SID	Standard Instrument Departure
SIGMET	SIGnificant METeorological information (warning)
SJU	SESAR Joint Undertaking (Agency of the European Commission)
SJU Work Programme	The programme which addresses all activities of the SESAR Joint Undertaking Agency
SL	Service Level
SLDT	Scheduled Landing Time
SM	Solution Message
SMAN	Surface Manager
SOBT	Scheduled Off Block Time
SPR	Safety and Performance Requirements
SSC	Single Sky Committee
SSR	Secondary Surveillance Radar
STAR	Standard Terminal Arrival Route
STOT	Scheduled / Sequenced Take-Off Time
STTT	Scheduled Turn-round Time
SWIM	System Wide Information Management
SWP	Sub Work Package
TAD	Technical Architecture Description
TAF	Terminal Area Forecast
TDFT	Target Departure Fix Time
TH	Threshold
THOT	Target Hold Over Time

Term	Definition
TIAT	Target Initial Approach Fix Time
TIBT	Target In Block Time
TLDT	Target Landing Time
TMA	Terminal Manoeuvring Area (also Terminal Control Area)
TMF	Trajectory Manipulation Function
TOBT	Target Off-Block Time
TS	Technical Specification
TSAT	Target Start-up Approval Time
TTA	Target Time of Arrival
TTOT	Target Take-off Time
TWR	Tower
TWY	TaxiWaY
TXIT	Target Taxi-In time
UC	Use Case
UDPP	User Driven Prioritisation Process
VMC	Visual Meteorological conditions
VTT	Variable Taxi Time
WISADS	Weather Information System for Airport Decision Support
WP	Work Package
WTC	Wake Turbulence Category
Wx	Weather

Table 4. List of Acronyms

2 Summary of Operational Concept from DOD

The airport operations management view of the ATM concept is from perspective of "en-route to en-route" as this includes the airport processes and the aircraft turn-round process. In this view:

- The airport is considered as another, rather complex, "sector" (ground level) through which the aircraft passes
- Complementary processes (besides inbound and outbound flights), such as the aircraft turn-round, work together in a fashion similar to a modern production facility

Airport organisation is aimed at supporting co-operation between all stakeholders at appropiate decision-making stages whilst ensuring a seamless process over the entire planning spectrum, starting many years ahead down to the real time, and even including post-operations analysis.

Airport operators own and/or operate their nodes of the Air Transport Network:

- In partnership with all stakeholders, the airport aims at achieving a common business approach, by linking flight segments (inbound and outbound flight), surface operation, and the aircraft turn-round processes. This requires:
    - Collaborative decision making based on an equal acceptance of all stakeholders
    - Common situational awareness about traffic evolution during execution phase
    - Common situational awareness about the status of the turn-round processes
    - Common Airport Performance Framework to all stakeholders sharing a common target, aiming at on-schedule performance, meeting the business needs of the airspace users
- An airport resources allocation and capacity plan is established in a collaborative manner between airport operator, ATC and users (aircraft operators) from the begining of each season and iteratively maintained up to date until execution phase. Short notice changes and/or refinements are handled using a mixture of collaborative processes and tactical interventions
- Optimum management of surface traffic flows will not only increase efficiency and predictability during the ground movement phase but will also have a positive impact on the environment
- Co-operative mechanisms will improve visibility for ATM actors regarding the progress of the turn-round process and result in better estimated times of subsequent events such as off-block and take-off

2.1 Mapping tables

2.1.1 List of relevant OIs within the OFA.

In the following table, the Operational Improvements, within the OFA 05.01.01 (Airport Operations Management) are listed. The data is extracted from the SESAR Data Navigator Models ATM Master Plan, Step 1 Data from DS 16 (OI Step and Enabler) [15].

OI Step Id. (coming from the OFA Integrated Roadmap)	OI Step Title	Story Board Step	Master or Contributing (M or C)[5]	Relevant ENs

[5] Each OIs should in general be allocated to a single OSED, but the possibility of having multiple OSEDs for the same OIs may occur. In this case, the OSED is either the 'Master' (M) or 'Contributing' (C) for the OIs.

OI Step Id. (coming from the OFA Integrated Roadmap)	OI Step Title	Story Board Step	Master or Contributing (M or C)[5]	Relevant ENs
Predecessor OIs				
AO-0501	Improved Operations in Adverse Conditions through Collaborative Decision Making	Pre-Step1	N/A	PRO-204a PRO-204b PRO-204c PRO-204d
AO-0601	Improved Turnaround Processes through Collaborative Decision Making	Pre-Step1	N/A	AIRPORT-31 CDM-01 PRO-213a PRO-213b
AO-0602	Collaborative Pre-Departure Sequencing	Pre-Step1	N/A	CDM-01 PRO-214a PRO-214b
AO-0603	Improved De-Icing Operation through Collaborative Decision Making	Pre-Step1	N/A	AIRPORT-31 CDM-01 PRO-073 PRO-075
AUO-0201	Enhanced Flight Plan Filing Facilitation	Pre-Step1	N/A	NIMS-14a NIMS-18 NIMS-31 NIMS-32 PRO-017 PRO-215a PRO-215b PRO-215c PRO-215d PRO-217
DCB-0301	Improved Consistency between Airport Slots and Flight Plans	Pre-Step1	N/A	NIMS-33 PRO-242
DCB-0302	Collaborative Management of Flight Updates	Pre-Step1	N/A	PRO-001 PRO-003
Applicable OIs				
AO-0801-A[6]	Collaborative Airport Planning Interface	Step 1	M	AIRPORT-02 AIRPORT-03 AIRPORT-31 AIRPORT-38 AOC-ATM-13 HUM-007 HUM-008 HUM-009 HUM-011 HUM-012 HUM-013 PRO-028 SWIM-APS-03a SWIM-APS-04a SWIM-INFR-05a SWIM-NET-01a METEO 03 METEO 04b SWIM-SUPT-01a SWIM-SUPT-03a SWIM-SUPT-05a

[6] a change request to remove AIRPORT-41 from AO-0801-A ENs is submitted to align the SESAR Data Navigator

OI Step Id. (coming from the OFA Integrated Roadmap)	OI Step Title	Story Board Step	Master or Contributing (M or C)[5]	Relevant ENs
AO-0802-A[7]	A-CDM process enhanced through integration of landside (passenger only) process outputs	Step 1	M	AIRPORT-03 AIRPORT-31 AIRPORT-35a AIRPORT-38 HUM-007 HUM-014 HUM-015
AO-0803	Integration of airports into ATM through Monitoring of Airport Transit View (Extension of Performance Monitoring building on A-CDM)	Step 1	M	AIRPORT-03 AIRPORT-04 AIRPORT-31 AIRPORT-38 AIRPORT-40 CTE-C06b HUM-007 HUM-016 METEO 03 METEO 04b PRO-073a SWIM-APS-03a SWIM-APS-04a SWIM-INFR-05a SWIM-NET-01a SWIM-SUPT-01a SWIM-SUPT-03a SWIM-SUPT-05a
AO-0804	Collaborative Airport Performance Management	Step 1	M	AIRPORT-03 AIRPORT-05 AIRPORT-31 AIRPORT-35a AIRPORT-36 AIRPORT-38 AIRPORT-41 HUM-007 HUM-008 HUM-009 HUM-010 HUM-011 HUM-012 HUM-013 METEO 03 METEO 04b PRO-028
DCB-0304	Airport CDM extended to Interconnected Regional Airports	Step 1	M	AERODROME-ATC-20 NIMS-03 NIMS-06

[7] a change request to remove AIRPORT-41 from AO-0802-A ENs is submitted to align the SESAR Data Navigator

OI Step Id. (coming from the OFA Integrated Roadmap)	OI Step Title	Story Board Step	Master or Contributing (M or C)[5]	Relevant ENs
DCB-0309	Airport Demand-Capacity Balancing (A-DCB)	Step 1	M	AERODROME-ATC-49 AERODROME-ATC-64 AERODROME-ATC-65 AIRPORT-42a PRO-028 REG 0510 SWIM-APS-03a SWIM-APS-04a SWIM-APS-06a SWIM-APS-07a SWIM-INFR-05a SWIM-NET-01a SWIM-SUPT-01a SWIM-SUPT-03a SWIM-SUPT-05a
DCB-0310	Improved Efficiency in the management of Airport and ATFCM Planning	Step 1	M	AIRPORT-02 AIRPORT-38 NIMS-41 REG 0510
MET-0101	Enhanced MET observations, nowcasts and forecasts provided by ATM-MET systems for Step 1	Step 1	C	METEO-03 METEO-04b METEO-05b METEO-06b METEO-08b

Table 5. List of relevant OIs within the OFA

2.1.2 List of relevant DOD Scenarios and Use Cases.

Airport operational scenarios per ATM flight phase were identified in the domain of airport operations within the P.6.2. DOD Step 1 document [8]. These scenarios describe the processes occurring at the airport level as well as the interactions among the relevant airport actors.

The P6.2 DOD Step 1 document [8] identifies four scenarios (Long Term Planning, Medium to Short Term Planning, Execution Phase,,Post Operations Analysis phase) and 99 Use Cases associated. These Scenarios & Use Cases should be addressed through the eleven OFA's to which WP6 contributes.

In the case of the OFA 05.01.01, relevant Use Cases in each Scenario has been identified and developed in this document (see section 5), resulting in list of 45 Use Cases as follows:

- 9 UCs for long term-planning phase (see Appendix D part 2)
- 11 UCs for medium term / short term phases (see Appendix D part 2
- 21 UCs for execution phase (see Appendix D part 2)
- 4 UCs for post-operations phase (see Appendix D part 2)

2.1.3 List of relevant DOD Environments.

The objective of this section is to summarize the detailed operational environment which forms the airport operational context.

Being aware of the different airport environments, it will help to understand that validation and/or verification results of operational improvements at a specific airport cannot simply be extended to other airports. The differences are numerous. For the purpose of comparing and projecting validation results (generalisation), a set of objective criteria have been defined that will allow the 'real' airport(s) used in the validation exercise to be categorised objectively. This will support a realistic generalisation of the results from one particular airport to the overall population of airports within the ECAC states.

Operational Environment	Class of environment	Reference to DOD section where it is described
Generic Airport Characteristic	Network Function	3.1.1.1
	Layout & Basic Operational procedures	3.1.1.2
	Capacity Utilisation	3.1.1.3
	External Influencing Factors	3.1.1.4
Traffic Characteristics	-	3.1.3
Infrastructure Characteristics	Airport (ground) equipment	3.1.4.1
	Aircraft (airborne) equipment	3.1.4.2
Weather Characteristics	Nominal	3.1.5
	Adverse	
	Disruptive	

Table 6. List of relevant DOD Environments

2.1.4 List of relevant DOD Processes and Services.

Following methodology developed by B4.1 and described in "European ATM Architecture (EATMA) Guidance Material", the following high-level airport operational processes have been identifed by P6.2 project:

- Manage Airport Operations
- Manage Runway
- Manage Turn-round
- Manage Movement on airport surface
- Manage Safety at the airport

Amongst them, "Manage Airport Operations", "Manage Turn-Round" and "Manage Movement on the airport surface" (de-icing activities) high level processes are relevant to the OFA 05.01.01. These processes are provided with further details in section 2.3.

Operational Services are not part of 6.2 current DOD. Their development is still under discussion and will probably be led by WP8.

2.1.5 List of relevant DOD Requirements.

The current list of relevant DOD requirements (P6.2 DOD Step 1 document [8] edition March 2014) against OFA 05.01.01 is provided in table below.

DOD Requirement Identification	DOD requirement title	Reference to DOD section
REQ-06.02-DOD-6200.0081	The Airport stakeholders shall make the relevant information through time available to the AOP.	6.2

DOD Requirement Identification	DOD requirement title	Reference to DOD section
REQ-06.02-DOD-6200.0082	Airport Operators shall make the outputs of landside (passenger and baggage flow) process that can affect ATM performances available through A-CDM in both planning and execution phase.	6.2
REQ-06.02-DOD-6200.0083	Airport Operators shall be able to monitor the aircraft movements at an airport in both the planning and execution timeframe.	6.2
REQ-06.02-DOD-6200.0084	Airport stakeholders shall be provided with Decision Support tools capable to propose tactical changes to operational inputs, rules and procedures that facilitate the collaborative decision making during both planning and execution timeframes.	6.2
REQ-06.02-DOD-6200.0085	The Airport Operator shall be provided with available airport capacity and scheduled/forecast demand given the prevailing and/or forecast weather and other operational conditions.	6.2
REQ-06.02-DOD-6200.0086	Airport stakeholders shall continuously refine airport planning to improve local airport CDM process and consequently overall network planning.	6.2

Table 7. List of relevant DOD requirements attributed to OFA 05.01.01.

2.1.6 List of validation maturity levels.

The two tables below provides the maturity level of the different concept elements:

- the first one provides the global maturity level from the perspective of one Operational Improvement
- the second one provides the maturity level of each Operational Improvement broken down per Validation Exercise after completion.

OI Step	OI Title	Maturity level
AO-0801-A	Collaborative Airport Planning Interface	fully covered (February 2016 and June 2016). Comprises maintenance of the evolving content of the Airport Operations Plan (AOP) including an initial identification of elements that are common between the AOP and NOP; and means to allow the exchange of information between the AOP and NOP
AO-0802-A	A-CDM process enhanced through integration of landside (passenger only) process outputs	fully covered (July 2015). Comprises enhancement of airport airside processes with the inclusion of landside (passenger flow only) process outputs that can affect ATM performance e.g. through delayed departures.
AO-0803	Integration of airports into ATM through Monitoring of Airport Transit View (Extension of Performance Monitoring building on A-CDM)	fully covered (February 2016). Comprises improvement of ATM/airport operations through the integration and monitoring of Airport Transit Views (aircraft flows). An Airport Transit View describes the visit of an air frame to an airport. This includes the connections with inbound-outbound airborne segments (which are parts of SBT/RBT) as well as the main CDM milestones (e.g. TLDT, TIBT, TOBT/TSAT and TTOT).
AO-0804	Collaborative Airport Performance Management	partially covered (February 2016). Comprises development of the Airport Operations Performance Management concept. The concept identifies the functional and technical requirements required to manage the airport's processes. Specifically it requires an impact assessment of proposed tactical changes to operational inputs and rules by the decision support tools and procedures that facilitate the collaborative decision making involving all airport stakeholders.
DCB-0304	Airport CDM applied to Interconnected Regional Airports	fully covered (2011). Through application of Airport CDM to interconnected regional airports, those airports and the Network Manager exchange departure information to help improve traffic flow through the network. The concept aims to improve integration of small airports through improved availability of aircraft

		pre-departure information to the ATM network, through the provision of a data entry panel that is both easy to use and has a minimal impact upon the operator's workload in the tower, while providing accurate electronic pre-departure information to the network. This OI Step resulted in a SESAR Solution in the Release 1 timeframe (2012) entitled 'Low cost and simple departure data entry panel'.
DCB-0309	Airport Demand-Capacity Balancing (A-DCB)	partially covered (January 2016). This OI Step proactively assesses the balance between available airport capacity and scheduled/forecast demand given the prevailing and/or forecast weather and other operational conditions and proactively makes suggestions for runway configuration and capacity distribution according to priorities of performance management.
DCB-0310	Improved Efficiency in the management of Airport and ATFCM Planning	fully covered (June 2013 and June 2016). Airport planning is continuously refined with the application of local airport CDM processes. The overall network planning proposes CTOT/TTA for all regulated flights. For those flights where the allocated constraints will have a negative impact (e.g. disturbing airport/airline operations), the Network shall take into account this information in order to possibly re-allocate CTOT/TTA. This results in improved efficiency in the management of airport and ATFCM planning.

Table 8. List of validation maturity levels per OI.

AO-0804 and DCB-0309 OI Steps did not reach full maturity in SESAR 1 and will be carried forward to SESAR 2020.

OI Step	VP-010	VP-513	VP-549	VP-609	VP-669	VP-749	VP-757	V3?
AO-0801-A	V2		V3	V2	V2[8]	V3	V2	Yes
AO-0802-A			V3[9]					Yes
AO-0803		V2	V3	V2	V2[10]		V2	Yes
AO-0804	V2				V2[11]		V2	Partially
DCB-0309	V2[12]				V3			Partially
DCB-0310				V2				Yes

Table 9. List of validation maturity levels per OI per Validation Exercise.

2.2 Operational Concept Description

An operational concept portrays an ideal state in the future, to be reached progressively through a number of discrete change steps from the current situation. Descriptions of intermediate stages were done through scenarios, combining elements of the current global situations and target concepts.

The SESAR ATM Target Concept (3rd deliverable of the definition phase) follows a service-oriented approach based on a performance partnership among stakeholders. The notion of a multi-stakeholder performance partnership represents a paradigm shift for each stakeholder from the fragmented decision making process which exists today.

Collaborative decision making means achieving an acceptable solution that takes into account the needs of involved stakeholders. Collaborative decision making will apply to all layers of decisions, from longer-term planning activities through to real-time operations. Trade-offs may be required because collaborative decision making is primarily invoked to resolve competing demands for a resource and to organize a safe sharing of that resource among airspace users.

The stakeholders agree, to strengthen the air transport value chain, that the airspace users' requirements need to be better accommodated. For this to happen, each single flight needs to be executed as close as possible to the intention of its owner. This is the main driving principle for the ATM Target Concept, which is centered on the characteristics of the Business Trajectory, representing an airspace user's intention with respect to a given flight. The main aspects of the ATM Concept of Operations for 2020 represent a major change from an airspace-based environment to a trajectory based environment.

The concept is based on:

- Trajectory management, which introduces a new approach to airspace design and management
- Collaborative planning, to be continuously reflected in the Network Operations Plan (NOP)
- Integrated airport operations, contributing to capacity gains
- New separation modes, to allow for increased capacity

[8] AOP-NOP integration is to be considered
[9] connecting and reduced mobility pax were not considered
[10] The entire APOC process is to be considered
[11] The entire APOC process is to be considered
[12] Runway DCB Management validated with RMAN; end V3 will be attained with the inclusion of Taxiway DCB Management, the use of calculated runway capacity values based on operational parameters, the inclusion of real MET data and the integration of the DCB concept into the APOC

- System-Wide Information Management (SWIM), integrating all ATM business-related data
- Humans central as managers and decision-makers in the future European ATM system

"Time Based Operations" is the building block for the implementation of the SESAR 2020 concept and is focused on efficiency, predictability and the environment. It follows on from SESAR Definition Phase ATM service levels 0/1. "Time Based Operations" encompasses SESAR Definition Phase Service Level 2. The goal is a synchronized and predictable European ATM system, where partners and stakeholders are aware of the business and operational situations and collaborate to optimize the Airport Operations.

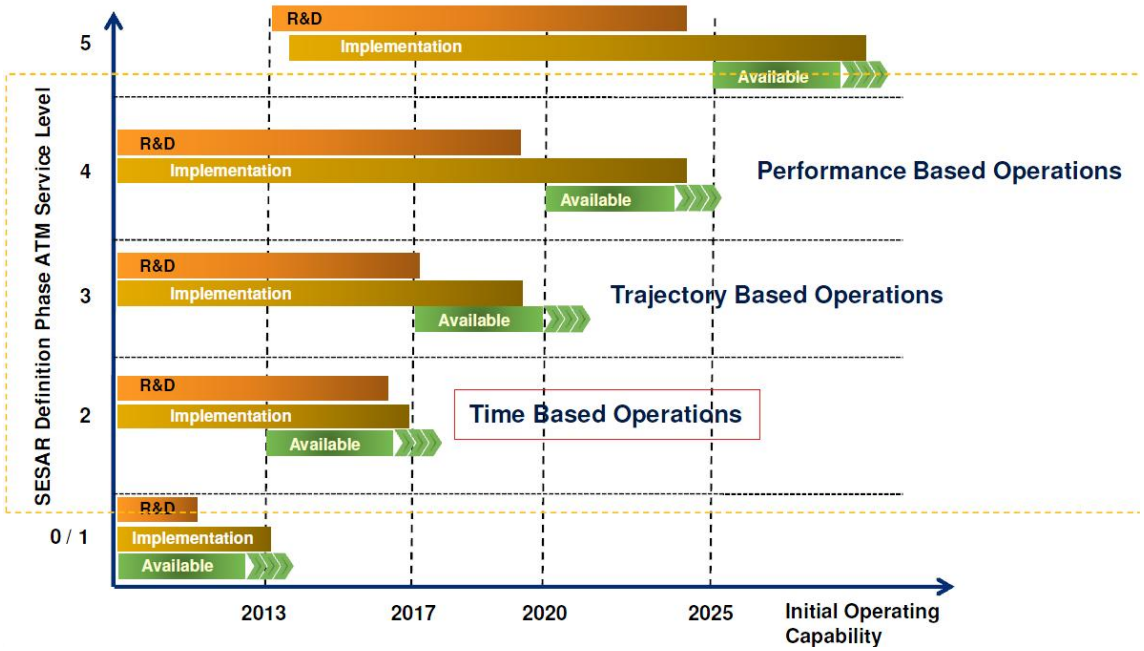


Figure 2. ATM Operational Steps

Airport operations in Step 1 are driven by enhanced stakeholders' participation in a rolling collaborative process, by continuously sharing latest demand and capacity intentions, defining targeted measures in the airport operations plan, realizing the plan taking into account operational updates, evaluating operations against performance targets and updating the plan. Fundamental to Step 1 improvements is the integration of airport operations in the Network. The SESAR Airport Concept Step 1 foresees the following key elements:

- Increased surface and runway safety
- Optimum surface management and arrival and departure sequence planning
- Accurate arrival and departure times and separation
- Optimum use of existing airport infrastructure and available capacity
- Reducing noise pollution and gas and particulate emission through operational improvements
- Better relations with neighbors (communities and local authorities)
- Additions and changes to airport infrastructure
- Optimum use of on-board devices / systems
- Improved efficiency by shared information and collaborative decision making leading to improved collaborative work between ANSP, Airspace User and Airport on operational and environmental issues
- Improved weather forecasts

While the above are essentially local airport issues, they will be developed and implemented so as to support the system wide goals and benefits.

SESAR has defined several relevant Key Performance Areas (KPAs) to describe the performance objectives of an airport community (i.e. the common performance goals that all airport stakeholders wish to achieve together). Five KPAs have been selected as appropriate for the Airport Performance Framework required to manage airport operations and the Airport Operations Plan:

- Capacity
- Efficiency
- Environmental Sustainability
- Flexibility
- Predictability

The notion of Airport Performance Framework for airport planning has been developed for the management of airport operations and especially the performance optimization of day to day operations where Key Performance Indicators (KPIs) measure performance in KPAs.

The SESAR performance targets related to Safety are ambitious. In particular it shall be ensured that the numbers of ATM incidents or risks bearing incidents do not increase and, where possible, decrease. Guidance for the determination of Safety performance requirements and the validation of operational improvements on these Safety performance requirements will be provided by SWP16.1.

Guidance for the determination of Security performance requirements and the validation of operational improvements on these Security performance requirements will be provided by SWP16.2. Generic Requirements could be provisionally copied from B4.1 Security Target.[13]

Guidance for the determination of Cost Effectiveness and Environmental Sustainability performance requirements and associated validation of operational improvements will be provided by SWP16.3.

Information sharing between Airport Operations and Network Operations will assure the best overall system outcome while paying due attention to the needs of the airport actors, the individual aircraft operators as also the Network. The information to be provided to agents in the ATM system information and to be used for operational purposes will be contained in the Airport Operations Plan (AOP) a single, common and collaboratively agreed rolling plan that will form the single source of airport operations information to all airport stakeholders whose purpose is to provide common situational awareness and to form the basis upon which stakeholder decisions relating to process optimization can be made. Through its 'rolling' nature, the AOP will ensure that mitigation actions taken by each stakeholder will be based on accurate information with the result of their actions being reflected directly back into the AOP. As well as timely and accurate information, the AOP is supported by a robust performance monitoring capability which allows the airport processes to be efficiently managed in real-time.

2.3 Processes and Services (P&S)

This section presents the Airport Processes and Services (P&S) at high level and refers to section 5 of 6.2 DOD step 1 document [8].

2.3.1 Processes

Amongst high-level airport operational processes that have been identifed by P6.2 project, "Manage Airport Operations", "Manage Turn Round" and "Manager Movement on th airport surface" (de-icing activities) are of particular interest for OFA 05.01.01.

[13] Included in the document B4.1 Performance Framework (Edition 1) document [6]

The three following sub-sections present the relevant high-level airport operational processes for OFA 05.01.01. For each process, a table with the following data includes:

- Process: name of the high level airport operational process
- Node: node which is responsible for the activities in the process
- Activity: sub-process called to realize a part of the process
- Description: description of the activity
- OI step: OI step addressed by the activity or associated (only Step 1)
- Associated Use Cases: Use Cases associated to the current activity

2.3.1.1 Airport planning process

Process	Node	Activity	Description	OI step	Associated Use Cases
Plan over Long Term horizon	AOS	Establish the Airport Performance Targets	Establish the operational and performance framework, determine the performance targets and associated levels and publish them.		UC 6 01
		Forecast Airport Demand	Forecast the future traffic demand.		UC 6 02
		Establish Airport Operational Configuration	Define all the possible Airport Configurations (runway uses, airport circulations…) that could be applied during the next season.		UC 6 03
		Forecast Airport Capacity			UC 6 04
		Determine Airport Demand & Capacity Imbalance	Considering the future airport demand, identify the enhancements that will be necessary to achieve new performance targets or achieve the same level of performance.	DCB-0309	UC 6 05
		Revise Airport Plan	Prepare revisions and enhancements to optimise the performance of the airport.		UC 6 06
		Revise ATM systems plan	Ensure improvement of the airport performance by facilitating the installation of new ATM systems.		UC 6 07
		Identify external issues associated with enhancement plans			UC 6 08
		Define and update response to emergency			UC 6 09
		Declare pre-seasonal capacity	Define the appropriate capacity for the next season (rules for taxiway usage, stand allocation…).		UC 6 10
		Publish seasonal schedule via NOP			UC 6 11
		Create AOP		AO-0801-A AO-0803 AO-0804	UC 6 12
		Revise AOP		AO-0801-A AO-0802-A AO-0803 AO-0804 DCB-0304 DCB-0310	UC 6 13
Manage Airport Operations Plan	AOS	Update AOP	Update AOP during the day of operation	AO-0801-A DCB-0310	UC 6 14 UC 6 32 UC 6 57 UC 6 65 UC 6 66 UC 6 67 UC 6 68
Monitor Airport Performance	AOS	Record Airport Data			Too many Use Cases to be listed here

Process	Node	Activity	Description	OI step	Associated Use Cases
Manage Post-Operations	AOS	Collect Airport Data			
		Analyse data			UC 6 91 UC 6 92 UC 6 93 UC 6 94 UC 6 95
		Create reports			
		Distribute reports			UC 6 96 UC 6 97
		Develop new predefined operational scenarios			UC 6 98

Table 10. Airport Planning process

2.3.1.2 Manage Turn Round

Some activities are of interest for OFA 05.01.01.

Process	Node	Activity	Description	OI step	Associated Use Cases
Prepare and execute in-block	ATS	Monitor aircraft trajectories	Monitor the progress of the aircraft through its ATV and update EIBT. Generate an alert if EOBT cannot be respected.		-
		Provide Departure Planning information	Sometime before EOBT, generate and publish departure planning information.		-
	AATS	Manage in-block	Determine a pre-departure sequence, update TTOT and propagate iSBT.	TS-0202 AUO-0203-A	UC 6 54 UC 6 57
	AOS	**Manage airport resources**	Organise resources (equipment and operators) to handle arriving aircraft.		-
	AUOO	Execute handling	Execute the different ground handling actions (de-board, unload, refuel, board…).		UC 6 55 UC 6 56 UC 6 66 UC 6 67
	FD	Manage airline resources	Organise resources (equipment and operators) to handle arriving aircraft.		-
		Execute in-block	Determine turn-round time and update TOBT.	AUO-0203-A	UC 6 54
Prepare and execute off-block	AATS	Manage pre-departure	Compute TSAT, issue TSAT and TTOT, publish the iRBT/iRMT, determine priorities and provide departure clearance.	TS-0202 AUO-0204-A AUO-0308	UC 6 58 UC 6 59 UC 6 61
		Provide start-up instruction	Check start-up and provide push-back clearance.	AUO-0308 AO-0208-A SDM-0201	UC 6 62
	FD	Plan departure	Receive take-off information, uploads the aircraft part of the iRBT/iRMT and requests departure clearance.	AUO-0308 AUO-0204-A IS-0402	UC 6 58
		Execute start-up	Start-up and request push-back clearance.	AUO-0308	UC 6 62
		Prioritize flights	Adjust iSBT planning for its own flights.	AUO-0103	UC 6 60

Table 11. Manage Turn Round process

2.3.1.3 Manage Movement on Airport Surface

De-icing activities of this process are under OFA 05.01.01 scope.

Process	Node	Activity	Description	OI step	Associated Use Cases
Prepare and execute taxi-out routing	AOS	Facilitate push-back execution		AUO-0308	UC 6 76
	FD	Prepare taxi-out route		AUO-0308 AUO-0603-A	UC 6 76 UC 6 77 UC 6 78
		Execute start-up and exit from the stand	Execute start-up. Execute push back. In some cases, aircraft may forward to exit from an open stand or use engine reverse power.	AUO-0308	UC 6 63 UC 6 64 UC 6 69 UC 6 76 UC 6 77 UC 6 78
		Execute taxi-out		AUO-0308 AUO-0603-A AUO-0403	UC 6 79
		Execute runway crossing		AUO-0603-A AUO-0403	UC 6 21 UC 6 79
	AUOO	**De-ice aircraft**			UC 6 80
	AATS	Plan and provide taxi-out route	Plan and provide a taxi-out route to the aircraft during the turn-round phase.	AO-0205-A AUO-0308 AO-0208-A SDM-0201	UC 6 76 UC 6 77 UC 6 78
		Provide instruction to exit from the stand	Provide instruction for push-back. In some cases, guide aircraft out of an open stand.	AUO-0308 AO-0208-A SDM-0201	UC 6 63 UC 6 64 UC 6 76 UC 6 77 UC 6 78
		Manage remote de-icing			UC 6 80
		Provide taxi-out routing guidance	Guide the aircraft until it reaches the holding point for take-off. The taxi route may be revised.	AO-0205 AUO-0308 AUO-0603-A AO-0208-A SDM-0201	UC 6 79
		Provide runway crossing		AO-0208-A SDM-0201	UC 6 21 UC 6 79
Plan and provide routing for a vehicle	AV	Execute runway crossing			UC 6 21 UC 6 79
		Execute vehicle route	Execute a route on the airport surface.	AO-0206	UC 6 21 UC 6 40
		Plan ground movement	Plan the movement of a ground vehicle (aircraft excluded).		UC 6 26
		Execute ground movement	Execute a planned route (aircraft towing manoeuvre for example).	AO-0206	UC 6 26
	AATS	Plan Vehicle route	Plan a route for the movement of a ground vehicle (aircraft excluded).	AO-0205	UC 6 40
		Provide vehicle routing guidance	Guide a ground vehicle (aircraft excluded) on the airport surface.	AO-0206 AO-0208-A AO-0215 SDM-0201	UC 6 21 UC 6 39 UC 6 40 UC 6 79
		Provide runway crossing clearance		AO-0208-A AO-0215 SDM-0201	UC 6 21 UC 6 79

Table 12. Manage Movement on Airport Surface

2.3.2 List of Application Services, Information Services and Systems

Operational Services are not described in P6.2 DOD Step 1 document [8]. Their development is still under discussion and will probably be led by WP8.

3 Detailed Operating Method

In the European airspace, approximately 30.000 daily operations are performed with only 5.000 aircraft; in other words, each aircraft on average performs around 6 flights per day.

In the current situation, in particular at airports where DEPLOYMENT BASELINE Airport CDM has not been fully implemented (yet), there is no real network wide connection between an arrival flight of an aircraft and its planned departure flight. The impact of deviations from the aircraft's initial planned trajectory cannot be transmitted through the Network to assess the impact on the remaining part of the aircraft's trajectory as also on the planned next trajectories (flight segments). There is no knock on effect assessment due to the lack of connection between the airborne part and the ground part (ATV – Airport Transit View) of the aircraft's consecutive trajectories.

Several reasons can be identified for explaining why the airborne part(s) and ground part of the aircraft trajectory are not linked, e.g.:

- Airports are complex transport transfer places where a lot of operations are planned to meet specific scheduled times. All stakeholders involved in airport ground operations are oriented to comply with two time targets, the aircraft scheduled arrival time and the aircraft scheduled departing time. Those Scheduled times are referring to arriving or departing from the stand (doors open / doors closed)
- All ground stakeholders involved in aircraft turnaround activities (airport operators, handling agents, fuelling, cleaning, catering, airspace users, etc.) have their own priorities that may be not aligned to each other

ANSP stakeholders including local ATC (TWR) and local airspace (TMA/ACC), expect a high degree of conformance between planned and actual operations to be able to handle planned traffic demand safely and efficiently. Therefore different stakeholders - simultaneously involved in the management of the same aircraft - use different, often inconsistent, planning information, resulting in a poor predictability in arrival times and departures times (around 20 minutes in departures according to PRU), and therefore a bigger cost to all stakeholders involved including the airspace users.

The airport view of the ATM concept is from the perspective of "en route to en route" as this includes all airport processes involved in the aircraft turn round process. In this view, the airport can be considered as another, rather complex, "sector" through which the aircraft passes, where complementary processes, such a as the aircraft turn round, work together in a fashion similar to a modern production facility.

There is a strong need to optimize airport stakeholders' resources to reduce cost and improve efficiency. It is essential that not only the runway and surface movement of the aircraft is included in this concept, but also the aircraft handling process on the parking stand, if reactionary delay is to be fully addressed.

Airport organisation is aimed at supporting co-operation between all stakeholders at appropriate decision-making stages whilst ensuring a seamless process over the entire planning spectrum, starting many years ahead down to the real time. Besides the high-level operational processes, there is also a long-term development process which focuses on future demand and capacity planning for airport expansion. This includes issues ranging from airport infrastructure and environmental aspects to landside capacity and regional planning. The attention of airports on future development is both on the potential aircraft movement rate and also passenger throughput.

Airport operators own and/or operate the nodes of the Air Transport Network. It is their responsibility to provide a safe airport infrastructure in balance with environmental limitations. In partnership with all stakeholders, the airport aims at achieving a common business approach, by linking flight segments, surface operations, and the aircraft turn around process. This requires collaborative decision making based upon:

- an equal acceptance of all stakeholders (level playing field)
- a common planning process and understanding of its inherent assumptions
- a common situational awareness of traffic evolution during execution

- a common situational awareness of the status of the turn-round process
- a common performance framework

This allows all stakeholders sharing a common target, aiming at on-schedule performance meeting the business needs of the airspace users.

3.1 Previous Operating Method

This section describes the operating methods in use before the SESAR Step 1 implementation, referring to airport operations planning and management and the link between the airport and the ATM Network. It is the baseline for Step 1 activities.

The actual operating method can be described against the four ATM phases, i.e. long term planning, medium / short term planning, execution and post-operations phase.

- Long term planning phase:

  As airport capacity is usually linked to improving and building new infrastructure (very costly and slow investment process), airport long term planning phase starts in the Airports Passengers and Aircraft Operations Forecasting Units. A first approach to the expected demand in the long term can be forecasted using different statistical models taking into account different variables such as forecasted economic growth, forecasted population, airports strategic plans, etc. An investment plan is then developed to cope with the expected demand.

- Medium/short term planning phase:

  Nowadays, the lack of capacity at some ~80 fully coordinated European airports is regulated by the European directive CEE nº95/93 18th of January of 1993 modified in CEE nº793/2004 30th of April of 2004. This directive introduced a new actor, the Slot Coordinator. The Slot Coordinator is an independent entity that receives airports capacity and attends airspace user's demands using some predefined rules.

  Within the European Union and according to this directive, airports are classified in:

  - Fully coordinated (demand > capacity)
  - Partially coordinated (demand ~ capacity)
  - No coordinated (demand < capacity)

  This classification is, in some cases, only based on airport terminal and runway capacity, not involving ATM capacity, just considering the maximum capacity of the airport's bottleneck. This is an initial and high level Demand Capacity Balancing - DCB process, taking place at creating the seasonal operating plan.

  A few points regarding this European directive can be highlighted in relation to the information shared between airports and the Network:

  - The airport slot allocation procedure does not currently address any specific obligation to check network consistency, although a Memorandum of Understanding (MoU) between EUROCONTROL and EUACA (EUropean Airport Coordinators Association) has been signed to share slot allocation information within the European Region
  - Consistency between flight plans and airport slots is done at airport level but no consistency check is performed at Network level
  - The obligation to follow slot allocation procedures only applies to fully coordinated airports. Nevertheless, apart from extraordinary situations, prior to its operation at an airport an aircraft operator will agree with the airport authorities the allocation of resources he needs to support his operations. Schedules are therefore well known in advance

- The slot allocation procedure is independently approached for block-to-block, airport-to-airport operations with the different Slot Coordinators
- The Slot Coordinator or the airport authority will ensure that the airport aircraft rotation requested by the aircraft operator is feasible; that is, its scheduled turn-around time is consistent with the aircraft and transport mode characteristics. This consistency check is not done for those carriers based at a specific airport
- General and Business Aviation operations at fully coordinated airports need to follow the same coordination procedures as commercial operations or the specific local rules as set by the local slot coordination authority

Although a limited number of airports have fully implemented Airport Collaborative Decision Making (Airport CDM or A-CDM) in 2013, the concept is considered as Deployment Baseline. These “CDM labelled” airports are called CDM airports.

Airport CDM improves the way the key airport stakeholders (i.e. airspace users, airport operator, ANSP, ground handlers and the Network Manager) work together at operational level. Collaboration between different partners in air transport has to some extent always existed. However, before Airport CDM, the collaboration was more of an ad-hoc and human-centred essence, especially in cases of disruption. Airport CDM is a culture that emphasises the importance of collaboration in planning and managing air traffic to, from & at airports. The objective of Airport CDM is to improve the overall efficiency of operations at an airport in normal and adverse conditions, with a particular focus on the aircraft turn around processes. This is achieved by sharing up-to-date relevant information and by taking into account the preferences, available resources and constraints of those who are involved at the airport and at network level. Limited collaborative decision making processes exist, mainly focusing on the management of adverse conditions. They are not harmonised from one airport to the other.

The A-CDM processes start in the short term planning phase, when the ATC flight plan is activated. The first milestone consists in checking the consistency between the ATC flight plan, the airport slot and the airport flight data. The flight can then be confirmed to the Network Manager and it can be further processed by the airport.

- Execution phase:

  The following bullet points list the key characteristics of the actual aircraft operations from an airport point of view:

  - The Flight Update Messages (FUM) sent by the Network Manager to CDM airports and the milestones associated to inbound flights allow the airport stakeholders to receive more accurate information on the incoming traffic and improve the planning of the turnaround and the outbound phases
  - Aircraft are delivered to the airport using a “first in, first out” scheme
  - The monitoring of the turnaround processes is limited to a few A-CDM milestones, focusing mainly on the aircraft’s departure (off block). The aircraft operator or its ground handler issue and update when necessary a Target Off Block Time (TOBT), the time at which they estimate the aircraft will be ready to leave the block
  - The traditional ICAO flight planning rules apply. Therefore, the aircraft operators have to ensure that the TOBT and EOBT are consistent
  - Based on this TOBT, a pre-departure sequence is built and maintained under the responsibility of the local ATC. A Target Start up Approval Time (TSAT) is allocated to each departing flight representing the time when an aircraft can expect start up / push back approval
  - For the determination of TSAT the local ATC takes the TOBT, CTOT as also the traffic situation into account
  - Thanks to the Departure Planning Information – DPI Messages, sent by the local ATC to the network, the Network Manager is better informed about the outbound traffic

than when using only flight plan data. For each flight, the DPI message contains an estimated or target take off time (ETOT/TTOT) based on the best information available at that time (i.e. EOBT, TOBT, TSAT, depending on the time period and the flight status)

- Variable taxi times instead of fixed taxi times are used at CDM airports to improve the accuracy of the estimated timestamps that are based calculation using taxi-in and taxi-out times. However, in the vast majority of cases the calculation is limited to a static matrix listing an average time for each parking stand / runway threshold combination. Parameters like aircraft performance, weather conditions or taxi route are not taken into account
- De-icing and take-off sequences are built and managed manually, with very little anticipation and a limited optimisation
- A very limited number of airport Key Performance Indicators (KPIs) are harmonised at European level (Performance Review Commission), preventing a complete and efficient monitoring of the performance of the airports to take place

- Post Operations phase:

  No harmonised post-operations procedures are implemented at airport level.

3.2 New SESAR Operating Method

The SESAR ATM Target Concept document [11] as presented in the 3rd deliverable of the definition phase (D3) follows a service-oriented approach based on a performance partnership among stakeholders. The stakeholders agree that, to strengthen the air transport value chain, the airspace users' requirements need to be better accommodated and that airports, as nodes of the Network, have to be considered as an integral part of the ATM Network.

For this to happen, each single flight needs to be executed as close as possible to the intention of its owner. This is the main driving principle for the ATM Target Concept, which is centred on the characteristics of the business trajectory, representing an airspace user's intention with respect to a given flight.

Regarding initial trajectory based operation in Step 1, the trajectory does not yet contain all the necessary elements to enable the implementation of the Shared and Reference Business Trajectories (and/or Mission Trajectories) that will be in use during step 2. In particular,

- Ground routing is not yet an integrated part of the airborne trajectory although related ground (CDM) timestamps such as TSAT, based on individual Variable Taxi Times (VTT) will be used
- trajectory information computed on board is made available all along the flight, although only equipped ANSPs will be able to use it to complement the flight data available on ground, supported by ground trajectory prediction

However the airport will not be considered as a start or end, but as part of a continuum fully integrated into the ATM system: the airport will become a node in that system.

The new SESAR operating method for airport operations management is mainly based on:

- A collaborative planning transcribed in the Airport Operations Plan (AOP), to be continuously updated (rolling plan) and reflected in the Network Operations Plan (NOP) to integrate the airport into the ATM network. The AOP will form the single source of airport operations (planning and execution) information to which the progress of operations are compared with (monitoring). The AOP provides/integrates the airport information into the Network (NOP)
- Humans remain central managers and decision-makers in the future European ATM system where changes will be made in creating an environment in which the consequences of decisions taken are visible to all partners, systematic strategies are improved, agreed and applied by the relevant stakeholders to deal with predictable and unpredictable conditions. The APOC (Airport Operations Centre), a multi stakeholder organisational unit, whose main objective is to manage the AOP (Airport Operations Plan), is seen as the principle support to the airport decision-making process among all relevant airport stakeholders including the Network Management
- Airport CDM is extended to include regional airports. Relevant A-CDM airports at regional level and the Network Manager exchange information, especially in support of improving the estimated time of arrival for all flights bound to the region
- A System-Wide Information Management (SWIM), integrating all ATM business-related data. Nonetheless, SWIM will not yet be in place at regional level in Step 1, the former involves effective methods of exchanging appropriate information on the expected or actual arrival of predictable (e.g. forecast bad weather, industrial action, scheduled maintenance) or unpredictable adverse conditions, special procedures, and system support to facilitate the sequencing of operations where needed (e.g. de-icing)

3.2.1 Overall description

The SESAR Airport Operations Management concept can be described around the four following operational services:

- Steer Airport Performance service
- Monitor Airport Performance service

- Manage Airport Performance service
- Perform Post-Operations Analysis service

and around the AOP Concept as a supporting tool for data exchange between these 4 services.

The following figure provides a high level functional view of these services.

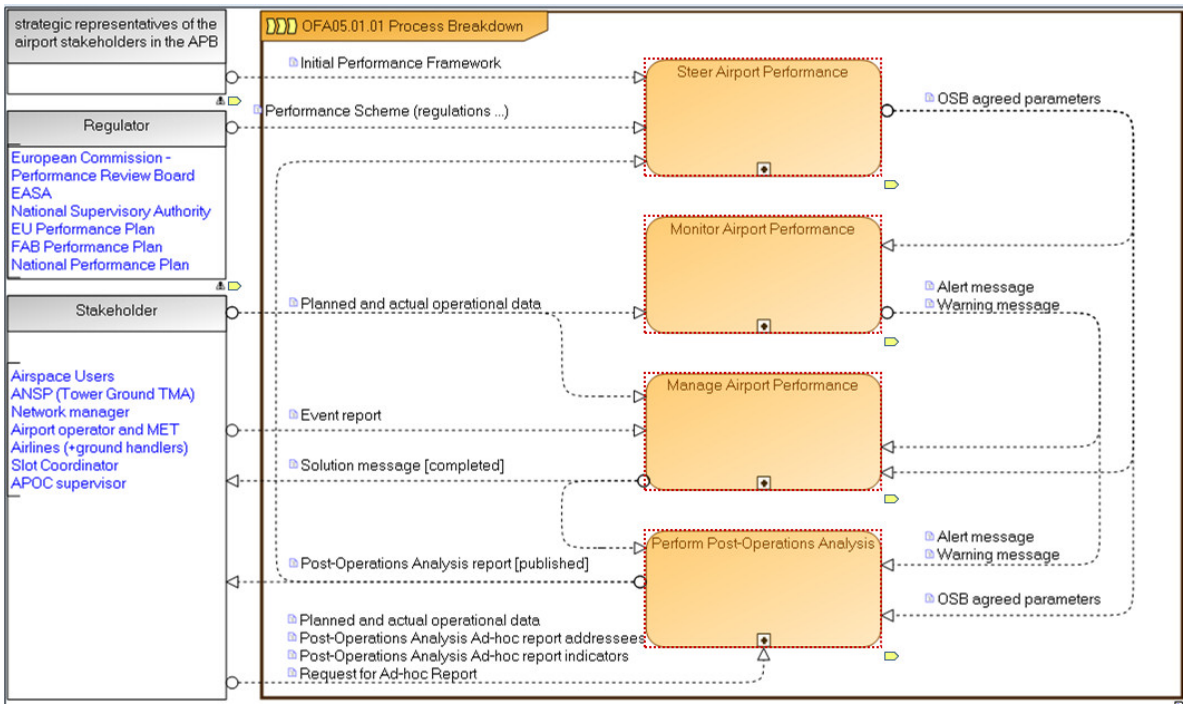


Figure 3. OFA 05.01.01 – high level process breakdown

The ***Steer Airport Performance*** service is the service that develops the performance standard (i.e., goals, targets, rules, thresholds, trade-off criteria and priorities) for airport operations and sets an overall strategic direction. Airport stakeholders develop a mutually agreed performance standard in a collaborative manner on the basis of the regional and/or national performance scheme(s) and post operations analysis reports. The ***Steer Airport Performance*** service is mainly acting in the long-term planning phase but can also be active in the medium-term planning phase and the post-operations phase.

The ***Monitor Airport Performance*** service is the service that maintains surveillance over airport operations, airport performance (against KPAs), airport environment (e.g. weather monitoring), supervising airport related information and any information that can impact the airport performance, it provides observations, forecasts, alerts and warnings against predefined thresholds. It is performed from the medium term planning phase until the execution phase.

The Monitor Airport Performance service provides the airport stakeholders with a common situational awareness of the airport operational processes. It also provides the airport performance in real time as well as a performance forecast for the next hours ahead. The ***Monitor Airport Performance*** service compares any new information created or updated in the AOP with the plan and raises warnings or alerts if a deviation is detected. These warnings or alerts are based on the performance standard set by the Steer Airport Performance service.

The ***Manage Airport Performance*** service instantiates the AOP at the beginning of the medium term planning phase. It uses the operational data provided by the airport stakeholders and the performance standard defined by the ***Steer Airport Performance*** service.

In the short term planning phase and the execution phase, the ***Manage Airport Performance*** service also assesses the severity of the deviations from the plan detected by the ***Monitor Airport Performance*** service and their impact on the airport processes and on the airport performance. The

assessment is not only for searching for reactive solutions but also for forecasting severe disruptions or adverse conditions and, hence, to implement a proactive management. It uses the warnings and alerts from the ***Monitor Airport Performance*** service and more generally the data contained in the AOP to make this impact assessment. It also uses Event Reports (coming from stakeholders) to perform the impact assessment.

Depending on the magnitude of the deviation and the severity of the impact on the airport processes and on the airport performance, the ***Manage Airport Performance*** service triggers the relevant collaborative decision making processes. In particular in adverse conditions[14], these processes take place in the APOC, where the representatives of the airport stakeholders can use simulation and decision support tools. The decisions are driven by the need to maintain an optimal performance level and to recover from a disruption as quickly and efficiently as possible. The outcome of these processes results in an update of the AOP, made by the relevant airport stakeholders.

To perform the ***Manage Airport Performance*** service meteorological data is necessary to monitor, forecast and categorize the evolution of meteorological phenomena. Due to the fact that the Meteorological Service Provider is not a stakeholder of this OFA 05.01.01 the process of providing weather data is in majority not part of this OSED (local ground based sensors however are treated in P15.4.9c). The process of data provision via the so called 4D Weather Cube into SWIM will be described in the output of Project 11.2 (OSED 11.2.1.D19). The interface between the ***Manage Airport Performance*** service and the Meteorological Service Provider are the tools IWIS, WISADS and DIMT which are provided with MET data via SWIM.

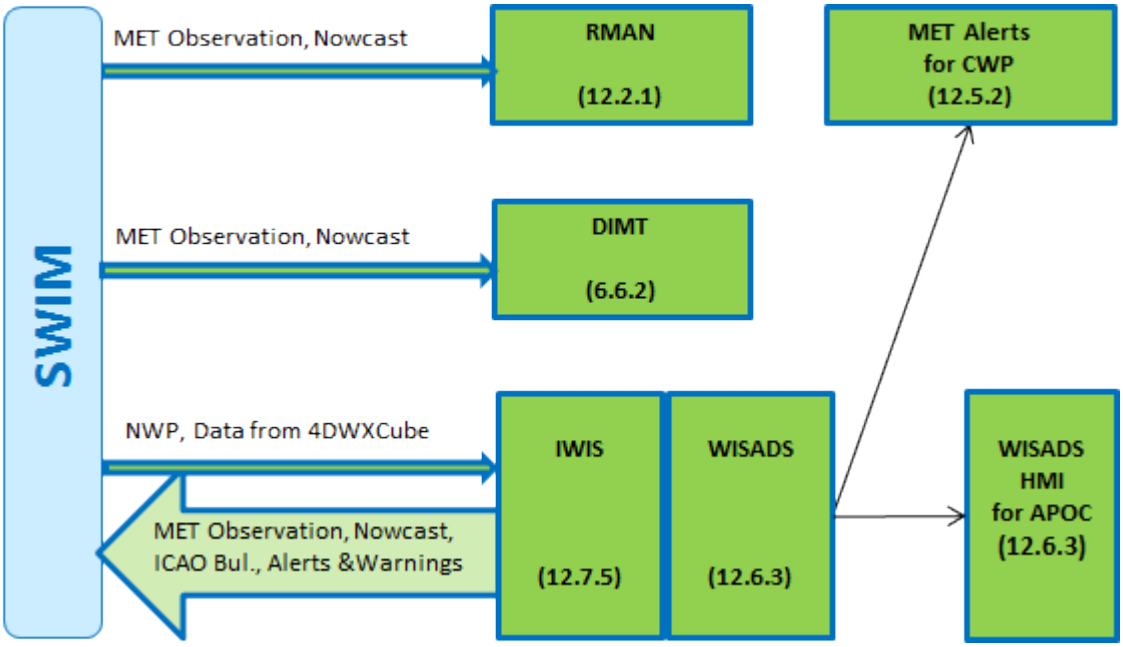


Figure 4. SWIM data

The ***Perform Post-Operations Analysis*** service records any planned and actual data used in the airport processes during the planning and execution phases.

This information is then used to produce post-operations analysis reports in the post-operations phase. These reports allow the airport stakeholders to:

- fully understand the airport performance against the performance plan and identify the root causes of any deviation
- assess the continued relevance of the performance plan
- justify the need for improving the way the airport operations are run

[14] The results drawn from P6.6.1 Validation Report [20] were taken into account in this document for addressing the management of adverse conditions.

- investigate of any disruption in the operations
- analyse actions and decisions made during the planning and execution phases

For the most complex and critical post-operations analysis reports, the airport stakeholders collaborate to produce an analysis and reach conclusions that will benefit the overall airport community.

Two kinds of reports may be provided by the ***Perform Post-Operations Analysis*** service: standard report and ad-hoc reports (see section 3.2.5 for more details). The recorded data in the AOP is used to perform the ***Perform Post-Operations Analysis.***

The ***AOP*** (Airport Operations Plan) is the principal source of information used by all involved stakeholders. It requires individual stakeholders to make changes within their own sphere of operations. The ***AOP*** is a rolling plan that interacts with a number of services, systems and stakeholders (gathering information from several systems - MET data, DCB, OSB agreed parameters, aircraft processes, passenger processes - and providing that information to the stakeholders).

At the beginning of each season, the plan is instantiated and continuously updated during the Medium Term Planning Phase, the Short Term Planning Phase and the Execution Phase. It will be used as data source for the ***Perform Post-Operations Analysis*** service.

3.2.2 Steer Airport Performance service

The ***Steer Airport Performance*** service is the service that develops the performance standard (i.e., goals, targets, rules, thresholds, trade-off criteria and priorities) for airport operations and sets an overall strategic direction. Airport stakeholders develop a mutually agreed performance standard in a collaborative manner. The ***Steer Airport Performance*** service is mainly performed in the long-term planning phase and the post-operations phase but also performs activities in the medium-term planning phase.

3.2.2.1 Basic Service Description

The ***Steer Airport Performance*** service is applicable at every airport that operates an AOP.

Figure 5 shows the context of the ***Steer Airport Performance*** service. It is used in the long-term planning phase to specify the (current) ***Airport Performance Framework***. Occasionally[15], the ***Steer Airport Performance*** service is applied in the medium-term planning phase. It includes the identification of local Key Performance Indicators (KPIs), Performance Driver Indicators (PDIs), thresholds used for signalling when KPIs/PDIs exceed limits that have been identified as not acceptable regarding the expected airport performance, and a diversity of rules[16], to define how to deal with local warnings and alerts. The (current) ***Airport Performance Framework*** is developed and ratified in the ***Steer Airport Performance*** service. Another aspect is the development of targets for each KPI and PDI included in the (current) ***Airport Performance Framework***. This constitutes the development of the ***Airport Performance Baseline*** during the long-term planning phase. In the short-term planning and execution phases, target values from the ***Airport Performance Baseline*** are used as guidance to performance management, setting the course of operations. The ***Manage Airport Performance*** service is not allowed to modify the ***Airport Performance Baseline***, except when predefined goals and criteria need to be temporally modified to cope with a local adverse condition (see section 3.2.4.2.2.2). In the execution phase, performance values are obtained and aggregated from the operational airport services following pre-defined measuring methods which are compared with thresholds. All values are registered and recorded for the ***Perform Post-Operations Analysis*** service. In the post-operations phase, the performance values (i.e. Actual Airport Performance Framework) are being analysed against the ***Airport Performance Baseline*** (target values and threshold values), which is part of the ***Current Airport Performance Framework***. The results of analysis will be reported to the ***Steer Airport Performance*** service. The airport stakeholders will take the analysis results into account when taking decisions for adapting the ***Airport Performance Framework*** and ***Airport Performance Baseline***.

The following table summarizes the concept elements introduced by the ***Steer Airport Performance*** service.

[15] Such as a natural or man-made or technological hazard with such an impact, that regular operation is not soon foreseen.

[16] This can be trade-off rules, priority rules, etc. In this section these rules are not further specified.

Operational concept	Description
Airport Performance Framework	It includes: - KPIs metrics - PDIs metrics - Thresholds type (minimum, maximum or both) and number of threshold levels (1, 2, 3, ...levels) - Rules (trade-off criteria, priorities, engine rules, runway/taxiway configurations and capacities etc...) - Alerts type. - Warning type. - (refer to section 3.2.3.3.4 for more details)
Airport Performance Baseline	It includes: - KPIs target values. - PDIs target values. - Thresholds values.
Version	**Description**
Initial	It is the starting perspective for the very first Airport Performance Board. Updates and changes to this initial version may be proposed by the APB.
Current	Includes the updates and changes proposed by the APB and valid for use during medium/short term planning phase as well as for the execution phase.
Actual (past)	Includes the actual performance values (for KPIs and PDIs) in comparison with the current Airport Performance Framework and current Airport Performance Baseline

Table 13 Operational concepts included in the Steer Airport Performance service

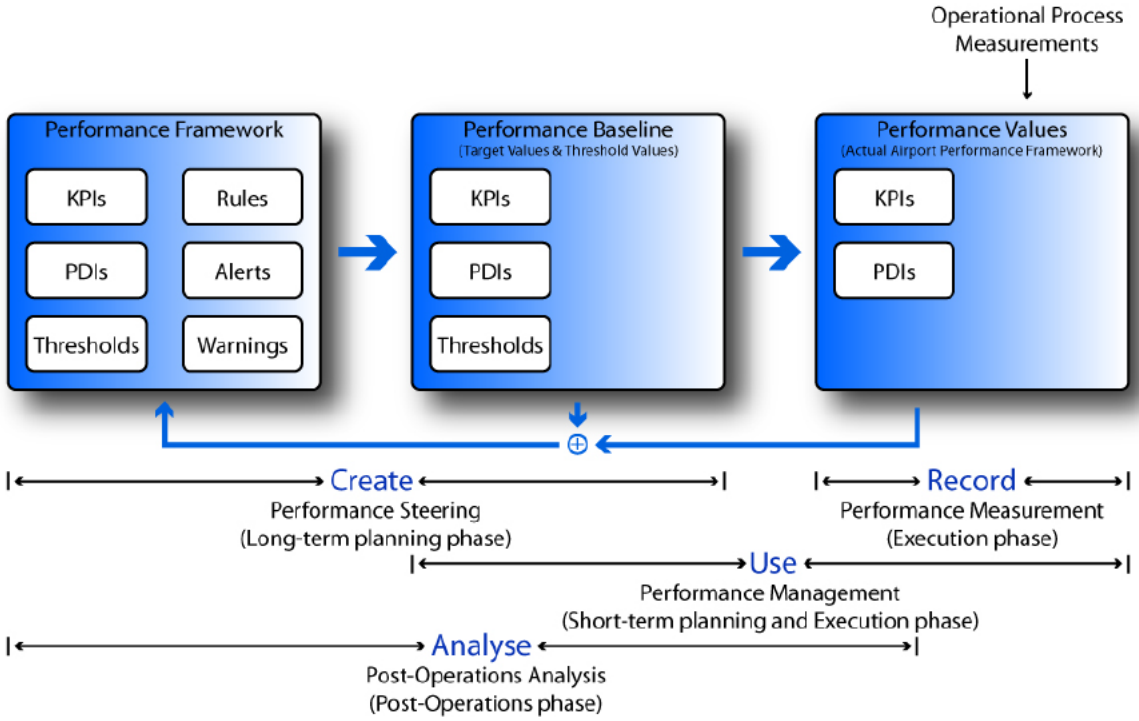


Figure 5. Context of the Steer Airport Performance service

During the Long-Term Planning Phase the ***Steer Airport Performance*** service is used to set-up a commonly agreed (i.e. amongst the airport stakeholders) ***Airport Performance Framework*** and

Airport Performance Baseline. This includes the elements as mentioned in Figure 5 including rules for accepting or rejecting an AOP proposed modification, prioritisation guidance for the Decision Making process of the ***Manage Airport Performance*** service as also agreed operational rules (possible runway/taxiway configurations, allocation rules and capacity values) and threshold values to be used for Airport-DCB. This service is used prior to the instantiation of the AOP elements in the beginning of the medium-term planning phase.[17]

The ***initial Airport Performance Framework*** and ***initial Airport Performance Baseline*** equals the one of the previous season/year. After discussion, change/update and agreement by the Airport Performance Board the ***Current Airport Performance Framework*** and ***Current Airport Performance Baseline*** will form the basis to which the planned and actual performance during the medium/short term planning and execution phases is mirrored.

During the medium-term planning and short-term planning phases, the ***Steer Airport Performance*** service will not be used to introduce new elements in the ***Current Airport Performance Framework***. However a possible refinement of the ***Current Airport Performance Framework*** (i.e. the performance standard) might be achieved by the "check applicability of predefined goals and criteria" activity of the ***Manage Airport Performance*** service (see section 3.2.4). As a consequence the ***Steer Airport Performance*** service will not introduce any new SESAR operating method in that phase.

During the Post Operations Analysis phase, reporting and analysis of the recorded data obtained from the airport stakeholders, ***AOP*** and the NOP will be generated by the ***Perform Post-Operations Analysis*** service. For that the ***actual Airport Performance values*** are used in comparison with the agreed ***current Airport Performance Framework*** and ***Current Airport Performance Baseline***. The reports are the result of various analyses. The knowledge derived from these reports is used in the long-term planning phase through the ***Steer Airport Performance*** service to establish/update the ***Current Airport Performance Framework*** and for the creation of the *initial* ***Airport Performance Framework*** and ***initial Airport Performance Baseline*** as starting point for the next season/year.

3.2.2.2 Detailed Service Description

The ***Steer Airport Performance*** service provides detailed steering parameters that are part of the ***Current Airport Performance Framework*** and ***Current Airport Performance Baseline*** (KPIs, PDIs and performance levels) that will be used by the other services.

This service is directed by the ***Airport Steering Administrator (ASA).*** This role is in charge of identifying stakeholder in the:

- ***Airport Performance Board (APB)***: seasonal scheduled board that produces high level steering parameters (relevant KPIs and target performance values)
- ***Operational Steering Board (OSB)***: regularly (monthly) scheduled board that produces detailed steering parameters (KPIs and PDIs for the KPAs defined in the APB and performance values that should trigger warnings and alerts).

The ***OSB agreed parameters*** represent ***Current Airport Performance Framework***. Post-Operations Analysis report is used to compare the **Actual Airport Performance Framework** with the initial ***OSB agreed parameters*** (i.e. Current Airport Performance Framework). If any deviation is detected it will be used as an input for the next OSB meeting.

Trade-offs rules, priority rules, AOP consistency rules are also part of the ***Current Airport Performance Framework*** and they are agreed and established within the ***Operational Steering Board (OSB)***.

[17] For a detailed description of KPIs and PDIs, please refer to P6.5.1_D05/D06.

The following figure shows the ***Steer Airport Performance*** service model.

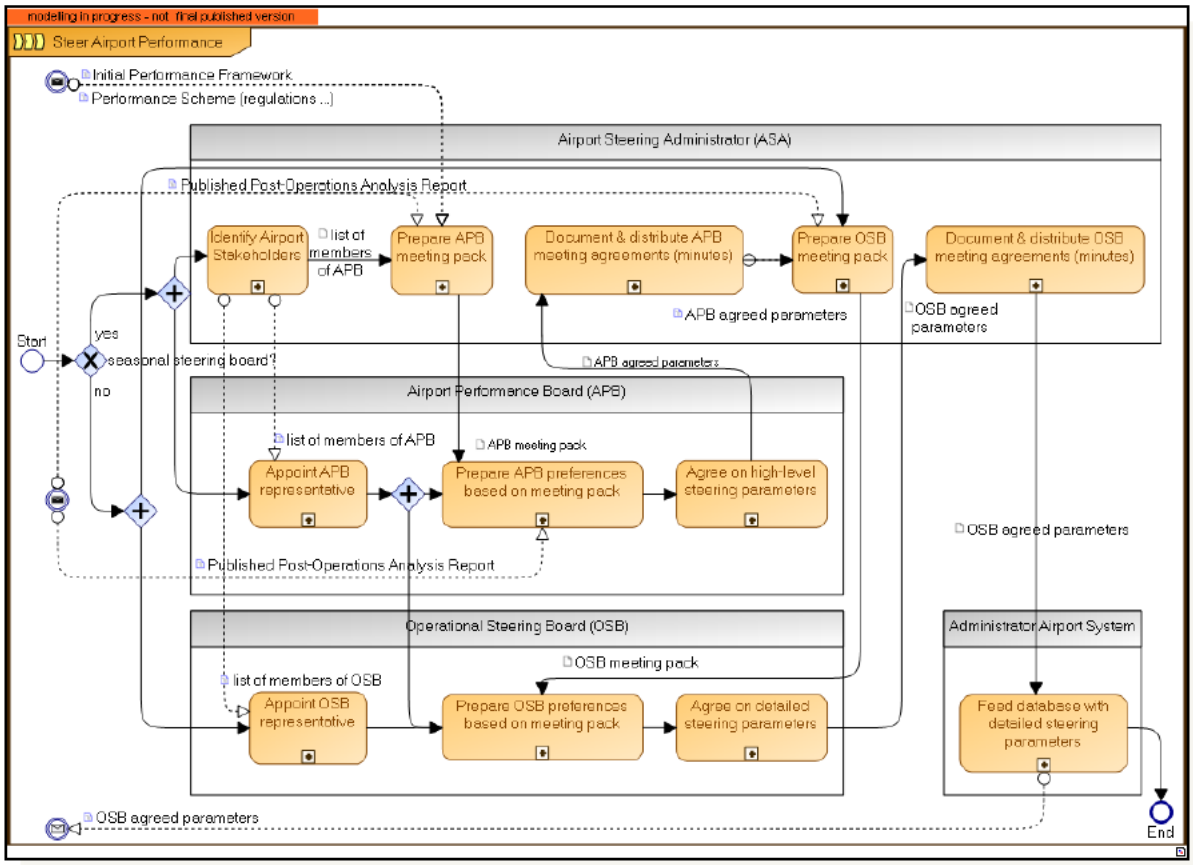


Figure 6. Steer Airport Performance service model

The activities related with the ***Steer Airport Performance*** service model are explained as follows:

Identify Airport Stakeholders activity

Who (Role):	Airport Steering Administrator (ASA)
Input:	None
Action:	- To collate a list of all the organisations operating at the airport or with an interest in the operational performance of the airport - Identify a means of contacting/communicating with these organisations
Output:	- A list of contact information from all stakeholders of the Airport - List of members of APB - List of members of OSB
Resources:	No relevant resources

Appoint APB Representative activity

Who (Role):	Airport Stakeholder Organisations
Input:	List of members of APB
Action:	- To identify a suitable representative from the Organisation to participate in the APB. - To communicate the name and contact details of the representative to the ASA.
Output:	- APB Representative appointed
Resources:	No relevant resources

Prepare APB Meeting Pack activity

Who (Role):	Airport Steering Administrator (ASA)
Input:	- List of members of APB - Initial Performance Framework - Performance Scheme (Regulations) - Published Post-Operations Analysis Report
Action:	- To collate the APB meeting pack as per the contents described below in section 3.2.2.3.2. - Distribute a copy of the APB Meeting Pack to the APB representatives as advised by the Airport Stakeholder Organisations
Output:	APB Meeting Pack distributed to APB members
Resources:	No relevant resources

Prepare APB stakeholder representatives' preferences based on meeting pack activity

Who (Role):	APB Representative
Input:	APB Meeting Pack
Action:	- Each one of the APB representatives, after having received the APB meeting pack, prepares their own preferences for discuss and agree with the rest of APBs
Output:	- Preferences identified based on the APB Meeting Pack
Resources:	No relevant resources

Agree on high-level steering parameters activity

Who (Role):	APB Representative
Input:	None
Action:	- During the APB meeting discussion of preferences among APBs is undertaken in order to agree the High-level steering parameters as described in section 3.2.2.3.4 of this document
Output:	- High Level steering parameters agreed and captured in the meeting minutes (APB Agreed Parameters)
Resources:	No relevant resources

Prepare APB meeting Agreements (minutes) activity

Who (Role):	Airport Steering Administrator (ASA)
Input:	APB Agreed Parameters
Action:	Following the APB Meeting, the ASA; - Documents the primary elements of the discussion (meeting minutes) - Creates a document with the agreed high level steering parameters (Airport Performance Framework with high level parameters only - Distributes the meeting minutes and agreed high level steering parameters to the APB members before them including in the OSB meeting pack and archives a copy of the minutes
Output:	- APB Meeting Minutes & Airport Performance Framework with High Level parameters only (APB agreed parameters)
Resources:	No relevant resources

Appoint OSB Representative activity

Who (Role):	Airport Stakeholder Organisations
Input:	List of members of OSB
Action:	- To identify a suitable representative from the Organisation to participate in the OSB. - Communicate the name and contact details of the representative to the ASA

Output:	- OSB Representative appointed
Resources:	No relevant resources

Prepare & Distribute OSB meeting pack activity

Who (Role):	Airport Steering Administrator (ASA)
Input:	Published Post-Operations Analysis Report
Action:	- To collate the OSB meeting pack as per the contents described below in section 3.2.2.3.2. - To distribute a copy of the OSB Meeting Pack to the OSB representatives as advised by the Airport Stakeholder Organisations
Output:	- OSB Meeting Pack distributed to OSB members
Resources:	No relevant resources

Prepare OSB stakeholders representatives' preferences based on meeting pack activity

Who (Role):	OSB Representative
Input:	OSB Meeting Pack
Action:	- Each one of the OSB representatives, after having received the OSB meeting pack, prepares their own preferences to discuss and agree with the rest of OSBs
Output:	- Preferences identified based on the OSB Meeting Pack
Resources:	No relevant resources

Agree on detailed steering parameters activity

Who (Role):	OSB Representative
Input:	None
Action:	- During the OSB meeting, discussion of preferences among OSB representatives is undertaken, in order to agree the detailed steering parameters (OSB agreed parameters) as shown in section 3.2.2.3.4.
Output:	- Detailed steering parameters agreed and captured in the meeting minutes (OSB Agreed Parameters)
Resources:	No relevant resources

Document & Distribute OSB meeting agreements (minutes) activity

Who (Role):	Airport Steering Administrator (ASA)
Input:	OSB Meeting notes.
Action:	Following the OSB Meeting, the ASA; - Documents the primary elements of the discussion (meeting minutes) - Completes the *(Airport) Performance Framework* and the *(Airport) Performance Baseline* document with the agreed detailed steering parameters, in order to build *Current Airport Performance Framework* - Distributes the meeting minutes and agreed detailed steering parameters to the OSB members for agreement before distributing to the AAS, Airport Performance Monitoring service and the Perform Post-Operations Analysis service and archives a copy of the minutes
Output:	- OSB Agreed Parameters (***Current Airport Performance Framework***). - OSB Meeting Minutes.
Resources:	No relevant resources

Feed database with detailed steering parameters activity

Who (Role):	Airport Platform Administrator (APA)

Input:	OSB Agreed Parameters
Action:	On receipt of the agreed ***(Airport) Performance Framework*** and ***(Airport) Performance Baseline***, adjust the following parameters in the ***Airport Performance Monitoring platform*** on the applicable data and for the agreed timeframe. - Activate or de-activate KPA's, KPI's & PDI's to align with the ***Current Airport Performance Framework*** - Activate or de-activate KPA's, KPI's & PDI's to align with the ***Current Airport Performance Framework*** - Enter/Adjust the Alert and Warning trigger levels to align with the ***Current Performance Framework*** i.e. Update the Rules Engine; Manage rules; the Post Operations Analysis rules - Make any adjustments to the KPI & PDI calculations as requested by the OSB
Output:	- ***Airport Performance Monitoring Platform*** is aligned with the ***Current Airport Performance Framework***
Resources:	AOP

3.2.2.3 Roles, (internal) Resources, Inputs and Outputs of the Steer Airport Performance service.

3.2.2.3.1 Roles

1. Airport Steering Administrator (ASA):

The person responsible for coordinating the stakeholder representatives, the meetings and the documents (revision, supervision and distribution) needed to manage the ***Steer Airport Performance*** service.

This involves:

- Identifying and communicating with the stakeholder representatives in the ***Airport Performance Board (APB)*** and ***Operational Steering Board (OSB)***
- Coordinating/facilitating the ***Airport Performance Board (APB)*** and ***Operational Steering Board (OSB)*** meetings
- Recording and documenting the board meeting decisions and outcomes
- Circulating the board meeting decision and outcomes for approval
- Publishing the approved board meeting decisions and outcomes
- This person also ensures the communication with the ***Administrator Airport System*** (role, see section 3.2.2.3.1), ***Post-Operations Analyst*** (role, see section 3.2.5.3.1), and the ***Airport Operations Centre (APOC) Supervisor*** (role, see section 3.2.4.3.1)

2. Airport Performance Board (APB):

The ***Airport Performance Board (APB)*** is made up of board level (i.e. Strategic) representatives from the various airport stakeholders organisations. The representatives must have the ability to agree performance decisions for the airport operation and accept that the collaborative result may/may not equal strategic agreements between the airport and the individual stakeholder. As per the detail provided in Table 14, representatives of the APB are expected to be the Chief Operating Officer of the company or a delegate for this position.

As the APB is making collaborative decision about the high level (Strategic) focus of the airport performance, it is suggested that MET Providers and Ground Handler Organisations are not appropriate participants. MET Providers do not have a strategic interest in the performance of the

airport, they are, however an operational process provider. Ground Handler Organisations are contracted individually by the Airspace Users, and hence it is expected that the Airspace User representatives in the APB will be seeking the same strategic airport focus from their Ground Handling provider/s as they are from the Airport Operator and ANSP.

This group of stakeholders meets prior to commencing each seasonal schedule with the goal to set the high level guidance on what is important for the [local] airport to monitor/manage and analyse in post-operations phase. This output is passed to the OSB for expansion to a detailed level that will permit the level or monitoring/management it is believed that is necessary.

At the first meeting of the APB, the members will clarify the governance of the airport performance. For this first meeting, it is expected that the Airport Operator will chair the meeting until the governance process is agreed.

3. Operational Steering Board (OSB):

The ***Operational Steering Board (OSB)*** is made up of Operational based Managers/representatives from the airport stakeholders' organisations and will meet more regularly e.g. monthly or as it is deemed necessary by the local airport. It is expected that the airport stakeholders' representatives participating in the ***Operational Steering Board (OSB)*** should have a good understanding of the operational processes and performance drivers. For this reason the MET Service Provider and Ground Handler organisations are included. The Slot coordinator and the Regulator are not required as it is felt that they operate at a more strategic, long term planning level.

The ***Operational Steering Board (OSB)*** will use the high level (Strategic) agreed parameters from the ***Airport Performance Board (APB)*** and extend this to define performance metrics to be measured, the performance levels (thresholds) against which warnings / alerts are generated and the target values for the KPIs/PDIs included in the ***Current Airport Performance Framework***.

The Operational Steering Board (OSB) also provides the input parameters for the Airport-DCB, consisting of the possible runway and taxiway configurations, the relevant declared and practical capacities as also the operating rules and A-DCB steering parameters.

These agreed outputs will all be entered into the ***Airport Performance Monitor Platform*** and hence be available for all processes involved in Airport Operations Management including Planning, Execution and Post-Operations.

4. Airport Stakeholders' Organisations

The Airport Stakeholders' Organisations from which representatives are sought for the ***Airport Performance Board (APB)*** and the ***Operational Steering Board (OSB)*** are listed below. The roles identified are the recommended roles to attend these two steering boards. However, stakeholders may choose to delegate their representation to alternative roles within their company or external to their company, with appropriate decision making authority. For instance, non-home based Airlines may choose to be represented by their Station Manager or by the Airline Operators Committee Chair for that airport.

Airport Stakeholder Organisation	APB	OSB
Airport Operator	Chief Operating Officer	APOC Supervisor
ANSP - Airport	Chief Operating Officer	Tower Supervisor Ground Supervisor
ANSP - TMA	Chief Operating Officer	ACC/Approach Supervisor
Airspace Users	Chief Operating Officer	FOC Manager
Airline Operators Committee	AOC Chair	AOC Chair
Ground Handlers (including	Not required [18]	Ground Handler Operations

[18] As the APB is making collaborative decision about the high level (Strategic) focus of the Airport performance, it is suggested that Meteo Providers and Ground Handler Organisations are not appropriate participants.

Airport Stakeholder Organisation	APB	OSB
De-Icing Agents)		Manager
Network Manager	Network Division, Head of Airports	ACC/Approach Supervisor
Slot Coordinator	Chief Operating Officer	Not required[19]
Met Provider	Not required[20]	Meteorologist
Regulator	National Supervisory Authority Director	Not required[21]

Table 14. Stakeholder roles recommended for the APB and the OSB

5. Administrator Airport System (AAS)

The ***Administrator Airport System (AAS)*** is the person that amends the rules, KPI / PDI equations, KPI / PDI targets, etc. in the ***Airport Performance Monitoring Platform***. He/she will also fill in the ***Post-Operations Analysis rules*** (i.e. all those rules from the *OSB agreed parameters* that applies to the ***Perform Post-Operations Analysis*** service).

It is anticipated that this role will be active in other services apart from the ***Steer Airport Performance*** service.

3.2.2.3.2 (Internal) Resources

1. APB Meeting Pack

The ***APB Meeting Pack*** should include:

- A comparison between ***Actual Airport Performance Framework*** and **Current Airport Performance Framework** (i.e. ***OSB agreed parameters***.) included in a Post-Operations Analysis report as prepared by the ***Perform Post-Operations Analysis*** service
- ***Initial Airport Performance Framework*** (if it is the first APB meeting for the Airport)
- Previous APB agreed ***Airport Performance Framework*** (if there has been a previous APB for the Airport)
- The most recent requirements and targets published by the ***European Commission Performance scheme*** and interpreted by the National Supervisory Agency
- Current List of Members of APB as advised by the Airport Stakeholder Organisations

2. OSB Meeting Pack

The ***OSB Meeting Pack*** should include:

- A comparison between ***Actual Airport Performance Framework*** and **Current Airport Performance Framework** (i.e. ***OSB agreed parameters***.) included in a Post-Operations Analysis report as prepared by the ***Perform Post-Operations*** Analysis Service
- To compare APB agreed parameters for the new season against the Current Airport Performance Framework for the past season
- Current List of Members of OSB as advised by the Airport Stakeholder Organisations

3.2.2.3.3 Inputs

[19] The Slot coordinator and the Regulator are not required as it is felt that they operate at a more strategic level.
[20] As the APB is making collaborative decision about the high level (Strategic) focus of the Airport performance, it is suggested that Meteo Providers and Ground Handler Organisations are not appropriate participants.
[21] The Slot coordinator and the Regulator are not required as it is felt that they operate at a more strategic level.

1. Initial Airport Performance Framework / Actual Airport Performance Framework.

The ***Initial Airport Performance Framework*** is the starting perspective for the very first Airport Performance Board. It is the Airport Performance Framework as define in SESAR Project 6.5.1 Deliverables D05/D06 and assessed in Deliverable D07.

The performance metrics included in the ***Initial Airport Performance Framework*** (as shown in part 2) have been incorporated into the ***Rules Engine*** as defined in the ***Monitor Airport Performance*** service (see section 3.2.3.3.2)

After the first cycle of the ***Steer Airport Performance*** service (i.e.: from the second cycle on), it is expected that the airport will use the ***Airport Performance Framework*** agreed at the previous board meeting. This will be constantly reviewed and updated based on the ***Actual Airport Performance Framework*** (i.e.: the actual figures of the ***Airport Performance Framework*** parameters after the execution of the plan) and any new arising regulations or performance requirements.

REQ-06.05.04-OSED-APSO.0010
REQ-06.05.04-OSED-APSO.0020
REQ-06.05.04-OSED-APSO.0030

2. Post-Operations Analysis report in which the Actual Airport Performance Framework is compared with Current Airport Performance Framework (i.e.: OSB agreed parameters).

A comparison between the ***Actual Airport Performance Framework*** (i.e. It includes the actual figures of the KPIs and PDIs included in the ***(Airport) Performance Framework*** after the execution of the plan) and the ***OSB agreed parameters*** (i.e. the ***Current Airport Performance Framework***) is included in a (pre-defined) Post-Operations Analysis report.

This report will be provided by the ***Perform Post-Operations Analysis*** service and it is an input for the ***Steer Airport Performance*** service. It will be available for all APB and OSB members, as a part of the meeting pack.

The APB and OSB members may request specific information and layout of this performance report. Any requests from the APB and OSB will be communicated to the role responsible for producing the Post-Operations Analysis reports by the ***Airport Steering Administrator***.

3. European Commission or National Regulator Performance scheme (Regulations, etc.)

At any given time, European or National regulators may apply requirements or regulations against which the airport must respond. These requirements will be reviewed by the ***Airport Performance Board (APB)*** and if applicable will be added to the next edition of the ***Current Airport Performance Framework.*** The local Performance Plan is expected to be reviewed seasonally and updated as required. Sources of such material could be (note, this is not an exclusive list):

- European Commission – Performance Review Board
- EASA
- National Supervisory Authority
- EU Performance Plan
- National Performance Plan

3.2.2.3.4 Outputs

1. APB Agreed Parameters (Airport Performance Framework with High Level parameters only)

During the APB Meeting, the following parameters should be agreed:

- KPA's in the airport performance that are relevant for the airport
- the targeted performance levels

- Operational Guidelines e.g. Best Equipped Best Served, First Scheduled First Served.
- the priority order of the KPAs, along with any conditions
- Instructions for the Post-Operations Analysis Reporting
- Agreed Declared capacity figures

2. OSB Agreed Parameters (Current Airport Performance Framework)

During the OSB Meeting, the following parameters should be agreed:

- KPI's and PDI's that are relevant for the airport given the selected KPA's from the APB
- Performance levels (i.e. threshold values) that should trigger warnings and alerts given the Performance target values set by the APB and against each performance metric that will be used
- Participants involved in making performance trade-off decisions given the priority order of the KPAs set by the APB
- changes required as to how the KPI's or PDI's are calculated
- Rules for the Post-Operations Analysis Reporting:
  - Reports classification (standard/optional /special)
  - Report Identification number
  - Template (reference to few number of pre-defined models) [22]
  - Distribution rule (with/without Post-Operations Analysis Committee)
  - For each report:
    - Concerned KPI(s)
    - List of requested data
    - Status (automatic/optional)
    - Periodicity
    - Distribution list
- Probability thresholds that trigger updates of capacity data. These are the thresholds against which responsible individuals or a system takes an action. This concerns runway, taxiway and TMA capacities
- Threshold values and probability thresholds for the automatic calculation of runway availability due to crosswinds and gusts
- Default (nominal conditions) capacity values (other than declared capacity) for taxiway, TMA[23] apron, terminal, etc.
- Runway configurations look-up table addressing possible runway configurations over time (time of day, day of week, etc.) and taking into account any political and environmental operating restrictions
- Planning buffer/accepted delay for deriving Saturation (Practical Capacity from Saturation) capacity

[22] It is expected that standard Post Operations Analysis Report templates are developed based on local airport needs as part of the implementation activities. The APB may request modifications to the template based on the outcome of discussions within the Steer Airport Performance Service.

[23] The TMA capacity is coming from a service external to the Airport Steering Board, however the TMA capacity needs to be agreed upon in this meeting, in order to ensure the most restrictive capacity figure is considered.

- Rules for when the airport will utilise TTAs to manage the airport performance, considering different look ahead times
- Maximum value for aircraft on airport at a certain time and certain condition/scenario
- Proposal or recommendations for changes to 'Pre-Defined Solutions' available to the Manage Airport Performance Service based on experience, changed regulations, changed operational environment, etc.

REQ-06.05.04-OSED-APSO-0040
REQ-06.05.04-OSED-APSO-0050
REQ-06.05.04-OSED-APSO-0060
REQ-06.05.04-OSED-APSO-0070
REQ-06.05.05-OSED-MET1.0011
REQ-06.05.05-OSED-MET1.0012
REQ-06.05.05-OSED-MET1.0013
REQ-06.05.05-OSED-MET1.0015
REQ-06.05.05-OSED-MET1.0016
REQ-06.05.05-OSED-MET1.0017
REQ-06.05.05-OSED-MET1.0018
REQ-06.05.05-OSED-MET1.0019
REQ-06.05.05-OSED-MET1.0021
REQ-06.05.05-OSED-MET1.0022
REQ-06.05.05-OSED-MET1.0023
REQ-06.05.05-OSED-MET1.0030
REQ-06.05.05-OSED-MET1.0031

3.2.3 Monitor Airport Performance service

The ***Monitor Airport Performance*** service is the service that maintains surveillance over airport operations, airport performance (against KPAs), airport environment (e.g. weather monitoring), supervising airport related information and any information that can impact the airport performance, providing observations, forecasts, alerts and warnings against predefined thresholds.

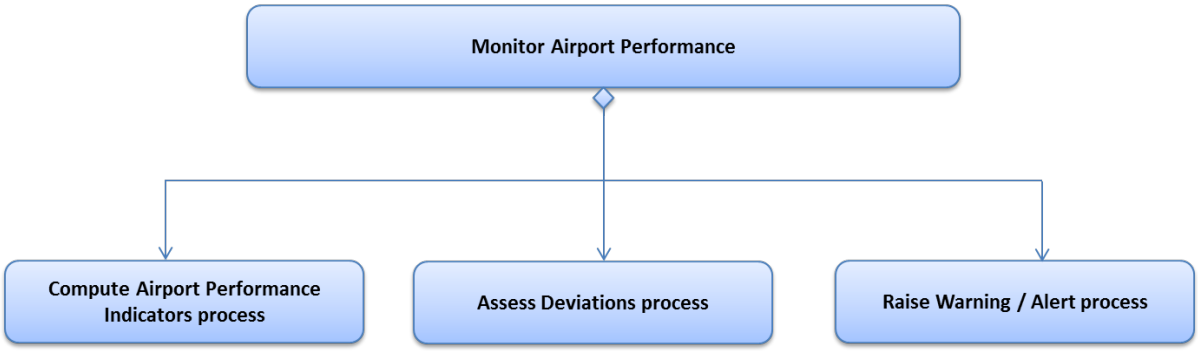


Figure 7. Processes of the Monitor Airport Performance service

As shown in Figure 7, the ***Monitor Airport Performance*** service can be broken down into three processes:

1. ***Compute airport performance indicators*** process
2. ***Assess Deviations*** process
3. ***Raise warning/alert*** process

The Performance monitoring service forms a cornerstone of the SESAR airport operations management concept. Integral to the Performance monitoring service is the display of appropriate Key Performance Indicators so as to provide stakeholders with appropriate knowledge concerning airport performance and its predicted evolution. It has become apparent during the SESAR1 validation exercises that the judicious choice of such KPIs is extremely important and should ideally provide information at a sufficient degree of granularity to permit the identification of problems as well as rapid identification of potential solutions. A highly promising V2 validation exercise was performed with Paris Charles de Gaulle airport using a performance 'dashboard' which provided detailed information relating to both airside and landside processes in the airport. This dashboard will be further developed with a wider range of airport partners in SESAR2020 (PJ04), and with the addition of further information specifically in the area of Environmental performance. Nevertheless, the work performed in SESAR1 has demonstrated without question the utility of a 'tailored' dashboard in the airport operations management process.

3.2.3.1 Basic Service Description

The ***Monitor Airport Performance*** service addresses both the planning phase (medium and short Term Planning phases) and the execution phase.

In the Medium/Short term planning phase the ***Monitor Airport Performance*** service mainly focuses on Airport-DCB issues. It will detect the evolution of resources availability and demand, highlighting the situations where the plan will be incompatible with matching the performance target values (***Airport Performance Baseline***). At the end of medium term planning and during short term planning phase (i.e. up to a few days ahead), as weather data will be more and more reliable, weather forecasts will be provided, as well as MET warnings and alerts with probabilistic parameters. During Medium/Short term planning phase, the ***Monitor Airport Performance*** service does not necessarily require the active participation of each stakeholder, but has to be configured to allow the provision of alerts/warnings to the appropriate actor and the APOC (if implemented) in the event of potential deviation from the plan.

In the execution phase, the ***Monitor Airport Performance*** service:

- Supervises both actual and forecasted airport situation until the end of the day of operations.

- Detects the deviations of airport processes from the planned data during the execution phase, assesses those deviations against thresholds and warn/alert stakeholders and APOC whenever necessary, by:
    a. Receiving information from the airport processes and the AOP
    b. Integrating the information
    c. Providing feedback to stakeholders
- is the enabler to the APOC (and any other stakeholder) for performing the management of the airport performance, i.e.
    - Assessing the airport situation in few seconds
    - Performing an impact assessment in few minutes
    - Triggering decision-making at the right level
- provides all stakeholders with a common situational awareness of the airport processes and performance in real time for both the actual situation and the forecasted situation

The ***Monitor Airport Performance*** service relies on detecting and assessing deviations from different airport processes. This includes the initial assessment of the detected deviations / disturbances to determine the impact on the Key Performance Indicators. When threshold levels are exceeded, alerts & warnings are initiated and provided to the (relevant) stakeholder(s) and the APOC.

Therefore, the ***Monitor Airport Performance*** service provides two main outputs:

1. The common situational awareness of the actual and forecasted overall airport situation (through publishing values of the several monitoring sources included in the Airport Performance Monitoring Platform)
2. Alert / warning messages, after comparing the actual overall airport situation with the planned operations and the ***Airport Performance Baseline***

The definition for airport warnings and alerts:

- Warning: it refers to a KPIs deviation from its target which indicates tendency of degraded performance. The threshold is established where there is still headroom before achieving the maximum “acceptable” level to raise an alert; in fact it works as a pre-alert
- Alert. It covers:
    - **Process Alert:** it refers to a process evolution. Isolated, this kind of alert may not have a direct impact on the ***Actual Airport Performance Framework*** in deep way, but it will impact on the AOP evolution
    - **Performance Alert:** it refers to an important deviation on KPIs targets which requires an immediate action. This kind of alert will be raised when the maximum threshold established for a KPI is exceeded
    - While Process Alerts (and warnings) are generated on a flight by flight basis, Performance Alerts (and Warnings) are mostly related to pan-airport performance, or substantial portions thereof. The ***Rules Engine*** does not distinguish between Process and Performance Alerts since it is focussed on describing all performance metrics

The ***Monitor Airport Performance*** service also incorporates a shadow mode which serves for testing different Airport-DCB Management measures, resulting in KPIs to be assessed by the ***Manage Airport Performance*** service before implementation of a solution.

3.2.3.2 Detailed Service Description

The ***Monitor Airport Performance*** service is a system based activity handled by the ***Airport Performance Monitoring Platform***, an evolution from the baseline ACISP (Airport CDM Information Sharing Platform). Data is being provided by the airport stakeholders and updated as changes occur. This data is received and reflected in the AOP. The ***Airport Performance Monitoring Platform*** constantly calculates performance information and measures it against the warning and alert levels entered into its ***Rules Engine***. If a change in the input data results in change in the performance information, then the ***Airport Performance Monitoring Platform*** will show the updated performance information. If the change in the performance information triggers a warning or alert rule, then the ***Airport Performance Monitoring Platform*** will show the warning or alert as per the ***Rules Engine***.

It is important to clarify the difference between the ***AOP*** and the ***Airport Performance Monitoring Platform***. The first one is the principal source of information used by all involved airport stakeholders in obtaining a common situational awareness, whereas the second one is a tool that allows to monitor the actual airport processes and performance, showing information from different sources (the main one is the ***AOP***) in order to detect deviations and provide alerts / warnings when necessary to the assigned stakeholders.

The ***Airport Performance Monitoring Platform*** shall be fed from several sources such as:

- Airport Operations Plan (main source)
- Airport-DCB Monitor.
- Processes monitor (aircraft, passengers, baggage)
- Cameras
- Graphics based upon the data in AOP and that are used to monitor the real time operations
- Etc.

The ***Monitor Airport Performance*** service includes, among others, the monitoring of specific fields such as Demand and capacity balancing (Airport-DCB) and Weather:

- The monitor demand and capacity balancing (Airport-DCB) section of the service identifies any imbalance between demand and capacity at total airport level as well as on individual runway level and triggers warnings and/or alerts when the imbalance exceeds locally defined thresholds for specific KPIs. DCB monitoring is based on demand and capacity forecasts. The demand is aggregated from the information available in the AOP which always reflects the latest users' intention. For medium term phase the declared capacity is used and taken directly from the AOP. For short term planning phase the saturation capacity and the practical capacity are calculated based on the forecasted operating modes and conditions (e.g. weather data). Alerts or warnings are raised on the KPIs capacity shortage, delays and punctuality reflecting different levels of severity of the demand capacity imbalance to show the impact on airport operations.
- The monitor weather data section of the service provides weather information – both observations and forecasts, including probabilistic MET forecasts as well as probabilistic impact parameters (probability, severity, duration) which can be used further on as input to decision-support tools (what-if) as well as to provide specific alerts/warnings.

The following figure shows the ***Monitor Airport Performance*** service model:

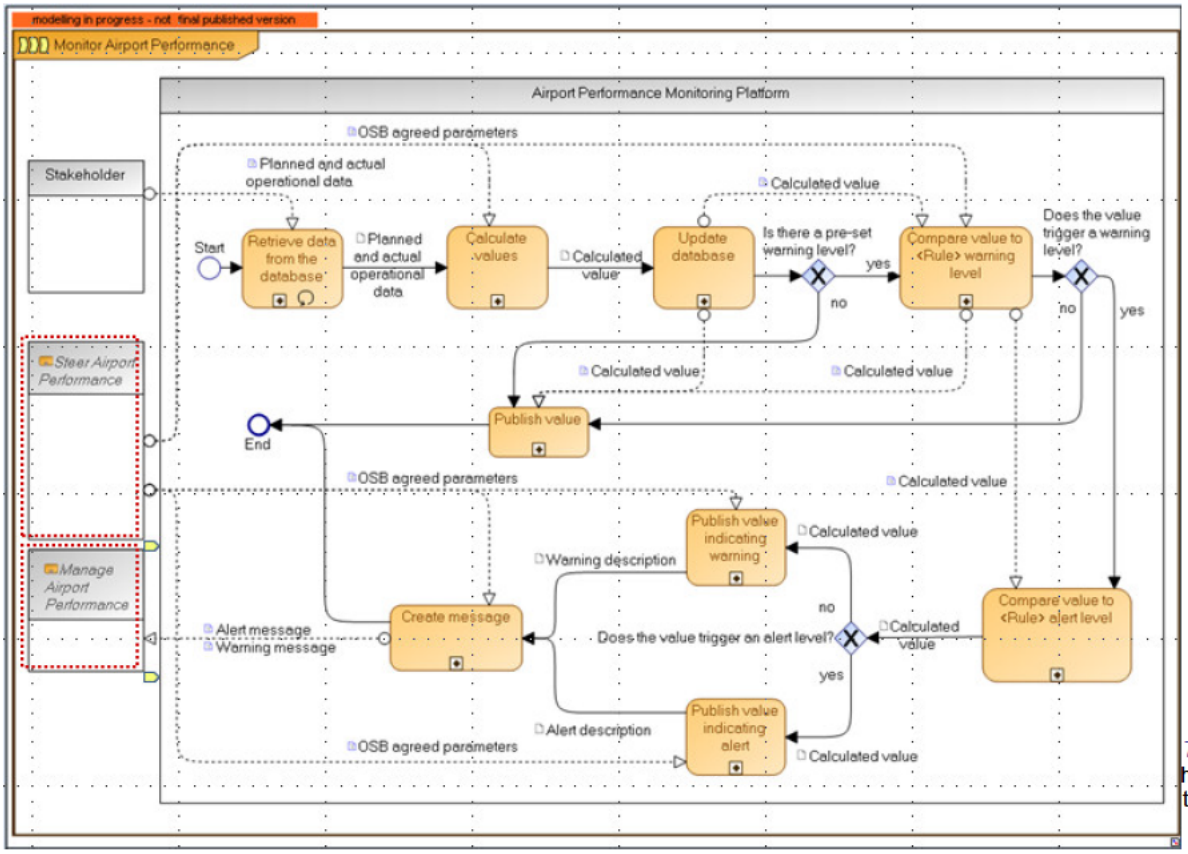


Figure 8. Monitor Airport Performance service model

3.2.3.2.1 Compute airport performance indicators process

The ***Compute airport performance indicators*** process integrates two different approaches:

1. **A process approach**: it includes the three process sub-monitors (aircraft, passengers and baggage / cargo[24]). It shows the actual situation of the three processes and it compares them with the planned situation[25]
2. **A performance approach**: it includes the key performance indicators (KPIs) and performance driver indicators (PDIs) from the ***Current Airport Performance Framework***. It gathers the necessary data from the AOP and from stakeholders' databases and continuously evaluates and/or forecasts indicators based on the selection and algorithms defined through the ***Steer Airport Performance*** service

The activities related with the model and included in the ***Compute airport performance indicators*** process are explained as follows:

Retrieve data from the database activity

Who (Role):	Automatically done by the system – No humans directly involved.
Input:	None
Action:	- Receive all necessary data, as defined by the ***Rules Engine***, corresponding to the KPI / PDI elements which are listed in the ***Airport Performance Framework*** (set up done by ***Steer Airport Performance*** service) from the available databases[26] (especially from/to AOP) with two types of data: the reference (planned) ones and the actual ones.
Output:	- A list of data corresponding to input elements required for the KPI / PDI
Resources:	Connections with ***AOP*** and rest of sources that feed the ***Airport Performance Monitoring Platform***.

Calculate values activity

Who (Role):	Automatically done by the system – No humans involved
Input:	Data retrieved in the previous activity.
Action:	- Execute the calculations, as defined in the ***Rules Engine***, for each KPI / PDI with the corresponding input data and calculations rules.
Output:	- KPI / PDI metric at the time of calculation and given the input data available at that time.
Resources:	No relevant resources

Update database activity

Who (Role):	Automatically done by the system – No humans involved
Input:	Calculated values
Action:	- Update the relevant KPI / PDI in the AOP (or appropriate database).
Output:	- AOP (or appropriate database) contains the KPI / PDI metric at the time of calculation and given the input data available at that time with a timestamp showing when the metric was updated.
Resources:	No relevant resources

[24] Baggage and cargo monitors are not described in this OSED
[25] The reference for the process sub-monitors definition can be found in D09 of P.6.5.1
[26] depending on the airport database organization: either one unique DB shared by all stakeholders or separated databases managed by each stakeholder with accesses capabilities.

Publish values activity

Who (Role):	Automatically done by the system – No humans involved
Input:	Calculated values
Action:	- Publish the value on the display as per the defined default rules.
Output:	- Display of KPI / PDI values
Resources:	Airport Performance Monitoring platform

3.2.3.2.2 Assess deviations process

The ***Assess deviations*** process compares, on one hand, the values of monitored KPIs and PDIs with the set of thresholds and target values defined in the ***Airport Performance Baseline*** (see ***Steer Airport Performance*** service) and, in the other hand, it compares the actual values of the operation day with the planned values (regarding KPIs, PDIs and process sub-monitor). This assessment is delivered to the ***Raise Alert/Warning*** process.

The activities related with the model and included in the ***Assess deviations*** process are explained as follows:

Compare values to <rule> warning level activity

Who (Role):	Automatically done by the system – No humans involved
Input:	Planned and actual values of the KPIs and PDI.s and threshold levels to raise a warning.
Action:	- Apply the comparison <Rule> defined in the ***Rules Engine*** to compare the warning trigger value (in the ***Rules Engine***) with the actual value for the relevant KPI / PDI
Output:	- Answer to the question 'Does the value trigger a warning level?
Resources:	Rules engine

Compare value to <rule> alert level activity

Who (Role):	Automatically done by the system – No humans involved
Input:	Planned and actual values of the KPIs and PDI.s and threshold levels to an alert.
Action:	- Apply the comparison <Rule> defined in the ***Rules Engine*** to compare the alert trigger value (in the ***Rules Engine***) with the actual value for the relevant KPI / PDI
Output:	- Answer to the question 'Does the value trigger an alert level?
Resources:	Rules engine

3.2.3.2.3 Raise warning / alert process

The ***Raise warning / alert*** process triggers the appropriate level of alert / warning, based on the findings of ***Assess Deviations*** process, informing the relevant stakeholder and prompting him/her to react when necessary and/or triggering the ***Manage Airport Performance*** service.

The activities related with the model and included in the ***Raise warning / alert*** process are explained as follows:

Publish value indicating warning activity

Who (Role):	Automatically done by the system – No humans involved
Input:	Calculated values
Action:	- To publish the calculated value indicating warning as per the defined warning rules
Output:	- Display of KPI / PDI value in the warning format and the warning description

Resource:	AOP

Publish value indicating alert activity

Who (Role):	Automatically done by the system – No humans involved
Input:	Calculated values
Action:	- Publish the calculated value indicating alert as per the defined alert rules
Output:	- Display of KPI / PDI value in the alert format and the alert description
Resource:	AOP

Create and distribute warning / alert message activity

Who (Role):	Automatically done by the system – No humans involved
Input:	Calculated values and indication of alert / warning.
Action:	- To create the warning / alert message and to fill in all their information fields. The list of affected stakeholders is one of the fields that is part of the message. - To distribute the warning / alert to responsible stakeholders
Output:	- The warning / alert message.
Resource:	AOP and Airport Performance Information Platform.

3.2.3.3 Roles, (internal) Resources, Inputs and Outputs of the Monitor Airport Performance service.

3.2.3.3.1 Roles

There are no 'human' roles within the ***Monitor Airport Performance*** service. The service itself is automated by "smart" system/s, databases and user interfaces, under the generic term of ***Airport Performance Monitoring Platform*** (see section 3.2.3.3.2). This platform contains a calculation/prediction capability defined by its ***Rules Engine*** (see section 3.2.2.3.2), in order to make comparisons with agreed warning/alert levels, and to generate & distribute warning / alert messages to the corresponding stakeholders and to publish/update those calculations/predictions (values) in AOP (and hence, to the appropriate database).

Any changes to the monitoring rules will be entered by the **Administrator Airport System (AAS)** as described in the ***Steer Airport Performance*** service. Any actions taken on the output of the ***Airport Performance Monitoring Platform*** will be described in the ***Manage Airport Performance Management*** service.

3.2.3.3.2 (Internal) Resources

Apart from the ***Airport Performance Monitoring Platform*** by itself, as the ***Monitor Airport Performance*** service is entirely automated, the rest of (internal) resources are look-up tables providing the reference information or rules against which the ***Airport Performance Monitoring Platform*** is operating.

1. Airport Process Monitoring - Rules Engine

The ***Rules Engine*** contains all the information that the ***Airport Performance Monitoring Platform*** requires in order to operate (as defined by the ***Steer Airport Performance*** service):

a) The KPI / PDI data label
b) The input data required to calculate the KPI / PDI
c) The detailed method to calculate and/or predict additional information elements
d) The rule for determining whether the 'calculated value' triggers a warning / alert or not

e) The value against which a warning is created as included in the ***OSB agreed parameters (i.e. Current Airport Performance Framework)*** [27]
f) The value against which an alert is created as included in the ***OSB agreed parameters (i.e. Current Airport Performance Framework)*** [28].
g) What to display for each KPI / PDI (e.g. time, number of movements, etc.)
h) Time periods for which the KPI / PDI should be calculated
i) The assigned stakeholders who should receive a given warning or alert message that is produced
j) The warning and alert codes[29].

All elements of the ***Rules Engine*** can be amended post implementation. However, it is expected that items (e) & (f) should be reviewed on a regular bases - as per the ***Steer Airport Performance*** service. Other items may be adjusted regarding the return of experience (through the ***Post-Operations Analysis reports***). These refining amendments will be agreed within the ***Operational Steering Board (OSB).***

The ***Rules Engine*** shall take into account that:

- The observed trends will also be reflected by arising warning or alert messages from the ***Airport Performance Monitoring Platform***. Interpretation of the trends, warnings and alerts will allow analysis of the likely impact to the overall airport operation. This analysis will be done through the ***Manage Airport Performance*** service. This skill is most critical in adverse conditions situations in which it is likely to be multiple warnings and alerts, sometimes reflecting conflicting information.

- It is expected that a warning/alert message will only be issued once for each instance. However, the visualisation of the warning/alert will remain active on the HMI until such time as the performance metric returns to a level that does not pass the trigger point. Thus, the personnel undertaking the management of active warnings/alerts are not being sent repeated messages for the same event, but can still see that performance is not within ideal levels. Additionally, any new messages generated would be indicating a new event rather something that is already known.

The detail of the ***Rules Engine*** (see part 2) is broken down into the timeframe of operation (Medium / Short Term Planning, Execution, Post Operations) during which the KPI / PDI is applicable and how to calculate during that timeframe of operation. For example, during Medium/Short term planning, “schedule” or “declared” information is predominantly used whereas while during Execution phase “estimate” or “target” information is used before the event and “actual” data is used after the event. No differentiation has been made between Process and Performance metrics as described by P 6.5.1. However, all relevant metrics have been retained.

2. Airport Performance Monitoring Platform

The following requirements (regarding the HMI) should be achieved by the ***Airport Performance Monitoring Platform***:

- Intuitive and user friendly
- Visual with both a graphical and a numeric representation
- Able to be filtered
    - at a per flight level
    - at a global (pan airport) level
    - available against a clear and adjustable set of timeframes including;

[27] Detail is entered following decisions from the Steer Airport Performance service. Hence, the Rules Engine information does not show the value for these levels. Where the warning / alert level is shown as N/A, it is expected that no warning/alert will be produced, however the metric is still informative
[28] Detail is entered following decisions from the Steer Airport Performance service. Hence, the Rules Engine information does not show the value for these levels. Where the warning / alert level is shown as N/A, it is expected that no warning/alert will be produced, however the metric is still informative.
[29] The warning/alert codes for each metric will contain the standard code. If the code is followed by an ‘a’ it will be an alert level, however the meaning of the code remains the same as if it were a warning and the associated message remains the same.

- Past → T0 based on actual
- Forecast: T0 → end of the operational day, based on target or estimate times, whichever is the most accurate.
- Rolling 24 hours from T0
- Operational day, as set by the local ***Steer Airport Performance*** service

Apart from these requirements, the ***Airport Performance Monitoring Platform*** shall be fed from several sources such as:

- DCB Monitor
- Processes monitor (aircraft, passengers, baggage)
- Cameras
- Graphics based upon the data in AOP and that are used to monitor the real time operations
- Etc.

The ***Monitor Airport Performance*** service, as well as displaying the ***Rules Engine*** output of KPI and PDI calculations, will support stakeholders in having a Common Situational Awareness by the provision of view-only access to the following operational systems, when available:

- a display of airside movements in real time. (this may be sourced from existing A-SMGCS or ANSP system/s)
- weather radar map (this may be sourced from existing and/or external provider/s)
- sequencing visuals (this may be source from the AMAN, DMAN and A-SMGCS HMI's as used by the local ANSP)

As a consequence, this threefold view-only access shall be part of the ***Airport Performance Monitoring Platform.***

3.2.3.3.3 Inputs

1. Content for data calculation

This input refers to the definition of inputs and any detailed method to calculate and/or predict additional information elements. The data will be stored in the appropriate database. (e.g. AOP, Met database, DCB database...)

For more details, see section 3.2.3.3.2 above ("Resources of the Monitor Airport Performance service; 1. Rules Engine").

2. Content for warning/alert generating

The input refers to the specification of individual warning and alert levels for specific information elements & time-period of applicability.

For more details, see section 3.2.3.3.2 above ("Resources (of the Monitor Airport Performance service); 1. Rules Engine").

3. Content for warning/alert publishing

The specification of individual warning or alert codes and their associated standard message along with the assigned stakeholder responsible for the specific warning & alert code.

For more details, see section 3.2.3.3.2 above ("Resources (of the Monitor Airport Performance service); 1. Rules Engine").

4. Stakeholders Operational Data

This data is contained in airport stakeholders' Database/s as ***AOP***[30] data. It is required in order to calculate, compare and trigger warnings and alerts. Stakeholders' operational data will be based on DEPLOYMENT BASELINE A-CDM modelling (FT10 project WP 8.3.6) & additional SESAR Airport Operations Management elements identified by all processes in OFA 05.01.01.

Using the stakeholders' operational data, calculations are made by the ***Airport Performance Monitoring Platform***. This additional data is also utilised by ***Monitor Airport Performance*** service in order to display the ***Actual Airport Performance Framework*** and determine the need for warnings or alerts.

Note: all IER's related to the stakeholders' operational input data and any additional calculated data are reflected in the 'OFA IER' file and will not be repeated in this document.

5. OSB agreed parameters (Current Airport Performance Framework).

See section 3.2.2.3.4 (outputs of the Steer Airport Performance Framework.

6. Warning and Alert Codes

There are three 'types' of code:

CDM	• These are existing A-CDM codes. They apply to individual flights and have specific rules around display. For example, CDM-01 is either on or off i.e. the HMI shows a normal display or a red display if the CDM-01 rule applies. Whereas, CDM-11 has three levels of criticality (green, amber, red) highlighting the level of impact with red indicating the flight has been impacted i.e. it has lost its place in the sequence. • Distribution of CDM code messages will be as defined in the A-CDM implementation guidelines. The messages are designed for specific stakeholders, but the impact is relevant for that single flight only. As such, CDM codes are unlikely to trigger the full Manage Airport Performance process
AOM	• These are new codes applying to new metrics defined through the SESAR Airport Operations Management concept and generally having a pan-airport impact. • AOM codes are likely to trigger the ***Manage Airport Performance*** service.
MET	• These are new codes applying to new metrics defined through the SESAR Airport Operations Management concept relating to meteorological information. The impact will generally be the same for all flights in the given time period. It is highly likely that a MET code will occur just before or simultaneously with an AOM code or codes. • MET codes are likely to trigger the ***Manage Airport Performance*** service.

Each message has a standard code. If the AOM or MET code is followed by an 'r' it will be an alert level. However, the meaning of the code remains the same as if it is a warning and the associated message remains the same.

Refer to part 2 to see a full list of the warning/alert codes and the associated pre-set message, including A-CDM codes that will be retained.

3.2.3.3.4 Outputs

1. Updated Operational Data/Published Value

All values calculated within the ***Monitor Airport Performance*** service, including performance values, are published in the AOP. It is expected that the operational data used for monitoring purposes is the most accurate available e.g. Scheduled, Estimated, Target or Actual (see more details in section 3.2.3.3.2). For instance, in the Medium Planning phases most input data will be 'Scheduled' or 'Declared'; in the Short Term Planning and Execution phases the input data will use 'Estimated',

[30] The AOP is expected to be the next generation of the Airport – CDM Information Sharing Platform (ACISP).

'Expected', 'Target' or 'Operational/Practical' figures; after the event 'Actual' figures will be used. The ***Rules Engine*** will define which input data figures are to be used in each phase.

2. Warning Messages

A system generated process warning message warns the assigned stakeholders and the ***Manage Airport Performance*** service of a detected deviation, only for information purposes. The warning message will only be sent once for each event.

Warning messages shall also be input for the ***Record Airport Performance Data*** process of the ***Perform Post-Operations Analysis*** service. For this process, the time at which the warning is activated and the time at which the warning is de-activated against the single event must be recorded.

Each warning message shall raise a ***flag*** (for example, yellow in colour) in the HMI of the ***Airport Performance Monitoring Platform***. A detailed description containing the warning code shall be displayed as well as the standard message describing why this warning is raised and the assigned stakeholder receiving the message shall be displayed when the "warned" information element is clicked upon in the mentioned HMI. A similar standardised message shall be pushed (by local SWIM) to the assigned stakeholder who shall take action against the warning, as defined in the ***Manage Airport Performance*** service.

3. Alert Messages

A system generated alert message warns the assigned stakeholders and the ***Manage Airport Performance*** service of a detected deviation, for active intervention purpose. The alert message will be only sent once for each event.

Alert messages shall also be inputs for the ***Record Airport Performance Data*** process of the ***Perform Post-Operations Analysis*** service. For this process, the time at which the alert is activated and the time at which the alert is de-activated against the single event must be recorded.

Each alert message shall raise a ***flag*** in the HMI of the ***Airport Performance Monitoring Platform***. A detailed description containing the alert code shall be displayed as well as the standard message describing why this alert is raised; and the assigned stakeholder receiving the message shall be displayed when the "alerted" information element is clicked upon in the mentioned HMI. A similar standardised message shall be pushed (by local SWIM) to the assigned stakeholder who must take action against the warning, as defined in the ***Manage Airport Performance*** service.

3.2.4 Manage Airport Performance service

The ***Manage Airport Performance*** service comprises two processes, namely the ***Assess Overall Impact*** process and the ***Make Decision*** process. Both processes are supported by a third building block that comprises stakeholder applications and systems, hereafter referred to as the ***decision support systems***. A decision support system often resides at the premises of the responsible stakeholder and is therefore by definition not necessarily located at one location together with other decision support systems.

A ***decision support system*** contains proprietary and business sensitive information. Therefore it may be treated as a black-box[31] system that interact according to a question and answer principle. This chapter is focused on the ***Assess Overall Impact*** process and the ***Make Decision*** process, and not on the decision-making supporting processes. Specific ***decision support systems*** are not discussed in further detail since they highly depend on the local needs and implementations.

3.2.4.1 Basic Service Description

The objective of the ***Manage Airport Performance*** service is to “host” and “support” the decision making process in such a way that the total airport performance is effectively controlled and optimized. This service not only operates in “nominal” conditions like delay for specific flights or the sudden un-serviceability of gates, but especially in situations with severe disruptions or adverse (weather) conditions, such like runway blockage, low visibility, industrial actions or system malfunction. In those conditions the ***Manage Airport Performance*** service is a prerequisite to efficiently and effectively manage the total airport performance as well as the impact of the event on the airport and network performance.

The ***Manage Airport Performance*** service is active mainly in the Short Term planning phase and the Execution phase of the airport operations. The service is triggered by the ***Raise Warning / Alert*** process of the ***Monitor Airport Performance*** service when it detects deviations from plan and/or fluctuation in airport performance in the actual and forecasted setting of the airport. Following that trigger, the ***Manage Airport Performance*** service will act accordingly to return as closely as possible to plan and try to restore the performance to the agreed ***Airport Performance Baseline*** (target values). The process proactively acts in the forecasted operational situation several hours ahead (short term planning time horizon) and reactively in the actual situation of the airport.

In case of a forecasted severe disruption or adverse condition, a proactive management is required. Anticipation on situations that are likely to occur presents the opportunity to take early actions to mitigate operational disruptions and to prevent performance deterioration. The process enables to analyse different possible pre-defined or ad-hoc solutions (so called Pre-defined candidate solutions) that may enable quick recovery from a disrupted situation or even prevent that a disruption may occur. The process will continuously endeavour to conserve or recover to normal and planned operation. The process uses all available operational data necessary to make a decision. Operational data is fundamental in providing the stakeholders with the means to take appropriate decisions and actions, showing in particular the potential impact and consequences of do-nothing decisions on the airport performance.

The ***Manage Airport Performance*** service can be broken down into two main processes:

1. ***Asses Overall Impact*** process
2. ***Make Decision*** process

The trigger for action will be any process or performance alert / warning generated by the ***Monitor Airport Performance*** service or an event report sent by a relevant airport stakeholder, both internal and external to the APOC. Event reports like MET reports on adverse weather conditions and/or special event reports like industrial action or closure of a nearby airport causing a large number of

[31] In science and engineering, a black box is a device, system or object which can be viewed solely in terms of its input, output and transfer characteristics without any knowledge of its internal workings, that is, its implementation is "opaque" (black).(http://en.wikipedia.org/wiki/Black_box).

additional flights (diversions) and other occurrences can also trigger an overall impact assessment and possible actions to be taken. An event report can be delivered by phone, text, etc. It is a non-standardised way of communicating of information. An event report will trigger to instantiate an Overall Impact Message, but there is no added alert/warning message from the ***Monitor Airport Performance*** service. The event report will contain the description and as much additional information as available at that moment to expedite the impact assessment process.

The ***Assess Overall Impact*** process will perform the initial analysis to determine the severity level of the impact on operations and to prepare for the ***Make Decision*** process. The ***Make Decision*** process shall result in the selection of a collaboratively developed and agreed solution to mitigate the (forecasted) performance degradation and, when necessary, to recover as soon as possible and practical to the normal and planned operations.

Both the ***Assess Overall Impact*** process and the ***Make Decision*** process rely on supporting information and systems. The access to this supporting information and systems are described in the ***Make Decision*** process that can be viewed as a functional block in the ***Manage Airport Performance*** service.

The Airport DCB process is incorporated in the ***Assess Overall Impact*** process and in he ***Make Decision*** process. Airport Demand and Capacity Balancing (Airport DCB) represents one application example of the ***Manage Airport Performance*** service. In the following sections Airport DCB reference will be used to explain and clarify the individual process steps.

In order to ensure the traceability and the recording of the performance management activities several data will be generated. These data will be transferred from one process to another and will be interlinked. In Figure 9, it is shown the connection between the ***Monitor Airport Performance*** service, the ***Assess Overall Impact*** process and the ***Make Decision*** process through the different types of messages.

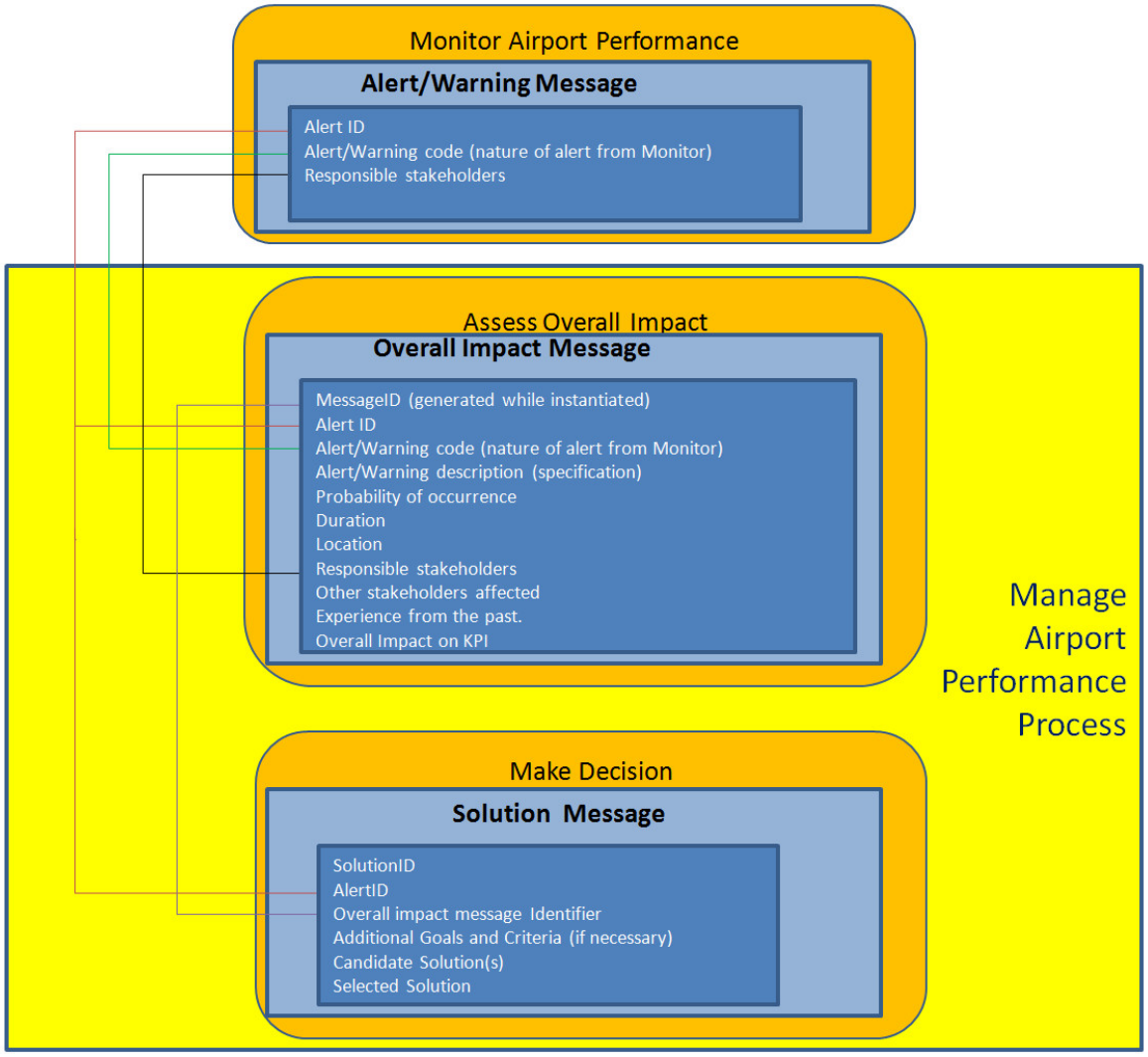


Figure 9. Linkage between Alert/Warning Message, Overall Impact Message and Solution Message.

The **Assess Overall Impact** process creates for each performance alert / warning or event report an ***Overall Impact Message*** that describes in more detail the disruption for which the performance alert / warning or event report has been generated.

The ***Overall Impact Message*** provides background information, an initial indication of the impact on operations (KPI's) and if any relevant information from the past related to comparable situations / conditions occur. It is prime input for the **Make Decision** process in order to determine the necessity for individual or collaborative action and the best solution to be taken.

3.2.4.2 Detailed Service Description

3.2.4.2.1 Assess Overall Impact process.

The main objective of the ***Assess Overall Impact*** process is to determine the impact on airport operations and performance of a (possible) performance shortfall. This includes the evaluation by experts which will be supported by systems to do a calculation of the influence on the KPI(s) and hence the performance of the airport itself. The ***Assess overall impact*** process will also set the severity level of the (actual or forecasted) disruption for which a performance alert/warning or event report has been raised. In this part of the ***Manage Airport Performance*** service, not only the impact will be assessed but also negotiations about possible candidate solutions will take place. The Overall

Impact Message will be updated with as much information as possible before being shared with the ***Make Decision*** process which will develop a solution based on the completed ***Overall Impact Message***.

From the beginning of the Overall Impact Process, the APOC Supervisor will take a mediator role within the APOC. Depending on the implementation at an airport all involved stakeholders will be gathering in an APOC room or being connected directly with the APOC via other media means. Through this direct conversation, it is possible, for all influenced additional stakeholders to assist in specifying the problem by providing their expertise and knowledge.

Generally the APOC supervisor inserts the already available information into the OIM. During this process all involved stakeholders will assess their possible impact to the given deviation and give their feedback to the APOC supervisor via the system. The APOC supervisor adds this feedback into the OIM and distributes the OIM to all involved stakeholders.

The breakdown of the ***Assess Overall Impact*** process is as shown in Figure 10:

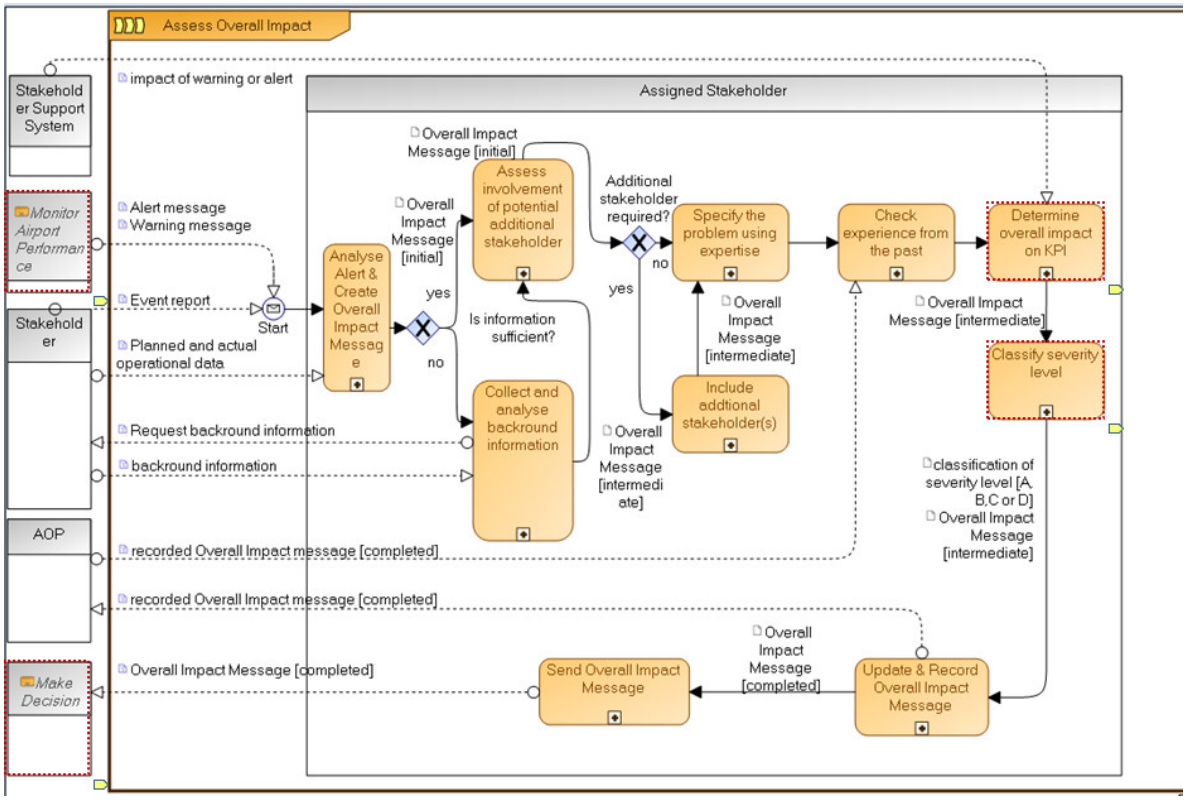


Figure 10. Assess Overall Impact process

The vehicle to describe the overall impact will be the ***Overall Impact Message***. This message will contain diverse data which will be completed along the assessment process.

3.2.4.2.1.1 Analyse alert and create Overall Impact Message activity

The starting point of the ***Assess Overall Impact*** process will be the reception of a performance alert/warning or event report received by the ***Manage Airport Performance*** service.

The Overall Impact Message Identifier (see Table 15 Item 1) will be generated through the system in the first moment of instantiation.

Table 15 summarizes the content of the ***Overall Impact Message***:

#	Item	Elements of Overall Impact Message. Description
1	Message Identifier	A unique code required for traceability with the alert / warning / event report for future post-operations analysis.
2	Alert Identifier	A unique code for the alert / warning allocated by the ***Monitor Airport Performance*** service or for the event report. Required for traceability and future post-operations analysis
3	Alert/Warning Code	A predefined code representing the nature of the alert / warning, as describe in the ***Monitor Airport Performance*** service
4	Alert/Warning/Event Description	A (short) description of the deviation or disruption (adverse condition) relevant to the alert / warning / event report
5	Probability of Occurrence	The probability of occurrence of disruption will be settled by the **Assess Overall Impact** process, during the initial analysis of the alert / warning.
6	Disruption duration	Probable start time and duration of the deviation or disruption (adverse condition) settled by the **Assess Overall Impact** process.
7	Disruption location	Gives indication where the disruption occurs.
8	Responsible stakeholder	The stakeholder that is responsible to deal with the alert/warning and to take action.
9	Other stakeholders	Other stakeholder(s) affected
10	Possible Impact	Using their expertise, the involved stakeholders are further specifying the possible impact on their own operations.
11	(forecasted) Overall Impact on KPI	(forecasted) Impact on affected KPIs evaluated from the involved stakeholders through individual systems. Additional information (comments) to the KPIs shall be inserted.
12	Severity Level	Severity level (A, B, C or D)
13	Message Status	Active / Cancelled / Completed

Table 15. Overall Impact Message elements

The initial data inserted into the ***Overall Impact Message*** will be delivered from the ***Monitor Airport Performance*** service or by an event report initiated by all stakeholders. The APOC Supervisor will get the responsibility to complete the OIM. These data are:

- Alert Identifier (see Table 15 Item 2) which is a consecutive numbering of each alert/warning generated by the ***Monitor Airport Performance*** service. This number gives the ability to trace back to a certain message
- Alert/warning code (see Table 15 Item 3) which provides the type of alert/warning. These codes are described in the ***Monitor Airport Performance*** service
- Responsible stakeholder (see Table 15 Item 8) whom the alert/warning will be assigned to. This stakeholder will be in charge of completing the ***Overall Impact Message*** possibly in cooperation with others. By default, the responsible stakeholder is either APOC supervisor or a pre-defined responsible stakeholder (depending on the type of event).It is possible to delegate the responsibility to another stakeholder
- The status of the Overall Impact Message is by default “active”

  After pressing the “cancel” button the status will automatically change to “cancelled” and the alert/warning is cancelled.

  After pressing the “publish” button the status will automatically change to “completed” and the Make Decision Process is starting.

[REQ-06.05.04-OSED-AOIP.1000]
[REQ-06.05.04-OSED-AOIP.1020]
[REQ-06.05.04-OSED-AOIP.1040]

The APOC supervisor or responsible stakeholder inserts all available information into the instantiated Overall Impact Message.

The short description of the disruption/problem will be further specified with characteristics like:

- Description
  All information about the disruption
- Location of disruption.
  The location (geographically) of the disruption may influence the action / solution to be taken. Example: TMA, runways, stands etc.
- Probability of occurrence
  When forecasting a disruption a probability of occurrence might influence the **Decision Making** process. Low probability of occurrence can delay the need for actions / solutions until more certainty is provided. High probability of occurrence can result in immediate action(s) to mitigate the performance reduction.
- Estimated start time and duration of disruption
  The duration may influence the action / solution to be taken. Disturbance with relative short duration can require actions or not. (e.g. MET forecast)

Analyse alert and create Overall Impact Message activity

Who (role):	The APOC Supervisor or the responsible stakeholder
Input:	Reception of performance alert/warning message or event report provided by ***Monitor Airport Performance*** service
Action:	To complete the ***Initial Overall Impact Message***.
Output:	• Updated ***Initial Overall Impact message :*** o ***Element 1: Message Id*** o ***Element 2: Alert Id*** o ***Element 3: Alert/Warning Code*** o ***Element 4: Alert/Warning Description*** o ***Element 5: Probability of Occurrence*** o ***Element 6: Start Time and Duration*** o ***Element 7: Location*** o ***Element 8: Responsible stakeholder*** o ***Element 13: Message Status***
Resources:	• AOP • ***Overall Impact Message*** template

Table 16. Analyse alert and create Overall Impact Message elements

In case the alert does not affect the performance of the airport the APOC supervisor or responsible stakeholder may or may not start the OIM process. In case the disruption will not impact the airport performance, it must be possible for them to cancel the Overall Impact Message and terminate this process.

[REQ-06.05.04-OSED-AOIP.5060]

3.2.4.2.1.2 Collect and analyse background information activity

In case of a performance alert/warning being raised by the ***Monitor Airport Performance*** service or an issuance of an event report, the impact of the operational disruption or performance degradation, both actual and forecasted, will most probably not be limited to a single flight. The problem needs to be further described in detail and analysed to enable the right action to be taken.

After instantiation of the ***Overall Impact Message*** due to a performance alert/warning or an event report that will be allocated to the responsible stakeholder, the process of the assessment begins.

In case the first analysis is not sufficient to determine the impact of the performance alert/warning, the responsible stakeholder must collect all available background information to identify the nature of the problem and its relevant characteristics. The responsible stakeholder shall use the ***AOP*** as common

source of information but might use other sources as well in order to gain more knowledge about the disruption and its impact on the airport performance.

The assigned stakeholder will also be supported by MET reports (forecasts).

[REQ-06.05.04-OSED-AOIP.6000]
[REQ-06.05.04-OSED-AOIP.6010]
[REQ-06.05.04-OSED-AOIP.1060]
[REQ-06.05.04-OSED-AOIP.1070]

Collect and analyse background information activity

Who (role):	The APOC Supervisor or the responsible stakeholder
Input:	***Initial Overall Impact Message***
Action:	- To investigate the disruption with more details by the use of all available information sources. - To add available information to the **Initial Overall Impact Message**
Output:	- Further investigated impact on the airport performance - All available information filled into the **Overall Impact Message**
Resources:	***AOP*** **Overall Impact Message** template Other communication and research means (telephone, internet, email etc.)

3.2.4.2.1.3 Assess involvement of potential additional stakeholder activity

The responsible stakeholder shall determine if the performance alert/warning or event report will have a potential impact on other stakeholders. In most cases, more than one stakeholder is involved when a performance deviation occurs. There must be a first quick assessment on the exposure of the disruption/event to determine if any and which other stakeholder(s) may be concerned. Then the responsible stakeholder will involve other additional stakeholders, both internal and external to the APOC.

[REQ-06.05.04-OSED-AOIP.1080]

Two possibilities exist in case of an alert regarding an imbalance between demand and capacity. If an alert on one or more of the performance KPIs is raised by ***Monitor Airport Performance*** service, the situation will be analysed by the assigned stakeholder. This information is given along with the alarm. Assuming an alert on the KPI capacity shortage that is due to a reduction in capacity compared to the nominal level and not due to an increased demand, the assigned stakeholder will be the one who is responsible for the area that is causing the capacity bottleneck (e.g. TMA capacity bottleneck → assigned stakeholder: ATC). However, in case of over demand instead of a capacity reduction, no individual responsible stakeholder can be assigned. Flights of more than one airline might be causing the over demand. The same applies for the KPIs “Delay” and “Punctuality” In these cases the APOC supervisor will be assigned to lead the impact assessment.

If it is identified by the responsible stakeholder that additional stakeholders need to be involved, the responsible stakeholder shall contact and include them in the Overall Impact Assessment process. In collaboration with these additional stakeholders relevant information is collected to further specify the (forecasted) disturbance/problem.

[REQ-06.05.04-OSED-AOIP.1050]
[REQ-06.05.04-OSED-AOIP.2000]
[REQ-06.05.04-OSED-AOIP.2010]
[REQ-06.05.04-OSED-AOIP.2020]

Assess involvement of potential additional stakeholder activity

Who (role):	The APOC Supervisor or the responsible stakeholder
Input:	Updated ***Initial Overall Impact Message***
Action:	- Identify additional influenced stakeholders

Output:	- Selection of involved stakeholders.
Resources:	***AOP*** **Overall Impact Message** template Other communication and research means (telephone, internet, email etc.)

The information element number 9 (other stakeholders affected) is completed in the ***Overall Impact Message*** by the responsible stakeholder.

The APOC supervisor or responsible stakeholder will share the OIM information at any time by pushing the send button.

[REQ-06.05.04-OSED-AOIP.5045]
[REQ-06.05.04-OSED-AOIP.5046]

3.2.4.2.1.4 Specify the possible impact using expertise activity

All involved stakeholder(s) are requested to further specify the possible impact on their own operation.

[REQ-06.05.04-OSED-AOIP.3000]
[REQ-06.05.04-OSED-AOIP.3010]
[REQ-06.05.04-OSED-AOIP.1050]

In case of KPI alerts due to capacity bottlenecks, the probability of occurrence is given along with the alert. The probability of occurrence is either entered along with the manual capacity in/out (by the stakeholder responsible for that specific capacity) or derived from the probability of occurrence of the related weather event. As an example the TMA capacity needs to be entered manually in case of a deviation from the declared value and a probability value is entered along with the number of movements. If the reason for the reduced capacity is staffing then the associated probability is 100%. If the bottleneck is related to weather then the probability relates to the probability of occurrence of the weather event.

Not only the impact of time deviations (actual versus planned; estimated versus planned) are assessed but also the impact of deviation / disturbances on all items used for the establishment of the ***AOP*** will be assessed. Capacity reduction due to unforeseen maintenance activity will logically be monitored as a deviation from the plan (actual capacity less than declared capacity). However, when the maintenance takes place during a period of low demand, the impact on airport and network operations might well be marginal and thus acceptable. In order to identify if there is no or marginal impact the “what if I do nothing” assessment will be performed.

Specify the problem using expertise activity

Who (Role):	The APOC Supervisor or the responsible stakeholder
Input:	Updated ***Overall Impact Message***.
Action:	- Complete or update elements in the ***Overall Impact Message*** with available information.
Output:	- Updated ***Overall Impact Message***.
Resources:	***AOP*** ***Overall Impact Message*** template Other communication and research means (telephone, internet, email etc.)

3.2.4.2.1.5 Check experience from the past activity

The **Check experience from the past** activity collects from the ***AOP*** (recorded data) all relevant information (including solution, impact scenarios available on this type of event, alert or warning and the corresponding post-operations analysis). The information may be used to enhance and refine the problem description and to explore the possible impact based on historical operational information.

It is assumed that a repository of disturbances / problems is available and accessible for all stakeholders involved. It is accessible through the ***AOP***. This catalogue serves as a repository for

determining the impact of a given problem. The ***AOP*** shall be able to receive a request for consulting the repository in order to find incidents from the past and their implications. It is required that experts responsible for this process will adapt the pre-defined scenarios as part of a continuous learning loop through the ***Perform Post-Operations Analysis*** service and the ***Steer Airport Performance*** service.

[REQ-06.05.04-OSED-AOIP.3020]

The repository of disturbances / problems contains all the ***Overall Impact messages*** from previous experiences, the ***Solution messages*** and the corresponding post-operations analysis. The ***Overall Impact messages*** with equal alert/warning codes will be extracted from the repository (database) to allow the **Make Decision** process to use any relevant information concerning a past impact.

Check experience from the past activity

Who (role):	APOC Supervisor and involved stakeholder
Input:	Overall Impact message and solution message from the past
Action:	- Access repository of previous similar situations and make an assessment of how this information can support the overall impact assessment. - Complete or update elements in the ***Overall Impact Message*** with available information.
Output:	- No similar situation was found - No result. - If similar situation(s) were found, record the conclusions from those instances. - Updated ***Overall Impact Message***
Resources:	***AOP*** Overall Impact messages from the past

3.2.4.2.1.6 Determine overall impact on KPIs activity

This activity step determines the overall impact on the KPIs. This might (partly) be done through the use of dedicated support systems of the involved stakeholders but will also be provided by the Demand Capacity Balancing (DCB tool) capability of the Monitor Airport Performance service (e.g. Airport-DCB system).

The ***Monitor Airport Performance*** service already provides impact information for the specific KPI for which the alert / warning has been raised. It is the prime objective of the **Overall Impact Assessment** process to determine if and to which degree there will be an impact also on other performance indicators.

The APOC supervisor will request the involved stakeholder(s) to perform a local impact on their KPIs. This will be done through individual ***decision support systems***.

If an alert on any of the KPIs related to Airport-DCB was raised, the Airport-DCB Tool which displays the KPI values will be consulted to support the assessment. Each individual stakeholder can do so on their own but will use the same Airport-DCB support tool containing the most up to date information and data. This will create a common situational awareness with respect to the overall impact on performance KPIs. The Airport-DCB support tool will show to what extent the threshold was crossed and will (in addition to the content of the alarm message) provide an indication of the duration of the problem.

The Airport-DCB tool will also show on which boundary conditions the forecast of the KPI was based. It might be that it was based on the assumption that one of the runways is not useable during a certain period due to crosswind. Information on the probability of the crosswind is also provided with the Airport-DCB tool. The probability threshold for automatically closing the runway for the KPI forecast might only slightly be crossed. If a stakeholder, judges the crosswind probability differently he might by using a what-if mode manually open the previously closed runway and will see that the KPI forecast improves and falls below the alert level. However, only the stakeholder responsible for runway usability, i.e. ATC, is allowed to change the settings in real mode. The impact will hence be reassessed.

Additional experts might be involved to manually perform local impact assessment on specific KPI(s).

The result of the local impact assessment will be used for escalating these KPI(s) to airport level. That means all local KPI(s) shall be aggregated to assess the impact of the deviation to the whole airport.

This aggregation will be used for a forecast on KPI(s) at airport level performed by the APOC supervisor.

The result of the overall impact on KPIs will be inserted to the Overall Impact Message under the field 11 “Overall Impact on KPIs”.

[REQ-06.05.04-OSED-AOIP.4000]
[REQ-06.05.04-OSED-AOIP.4010]
[REQ-06.05.04-OSED-AOIP.1050]

The APOC Supervisor takes a mediator role during the entire process. Already during the Overall Impact process, the APOC representatives are preparing options for the solution to be implemented during the recovery phase.

All APOC participants try to find personal candidate solutions and forward them to the APOC Supervisor to be inserted into the OIM. This updated OIM will be shared with all stakeholders.

Determine overall impact on KPIs activity

Who (role):	The APOC Supervisor or the responsible stakeholder
Input:	***Overall Impact message***
Action:	- By using the recorded experience from the past and the aggregated overall KPI impact assessment coming from one or more stakeholders and/or ***decision support systems*** (e.g. Airport-DCB tool) an initial KPI impact will be determined.
Output:	- Updated impact on KPIs in the Overall Impact Message
Resources:	***AOP*** Access to relevant support systems (monitors and other stakeholder systems)

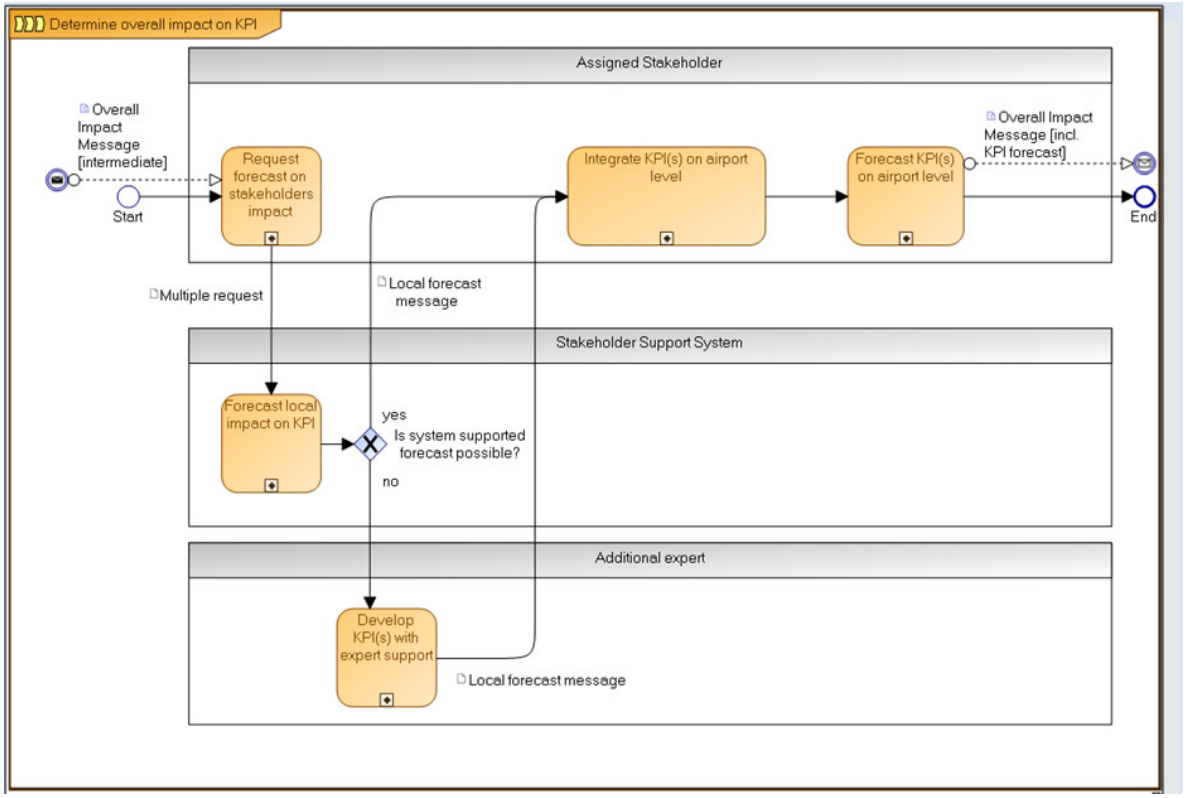


Figure 11. Determine overall impact on KPI activity breakdown

3.2.4.2.1.7 Classify severity level activity

It is important to have an indication about the severity of the expected / forecasted changing condition(s). The severity is determined by the impact of the changing condition(s) as also by its exposure.

The impact can range from “not significant” to “crisis” and the exposure from “one stakeholder at the airport” to “impacting the total airport” and even “part of the network”.

Combinations of impact and exposure are expressed in a severity level and this severity level will be an indication for next actions to be initiated.

The APOC supervisor will determine the severity level in collaboration with all involved stakeholders.

[REQ-06.05.04-OSED-AOIP.5000]

However, the responsible entity to publish the severity level is the APOC supervisor (or airport operator in case no APOC is implemented) and will therefore have the ability to overrule the severity level as determined by the responsible stakeholder.

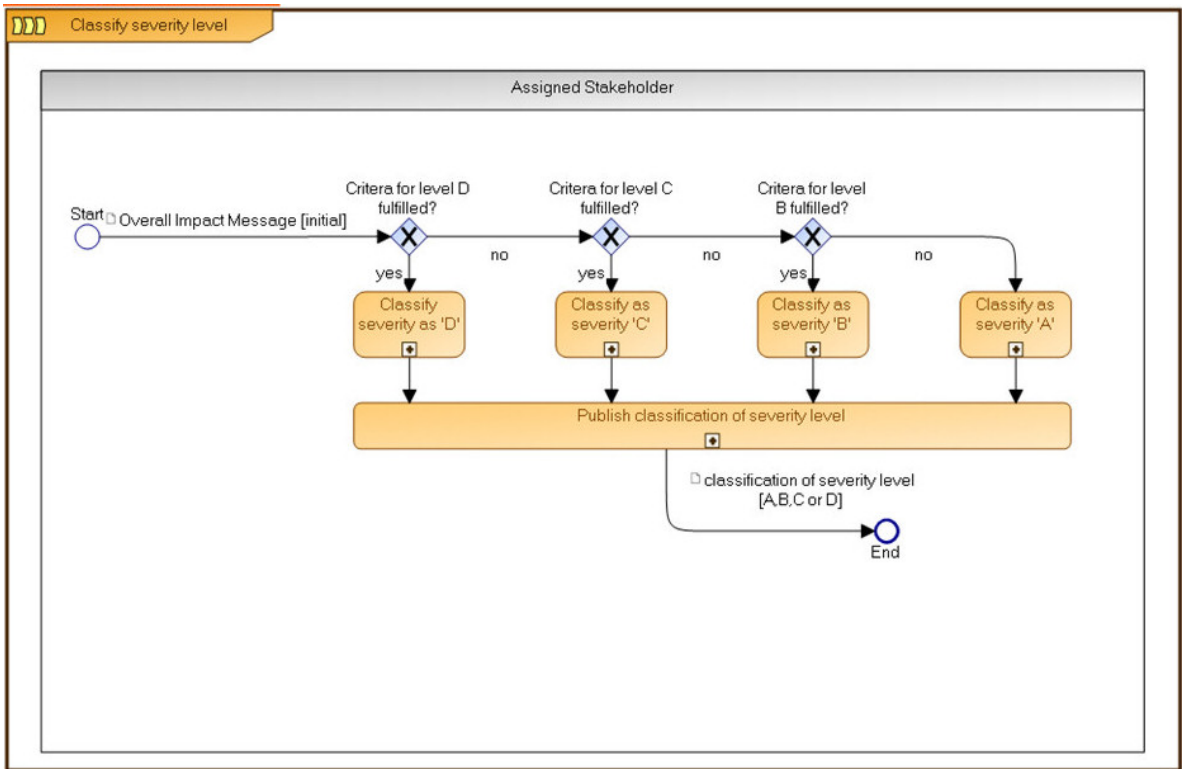


Figure 12. Classify severity level activity breakdown

The severity levels are described as follows:

- **Green status, monitoring mode, severity level A:**

  The operations are executed on or near to plan, within the performance and service level agreement targets determined under the Steer Airport Performance Service. Some operations are executed with minor deviations from the plan, but within the performance and service level agreement targets. When a deviation of airport performance exceeds a threshold level, a warning/alert is forwarded to the appropriate individual stakeholder to take appropriate actions. The involved stakeholder may find a local solution to return to the baseline plan. In most cases this will result in an AOP update by the responsible stakeholder.

  [REQ-06.05.04-OSED-AOIP.5040]

  Once solved by the responsible stakeholder and updated in the AOP, the alert will be removed. The alerts should also be made available to the APOC in silent mode; specific monitoring/coordination action being triggered at APOC level only if an alert has not been removed after a timeout. In that sense the APOC should manage alerts by exception, only a very few should be raised up at APOC level.

- **Orange status, negotiation mode, severity level B:**

  The orange status will be set if the Monitor Airport Performance Process indicates deviations from the plan, and the performance and service level agreement targets are challenged (below the maximum deviation threshold determined from the Steer Airport Performance Process). At this level more than one stakeholder can/will be involved with the same problem. The problem is limited *to* time and scope and a solution can be found through APOC mediation in the “Make Decision Process”.

  REQ-06.05.04-OSED-*AOIP.5030]*

- **Red status, disruptive mode, and severity level C: (Adverse Conditions)**

  When the deviation on the performance exceeds the maximum threshold allowed determined under the Steer Airport Performance Process, adverse conditions will be activated. Possible adverse conditions can be a severe thunderstorm with possible stop of operation or a closure of a runway due to an accident. Adverse conditions will have impact to a wider scope and can

maintain over a longer period of time. The impact will influence a bigger number of stakeholders with a significant impact on the total performance of the airport.

[REQ-*06.05.04-OSED-AOIP.5020]*

- **Black Status, crisis mode, severity level D**

  In case of a major accident or terrorist attack, etc. a crisis management cell at the airport will take over. Operations during a crisis situation are described in the crises manual and determine clear action rules. The crisis management cell will have its focus on the crisis itself (e.g. the crash or aircraft hijack). It also remains responsible for fast and reliable communication to all ATM players, being the focal point where updated and reliable information about the crisis comes together. The APOC supports this process as defined under severity level C.

REQ-06.*05.04-OSED-AOIP.5010]*

Classify severity level activity

Who (role):	The APOC Supervisor or the responsible stakeholder
Input:	***Overall Impact Message***
Action:	- Determination of severity class of the occurrence according to pre-set description
Output:	- The severity level is inserted in the **Overall Impact Message**
Resources:	Access to relevant support systems (monitors and other ***decision support systems***)

3.2.4.2.1.8 Update and record overall impact message activity

The completed ***Overall Impact Message*** now provides additional background information. This includes an initial indication of the impact on operations, who else will be involved, any relevant information from the past related to comparable situations/condition, influence on KPI's from stakeholders and on airport level and the severity level of the impact on the airport. All this is the main input for the Make Decision Process in order to determine the necessity for individual or collaborative action and the best solution to be taken.

[REQ-06.05.04-OSED-AOIP.1020]
[REQ-06.05.04-OSED-AOIP.1050]
[REQ-06.05.04-OSED-AOIP.6000]

The responsible stakeholder finalizes the overall impact message by checking all the information elements of the message on completeness.

The ***Overall Impact Message*** is then recorded in the AOP. Thus, it is ensured that the message can be connected with a solution message and it can be used for a later Post-Operations Analysis to trace and evaluate the quality of the process.

[REQ-06.05.04-OSED-AOIP.1010]
With the recording of the completed ***Overall Impact Message*** in the ***AOP***, the message will be available for further use for future upcoming alerts/warnings for the purpose of **Overall Impact Assessment** activity.

Update and record overall impact message activity

Who (role):	APOC Supervisor and involved stakeholder.
Input:	Completed ***Overall Impact Message***
Action:	- Update if needed and record the ***Overall Impact Message***
Output:	- Recorded the completed ***Overall Impact Message*** - Finalised ***Overall Impact Message***
Resources:	***AOP***

3.2.4.2.1.9 Publish overall impact message activity

Once the ***Overall Impact Message*** is completed, the responsible stakeholder, in coordination with the APOC supervisor, publishes the final ***Overall Impact Message*** which triggers the **Make Decision** process. With the publishment the OIM will become available to all relevant airport stakeholders, both internal and external to the APOC.

REQ-06.05.04-OSED-AOIP.5050
[REQ-06.05.04-OSED-AOIP.7000]
[REQ-06.05.04-OSED-AOIP.7010]

Even after publication of the OIM and if needed, the APOC supervisor shall have the ability to update and send again the OIM through the entire process (including make decision process).

[REQ-06.05.04-OSED-AOIP.5046]
[REQ-06.05.04-OSED-AOIP.7020]

Send overall impact message activity

Who (role):	APOC Supervisor.
Input:	Completed ***Overall Impact Message***
Action:	- Send ***Overall Impact Message*** to Make Decision Process
Output:	- Sent ***Overall Impact Message***
Resources:	AOP

3.2.4.2.2 Make decision process

This process aims at describing the decision making activities in accordance with the ***AOP*** consistency rules defined by the ***Steer Airport Performance*** service on the basis of the output of the **Assess Overall Impact** process. The **Make Decision** process provides the functional procedures for the decision making for any corrective and/or pro-active actions to be applied by stakeholders in an individual way or by means of a collaborative process. In the latter case, this process will come up with a recommended set of actions mainly based on predefined solutions that should either solve or mitigate issues against airport performance in any kind of disturbance respectively adverse condition. Otherwise ad-hoc solutions will be developed if predefined solutions are inappropriate.

This process will end up with agreed assigned actions to be taken by the stakeholders, including publishing the solution.

These agreed actions will be documented in a ***Solution Message*** which is linked to the ***Overall Impact Message*** through the Alert ID.

Num	Element	Description.
1	Solution Message Identifier	It is unique ID for each solution message.
2	Alert/Warning Identifier (consecutive number from Monitor)	In order to assign the solution message to a dedicated Alert/Warning.
3	Overall Impact Message Identifier	In order to assign the solution message to a dedicated overall impact message
4	Additional Goals and Criteria (if necessary)	To avoid continuous indication of alert/warning if the originally planned threshold cannot be achieved in the degraded situation. This periodically threshold will be set for a limited period of time.
5	Candidate solution(s).	List of possible solutions retrieved from the Predefined solution table or ad-hoc defined solutions
6	Selected solution	Final solution to be implemented

Table 17. Solution message elements

The implementation of the selected solution will be done by the responsible stakeholder but this is out of the scope of this service.

In general two different situations of deviations or disruptions may occur:

Unpredicted

An unpredicted deviation or disruption (adverse condition) is a situation that cannot or has not been anticipated, for which there is very limited time to react. Depending on the impact on the operation, decisions may be taken at individual stakeholder level or using a collaborative decision making process if more stakeholders are involved. In the latter case, assessing expected impact of pre-defined adverse conditions scenarios as described in the previous Assess Overall Impact Process, pre-defined scenarios will be used to keep responsible to recover airport operations to the highest possible level.

Predicted

A predicted deviation or disruption (adverse condition) is a situation for which pro-active management is possible through anticipation, i.e. when a situation is likely to degrade according to tendencies and forecasts issued by ***Monitor Airport Performance*** service and evaluated through **Assess Overall Impact** process as previously described. Anticipation of situations likely to occur presents the opportunity to take early actions to mitigate risks of deviation from performance targets as well as monitoring the results about what was expected. It also enables to prepare an agreed course of actions associated with an expected impact on performance (through **Assess Overall Impact** process) to be implemented in the case early actions do not produce expected results or when degradation of performance reaches a pre-determined level.

The **Make Decision** process can be envisaged as an iterative loop supported by the ***Monitor Airport Performance*** service for evaluating different solutions through what-if cycle. The **Decision Making** process will therefore be based on the outcome of the **Assess Overall Impact process** and the situation awareness of the involved stakeholders by all assessable information sources.

Based on information provided by the **Assess Overall Impact** process including adverse conditions, stakeholders will be able to determine the strategy they have to follow, by either implementing local defined ad-hoc solutions or pre-defined action scenarios. As there will not always be a pre-determined solution for every possible situation, a default solution, coming closest to the actual situation, may be selected within the **Make Decision** process as described later on. Furthermore, since every airport is unique, the candidates of possible solutions must be defined individually according to local conditions.

During post-operations analysis the effectiveness of the selected solution will be investigated to assess whether the selected solution was the most appropriate one. This might result in the adjustment of the available predefined solution or in the decision to create a new solution.

The assessment of expected impact of different solutions on individual stakeholders and overall airport performance will help in reaching an agreement between stakeholders about implementing a course of actions for which expected benefits will be compared with actual benefits.

The entire **Make Decision** Process is shown in the diagram below.

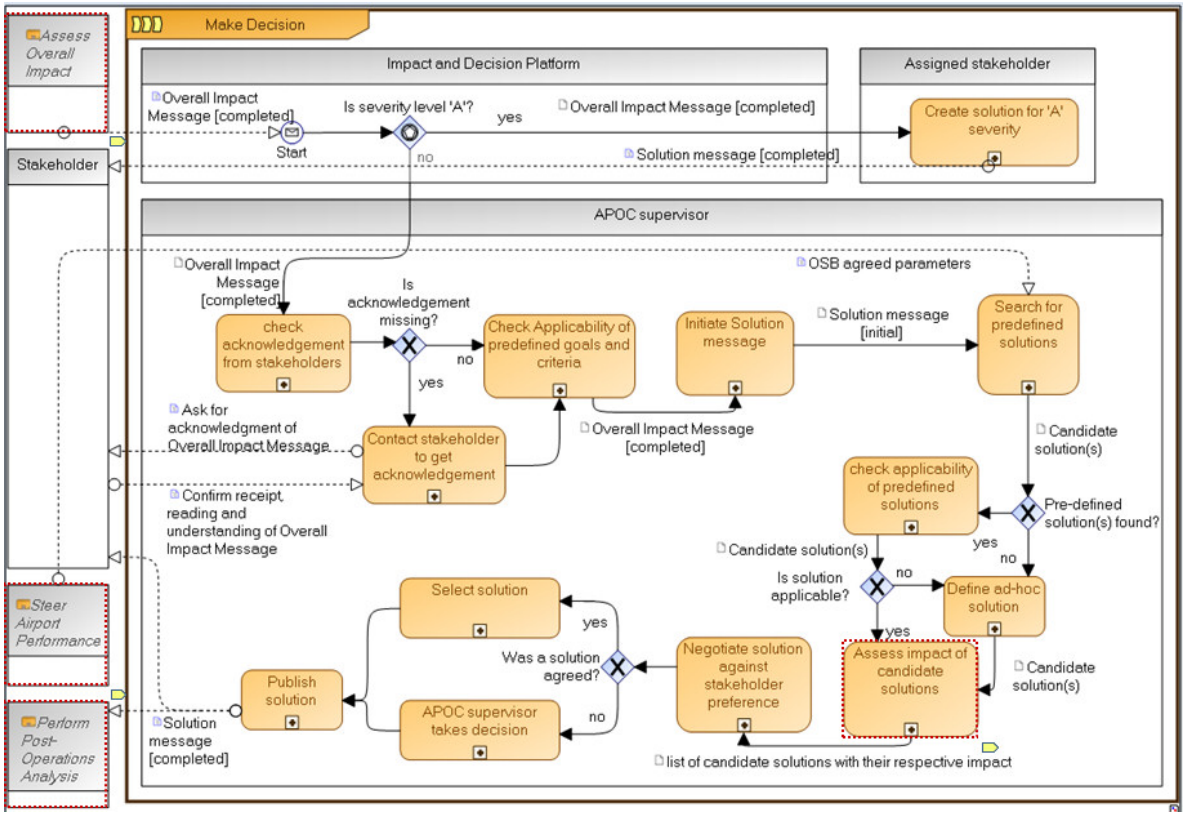


Figure 13. Make Decision process breakdown

3.2.4.2.2.1 Check acknowledgement from stakeholders and contact stakeholders to get acknowledgement activities.

Individual stakeholders must acquire a common situational awareness based on the elaborated overall impact message from the **Assess Overall Impact** process and in combination with additional information sources from ***Monitor Airport Performance*** service and event reporting. It is essential that all relevant airport stakeholders are involved and committed to this process to obtain complete awareness in order to increase collaboration.

[REQ-06.05.04-OSED-MDEC.0100]
[REQ-06.05.04-OSED-MDEC.1000]
[REQ-06.05.04-OSED-MDEC.1020]

After reception of the ***Overall Impact Message***, the acknowledgement of all stakeholders must be checked within the collaborative information alignment. In case all involved stakeholder confirm that the necessary information is available, the process follows with the next steps “Check applicability of predefined goals and criteria” activity and “Initiate Solution Message” activity.

Check acknowledgement from stakeholders’ activity

Who (role):	APOC supervisor and all stakeholders
Input:	Acknowledgement from stakeholders that they have received, understood and agreed with the information content of the ***Overall Impact Message***
Action:	- To check if all additional stakeholders have sent their acknowledgement after the ***Overall Impact Message*** reception.
Output:	- A list of the additional stakeholders that have already sent their acknowledgement after the ***Overall Impact Message*** reception and a list of those that has not yet done so.

Resources:	*AOP*

If there are acknowledgements missing, the open issues and missing information have to be checked and clarified with the involved stakeholders through the APOC Supervisor. If there is no reply within a timeframe (to be set individually) the APOC Supervisor shall force the acknowledgement.

[REQ-06.05.04-OSED-MDEC.1021]

Contact stakeholder to get acknowledgement activity

Who (Role):	APOC supervisor
Input:	List of additional stakeholders who have not sent an acknowledgement of reception
Action:	- To contact those involved stakeholders who have not yet sent its acknowledgement after the ***Overall Impact Message*** reception and get its acknowledgement. In case there is no reply from the contacted stakeholders within a pre-defined timeframe (to be set individually in each airport) the APOC supervisor shall force the acknowledgement.
Output:	- Acknowledgement from all involved stakeholders
Resources:	*AOP*

3.2.4.2.2.2 Check applicability of predefined goals and criteria activity

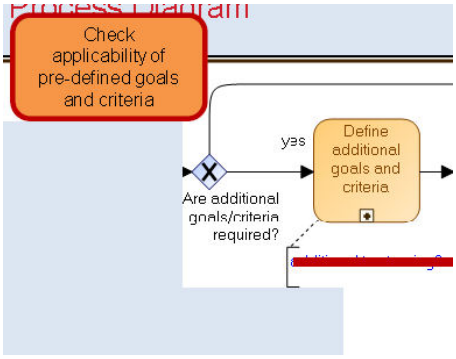


Figure 14. Check applicability of predefined goals and criteria activity

After acknowledgement of the ***Overall Impact Message*** the responsible stakeholder shall check the applicability of the pre-defined goals and criteria and set new ones, if necessary. The purpose of this activity is to avoid a continuous indication of an alert during a serious disruption (adverse condition). This happens if goals cannot be reached even though mitigating actions will be implemented. The new balanced plan will remain in a lower performance level than defined from the ***Steer Airport Performance*** service.

[REQ-06.05.04-OSED-MDEC.1022]

The determination of additional goals and criteria for example, which KPIs have to be monitored against KPAs (Capacity, Efficiency, Environmental Sustainability, Flexibility and Predictability) or on what level of impact to the recovery procedures have to be focussed on, shall be done through agreement with all involved stakeholders. Only after a collaborative acceptance of the refined criteria's and goals is reached, the search for appropriate predefined solutions can be started. The additionally defined goals and criteria have a temporal validity to be defined concurrently because they must be revoked to return to the original performance.

[REQ-06.05.04-OSED-MDEC.2500]
[REQ-06.05.04-OSED-MDEC.2600]
[REQ-06.05.04-OSED-MDEC.2610]

If no additional goals and criteria's are required respectively necessary, then the process step "search pre-defined solutions" can be started directly.

Pre-defined goals and criteria are of high relevance for the Airport-DCB process. Airport-DCB will present solutions optimized for different KPIs. If a situation occurs that requires prioritizing one of the KPIs during a well-defined period (e.g. departure punctuality if it is the end of the day, or arrival

capacity shortage during inbound peak periods) this information is vital for selecting candidate solutions in the following step.

Check applicability of predefined goals and criteria activity

Who (role):	APOC Supervisor, responsible stakeholder and additional stakeholders
Input:	***Overall Impact Message***
Action:	- To check the applicability of the pre-defined goals and criteria to the deviation. If needed, define new goals and criteria in a collaborative way.
Output:	- A set of new goals and criteria (only when necessary) with a lower performance level than defined from the Steer Airport Performance service. - A time frame for the duration of the new set of goals and criteria
Resources:	Overall Impact Message Steer Airport Performance Repository (List of the pre-defined goals and criteria)

3.2.4.2.2.3 Initiate solution message activity.

The solution message described in [UC 654 04. Instantiate and complete a solution message] needs to be initiated with basic information before being enriched in a series of steps.

The elements set during this phase are:

- Element 1: Solution Message Identifier
- Element 2: Alert/Warning Identifier (consecutive number from Monitor)
- Element 3: Overall Impact Message Identifier
- Element 4: Additional Goals and Criteria (if necessary)

Initiate solution message activity

Who (role):	System
Input:	Overall Impact Message Agreed new set of goals and criteria (when necessary) Agreed time frame for application of goals and criteria
Action:	- Initiate the solution message filling in the relevant elements coming from the inputs
Output:	- Initial Solution Message
Resources:	***AOP*** ***Initial Solution Message*** template

3.2.4.2.2.4 Search for pre-defined solutions & check applicability of pre-defined solutions & define ad-hoc solutions activities.

All involved stakeholders will assess the candidate solutions or come up with new candidates or retrieved pre-defined solution documented in the pre-defined solution table.

The procedure for searching and evaluating predefined solutions is described in [UC 661 01. MANAGE – Search Find pre-defined Candidate Solution for adverse condition event] (See detailed description for development and update of the predefined solution table in section 3.2.4.2.3)

Reference is made here to pre-described solutions as documented in the predefined solution table stored in the ***AOP***. The purpose is to search and find predefined solutions to handle and solve the deviation or disruption (adverse condition) in the best way.

This process step “searching for predefined solution” will result in finding a set of appropriate solutions for the occurred events and make it available for the subsequent collaborative decision making process.

[REQ-06.05.04-OSED-MDEC.3000]
[REQ-06.05.04-OSED-MDEC.3010]

Search for predefined solutions activity

Who (role):	APOC supervisor or responsible stakeholders
Input:	***Initial Solution Message*** OSB agreed Parameters
Action:	- To search and find predefined solutions to handle and solve the deviation or disruption (adverse condition). The searching shall be done among the predefined solutions table stored in the ***AOP***.
Output:	- A set of predefined solutions to handle and to solve the deviation or disruption (adverse condition)
Resources:	***Solution Message*** ***AOP***

If predefined solutions are available, they have to be checked and assessed against the defined goals and criteria's, like

- To which requirements must these solutions comply?
- To what extent optimisation and utilization of recourses are required?
- What are the boundaries and goals for the recovery of the adverse condition?

The outcome of this collaborative process (evaluation of the applicability of predefined solutions) shall be:

- A set of best suitable candidate solutions out of the stored predefined solution table in order to assess the impact of the candidate solutions on operations during the entire duration of the disturbance
- A set of best suitable predefined solutions to achieve an optimal recovery back to normal operations

Check Applicability of predefined solutions activity

Who (role):	APOC supervisor or responsible stakeholders
Input:	Solution Message Candidate solutions
Action:	- The set of predefined solutions shall be checked and assessed against the defined goals and criteria
Output:	- One set of best suitable candidate solutions out of the ***Steer Airport Performance Repository*** in order to assess the impact of the candidate solutions on operations during the entire duration of the disturbance - List of feasible candidate solutions
Resources:	***AOP***

The predefined solution table may contain diverse solutions. To facilitate the process of selecting a solution only the most feasible three solutions should be selected for further negotiation.

[REQ-06.05.04-OSED-MDEC.3011]
[REQ-06.05.04-OSED-MDEC.3012]
[REQ-06.05.04-OSED-MDEC.3013]
[REQ-06.05.04-OSED-MDEC.3016]

Define ad-hoc solutions activity

In case no predefined solution is available, a new ad-hoc candidate solution has to be developed [UC 661 02. MANAGE - Develop an ad-hoc candidate solution for adverse condition event if no pre-defined solution is available]. The purpose of this step is to create an appropriate ad-hoc candidate solution set to handle and resolve the adverse condition event with the most positive impact on the KPA. The same requirements as mentioned above apply here too.

The name of the ad-hoc solution must be such, that this solution can be retrieved from the system. Since this ad-hoc solution could become a pre-defined solution, the retrievability of this solution is very important. Therefore the name should contain keywords related to this event.

[REQ-06.05.04-OSED-MDEC.3014]
[REQ-06.05.04-OSED-MDEC.3015]

The main activities within this process step are:

- The assigned stakeholders have to be clearly aware of their goals and priorities, their performance and the needs of the overall process, resulting in the boundary of maximum concessions the involved stakeholder are able to take
- In a collaborative decision making process under the lead of the APOC Supervisor, a set of e.g. three possible solutions has to be evaluated if they are mature enough to comply with the defined goals and criteria
- If the assessment against the criteria's is promising, the best solution has to be assessed for implementation according to the step "Assess impact of candidate solutions"

Who (role):	APOC supervisor or responsible stakeholder and all additional stakeholders
Input:	Collaborative agreement that no pre-defined solution is applicable to the situation.
Action:	- In case no predefined solution is available, a new ad-hoc candidate solution has to be created in order to handle and resolve the adverse condition or event
Output:	- A set of maximum three possible ad-hoc candidate solutions to be assessed regarding their capability to comply with the defined goals and criteria
Resources:	***AOP*** Template for creating an ad-hoc solution

3.2.4.2.2.5 Assess impact of candidate solutions activity

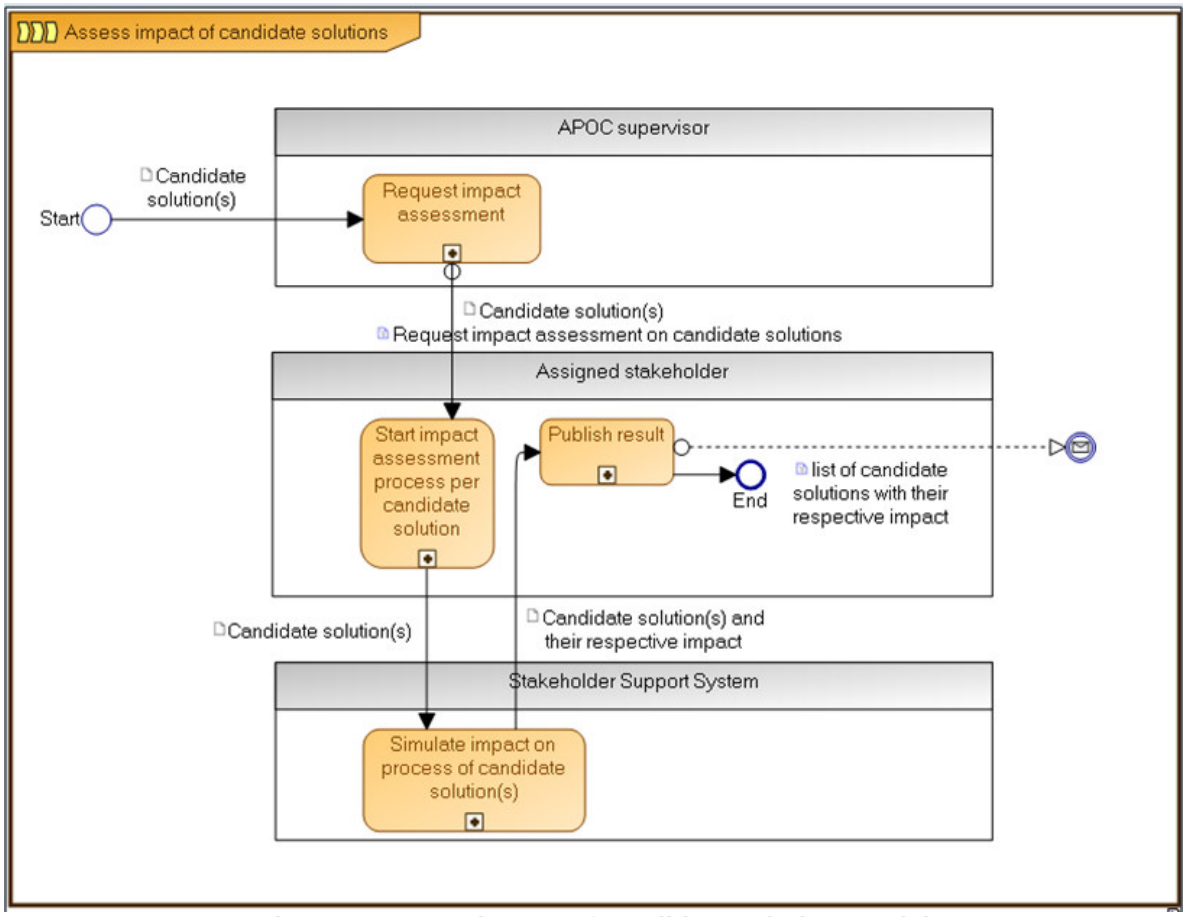


Figure 15. Asses impact of candidate solutions activity

The steps in Figure 15 are strongly relying on the stakeholders owned systems and process as also on the "what-if" capability of the Airport-DCB tool/system. After assessment, each assigned stakeholder publishes its list of candidate solutions to the APOC Supervisor. These candidate solutions are the most appropriate way of managing the specific deviation or disruption (adverse condition) for this assigned stakeholder.

[REQ-06.05.04-OSED-MDEC.5000]
[REQ-06.05.04-OSED-MDEC.5030]
[REQ-06.05.04-OSED-MDEC.5050]

Certain candidate solution can have an impact on the network. In that case close coordination with the Network Manager (one of the relevant airport stakeholders) is required to assess the network impact. Each candidate solution shall be assessed by using the Airport-DCB "what-if" capability to calculate the relevant KPI values based on forecasted landing and take-off times.

In case of a demand and capacity imbalance the Airport-DCB outcome of the proposed candidate solutions are presented to the decision makers. With help of the HMI they will see the values of the KPIs for each solution, identifying the effectiveness of each solution on the mitigation of the problem. In many cases Airport-DCB will not be able to prevent a disturbance from happening and the "assess impact of candidate solutions" process will consist of finding the least performance restraining solution.

Since the proposed Airport-DCB in step 1 does not take into account the apron / stand & gate capacity as an input to its optimizations the impact of each solution with respect to conflicts in the stand and gate planning must be further analysed by using other tools (e.g. what-if analyses using the airport's gate/stand allocation and planning tool).

If none of the solutions presented by the DCB is acceptable to the decision makers they can trigger an assessment cycle based on a new ad-hoc solution defined by them i.e. by selecting a different distribution of capacities.

All candidate solutions (also from the other stakeholders) must be shared to increase the common situational awareness.

[REQ-06.05.04-OSED-MDEC.5060]

Assess impact of candidate solutions activity

Who (role):	APOC supervisor or responsible stakeholder and all additional stakeholder
Input:	List of at least one and maximum three most feasible candidate solutions
Action:	- Each stakeholder assesses, individually, with their own decision support system and tools the impact of the candidate solutions
Output:	- Selected solution sent to the involved stakeholder and providing the associated impact
Resources:	Additional stakeholders own decision support system and tools Solution Message

3.2.4.2.2.6 Negotiate solution against stakeholder preferences & select solution activity.

In a negotiation session under the lead of the APOC Supervisor, the candidate solutions are assessed against the stakeholder's individual preferences in order to find a common agreement.

The decision makers compare the outcome of all assessments. Since KPIs might counteract each other, a negotiation process might become necessary if no predefined goals and criteria are applicable. One stakeholder may be more in favour of establishing a solution with the highest possible punctuality; others may prefer a solution giving the least possible delay. The stakeholders can now change the default weighting of the KPIs in the target function and iterate the process described above until DCB presents a solution that all partners can agree to.

[REQ-06.05.04-OSED-MDEC.6000]

Decision making will depend on whether pre-defined goals and criteria are applicable. This will guide the selection process towards a commonly agreed solution. Negotiation will be very limited in that case.

If all stakeholders can agree on one solution, this solution will be selected for further implementation.

[REQ-06.05.04-OSED-MDEC.6010]

Negotiate solutions against stakeholder's preferences and select solution activity

Who (role):	APOC supervisor and all additional stakeholders
Input:	List of the selected solutions and their impact sent by each stakeholder
Action:	- In a negotiation session under the lead of the APOC Supervisor, all the published solutions are measured against the stakeholder's preferences in order to find an agreement.
Output:	- A single commonly agreed solution
Resources:	Solution Message

3.2.4.2.2.7 APOC supervisor takes decision activity

If within this negotiation session no agreement can be reached, the APOC Supervisor will take the final decision. This should take place for the purpose to end the decision making process and select a

solution to continue operations He will publish the decision and enforce the implementation of the selected solution.

The solution message will be updated by the APOC Supervisor with the selected solution. This is to ensure that the solution is recorded and can be retrieved in case of a post analysis activity.

[REQ-06.05.04-OSED-MDEC.0100]
[REQ-06.05.04-OSED-MDEC.0110]
[REQ-06.05.04-OSED-MDEC.6011]
[REQ-06.05.04-OSED-MDEC.6013]

APOC Supervisor takes decision activity

Who (role):	APOC supervisor
Input:	List of the selected solutions and their impact sent by each stakeholder
Action:	- If within the negotiation session no agreement can be reached, the APOC Supervisor will take the final decision.
Output:	- Decision on one solution
Resources:	None

3.2.4.2.2.8 Publish solution activity

The APOC Supervisor will publish the final solution in the ***AOP*** to make ensure that all involved stakeholder are informed about the selected solution.

[REQ-06.05.04-OSED-MDEC.6014]
[REQ-06.05.04-OSED-MDEC.6015]
[REQ-06.05.04-OSED-MDEC.6016]

Publish solution activity

Who (role):	APOC supervisor
Input:	Selected solution
Action:	- To publish selected solution
Output:	- Selected solution message is published - ***Completed Solution Message***
Resources:	***AOP*** Solution Message

3.2.4.2.2.9 Stakeholders' implementation of the solution activity

After the decision is taken in a collaborative way or by means of the APOC Supervisor in case no agreement could be found every involved stakeholder shall implement the selected solution in the part of ***AOP*** which is under its responsibility. Every involved stakeholder must act according to the implemented solution.

[REQ-06.05.04-OSED-MDEC.7000]

Stakeholders' implementation of the solution activity

Who (Role):	All involved stakeholders.
Input:	Selected solution
Action:	- Each stakeholder implements the selected solution for the part under their responsibility.
Output:	- The selected solution is implemented by all involved stakeholders.
Resources:	***AOP***

3.2.4.2.3 Development and update of the pre-defined solution table process

During the **Make Decision** process, one process step called "search for pre-defined solutions" is defined. The mentioned pre-defined solutions will be stored in the predefined solution table in form of a set of data (see table below). The pre-defined solutions will be used in order to find the best possible way to manage the airport in case of deviation or disruption (adverse condition) of normal operations. The main purpose of this table will be to effectively handle an event or adverse condition, either predicted or unpredicted by using the experience from the past.

The following text explains how the predefined solution table is created, updated and how it will be used in the **Make Decision** process.

[REQ-06.05.04-OSED-MDEC.3000]

No	Element of Predefined Solution Table
1	Stakeholder name
2	Cancel flight: e.g. Prioritisation (cont/intercont)
3	Delay flight: e.g. Prioritisation (cont/intercont/all)
4	Change TOBT: Milestone in turnaround process (set/reset/adjust)
5	Change TSAT: Milestone in turnaround process (set/reset/adjust)
6	Change TTOT: Milestone in turnaround process (set/reset/adjust)
7	Change TTA: Milestone in turnaround process (set/reset/adjust)
8	Repositioning: e.g. (Remove from gate)
9	Other: Additional Information
10	Comments:
11	Alert/Warning Code: from overall impact message (link)
12	Alert/Warning description: description according to monitoring list
13	Candidate Solutions: Description of possible solutions

Example:

Operational Consequence	Stakeholder name								
	Cancel flight	Delay flight	Change TOBT	Change TSAT	Change TTOT	Change TTA	Re-Posi-tioning	Other	Comments
		all	reset		reset				
Alert/Warning code: …… Alert/Warning description: Low Visibility Procedure Activation	Candidate solutions for a Procedures Activation 1. In case the low visibility will last for 1-2 hours, all flights will be delayed. Flights will be departing as sequenced 2. In case the low visibility will stay until half a day, flights will be merged if possible, so there will be less outbound flights Which flights will be combined, will be decided on the day of occurrence 3. Depending on Peak-Situation: Unpeak – delay all flights, Peak - merge flights where possible and try to depart as much flights as possible								

Table 18. Example of the predefined solution table

[REQ-06.05.04-OSED-ADCO.0015]

The purpose of such pre-defined solutions is to optimise the **Make Decision** process by providing the stakeholders with one or more “proven” options to mitigate the impact of special events within a short timeframe. The pre-defined solutions are derived from experiences from the past (post-operations analysis) and will give the opportunity to make the decision making process faster and more reliable, since these solutions have already been appropriate solutions taken in a similar adverse situation.

[REQ-06.05.04-OSED-ADCO.0013]

Since there are many different stakeholders at an airport, the management of the operations shall be done in a most efficient, effective and satisfying way and most suitable for all participants. Every single stakeholder is having its own set of pre-defined solutions gathered in a table.

The alert/warning code is referring to the list of codes as defined in the monitoring process.

A set of operational consequences will give the assigned stakeholder the possibility to document the possible changes or adjustments of the milestones during the turn-around process.

The main data field of the table is to document one or more pre-defined solutions, like solutions being used during a previous similar situation and turn out to be a very suitable solution for solving the specific deviation or disruption (adverse condition). Every stakeholder will present their own pre-defined solutions. The selection of one solution to be implemented will be made in a collaborative way.

After each deviation or disruption (adverse condition) a post-operation analysis will take place. The outcome of the analysis can be such that a stakeholder wants to update or re-write the predefined solution table. This can either be a completely new pre-defined solution or an adjustment of an existing one.

[REQ-06.05.04-OSED-ADCO.0010]
[REQ-06.05.04-OSED-ADCO.0012]

In case of update of or addition to the predefined solution table, elementary information needs to be inserted in the table.

As every airport is unique and differs from its complexity and way of operations, the content of the table has to be adapted to the local conditions of each airport. Every airport may decide by itself how to retrieve the basic information for instantiation of the table or for development of new pre-defined processes; for example by means of a questionnaire. The questionnaire will contain basic questions about operations at the airport in order to retrieve the basic handling of an assigned stakeholder. This basic information is transferred into the predefined solution table as shown in table “Example of the predefined solution table”. This is differentiated into changes of milestones in the turnaround process, comments and descriptions of predefined solutions.

It is considered that basic pre-defined procedures e.g. Contingency plans and/or emergency procedures already exist on which pre-defined solutions can be further derived and developed.

[REQ-06.05.04-OSED-ADCO.0001]
[REQ-06.05.04-OSED-ADCO.0002]
[REQ-06.05.04-OSED-ADCO.0011]
[REQ-06.05.04-OSED-ADCO.0014]

3.2.4.3 Roles, (internal) Resources, Inputs and Outputs of the Manage Airport Performance service.

3.2.4.3.1 Roles

The participating roles in the Manage Airport Performance service are:

- APOC Supervisor
- Involved stakeholders
- Responsible stakeholders

Detailed responsibilities of all stakeholders involved in the “Manage Airport performance service” can be found in Section 4.2 (Roles and responsibilities).

3.2.4.3.2 Resources

List of resources for Manage Airport Performance service

AOP	Database where to find the predefined solutions to handle and solve the deviation or disruption, the experience from the past the pre-defined goals and criteria
Assigned stakeholders’ owned systems (“decision support systems”)	Systems external to the APOC that the stakeholders use to assess and simulate impact of each candidate solution and support their decisions in their sphere of responsibility.
Overall Impact Message / Overall Impact Message template	Standardized message used to describe the overall impact. This message will contain diverse data which will be completed along the Assess Overall Impact process.
Solution Message / Solution Message template	Standardized message used to describe the solution to an alert/warning/event report. This message will contain diverse data which will be completed along the decision making process
Template for creating an ad-hoc solution	Table used to describe a solution. This table will contain diverse data which will be used to describe the solution to an alert/warning for which no predefined solution exists
Steer Airport Performance Repository	List of predefined goals and criteria

Table 19. List of resources for Manage Airport Performance service

3.2.4.3.3 Inputs

List of inputs for Manage Airport Performance service.

Acknowledgement from stakeholders that they have received, understood and agreed with the Overall Impact Message	When an Overall Impact Message is issued by the Assess Overall Impact Process, it has to be acknowledged by the stakeholders
OSB agreed Parameters (Current Airport Performance Framework)	List of KPI / PDI, target values, rules, trade-off criteria...
Alert / Warning message	Standardized message provided by Monitor Airport Performance service informing the APOC Services and stakeholders of a deviation in the airport activity leading to an alert or a warning.
Event report	An Event Report is a non-standardized message issued directly by a stakeholder via any means of communication to inform the APOC of a problem
Solution Message	Standardized message used to describe the solution to an alert/warning/event report. This message will contain diverse data which will be completed along the decision making process
List of selected solutions and associated impact from all stakeholders	When several solutions fulfil the goals and criteria, some of them are selected among all

Table 20. List of inputs for Manage Airport Performance service

3.2.4.3.4 Outputs

List of outputs for Manage Airport Performance service:

Request for acknowledgement of reception of the Overall Impact Assessment message	When an Overall Impact Message is issued by the Assess Overall Impact Process, it has to be acknowledged by the

from all involved stakeholders.	stakeholders
List of additional stakeholders that have not sent an acknowledgement of reception	When an Overall Impact Message is issued by the Assess Overall Impact Process, it has to be acknowledged by the stakeholders. When it is not that case, the APOC Supervisor needs the list to contact them using a pre-defined list.
Agreed new set of goals and criteria (when necessary)	Goals and Criteria defined by the responsible stakeholder in the Make Decision Process when the predefined ones are not applicable in the situation.
Agreed time frame for application of goals and criteria.	When having additionally defined goals and criteria, a temporal validity is defined in order to return to the original performance when this time is elapsed.
List of (three) candidate solutions.	List of predefined solutions fulfilling the goals and criteria
List of at least one and maximum three most feasible ad-hoc candidate solutions	When no predefined solutions are found, the stakeholders have to define ad-hoc solutions. There can be up to three ad-hoc solutions.
List of selected solutions and associated impact from all stakeholders	When several solutions fulfil the goals and criteria, some of them are selected among all
Selected solution	Final selection when one solution has been decided on.
Overall Impact Message	Standardized message used to describe the overall impact. This message will contain diverse data which will be completed along the Assess Overall Impact process.
Solution message (initial, completed and implemented)	Standardized message used to describe the solution to an alert/warning/event report. This message will contain diverse data which will be completed along the decision making process

Table 21. List of outputs for Manage Airport Performance service

3.2.5 Perform Post-Operations Analysis service

3.2.5.1 Basic service description

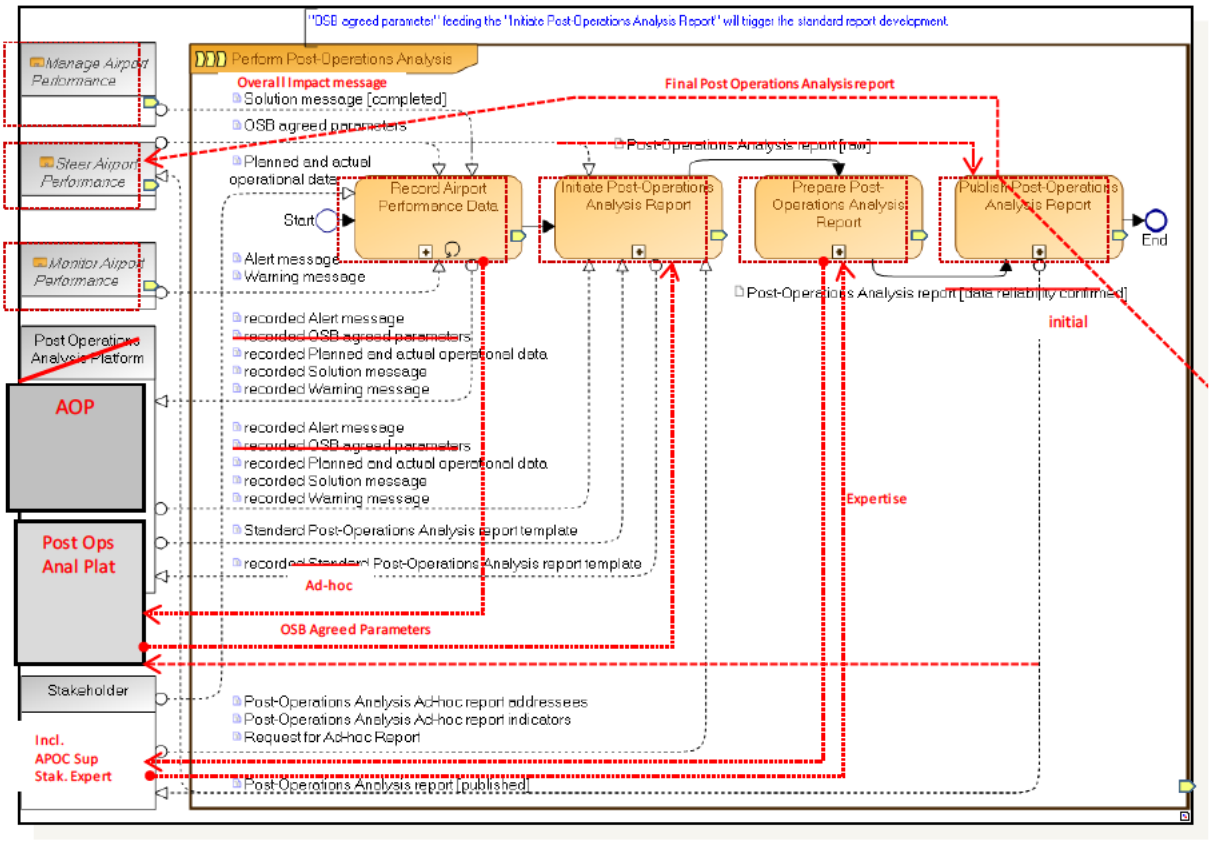


Figure 16. Perform Post-Operations Analysis service

The ***Perform Post-Operations Analysis*** service is composed of the 4 following processes:

- **Record Airport Performance Data process**. This process ensures that any planned and actual operational data, overall impact message, solution message, alert, warning and OSB agreed parameter is captured and recorded for later use to produce the ***Post-Operations Analysis reports***. This activity is performed automatically by the ***AOP and the Post-Operations Analysis platform.*** The ***OSB agreed parameters*** include the standard reports templates.
- **Initiate Post Operations Analysis Report process**. This process produces the raw ***Post-Operations Analysis reports*** (both standard and ad-hoc) in the post-operations phase on the basis of the inputs provided by the requesters of the reports (OSB for standard reports and/or individual stakeholder for ad hoc reports). These reports only contain indicators which reliability has not been assessed yet and in which there is no interpretation of the results yet.
- **Prepare Post Operations Analysis Report process**. This process allows the Post Operations Analyst to assess the quality and reliability of a raw ***Post-Operations Analysis report*** using, if necessary, additional data and/or inputs from operational experts. It also allows the Post Operations Analyst to analyse the report, adding where necessary information to understand and explain the results contained in the report.
- **Publish Post Operations Analysis Report process**. This process ensures that a ***Post-Operations Analysis report*** is published to the pre-defined list of addressees and that it is recorded for later access. Depending on the report type and sensitivity, it may include individual comments from the relevant airport stakeholders or it may contain a common analysis of the results, outcome of a collaborative process involving all the concerned airport stakeholders required by the originator of the said report.

3.2.5.2 Detailed Service Description.

3.2.5.2.1 Record Airport Performance Data process

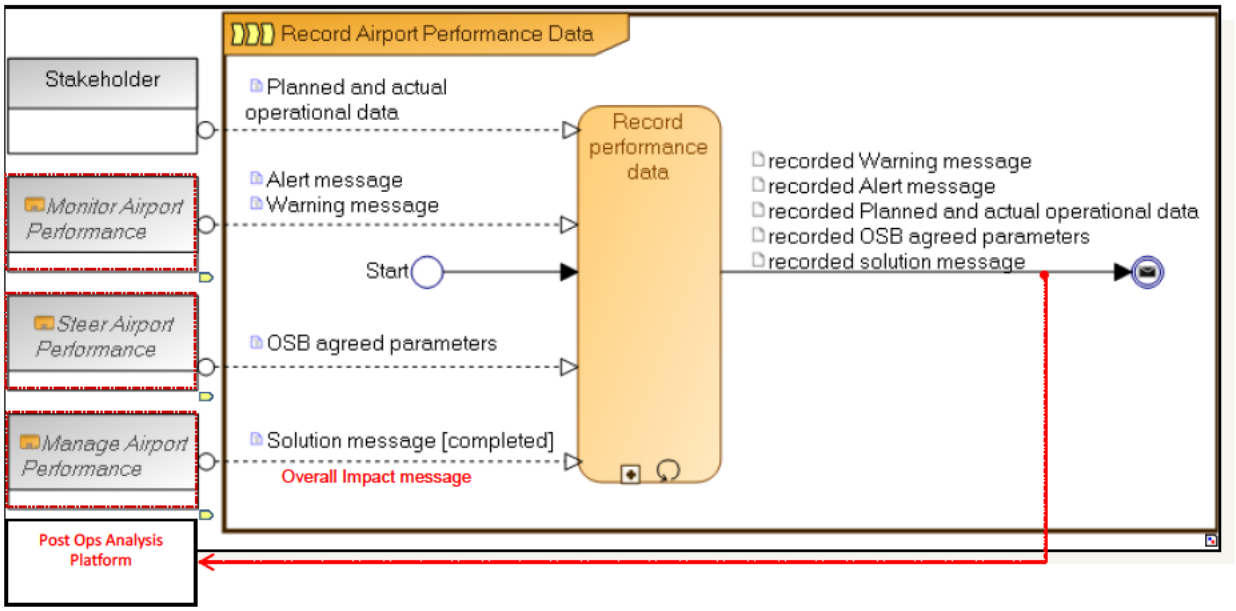


Figure 17. Record Airport Performance Data process diagram

The **Record Airport Performance Data** process ensures that any planned and actual operational data, overall impact message, solution message, alert, warning and ***OSB agreed parameters*** is captured and recorded for later use to produce the ***Post-Operations Analysis report***:, including:

- Planned and actual operational data from the ***AOP***
- Alert messages and warning messages from the ***Monitor Airport Performance*** service
- ***Overall Impact message*** and ***Solution message*** corresponding to a deviation from the ***Manage Airport Performance*** service
- ***OSB agreed parameters*** from the ***Steer Airport Performance*** service, including the standard report templates

The process is performed automatically by the ***AOP***, triggered automatically any time a data is created or changed in one of its inputs.

Regarding the predefined solutions recording process, see section 3.2.4.2.3 “Development and update of the pre-defined solution table process”, in which is described how the table of predefined solutions is created and updated.

Who (role):	Automated – ***AOP***
Input:	Planned and actual operational data from the stakeholder; Alert messages and warning messages from the Monitor Airport Performance Service; Overall Impact message and Solution message to a deviation from the Manage Airport Performance Service; OSB agreed parameters from the Steer Airport Performance Service, including the Standard report templates.
Action:	- Record, triggered automatically at any time when a data is created or changed in

	one of its inputs
Output:	- Recorded data: o Recorded Planned and actual operational data from the stakeholder; o Recorded ***Alert messages*** and ***warning messages*** from the ***Monitor Airport Performance*** service; o Recorded ***Overall Impact message*** and ***Solution message*** from the ***Manage Airport Performance*** service; o Recorded OSB agreed parameters from the ***Steer Airport Performance*** service, including the Standard report templates.
Resources:	***AOP***

3.2.5.2.2 Initiate Post Operations Analysis Report process

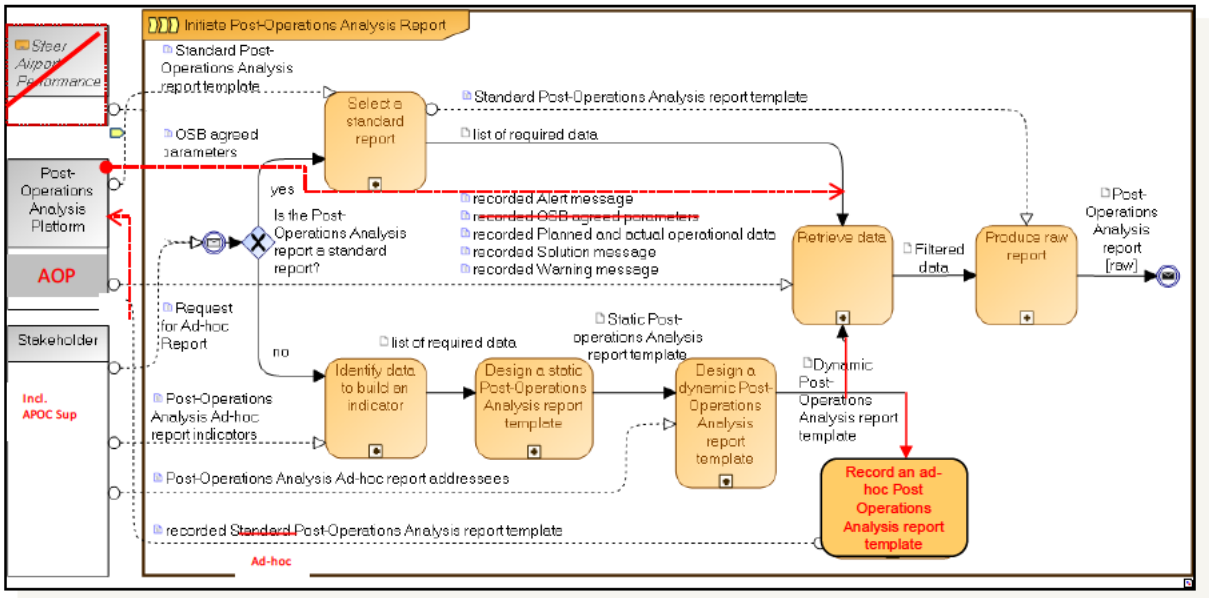


Figure 18. Initiate Post-Operations Analysis Report process diagram

The **Initiate Post Operations Analysis Report** process produces:

- The raw ***Post Operations Analysis reports*** (both standard and ad-hoc) in the post-operations phase on the basis of the inputs provided by the requesters of the reports; these reports only contain indicators whose reliability has not been assessed yet and for which there is no interpretation of the results yet.

The process is triggered by one of the following actors:

- The Operational Steering Board (OSB) which defines the content, periodicity and addressees of the ***standard Post Operations Analysis reports*** in the ***Steer Airport Performance*** service, and this content triggers the automated periodic process
- Each airport stakeholder who can create an ***ad-hoc Post Operations Analysis report*** for its own needs (according with the access data rights for each stakeholder)
- The APOC Supervisor (in charge of ***Manage Airport Performance*** service) or a stakeholder authorized member who can request an ***ad-hoc Post Operations Analysis report*** at the end of the Execution Phase

The **Initiate Post Operations Analysis Report** process is composed of the 7 following activities.

3.2.5.2.2.1 Select a standard report activity

This activity aims at selecting the predefined template and list of required data corresponding to the standard report to be produced.

Who (role):	Automated – Post Operations Analysis Platform
Input:	OSB agreed parameters Standard Post Operations Analysis report template
Action:	- Select Standard Post Operations Analysis report template corresponding to the system request
Output:	- Selected Standard Post Operations Analysis report template to the *produce a raw report* activity; - List of required data to the retrieve data activity.
Resources:	Post Operations Analysis Platform

3.2.5.2.2.2 Identify data to build an indicator activity

This activity is triggered when there is a manual request for an ad hoc Post Operations Analysis report; it aims at identifying the list of data required to build the indicators[32] defined by the actor triggering the development of an Ad-hoc Post Operations Analysis report in the Post Operations Analysis Phase.

The indicator may be either a KPI or a complex composition of several items or a simple indicator with only one item not listed on the agreed existing KPI list.

Who (role):	Post Operations Analyst
Input:	Request for ad-hoc report from stakeholder (including APOC) Post Operations Analysis ad-hoc report indicators
Action:	- Select necessary data for dealing with the ad-hoc Post Operations Analysis report
Output:	- List of data required for building the indicators for the *Design a static Post Operations Analysis report template* activity
Resources:	Post Operations Analysis Platform Stakeholders

3.2.5.2.2.3 Design a static Post Operations Analysis report template activity

Based on the list of required data, this activity aims at setting up the format, layout and expected content of an ad hoc Post Operations Analysis report template.

Who (role):	Post Operations Analyst
Input:	- List of data required for building the indicators
Action:	- Design the ad-hoc Post Operations Analysis report template
Output:	- Static Post Operations Analysis ad-hoc report template to be utilized by the *design a dynamic Post Operations Analysis report template* activity
Resources:	Post Operations Analysis Platform

3.2.5.2.2.4 Design a dynamic Post Operations Analysis report template activity

This activity aims at identifying the addressees of an ad hoc Post Operations Analysis report.

Who (role):	Post Operations Analyst

[32] The generic term "indicators" means the requester can ask for any type of existing data for building the ad-hoc report.

Input:	Static Post Operations Analysis ad-hoc report template List of Post Operations ad-hoc report addresses
Action:	- Fill the list of the ad-hoc Post Operations Analysis ad-hoc report template addresses
Output:	- Dynamic Post Operations Analysis report template to be utilized by *retrieve data* and *record an ad-hoc Post Operations Analysis report template* activities
Resources:	Post Operations Analysis Platform Stakeholder

3.2.5.2.2.5 Record a standard Post Operations Analysis report template activity

This activity aims at recording a new ad hoc Post Operations Analysis report template designed manually in the Post Operations Analysis phase and validated by the Post Operations Analyst.

Who (role):	Post Operations Analyst
Input:	Dynamic Post Operations Analysis ad-hoc report template
Action:	- Record the Post Operations Analysis report template

Output:	- Recorded Post Operations Analysis ad-hoc report template to be used in further Post Operations Analysis in one of or both two ways:
	  - Submitted to the Steer Airport Performance service for becoming a new standard report template,
	  - Kept at the disposal of the requester for being available later when the correspondent stakeholder decides to analyse a further similar situation.

Resources:	Post Operations Analysis Platform

3.2.5.2.2.6 Retrieve data activity

This activity aims at retrieving the data needed to produce a raw Post Operations Analysis report.

Who (role):	Automated – Post Operations Analysis Platform
Input:	List of required data from: *Select a standard report* in case of standard report, *Design Dynamic Post Operations Analysis report template* in case of ad-hoc report Recorded planned and actual operational data; Recorded alert messages and warning messages; Recorded overall impact message and solution message; Recorded OSB agreed parameters
Action:	- Collect the requested data
Output:	- Filtered data used by to the produce a raw report activity
Resources:	Post Operations Analysis Platform ***AOP***

3.2.5.2.2.7 Produce a raw report activity

This activity aims at producing a raw Post Operations Analysis report using a report template and the required data.

Who (role):	Automated – Post Operations Analysis Platform

Input:	Filtered data
Action:	- Fill the report template with the filtered data
Output:	- Raw Post Operations Analysis report used by the *Prepare Post Operations Analysis Report* process
Resources:	Post Operations Analysis Platform

3.2.5.2.3 Prepare Post Operations Analysis Report process

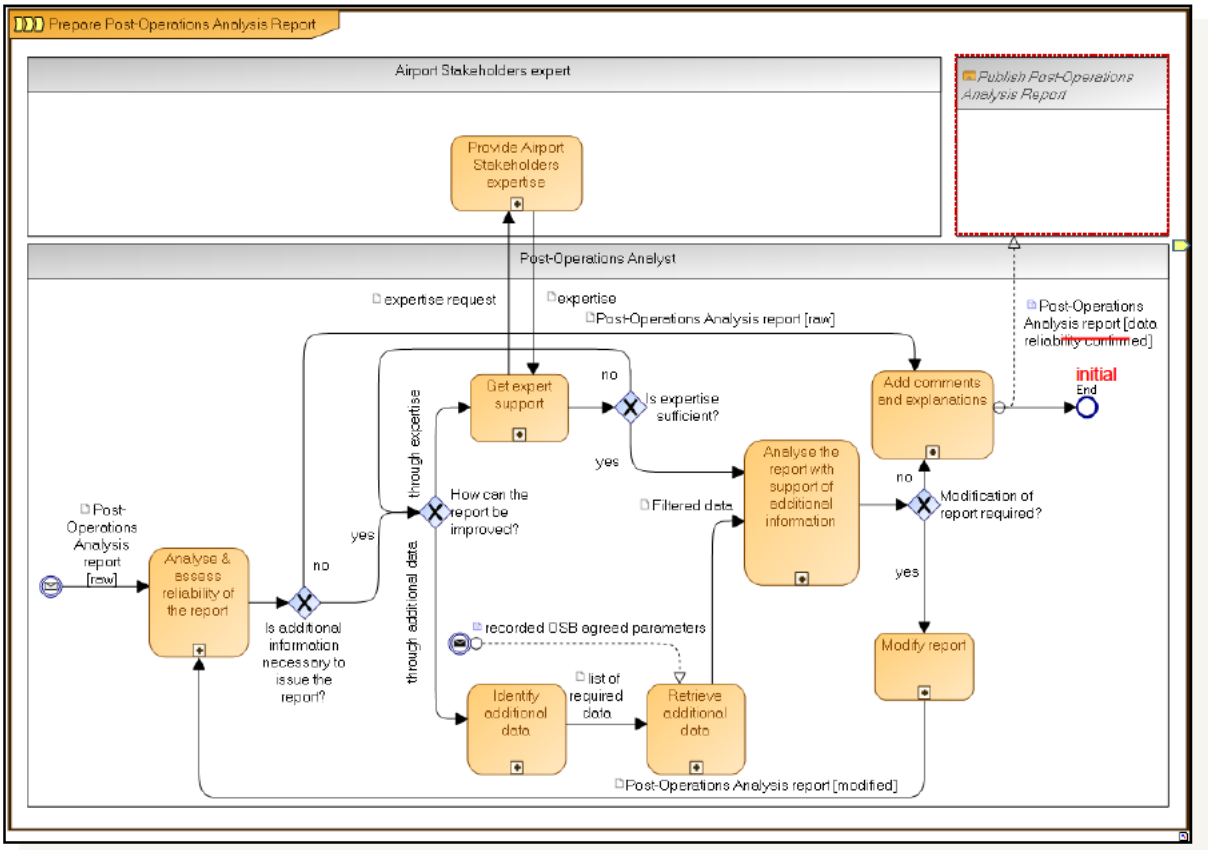


Figure 19. Prepare Post-Operations Analysis Report process diagram

The **Prepare Post Operations Analysis Report** process allows the Post Operations Analyst to assess the quality and reliability of a raw Post Operations Analysis report using, if necessary, additional data and/or inputs from operational experts. It also allows the Post Operations Analyst to analyse the report, adding where necessary information to understand and explain the results contained in the report. It produces the Initial Post Operations Analysis report.

The process is triggered by the reception of a raw Post Operations Analysis report from the **Initiate Post Operations Analysis Report** process.

The **Prepare Post Operations Analysis Report** process is composed of the 7 following activities.

3.2.5.2.3.1 Analyse and assess the reliability of a report activity

This activity aims at analysing a raw report to assess whether more information is needed before it is published.

Who (role):	Post Operations Analyst
Input:	Raw Post Operations Analysis report

Action:	- Analyze and assess the reliability of the Raw Post Operations Analysis report
	- Decide to:
	  o Add comments and explanations and/or,
	  o Get expert support to improve the report and/or,
	  o Identify additional data to improve the report

Output:	- Checked Raw Post Operations Analysis report used by the *Add comments and explanations* activity - Identification of needs to: o to add comments and explanations, o to get expert support, o to identify additional data need - Request for additional information
Resources:	Post Operations Analysis Platform

3.2.5.2.3.2 Get expert support activity

This activity aims at getting the appropriate expert support from an airport stakeholder to improve and further analyse a Post Operations Analysis report. This support can take the form of a verbal exchange between the Post Operations Analyst and the expert (phone call, meeting) or through documents provided to the Post Operations Analyst by the expert.

Who (role):	Post Operations Analyst
Input:	Raw Post Operations Analysis report after reliability analyse and assessment List of experts contact
Action:	- Get an expert support
Output:	- Expert opinion giving more reliability to the raw Post Operations Analysis report
Resources:	Post Operations Analysis Platform Expert (APOC Supervisor, stakeholder)

3.2.5.2.3.3 Identify additional data activity

This activity aims at identifying additional data that may be required to improve and further analyse a Post Operations Analysis report.

Who (role):	Post Operations Analyst
Input:	Raw Post Operations Analysis report after reliability analyse and assessment
Action:	- Identify additional data needs
Output:	- List of additional data used by Retrieve additional data activity
Resources:	Post Operations Analysis Platform

3.2.5.2.3.4 Retrieve additional data activity

This activity aims at retrieving the data needed to improve and further analyse a Post Operations Analysis report.

Who (role):	Automated – Post Operations Analysis Platform
Input:	Raw Post Operations Analysis report after reliability analyse and assessment
Action:	- Get requested additional data
Output:	- Filtered data giving more reliability to the Post Operations Analysis report and to be used by the Post Operations Analyst for *analyse the report with support of additional data* activity
Resources:	Post Operations Analysis Platform AOP

3.2.5.2.3.5 Analyse the report with support of additional data activity

This activity aims at analysing in details a Post Operations Analysis report after additional data/expertise have been collected either directly or through an expert.

Who (role):	Post Operations Analyst
Input:	Raw Post Operations Analysis report after reliability analysis and assessment Additional data or expert analysis
Action:	- Analyze of the Post Operations Analysis report after additional data/expertise has been collected either directly or through an expert - Improvement of report analysis
Output:	- Raw Post Operations Analysis report with additional data/expertise which may require: o Either to add comments and explanations during *Add comments and explanations* activity o Or to modify the report in *Modify report* activity
Resources:	Post Operations Analysis Platform AOP Filtered data Expert analysis

3.2.5.2.3.6 Modify report activity

If necessary, the Post Operations Analyst may modify a Post Operations Analysis report after analysis has taken place.

Who (role):	Post Operations Analyst
Input:	Raw Post Operations Analysis report after reliability analyse and assessment Additional data or expert analysis
Action:	- Modify the raw Post Operations Analysis report with either additional data or through expert analysis
Output:	- Modified Post Operations Analysis report used by *Analyse and assess reliability of the report* activity
Resources:	Post Operations Analysis Platform Filtered data Expert analysis

3.2.5.2.3.7 Add comments and explanations activity

This activity aims at adding comments and explanations if necessary to a Post Operations Analysis report before publication of an Initial Post Operations Analysis report.

Who (role):	Post Operations Analyst
Input:	Raw Post Operations Analysis report after reliability analysis and assessment When existing, additional data and/or expert analysis
Action:	Complete the Post Operations Analysis report with comments and explanations
Output:	Initial Post Operations Analysis report used by *Publish Post Operations Analysis Report* Process
Resources:	Post Operations Analysis Platform Filtered data Expert analysis

3.2.5.2.4 Publish Post Operations Analysis Report process

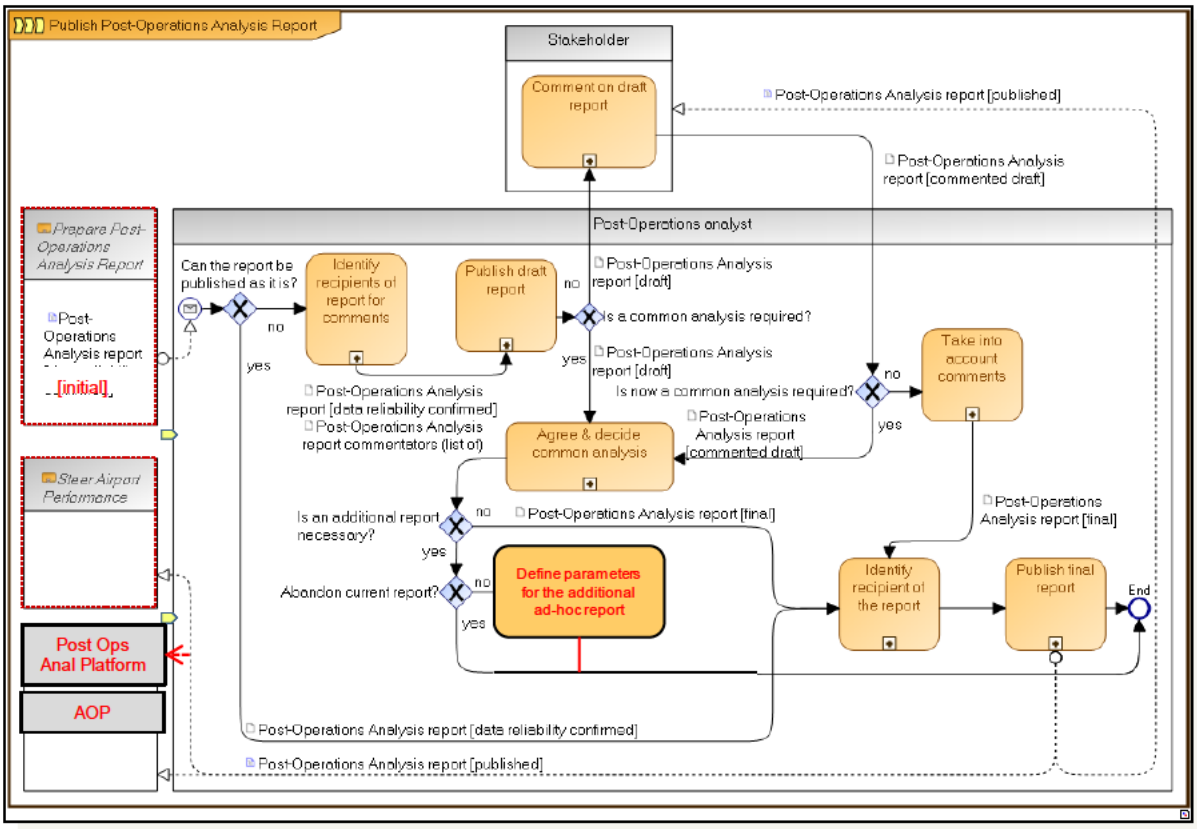


Figure 20. Publish Post-Operations Analysis Report process diagram

The **Publish Post Operations Analysis Report** process ensures that a Post Operations Analysis report is published to the pre-defined list of addressees and that it is recorded for later access. Depending on the report type and sensitivity; it may include individual comments from the relevant airport stakeholders or it may contain a common analysis of the results, outcome of a collaborative process involving all the concerned airport stakeholders.

It is assumed that a ***standard Post Operations Analysis*** report will not be commented before publication as the airport stakeholders will have reached an agreement on its content through the OSB in the ***Steer Airport Performance*** service. Then, the Post Operations Analyst considers that there is no need for comments from the airport stakeholders concerned.

In case of ***ad-hoc Post Operations Analysis report***, the airport stakeholders may comment individually or after a common analysis which may be triggered, depending on the complexity and sensitivity of the report.

The addressees of a ***Post Operations Analysis report*** depend on the type of report and who has requested the report:

- The addressees of a ***standard Post Operations Analysis report*** are decided by the OSB in the ***Steer Airport Performance*** service
- When an airport stakeholder or the APOC Supervisor asks for an ***ad-hoc Post Operations Analysis report*** he / she decides who the addressees are

The process is triggered by the reception of an initial Post Operations Analysis report from the *Prepare Post Operations Analysis Report* process.

The **Publish Post Operations Analysis Report** process is composed of the 9 following activities. It produces a final Post Operations Analysis report.

3.2.5.2.4.1 Identify addressees of a report for comments activity

This activity aims at identifying the stakeholders who will receive a draft ad-hoc Post Operations Analysis report for comments before publication.

Who (role):	Post Operations Analyst
Input:	Initial ad-hoc Post Operations Analysis report
Action:	- Identify the recipients invited to comment and/or analyze the initial ad-hoc Post Operations Analysis
Output:	- List of identified the recipients invited to comment and/or analyze the initial ad-hoc Post Operations Analysis
Resources:	Post Operations Analysis Platform Stakeholders

3.2.5.2.4.2 Publish draft report activity

This activity aims at publishing a draft ad-hoc Post Operations Analysis report for comments to the appropriate addressees.

Who (role):	Post Operations Analyst Stakeholder(s) concerned
Input:	Initial ad-hoc Post Operations Analysis report List of draft ad-hoc report addresses
Action:	- Publish the draft ad-hoc Post Operations Analysis report

Output:	- To send the draft ad-hoc Post Operations Analysis report
	- Based on the draft ad-hoc Post Operations Analysis report, the stakeholder concerned may decide:
	  - to comment the draft report activity,
	  - to perform common analysis

Resources:	Post Operations Analysis Platform Stakeholder(s) concerned

3.2.5.2.4.3 Comment draft report activity

When requested, this activity aims at adding comments to a draft ad-hoc post operations analyses report.

Who (role):	Stakeholder concerned
Input:	Draft ad-hoc Post Operations Analysis report
Action:	- Provide comments on the draft ad-hoc Post Operations Analysis report
Output:	- Draft ad-hoc Post Operations Analysis report with concerned stakeholder comments used by *Take into account comments of the report* activity
Resources:	Post Operations Analysis Platform

3.2.5.2.4.4 Take into account comments activity

This activity aims at accepting or rejecting the modifications suggested by the airport stakeholders who were asked to comment the report and update the report accordingly.

Who (role):	Post Operations Analyst

Input:	Commented draft Post Operations Analysis ad-hoc report
Action:	- Update the report accordingly the modifications proposed by the airport stakeholder(s) who were asked to comment the report
Output:	- Final Post Operations Analysis ad-hoc report used by *Identify recipients of the report* activity
Resources:	Post Operations Analysis Platform

3.2.5.2.4.5 Agree and decide common analysis activity

When decided during the *Publish draft report* activity, this activity aims at collaboratively deciding on the analysis to be added to a draft ad-hoc Post Operations Analysis report.

Who (role):	Post Operations Analyst Stakeholders concerned
Input:	Draft ad-hoc Post Operations Analysis report
Action:	- Doing a common analysis - Decide whether: o An additional report has to be produced o The current report has to be abandoned
Output:	- Final ad-hoc Post Operations Analysis report used by *Identify recipients of the report* activity - Common analysis - Decision: o To publish the final ad-hoc Post Operations Analysis report o To requested additional report o To abandon the report publication
Resources:	Post Operations Analysis Platform

3.2.5.2.4.6 Define parameters for an additional ad-hoc report activity

When decided during the *Agree and decide common analysis* activity, this activity aims at collaboratively defining the parameters for an additional Post Operations Analysis ad-hoc report that has to be produced.

Who (role):	Post Operations Analyst Concerned stakeholders
Input:	- Draft Post Operations Analysis ad-hoc report
Action:	- Define parameters for an additional ad-hoc report
Output:	- Parameters of a new Post Operations Analysis ad-hoc report used by *Initiate Post Operations Analysis report* process
Resources:	Post Operations Analysis Platform

3.2.5.2.4.7 Identify recipients of a report activity

This activity aims at identifying the stakeholders who will receive a final Post Operations Analysis report.

Who (role):	Automated – Post Operations Analysis Platform
Input:	Final Post Operations Analysis report
Action:	- Collect the Final Post Operations Analysis report addresses
Output:	- List of final ad-hoc Post Operations Analysis report used by *Publish final report*

	activity
Resources:	Post Operations Analysis Platform

3.2.5.2.4.8 Publish final report activity

This activity aims at publishing a final Post Operations Analysis report to the appropriate addressees.

Who (role):	Automated – Post Operations Analysis Platform
Input:	Final Post Operations Analysis report with addresses
Action:	- Publish the Final Post Operations Analysis report to selected addresses - Publish the Final Post Operations Analysis report to Steer Airport Performance Service: o Standard Post Operations Analysis reports: systematically o Ad-hoc Post Operations Analysis reports: may be sent if requested by the originator or on proposal by the Post Operations Analyst
Output:	- Publish the Final Post Operations Analysis report - Record of the Final Post Operations Analysis report
Resources:	Post Operations Analysis Platform ***AOP*** Stakeholders

The process flow ends after this activity.

3.2.5.3 Roles, (internal) Resources, inputs and outputs of the Perform Post-Operations Analysis service.

3.2.5.3.1 Roles

A more detailed list of roles and responsibilities of all stakeholders involved in the “Perform Post-operations management service” is in Section 4.2 (Roles and responsibilities).

1. Post Operations Analyst

The Post Operations Analyst is an actor who belongs to either every airport stakeholder or some airport stakeholders or/and airport operator. He/she is empowered in this role by the correspondent stakeholder and has the experience to produce ***Post-Operations Analysis Reports***. The Post Operations Analyst is granted to access to all and only the data he/she needs to perform his/her tasks.

If an ***ad-hoc Post-Operations Analysis report*** is requested by a specific airport stakeholder, the role of Post Operations Analyst may be assumed by a representative of the concerned airport stakeholder.

If an ***ad-hoc Post-Operations Analysis report*** is requested by the APOC Supervisor, the role of Post Operations Analyst is assumed by a representative of the Airport Operator.

In the case of ***standard Post Operations Analysis reports***, the role of Post Operations Analyst is assumed either by a representative of the Airport Operator when the report is addressed to several stakeholders or by a representative of the concerned airport stakeholder.

2. Stakeholder concerned

Any stakeholder of the airport may be involved in the ***Perform Post-Operations Analysis*** service through its contribution in the indicators basing a report (recorded in the AOP). When it is identified (either by the ***Post-Operations Analysis Platform*** or by the Post Operations Analyst as a

consequence of being related with some of the report elements), the stakeholder becomes "concerned".

3.2.5.3.2 (Internal) Resources.

1. AOP

The ***Airport Operational Plan*** is described in a specific chapter. Regarding the ***Perform Post-Operations Analysis*** service, it aims to collect and record all necessary data, designated within the following blocks:

- Planned operational data
- Actual operational data
- Alert and Warning messages
- Solution messages
- Standard and ad-hoc ***Post Operations Analysis reports***
- OSB agreed parameters
- Overall impact message

2. Post Operations Analysis Platform

This platform supports the ***Perform Post-Operations Analysis*** Service in the production and publishing of the ***Post Operations Analysis reports*** (standard or ad-hoc).

It executes all activities along the Post Operations Analysis processes which aim to set up and produce the reports, using the data recorded in the ***AOP*** and supported by the OSB agreed parameters.

3.2.5.3.3 Inputs

1. From Steer Performance Service

The ***Steer Performance Service*** defines the ***OSB agreed parameters*** in which are included all those parameters that applies to the ***Perform Post-Operations Analysis*** service. These parameters include:

- Rules engines:
  - Reports classification (standard/ad-hoc)
  - Report Identification number
  - Standard Reports templates[33], including the ***ad-hoc Post Operations Analysis reports*** which are accepted as new standard Post Operations Analysis reports
  - Distribution rules
  - For each standard report:
    - Concerned KPI(s)
    - List of requested data

[33] It is expected that standard Post Operations Analysis Report templates are developed based on local airport needs as part of the implementation activities. The APB may request modifications to the template based on the outcome of discussions within the Steer Airport Performance Service.

- Periodicity
- Distribution list

- All necessary instructions for performing the ***Perform Post-Operations Analysis*** service

The ***Steer Airport Performance*** service (at level either APB or OSB) may also request for ad-hoc report when its members need to analyse an unusual situation; it defines the required data, the draft of template and list of addressees.

All these inputs (coming from the ***Steer Airport Performance*** service) are recorded in the ***Post Operations Analysis Platform***.

2. From Monitor Airport Performance service

The ***Monitor Airport Performance*** service provides the Post Operations Analysis Service with:

- Alerts (with the corresponding parameters)
- Warnings (with the corresponding parameters)

These data are recorded in the ***AOP***.

3. From Manage Performance Service

The ***Manage Airport Performance*** service provides the ***Perform Post-Operations Analysis*** service with:

- The ***Overall Impact Assessment message***
- The ***Solution message***

These data are recorded in the ***AOP***.

4. From MET Service

The Meteorological Service provides the ***Perform Post-Operations Analysis*** service with selected data and agreed periodicity (i.e. observations every 30 minutes and forecast corresponding to the next 6 hours); this aims to be able to recreate the MET situation in the Perform Post Operational Analysis:

- ICAO Annex 3 compliant products (METAR, MET REPORT, TREND, TAF, Aerodrome Warnings)
- Wind (speed, gust and direction; observation and forecast)
- Visibility and RVR (observation and forecast)
- Significant weather (Precipitation, Thunderstorm; observation and forecast)
- Other Present weather (observation and forecast)
- Clouds and vertical visibility (observation and forecast)
- Atmospheric pressure (observation and forecast)
- Air Temperature (observation and forecast)
- Dew point temperature (observation and forecast)
- Adverse weather conditions (observation and forecast)[34]
- De-icing conditions (observation and forecast)

[34] The fact that a certain Meteorological situation may be considered as an “Adverse weather condition” will depend on local agreements but the related observations and forecasts shall be provided by the MET service.

- Thunderstorm, electric storm warning (observation and forecast)

5. From airport stakeholders:

The Airport Stakeholders provide the ***Perform Post-Operations Analysis*** service with:

- The list of reports addresses through the ***OSB Agreed parameters***
- The request for ***ad-hoc Post Operations Analysis report*** with the required parameters (indicators, addresses)
- Their expertise when requested
- Their contribution in the common analysis when requested

3.2.5.3.4 Outputs.

1. To the Steer Airport Performance service

The ***Perform Post-Operations Analysis*** service provides the ***Steer Airport Performance*** service with:

- Corresponding to the ***OSB agreed parameters***:
  - Standard reports
- Corresponding to the ***Perform Post-Operations Analysis*** service expertise:
  - Comments on the Post Ops Analysis management
  - Suggestions for Performance Management improvement (i.e. indicators, reference values, template formats, etc.)
  - Expertise report on the selected scenario for solving adverse situation
  - Proposal for defining new adverse situations scenario or improving the existing ones
- Corresponding to the stakeholders and APOC Supervisor requests for ***ad-hoc Post Operations Analysis reports***:
  - Ad-hoc reports for information and analysis by the OSB for possible inclusion within the standard Post operations Analysis reports

2. To Airport stakeholders

The Airport Stakeholders receive the ***Final Post-Operations Analysis reports*** according to the distribution list.

3.2.6 New support tools and processes for airport performance

3.2.6.1 Airport Operations Plan (AOP)

3.2.6.1.1 Basic Concept Description

The new SESAR concept comprises that all stakeholders at an airport shall have access to a single source of information referred to the Airport Operations Plan (***AOP***). It is mainly a database with several check procedures in order to ensure data updates from a couple of different entities are correct and consistent. The ***AOP*** will also be the principle means by which the integration of airports into the overall network will be achieved through a shared part of the airport data.

The AOP is a "rolling plan" continuously updated and enhanced with new information either automatically or through stakeholders input directly into the plan. Apart from single flight based status and planning information the AOP also contains flow based planning information such as airport resource capacity plan and runway configuration plan. The timeframe in which an ***AOP*** effectively starts is during the Medium Term Planning phase and ends with the post operations analysis.

The AOP incorporates all turn-round information from the airside and the flow information of passengers within a terminal on the landside to project the complete operation at an airport. In order to enhance the predictability the ***AOP*** will also be updated from the network.

The Airport Transit View (ATV) representing a visit of an aircraft at an airport from approach to departure has been developed to improve stakeholders' awareness and to provide the link between the network through the sharing part of relevant data in timely fashion. It provides an actual view of the key timestamps to the airport stakeholders and the network manager. All timestamps within the ***AOP*** represent the current and predicted situation at an airport. The airport monitor is able to process these timestamps and raise an alert or a warning if discrepancies are detected or a given threshold is exceeded.

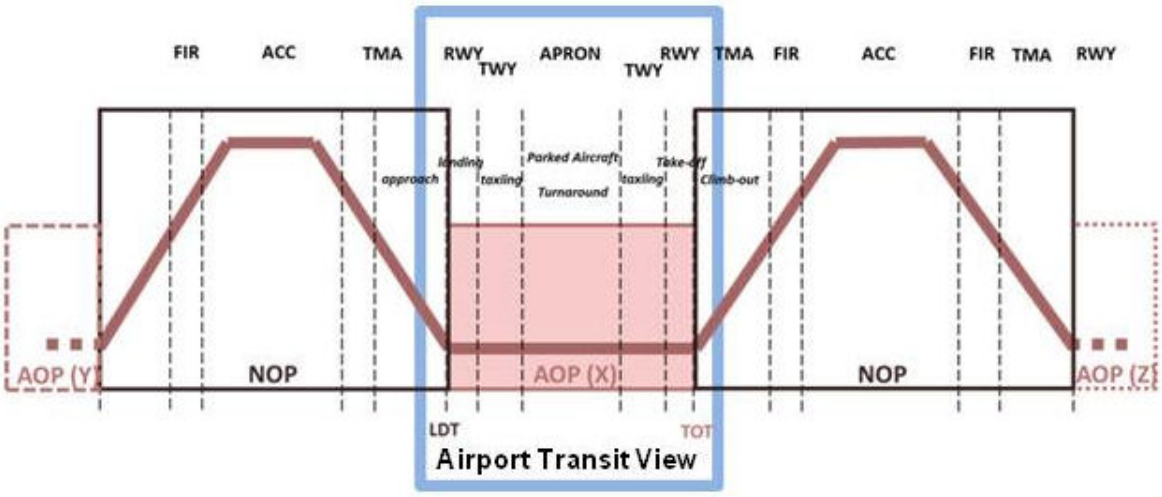


Figure 21. Airport Operations Plan (AOP)

In this way all airport stakeholders both within the airport and the wider ATM network have access to a single and unique source of information. Additionally the passenger can benefit from this current data while getting more accurate departure or arrival times.

The AOP is the fundamental tool for the four new developed services namely:

- Performance Steering
- Performance Monitoring
- Performance Management
- Post-operations analysis

where all data are collected and processed.

More details can be found under Appendix F, part 2.

3.2.6.2 Airport - Demand Capacity Balancing (DCB)

The Airport Demand Capacity Balance (Airport-DCB) function will assist in detecting imbalances between demand and airport capacity, both actual and forecasted. It will also propose solutions to solve any detected imbalance between demand and capacity runways, taxiways, TMA and/or aprons/stands (i.e. selection of runway/taxiway configuration, prioritization between arrivals and departures etc.).

The new SESAR operating method will include for the Airport Operations Management a supporting tool that provides this Airport-DCB functionality. By using actual and forecasted performance indicators (KPI's) the Airport-DCB function is aiming at implementing a performance driven Airport Operations Management.

The Airport-DCB function will complement AMAN, DMAN and A-CDM (if available at an airport) by focusing on short term planning phase and the medium term planning phase – starting from the AMAN/DMAN planning horizon until one or two day before the day of operation. Although the Airport-DCB function can be used stand-alone, it will never replace the AMAN/DMAN functionalities. Where AMAN/DMAN is in use, Target Times (TLDT/TTOT) determined by AMAN/DMAN will be respected. Airport – DCB will not adjust or update those Target Times. However AMAN/DMAN shall use for their initial Target Times and runway allocation the latest (most recent) Forecasted Times and runway allocation calculated by the Airport – DCB tool (e.g. RMAN). Within the AMAN/DMAN planning horizon, Target Times can and will be updated by the AMAN/DMAN to fine tune/optimize the sequence.

Outside the planning horizon of AMAN/DMAN the Airport-DCB will provide Forecasted Times for each flight within its own planning horizon (up to one or two days before the day of operation). The Airport-DCB tool (e.g. RMAN) will calculate FLDT and FTOT based on the expected runway configurations in use and the expected operational conditions (e.g. weather).

Forecasted times, calculated by the Airport-DCB tool (e.g. RMAN) can and will be used for Target Time Management of inbound flights (Target Time of Arrival - TTA). If the issuing of a TTA is required, the forecasted landing time (FLDT) from the local Airport-DCB tool will be used as a basis for the determination of this TTA.

In case the TTA will be related to the runway landing threshold, the TTA equals the FLDT. In case the TTA is related to another point along the aircraft's flight trajectory (e.g. IAF), the TTA will be calculated backwards from the FLDT. No concept has been developed yet for Target Time Management of outbound flights but similarities to the concept for inbound flights are expected.

A Demand-Capacity Imbalance is expressed in actual and forecasted KPI values (i.e. capacity shortage, delay and punctuality). An alert or warning will be triggered when the imbalance exceeds locally defined threshold values. These thresholds will become more stringent the closer time moves towards the day of operation. In order to be able to identify the imbalance, KPI(s) will be provided for each runway and will be given for both arrivals and departures.

The information out of the Airport-DCB Monitoring functionality will mainly be provided to the Airport Tower Supervisor and ACC/Approach Supervisor(s) (where required coordinated with their local FMP) who can then use this information as a trigger for starting further analysis to solve the detected Demand-Capacity Imbalances (Airport-DCB Management functionality). Dependent on the level of severity, the APOC supervisor and any relevant APOC stakeholder will also be informed.

Different options for solving the imbalance might be identified and will be evaluated based on the forecasted performance of these options. They might either be evaluated by an optimization algorithm or by a what-if probing analysis done by the respective stakeholder. The options have to be discussed and agreed with the relevant APOC stakeholders after which the selected option will be published in the AOP. This includes the proposed runway configuration, runway operating mode(s), associated runway assignment for each. Revised Target Times (TLDT/TTOT) will be calculated by AMAN/DMAN once the selected option/solution has been activated.

Once an option/solution has been agreed, the Airport-DCB functionality will on activation of that option/solution provide as output to the AOP the runway configuration plan (including runway operating modes) and for each flight the associated runway assignment and relevant Forecasted Times.

Summarizing the above, the DCB system distinguishes different functionalities:

The Airport-**DCB Basic Functionality** comprises of demand and capacity determination. Reference is the data of the AOP / NOP which has its base in the outcome of the seasonal IATA schedule conference and is constantly refined and updated thereafter.

The Airport-**DCB Monitoring Functionality** identifies any imbalance between demand and capacity, no matter whether it is caused by capacity shortfall or unplanned increase in demand.

The **Airport-DCB Management Functionality** will evaluate different options for runway configuration and priority between arrivals and departures on the runways (operated in mixed mode or with interferences between arrivals and departures) in order to minimize delay.

More details about DCB are available in part 2 under Appendix J.

3.2.6.3 De-Icing Management

De-icing operations, although seen as part of winter operations, is in the deployment baseline, the A-CDM-manual, considered as part of adverse weather conditions owing to significant impact on airport capacity. There are however airports where de-icing is frequently performed and considered as nominal conditions.

In the Airport Operations Management concept this experience is manifested by a tool that provides automated de-icing management with timestamps shared through the AOP to affected stakeholders.

De-icing – when needed – will be made a transparent, planned activity in the short term planning and execution phases by the support of a De-Icing Management Tool (DIMT). The DIMT is designed to be a planning tool for de-icing agents while at the same time supplying the Airport Operations Plan (***AOP***) with necessary data for airport performance monitoring. The tool is thought as a “plug in device”, fully compatible with the AOP, that an airport can chose to use or not to use.

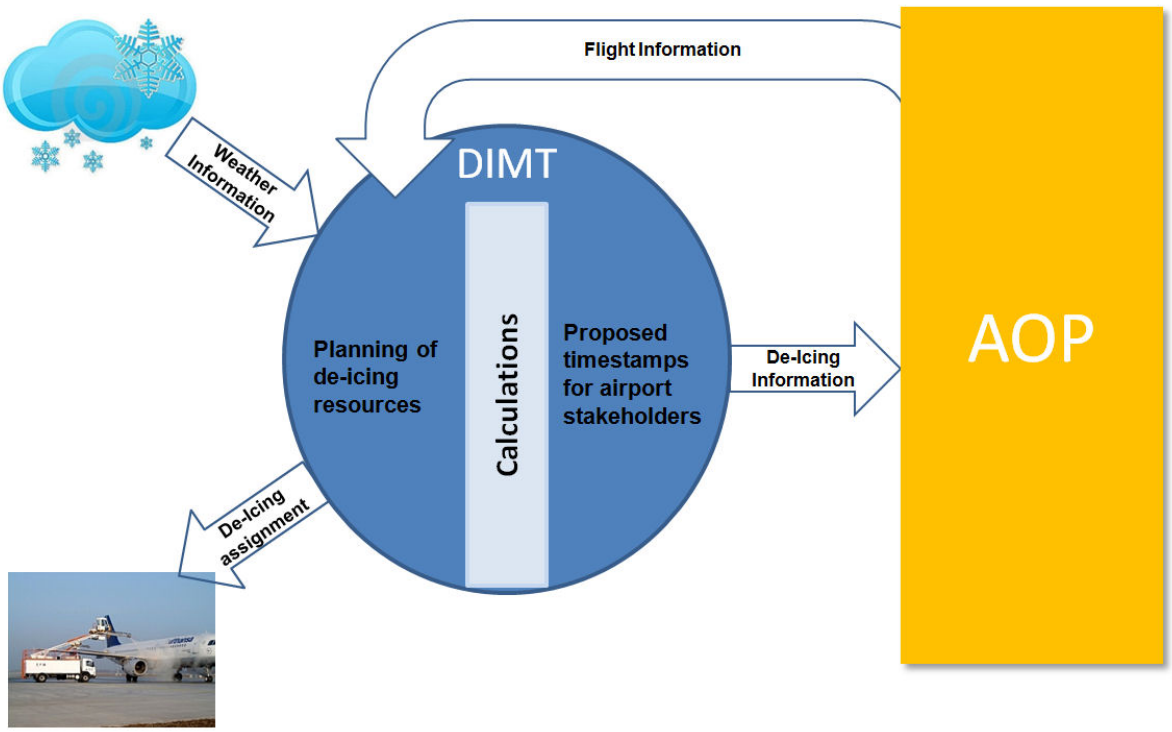


Figure 22. De-icing management tool (DIMT)

Starting from weather forecasts the DIMT will produce estimated de-icing time durations as well as suggested start and end times for de-icing operations for flights, taking existing time stamps and available de-icing resources into consideration. Through the sharing of data with the ***AOP*** de-icing will, for concerned actors, become a visible element in the Turn-round or Surface Out processes and, as such, will increase common situational awareness and predictability in the Airport Transit View.

The main functionalities of the De-Icing Management Tool are:

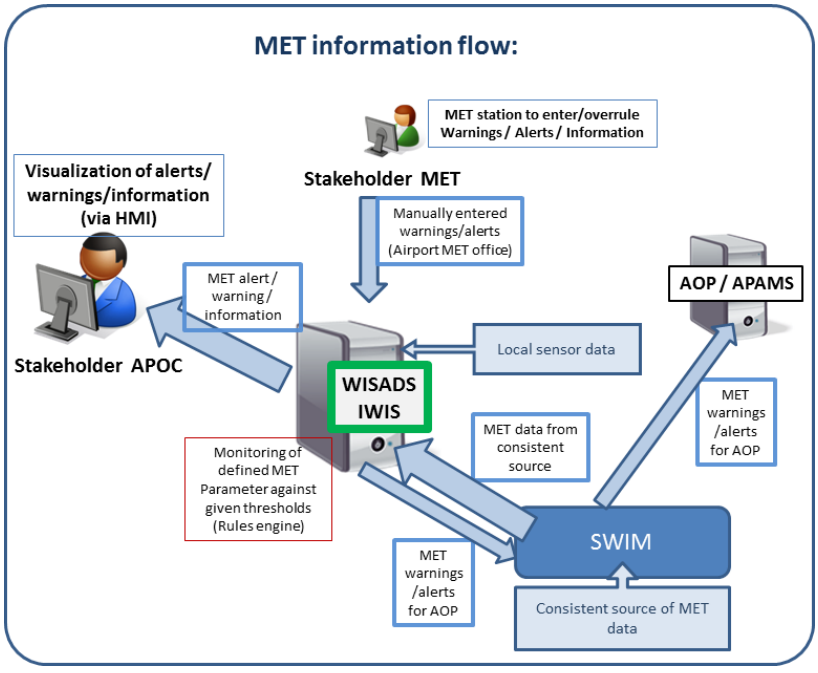
- Assessment of the up-coming weather conditions
- Calculation of Estimated De-Icing Time (EDIT) for departing flights during de-icing conditions
- Planning of de-icing sequence, including suggested start and end times for de-icing
- Allocation of de-icing rigs to flights expected to be de-iced
- Receipt of actual de-icing requests for flights

Concurrently with refinement of time stamps from the AOP, adjustments/re-planning is done to reflect the actual situation. A Post Operations Analysis capability is included as a means of follow up and learning cycle as well as refinement of estimated de-icing times and interpretation of weather data.

3.2.6.4 Meteorological Information (MET)

To improve the way meteorological data is handled in an SESAR airport, and as a next step on CDM IP 1, a generic net centric information sharing system (via SWIM and AOP), with HMI built for each stakeholder is used. This system provides a standardized and agreed set of MET-Data [parameters e.g.: wind, visibility, precipitation, thunderstorm activity; agreed period, refresh rate and amendment rules] as well as information from decision support tools to all stakeholders and therefore raises common situational awareness.

As required input, a single consistent MET data source (local sensors + single authoritative source → WP11.2) is provided by the MET office so that all stakeholders have the same information at hand. Means of distribution and display are the WISADS (Weather Information System for Airport Decision Support) and the IWIS (Integrated Weather Information System) which acts as the gateway to SWIM.



Improving accuracy and reliability of MET forecasts in the current format and data content is hardly possible as a result of physical and mathematical constraints. Probabilistic forecasting as a new methodology seems therefore feasible to enhance the performance of the overall system by adding valuable information about probability and accuracy of events.

Therefore, the MET data include probabilistic MET forecasts as well as data

derived from Decision Support Tools displaying (probabilistic) impact parameters (e.g. adverse weather, de-icing category). Clear decision rules are implemented in the so called rules engine (which is situated within WISADS) and are agreed amongst the stakeholders through the steer airport performance service.

Probability thresholds which trigger operational changes will be established and enable an improvement of the overall performance not only in adverse conditions. Those thresholds will also continuously be evolved by the steer airport performance service.

This System is applicable for both, short term planning phase and execution phase, in the same way. Therefore there is no need to distinguish between them.

Summarizing, the operational environment consist of the following items:

- standardized and agreed set of MET data from consistent source (local sensors + single authoritative source → WP11.2)
- devices to send/receive MET data (WISADS, IWIS as gateway to SWIM)
- HMI (WISADS, IWIS)
- Probabilistic forecast of weather elements
- Decision Support Tool calculating impact parameters (WISADS)

3.2.6.5 Target Time of Arrival (TTA)

In today's operation there is a strong focus on departure by the Air Transport Industry. Departure punctuality is a well-known KPI for mutual comparison among Airlines and among Airports. However, other commitments (connecting flights, further travel plans on other transportation modes, etc.) are linked to the stated flight arrival time as passengers plan their travel based on the required arrival time at their final destination.

Equally, resource planning of the airport operator and relevant stakeholders are based on this stated arrival time. Variance to the stated arrival time, both early arrival as much as delayed arrival, introduces inefficiency to the operations of all Airport stakeholders (including the Airspace User) with a likely impact on the passenger's travel plans.

The Target Times concept (4D trajectory) was introduced through the ATM Master Plan and SESAR CONOPS with the intent of improving predictability. This will not only result in more efficient use of industry resources (airspace and airport infrastructure) but shall also reduce the necessity of Airborne Holdings thereby having a positive impact on environment and cost (fuel burn reduction) performance. The consequence is a focus on arrivals through the Target Time of Arrival Concept.

The application to airports of the Target Time concept is part of SESAR Solution # 21 'Airport operations plan (AOP) and its seamless integration with the network operations plan (NOP)'. Solution # 21 is strongly linked with SESAR Solution # 18 'CTOT and TTA' and with Solution #20 'Collaborative NOP for Step1'.

The solution aims at complementing departure regulations, such as the calculated take-off time (CTOT), with the dissemination of locally-generated target times, over the traffic volume with a DCB imbalance detected in the short term planning phase, namely the hotspot. In case of hotspots located at the inbound flows an airport, target times of arrivals (TTA) are used as depicted in figure Figure 23.

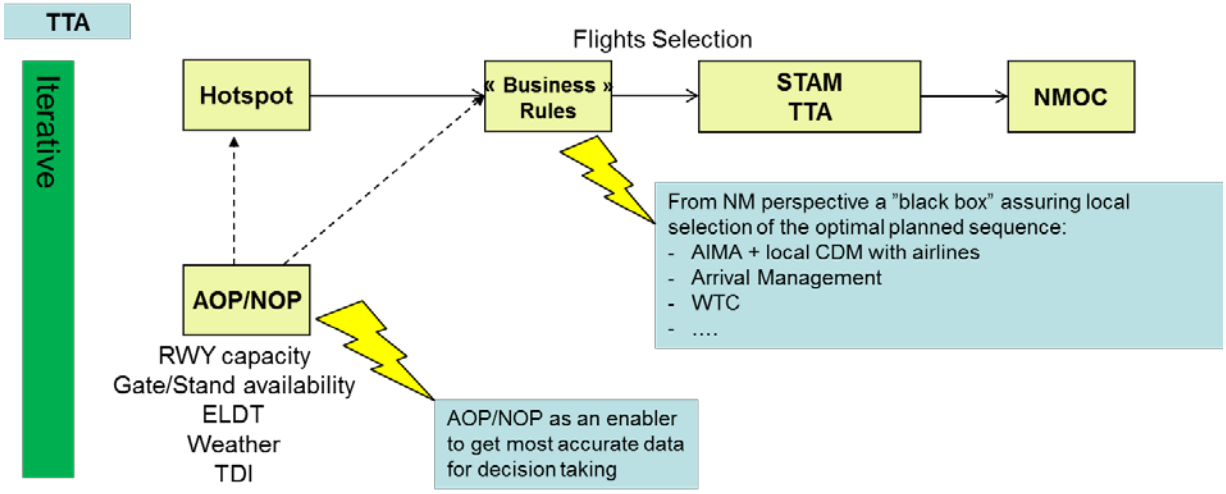


Figure 23: TTA allocation process

According to local rules, TTA's can be set either at known waypoints of the TMA (e.g. IAF) or at the arrival runways (TLDT). Ultimately, the goal of the TTA concept is to manage ATFCM at the point of congestion rather than only at departure and prevent bunching of aircraft arriving to the same airspace at the same time as per what happens in current operations.

While TTA's are allocated to the aircraft arriving at a single destination airport (ADES) the hotspot is associated to, CTOT's are linked to a number of airports the concerned aircraft are flying from, namely departure airports or ADEP.

Therefore the TTA allocation process has a network wise approach in close coordination with the local actors at ADES and ADEP such as: Flow Management Position (FMP) linked to ADES, and the stakeholders at ADES and at the different ADEP, especially the airlines and the airport operators.

A TTA allocation process can be proposed under three different situations:

- Over demand: DCB imbalance where Demand exceeds nominal Capacity within the airport arrival sectors or the arrival runway(s) (D>C).
- Capacity shortfall: DCB imbalance where the Capacity has been reduced below the forecasted Demand within the airport arrival sectors or the arrival runway(s) (C<D).
- Stakeholders' business needs (especially airlines' and airport operators').

In the two first situations above, when a hotspot is detected by the local DCB monitoring service, a coordination process is triggered to solve the imbalance. The process is started by the Flow Management Position (FMP) and is coordinated with the destination airport (ADES) affected. The process is underpinned by accurate traffic demand data provided by the NOP, which is integrated with the concerned AOP's, both from ADES and from the different ADEP. The result of this coordination process is a flight list with a number of selected with an allocated TTA. The outcome is then passed to the NMOC who will make the final decision on the allocation of CTOT's and TTA's and will publish them accordingly. The TTA is embedded in the CTOT dissemination process.

TTA's are finally allocated by the NMOC linked to a CTOT in close cooperation with the respective APOC stakeholders, including the FMP. The local Airport-Demand Capacity Balancing support tools assist the APOC in the determination of TTA's. The AIMA tool (Airport IMpact Assessment tool) can be used as the local A-DCB support tool for the determination if a TTA should be assigned to a certain aircraft and what time value that TTA should have.

The AIMA is related to the AOP concept and its mission is to carry an airport impact assessment of TTA data provided by Network for regulated flights, namely under DCB imbalance situations. The AIMA incorporates local intelligence to meet the airports' and the airlines' business needs. Its goal is to make aircraft adhere to the plan, namely the scheduled in block and subsequent of block times of the next leg of flight for every aircraft.

When the FMP triggers a coordination process to solve a hot spot at ADES using TTA's, an initial proposal consisting of a list of affected aircraft and the associated TTA's is sent to the airport operator and received by the AIMA. In an iterative process between the FMP and the APOC, the AIMA assesses the impact of the TTA's on the different airport processes and especially on the departure legs associated to each Airport Transit View (ATV) affected. The AIMA concentrates on the potential knock-on effects and provides an optimised solution to the FMP and then to the NMOC.

Comparing to pre-SESAR methods, this collaborative process contributes to a more coherent approach to demand regulation, which is expected to result in a reduced amount of reactionary delays due to mitigation of late arrivals causing knock on effects, thereby benefitting passengers and airlines, as well as the network.

3.2.6.6 Landside Processes

The nominal departure process is determined by two flows of passengers:

- Departure passengers
- Transit Passengers

This nominal process is visualized in

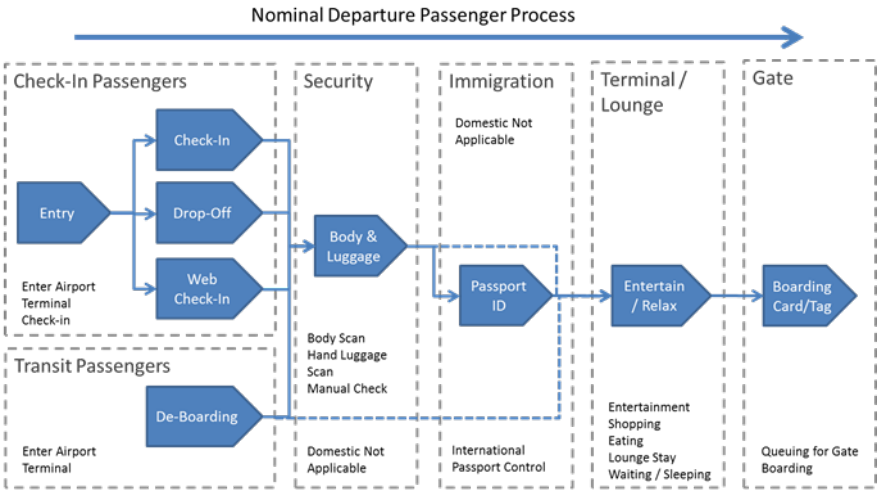


Figure 24: Nominal Departure Passenger Process

The main passenger information that is relevant for the AOP is:

- How many passenger have checked-in
- How many passenger have passed security
- How many passenger have passed immigration
- How many passengers are transferring to another flight
- How many have boarded the flight

Any gap in the number of checked and secured passengers compared to the number of boarded passengers is a reason to adjust TOBT or offload baggage of passengers, where applicable.

3.2.7 Airport Operation Center (APOC)

The APOC is the platform/operational structure which pro-actively manages the performance of present and short-term airport operations, giving relevant airport stakeholders a common operational overview of the airport, and allowing them to communicate, coordinate and collaboratively decide on their actions.

The APOC monitors and manages the overall performance of all airside and relevant landside processes. Following CDM principles, it assumes that all relevant information will be available to all stakeholders to ensure common situation awareness. The APOC permits stakeholders to communicate and co-ordinate, to develop and maintain collaboratively the airport performance and to operate in their respective area of responsibility. Its main information source is the Airport Operations Plan (***AOP***), a single, common and collaboratively agreed rolling plan available to all airport stakeholders whose purpose is to provide common situational awareness and to form the basis upon which stakeholder decisions relating to process optimisation can be made. As well as timely and accurate information, the AOP also contains a robust performance monitoring capability which allows the airport processes to be efficiently managed in real-time.

The prime focus for the APOC is the day of operation because during this phase quick analysis of the situation of a deviation must take place and instant actions are required to solve a problem or to mitigate the impact of a disturbance.

APOC main objective is to manage the Airport Operations Plan in order to make efficient use of scarce airport capacity / resources, to prevent airport overload under adverse and unforeseen conditions and to arrange fast recovery to normal conditions after operational disturbances. Pro-active action on predictions and forecast of operational degradations is as important as solving instantaneous problems. Identification of deteriorating conditions before they have an impact on operations will enhance the effectiveness of mitigating actions. The APOC also facilitates the operation / execution of the airspace users' trajectories as close as possible to their intention, to make the best use of available resources and to meet the networks ground node performance as agreed between airport, Network and airspace users.

Irrespective of any implementation option, the APOC is an organisation with well-defined roles and responsibilities. In particular it provides an arbitrator role (APOC supervisor) in situations where a collaboratively agreed decision cannot be made. Participating stakeholders in the APOC include – but is not limited to - the airport operator, the airspace users, the local ANSP and the ground handling providers. The trigger to start the APOC process is mainly a performance alert, warning or event impacting or possibly impacting in the near future the airport performance. The activation of an APOC is only deemed to be necessary when a problem cannot be solved in a bilateral manner.

The APOC is seen as the principle support to the airport decision-making process among all relevant airport stakeholders including the Network. It ensures that experiences from the past are available for effective acting on deviations and disturbances, and ascertains that decisions are timely taken. The APOC will be equipped with a decision support system (e.g. DCB tool) 3.2.4 using "what if" tools, and will be supported by a set of collaborative procedures that ensure a fully integrated management of airport processes and support decision making between airport stakeholders.

Depending on local conditions and operational philosophy, the APOC implementation can be either centralised - in which all relevant stakeholders participate physically in a room, or decentralised ('virtual implementation'), where communication and interaction between relevant stakeholders is realised via the exchange of most up-to-date and optimised Information and Communication Technology (ICT) as well as dedicated procedures.

The detailed process of managing the performance of the airport is described under chapter 3.2.4

3.3 Differences between new and previous Operating Methods

The following table is aimed at highlighting main changes between previous and new operating methods.

ATM Phases	PREVIOUS OPERATIONAL METHODS	NEW OPERATIONAL METHODS
In all phases	There is a poor common situational awareness at a local level and extremely poor at a network level, in particular at airports where DEPLOYMENT BASELINE A-CDM has not been fully implemented. Each stakeholder has its own plan. As a result, different stakeholders (simultaneously involved in the management of the same airport demand and capacity) use different, often inconsistent, planning information. There is not a real connection between arrival flight of an aircraft and the departure flight, so the impact of deviations of an aircraft trajectory cannot be transmitted downstream the network to the remaining trajectories, in particular at airports where DEPLOYMENT BASELINE A-CDM has not been fully implemented. MET is provided through individually tailored forecast products (where applicable). Weather forecast include a prediction model interpreted by the forecaster. Depending on regulations, RWY capacity and/or restrictions/RWY capacity are manually calculated. Landside processes are not considered to impact on TOBT in collective manner or great detailed description.	Rich common situation awareness is ensured both at local and Network level, in normal and adverse conditions, through the rolling AOP and NOP (continously updating their content by sharing information between all stakeholders). This results in a single (rolling) plan for the airport and the Network for all stakeholders involved in the management of the same airport demand and capacity. Therefore, airport management is carried out under a collaborative decision making environment, based upon an equal acceptance of all stakeholders. Aircraft trajectories (air and ground segments) are fully connected through ATVs (Airport Transit Views) in order to be able to assess any impact of a deviation of an aircraft trajectory downstream the Network to the remaining trajectories. MET is based on net centric information sharing, probabilistic forecasting methods and single data pool for ensuring information consistency throughout the system. Landside processes are considered to impact TOBT and are monitored with greater care for passenger and luggage progress in the terminal building, either for transit or departure.
Long Term Planning	Expected demand is based on statistical models taking into account different variables sucha as forecasted economic growth, forecasted population, airport strategic plans, etc. Capacity is usually linked with improving and building new infrastructure and any improvement in processes and services is assessed (e.g: through a set of KPIs) Airport stakeholders do not develop a mutually agreed performance standard for airport operations.	Performance standard (i.e., goals, targets, rules, thresholds, trade-off criteria and priorities) is developed for airport operations, setting an overall strategic direction in a collaborative manner. A set of KPIs is established under the Airport Performance Framework. Associated to this set of KPIs, PDIs, thresholds, rules, alerts and warnings are established in the Airport Performance Framework, taking into account the analysis and the results obtained from the Perform Post-Operations Analysis Service. Performance baseline is created for the coming season: targets and thresholds are defined for each of the KPIs included in the Airport Performance Framework.

ATM Phases	PREVIOUS OPERATIONAL METHODS	NEW OPERATIONAL METHODS
Short / Medium Term Planning	Demand and Capacity Balancing is carried out by the Airport Slot Coordinator, based on Airport Terminal and runway capacity, not involving ATM capacity in most cases. Airport Slot Allocation procedure does not address any specific obligation to check Network consistency. Consistency checks between flight plans and airport slots is done at airport level. There is no integrated demand/capacity balancing process, linking arrivals and departures at airport level. The airport operator is not able to assess the impact of the arrival of each aircraft on the next departure. With the A-CDM concept, the capability of the airport operator to influence on the inbound flow is extremely limited. Changes / updates in each stakeholder's plan are not shared or poorly shared with the rest of stakeholders, both at a local and network level. Any kind of a common agreed set of procedures (or very few) is available to cope with changes in stakeholders' plans. During short term planning, the de-icing process is still permeated by a lack of collaboration and information sharing between the different actors involved, influencing airport capacity and predictability of the de-icing process in a negative way.	DCB is carried out at a local level (runway, taxiway, apron, final approach airspace, initial departure airspace,…) and at a Network level. It is based on the information available in the rolling AOP and NOP. AOP and NOP are created for the coming season and, thereafter, are continously being updated with the changes made by any of the stakeholders and, thus, the changes are automatically shared with the rest of actors. The airport operator holds an active role concerning coordination of ATFM measures which affect their inbound traffic through the Target Time of Arrival (TTA) concept. Airports and Airlines business needs are incorporated to the decision making loop on such ATFM measures. The ATV concept together with the TTA enables airports and network to manage and mitigate the knock-on effect, linking arrivals with departures of each aircraft. Witthout a DCB imbalance in the inbound flow, the TTA also allows the airport operators and the airlines to influence the arrival times so that they can better meet their business needs. Airport Performance Framework and Airport Baseline are refined based on the analysis and results coming from the Perform Post-Operations Analysis service. Starting from short/medium planning phase (covering also execution phase and post flight analysis for lessons learnt), de-icing operation is fully integrated in A-CDM procedures. Accurate and optimized de-icing plan for the upcoming day/hours will be provided included expected delays.

ATM Phases	PREVIOUS OPERATIONAL METHODS	NEW OPERATIONAL METHODS
Execution phase	Flight Plan Information received at airports (directly or indirectly from IFPS). Aircraft are delivered to the airport following a FIFO queue management principle. DCB in execution phase is done on short notice after having run into a departure problem due to the common arrival priorization. Different stakeholders take decisions, often inconsistent, to mitigate deviations detected from their plans, based on an incomplete global situation awareness of the airport operations situation, which may cause even more deviation to the following trajectory. This is particularly true during adverse conditions.	Filling in and updating Business Trajectory information via the integration in the rolling AOP and NOP. Aircraft are delivered to the airport following the plan (AOP) as close as possible. DCB in execution phase is handled proactively allowing to exploit the control windows of inbound traffic (avoid holdings). The refinement and update of demand/capacity is continuously monitored to identify imbalance. Operators are supported by tools in their decisions so that coordination between processes is facilitated (e.g. suggestion of solutions, what-if analysis). APOC is the facility where the airport perfomance monitoring, the impact assessment (against monitored deviations) and the decisions (to mitigate those deviations) at airport level are held under a collaborative environment upon all the stakeholders involved in the airport operations management.
Post – Operations	Besides annual Performance Review Board reports, widely accepted post-operations procedures are neither implemented at airport level nor at Network level.	All data recorded from the AOP / NOP throughout the planning and execution phases are used as the main source to build post-operations reports at airport level. Some of these reports shall be standardised at Network level. Post-operations reports feed the Airport Performance Framework and Airport Baseline definition.

Table 22. Differences between new and previous operating methods

4 Detailed Operational Environment

The objective of this section is to refine the detailed operational environment for the airport operational context described in the P6.2 DOD Step 1 document [8].

4.1 Operational Characteristics

This section describes the different ways to characterise the airport operational context on the basis of the P6.2 DOD Step 1 document [8] The DOD identified four main points of view to characterise the airport operational environment:

1. Generic airport characteristics
2. Traffic characteristics
3. Infrastructure characteristics
4. Weather characteristics

4.1.1 Generic airport characteristics

There are thousands of influencing factors on airport operations, both internal and external, that shape the image of an airport but there are some of them that can be considered as key features to classify an airport:

- The function of the airport within the European Network ("Network Function")
- The physical layout of the airport ("Lay-out and Basic Operational Criteria")
- The utilisation of available capacity ("Capacity Utilisation")
- The impact of external influences ("External Influencing Factors")

4.1.1.1 Key feature 1: Network Function

The "Network Function" of an airport is an indicator "role" that plays in the European Air Transport Network and the network of the airspace users operating in that airport.

Class	Description
1. Intercontinental Hub	Large intercontinental airport acting as transfer hub for one or more major European airlines with a wide network spanning to a large number of destinations inside and outside Europe. Examples for this class of airports are: London LHR, Paris CDG, Frankfurt, Amsterdam, Madrid etc.
2. European Hub	Large European airport acting as a transfer hub for at least one European airline with a network spanning a wide range of European destinations. Only a limited number of destinations outside Europe are served directly from this airport. Examples of this class of airport are: Copenhagen, Helsinki, Vienna, Brussels, Palma, Milan-MXP etc.
3. Primary node	Medium sized airport with a limited hub function and intercontinental P2P connections. Examples of this class of airport are: Lyon-Satolas, Nice, Budapest, Warsaw, Athens etc.
4. Secondary Node	An airport with limited or no intercontinental traffic, mainly scheduled connections to the large intercontinental (class 1) or European (class 2) hubs, a significant size of charter/leisure operations and acting as a major base for one or more low fare carriers. Examples of this class of airport are: London-STN, London-LTN, Nuremberg, Gothenburg, Leeds Bradford, Milan-BGY, Rome –CIA, Valencia etc.
5. Tertiary node	A regional airport with a limited number of scheduled connections mainly operated by one or two (low fare) carriers. Examples of this class of airport are: Bern, Dortmund, Aarhus, Rotterdam, Girona, etc.
6. General / Business Aviation	An Airport dedicated to General / Business Aviation close to important metropolitan areas. Examples for this class of airports are: Paris LBG, Farnborough, Egelsbach, Copenhagen-Roskilde, etc.)

Class	Description
7. Military / Civil mixed operations	Primarily a military airfield with a (limited) number of civil operations (commercial and/or business aviation). Examples for this class of airports are: Eindhoven, Torrejon, Aalborg, etc.

Table 23. Network function - Classification

Secondary classes could be identified such as general aviation aerodromes (green fields) and pure military aerodromes. However their impact on the European network, as also for the SESAR airport concept, is very limited if not non-existent. For that reason those airport classes are not included.

The following criteria could be used to distinguish between classes:

- Total number of passengers (origin, final destination and transfer)
- Total number of aircraft movements
- Transfer passenger percentage
- Type of flight connections (intercontinental flights or European flights) of the hub operation operated by one or more airlines at that airport

4.1.1.2 Key feature 2: Layout and basic operational procedures

Airports can be categorized on their runway-taxiway lay-out and the associated basic operational procedures. The number of runways, their geometry (parallel or converging / crossing) as well as the connecting taxiway system determines the "basic" runway and ground movement operations.

Three types of runway geometry / basic operation have been selected:

1. Multiple runways independent
2. Multiple runways dependent
3. Single runway

For taxiway system, two configurations are distinguished:

1. A complex layout
2. A non-complex layout

Complex taxiway lay-outs are those where one or more of the following issues apply:

- Ground movement traffic in opposing directions takes place on a regular basis
- Crossing of active runways is required
- Backtracking on the runway is required

The following airport classification can be distinguished for the "Layout & Basic Operational Criteria":

Class	Description
1. Multiple Independent Runways, complex surface layout	Examples of this class of airports are: Madrid Barajas, Rome FCO
2. Multiple Dependent Runways, complex surface layout	Examples of this class of airports are: London LHR, Paris CDG, Frankfurt, Amsterdam, Manchester, Düsseldorf, Copenhagen etc.
3. Single Runway, complex surface layout	Examples of this class of airports are: London Gatwick, Funchal, Porto
4. Multiple Independent Runways, non-complex surface layout.	Examples of this class of airports are: Munich, Athens
5. Multiple Dependent Runways, non-complex surface layout	Examples of this class of airports are: Hamburg, Vienna, Hanover
6. Single Runway, non-complex surface layout	Examples of this class of airports are: Rotterdam, Bremen, Stuttgart, etc.

Table 24. Layout and basic operational procedures - Classification

The following criteria could be used to distinguish between classes:

- Potential go-around conflicts
- Crossing runways
- Runway crossings by taxiing/towed aircraft
- Backtracking
- Potential surface conflicts (opposing traffic, significant amount of towing traffic)

4.1.1.3 Key feature 3: Capacity Utilisation

Airports can be distinguished in the way their available capacity is utilized. High utilization means that the airport is vulnerable to disruptions such as adverse weather conditions. In those cases the impact on the network may be large. Airports with low runway utilization will have fewer disruptions from capacity reduction due to adverse conditions or other type of disturbances.

The following airport classification can be distinguished for the "Capacity Utilization"

Class	Description
1. Highly utilized airports/runways, traffic mix of heavy, medium and light aircraft. More than 90% load during 3 or more peak periods a day.	Examples of this class of airports might be: London LHR, Amsterdam, Madrid, Zurich etc.
2. Highly utilized airports/runways, homogeneous traffic (dominant heavy or medium or light). More than 90% load during 3 or more peak periods a day	Examples of this class of airports might be: Barcelona, Palma, Oslo
3. Normally utilized airports/runways. 70 – 90% load during 1 or 2 peak periods a day	Examples of this class of airports might be: Dusseldorf, Manchester, Hamburg, Stuttgart etc.
4. Low utilized airports/runways less than 70% load during peak periods.	Examples of this class of airports might be: Ljubljana, Lyon-Satolas, Luxembourg, Bristol, Budapest etc.

Table 25. Capacity Utilisation - Classification

The following criteria could be used to distinguish between classes:

- Traffic mix (H/M/L distribution)
- Number of peak periods during the day
- Landing/take-off demand versus available capacity
- Network delay (optional)

4.1.1.4 Key feature 4: External (environmental) influencing factors

"External (Environmental) Influencing Factors" can be a limiting factor when operating an airport. It can be for example a significant weather situation that is limiting operations, like a constant wind blowing in a 90 degree angle to the runway, or obstacles like high buildings or mountains close to the airport. Political factors as country boundaries adjacent to the TMA or military airspaces close by can also limit operations. Restrictions on operating hours can also arise from a wish to restrict the noise exposure of the local community. Airports can be constrained by more than one of the above issues.

The following airport classification can be distinguished for the "External (environmental) influencing factors":

Class	Description
1. Highly Constrained (Geographical / Weather issues)	Examples of this class of airports might be: Madeira, Innsbruck, Madrid, Nice etc.
2. Highly Constrained (Political / Community issues)	Examples of this class of airports might be: Amsterdam, Zurich, Stockholm Arlanda, Munich etc.
3. Moderately Constrained (both Geographical / Weather and Political / Community)	Examples of this class of airports might be: Prague, Cologne, Dusseldorf, Copenhagen etc.
4. Weakly or Unconstrained	Examples of this class of airports might be: Palma, Toulouse, Athens, Hannover etc.

Table 26. External influencing factors - Classification

The following list gives an overview of different factors that may determine the external influences on an airport and its operations:

Weather: • Fog (ICAO CAT I/II/IIIa/IIIb/IIIc) these categories are of course not limited to fog situations, as heavy rain or heavy snow fall can also reduce tie visibility • Rain (light, moderate, heavy) • Snow / Ice (light, moderate, heavy) on the ground and/or on aircraft • Wind (light, moderate, heavy, steady, changing direction, gusts) • Thunderstorm (light, moderate, heavy) • Temperature • Volcanic eruption
Topographical Issues • Height above sea level. • Obstacles (mountains, buildings, industrial buildings) • Location (close to water, close to obstacles, close to other airports).
Political Issues • Airport close to country boundary (approach and departure via a second country) • Restricted airspace (military or other reason) • Expansion or opening of a new airport (long term or short term capacity constraints) • Staff on strike (ATC and non ATC)
Community Issues • Noise • Emissions • Operating hours (limited, restricted or 24 hours) • Expansion of an existing airport

Table 27. Factors influencing external influences

A presentation of tables showing the matrices for each of the five combinations of two key features - where examples of airports (within ECAC region) are given of each combination of classes – is provided in the P6.2 DOD Step 1 document [8] section 3.1.2).

4.1.2 Traffic characteristics

Based on the Generic Airport Characteristics, key feature 1 “Network Functions”, an approximate indication can be given on traffic volume and traffic mix. It must be stressed that it is not more than just an indication and deviations from this categorization will exist.

Airport Category	Annual Movements	Heavy-Medium-Light mix
Intercontinental Hub	300.000 +	>15% Heavy, <1% Light
European Hub	150.000 – 300.000	<15% Heavy, 10-20% Light
Primary Node	75.000 – 150.000	< 5% Heavy, 20-30% Light
Secondary Node	30.000 – 75.000	< 1% Heavy, >30% Light
Tertiary Node	< 30.000	No Heavy, > 40% Light
General / Business Aviation	A few hundred – 80.000	No Heavy, > 90% Light
Military / Civil Mixed Ops	< 30.000	>50% military ops

Table 28. Traffic characteristics

Within SESAR1, the airport operations management concept has been developed from a holistic perspective and with the aim of satisfying the operational requirements of major airports in the future. Clearly, some of the concept elements may not be considered as operationally necessary or cost-effective particularly amongst the smaller, regional airport community. The specific needs of regional

airports will be addressed in SESAR2020 (PJ04) although two specific activities were performed in SESAR1 with relevance to regional airports:

1. The European Connected regional airport (E-CRA) project.
2. A V2 validation exercise focussed on Alicante airport.

The E-CRA activity focussed on the integration of the A-380 aircraft at Bordeaux airport. Specific Use Cases developed are described in the OSED document Part 2, namely [UC AOM 17] and [UC AOM 18].

The Alicante activity focussed on performing initial research into the feasibility of a more streamlined and semi-automated milestone approach aligned to the A-CDM concept. Further work is required and will be performed in PJ04.

4.1.3 Infrastructure characteristics

4.1.3.1 Airport (ground) enablers

This section identifies the technical basis for characterizing the airport infrastructure. In the table below, a list of airport technical equipment is given to classify airport depending on the degree of implementation regarding each equipment.

Airport technical equipment
Surveillance Systems (multi-lateration)
Surveillance Systems ADS-B
AMAN / DMAN
A-SMGCS (level 4)
GBAS
MLS
ILS
Datalink (CPDLC)
CDM DEPLOYMENT BASELINE
SWIM
AOP, APOC, DCB

Table 29. Infrastructure characteristics - airport ground enablers.

4.1.3.2 Aircraft (airborne) enablers

This section identifies the aircraft technology that impacts the airport operation. In the table below, a list of aircraft technology is given to assess the impact of airport operation depending of the degree of implementation in the aircraft that operate at the airport.

Aircraft technology
ADS-B in and out
ATSAW
Optimised braking
Datalink (CPDLC)
D-TAXI
GBAS Capability
MLS
ILS
P-RNAV
RNAV
FMS Capability

Table 30. Infrastructure characteristics - aircraft (airborne) enablers

4.1.3.3 Terminal Building Enablers

These enablers can be Passenger Tracking Systems (PTS) using various video and tracking techniques to determine dwell times and trace individual passengers through their path towards the departure gate. Collected data can be fed into the AOP and shared with the respective airlines.

Related A-CDM landside process enablers through the Operational Improvement AO-0802-A (A-CDM process enhanced through integration of landside (passenger only) process outputs) are provided in the table below.

AIRPORT-35a	Airport CDM (level 4 - CDM integrated with passenger process)
HUM-014	New interactions and communication patterns for the integration of landside process outputs into the A-CDM process.
HUM-015	New working methods for the integration of landside process outputs into the A-CDM process.

4.1.4 Weather characteristics

Weather conditions will have a significant impact on the airport operational performance. Operational improvements must therefore be considered in both good and degraded weather conditions as some improvements may only provide benefits during specific conditions. The following three basic weather categories have been distinguished for an airport:

- **Nominal weather conditions**, which are the conditions in which the airport operates in more than 90% of time and where the declared capacity for scheduling purposes is based on. Nominal conditions translate in excellent or good conditions like no wind, no snow, no visibility constraints, etc.
- **Adverse,** degraded, weather conditions, within the operational envelope of the airport, which have a significant negative impact on operations unless an appropriate response is organized
- **Disruptive** weather, adverse conditions which are very unlikely to occur and would have a severe impact on airport performance but the airport cannot be expected to provide resources to mitigate the condition (e.g. 6 hours of snow in Naples)

The table below gives the characteristics for the categories of **nominal** and **typical adverse conditions** which have a negative impact on operations at airports.

Weather constraint	Nominal conditions	Typical adverse Conditions	Comments
Visibility	More than 1,500 m	Less than 550 m	Visibility Condition 2. (ICAO Manual on A-SMGCS doc 9830: Visibility sufficient for the pilot to taxi and to avoid collision with other traffic on taxiways and at intersections by visual reference, but insufficient for personnel of control units to exercise control over all traffic on the basis of visual surveillance)
Cloud Base	> 1,500 ft	< 200 ft	
Wind Intensity and Direction	Less than 15 kt	More than: - 15 kt head - 30 kt head	Head winds reduce the arrival stream capacity for distance based separation. The limits on tail winds will depend on runway length
Wind gusts	No gusting	Gusting	Cross wind gust characteristics impact on wake vortex restrictions

Weather constraint	Nominal conditions	Typical adverse Conditions	Comments
Freezing conditions	Above +3 deg C, no moisture	Below +3 deg C	
Precipitation	No precipitation, No standing water on runway	Heavy rain, standing water on runway	
Snow/slush	No snow or slush on runway	Snow or slush on runway	
Braking conditions	Good	Medium to poor	
Duration of weather events	Less than 15 minutes	15 minutes or more	
Thunderstorm / lightning	No occurrence	Within 5 km of airport or on arrival / departure paths	Within 5 km of airport may result in the temporary halt of aircraft handling (e.g. fuelling) at the aircraft stand. On arrival / departure path may result in runway changes or temporary halt of runway operations

Table 31. Nominal and typical adverse conditions characteristics

A further specification to characterize visibility might be applicable where RVR (Runway Visible Range) is used as the metric.

Airport Category	Landing Decision Height (DH)	Runway visual Range
1	DH > 200ft	> 550m
2	100ft < DH < 200ft	> 300m
3a	0ft < DH < 100ft	> 200m
3b	0ft < DH < 50ft	> 200m
3c	DH = 0ft	0m

Table 32. Visibility characterisation

4.1.5 Assumptions

The high level Airport Operations Management concept described in this OSED is applicable to all the European airports. In particular, all the airports shall implement the high-level operational services defined in section 2.3 and all the airports shall implement an AOP consistent with the NOP.

Depending on the size and complexity of the airport and depending on the impact of the airport operations on the network operations, the airport stakeholders will tailor the concept implementation to their local needs. Their choice will also be driven by the network performance targets that all the European airports will have to comply to.

For example, different implementation options are envisaged for the APOC and its associated processes, from a fully virtual APOC with very limited staff and simple communication means at smallest airports to a physical centre gathering representatives of all the key airport stakeholders, supported by advanced support tools and communication means at major hubs.

The concept described in this version of the OSED does not make the difference between the different airport needs and implementation options. However, it is assumed that the airport of reference is complex enough to implement the most complex processes and support tools.

4.2 Roles and Responsibilities

A summary of the roles and responsibilities of all the stakeholders involved in the “Airport Operations Management” is provided in this section.

The table below identifies, on one hand, the responsibilities for each role under a general perspective and, on the other hand, the responsibilities that each role assumes in any of the 4 services of the Airport Operations Management in which it is significantly involved.

Note: The first group of responsibilities (general perspective) is extracted from the DOD's "Roles and Responsibilities" section. The second group of responsibilities is extracted from the services description (see section 3.2 of this document) when any (relevant) responsibility is not mentioned in the general perspective summary. Some of the roles only have a general perspective summary of their responsibilities since there is not any additional responsibility to add from the services description

Role name	Summary of responsibility	
Flight Crew	General view	The Flight Crew remains ultimately responsible for the safe and orderly operation of the flight in compliance with the ICAO Rules of the Air, other relevant ICAO and CAA/EASA provisions, and within airline standard operating procedures. It ensures that the aircraft operates in accordance with ATC clearances and with the agreed Reference Business Trajectory.
	Monitor Airport Performance[35]	• Updates the AOP information in charge according to their decision support tools for flight route planning, including 4D flight trajectory calculation, management of route catalogue and route cost estimations; • Creates and updates their part of ATV information.
Airspace User	General view	N/A (not included in DOD)
	Steer Airport Performance	Provides operational targets, thresholds, rules, etc. for the Current Airport Performance Framework.
	Monitor Airport Performance	• Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings. • Updates the AOP information in charge according to their decision support tools for flight route planning, including 4D flight trajectory calculation, management of route catalogue and route cost estimations;
	Manage Airport Performance	• Are informed about the impact of deviations from the plan. • Are informed about the impact of what-if solutions • Participates to the decision making process in case of collaborative decision process. • Take appropriate decisions to remove any alert / warning under their sole area of responsibility. Note: decisions / actions will ultimately result in the update of the AOP.
	Perform Post-operations analysis	• Run searches through data mining and capture data according to their access rights (data privacy policy); • Run post-operations analysis and generate performance reports.
Airline Operations Control Centre	General view	The Airline Operations and Control Centre is an organizational unit of an airline. It hosts the roles of Flight Dispatch, Slot Management and Strategic & CDM Management, thereby managing the operations of the Airline and implementing the flight programme.
	Monitor Airport Performance	• Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings. • Updates the AOP information in charge according to their decision support tools for flight route planning, including 4D flight trajectory calculation, management of route catalogue and route cost estimations.

[35] Those actions may be undertaken electronically by the On-board Flight Management System (FMS), manually by the Flight Crew, or by the AOC or Flight Dispatcher depending on the Airline operational standards

Role name	Summary of responsibility	
	Manage Airport Performance	• Are informed about the impact of deviations from the plan. • Are informed about the impact of what-if solutions • Participates to the decision making process in case of collaborative decision process. • Take appropriate decisions to remove any alert / warning under their sole area of responsibility. Note: decisions / actions will ultimately result in the update of the AOP.
	Perform Post-operations analysis	• Run searches through data mining and capture data according to their access rights (data privacy policy). • Run post-operations analysis and generate performance reports.
Slot Manager	General view	N/A (not included in DOD)
	Monitor Airport Performance	Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings.
	Manage Airport Performance	• Are informed about the impact of deviations from the plan. • Are informed about the impact of what-if solutions • Participates to the decision making process in case of collaborative decision process. • Take appropriate decisions to remove any alert / warning under their sole area of responsibility. Note: decisions / actions will ultimately result in the update of the AOP.
	Perform Post-operations analysis	• Run searches through data mining and capture data according to their access rights (data privacy policy). • Run post-operations analysis and generate performance reports.
Flight Dispatcher	General view	N/A (not included in DOD)
	Monitor Airport Performance	• The Flight Dispatcher is an actor included in the Airline Operations and Control Centre. A Flight Dispatcher is responsible for planning and monitoring the progress of a flight. • Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings.
Strategic and CDM Manager	General view	N/A (not included in DOD) From A-CDM: The Strategic and CDM Manager is an actor included in the Airline Operations and Control Centre. The Strategic and CDM Manager's prime responsibilities are the overall management of the daily operations of the Airspace User and the initiation of CDM processes with concerned partners to resolve potential and existing problems.
	Monitor Airport Performance	Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings.
	Manage Airport Performance	• Are informed about the impact of deviations from the plan. • Are informed about the impact of what-if solutions • Participates to the decision making process in case of collaborative decision process. • Take appropriate decisions to remove any alert / warning under their sole area of responsibility. Note: decisions / actions will ultimately result in the update of the AOP.
	Perform Post-operations analysis	• Run searches through data mining and capture data according to their access rights (data privacy policy). • Run post-operations analysis and generate performance reports.
Airport Operator	General view	The Airport Operator is responsible for the physical conditions on the manoeuvring area, apron and in the environs of the aerodrome. This includes assurance that the scale of equipment and facilities provided are adequate for the flying activities which are expected to take place at that Airport, as well as provision of staff who are competent and where necessary, suitably qualified.
	Steer Airport Performance	Provides operational targets, thresholds, rules, etc. for the performance baseline and maintains the system supporting the AOP.
	Monitor Airport Performance	• Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings. • Creates ATVs • Integrates OSB agreed parameters. • Updates the AOP information that is responsible for.

Role name	Summary of responsibility	
	Manage Airport Performance	• Are informed about the impact of deviations from the plan. • Are informed about the impact of what-if solutions • Participates to the decision making process in case of collaborative decision process. • Take appropriate decisions to remove any alert / warning under their sole area of responsibility. Note: decisions / actions will ultimately result in the update of the AOP.
	Perform Post-operations analysis	• Run searches through data mining and capture data according to their access rights (data privacy policy). • Run post-operations analysis and generate performance reports.
Airport Duty Officer	General view	The airport duty officer is the responsible manager for the daily operations, entitled by the airport operator to be in charge of assuring that the airport is operated in accordance with its national licensing conditions and international regulations. Other responsibilities: • Changes to the airport infrastructure, including the manoeuvring area under the delegated authority of the Tower Supervisor. • Ensuring the best interest of passengers and airlines are met.
	Monitor Airport Performance	• Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings. • Updates the AOP information that is responsible for.
	Manage Airport Performance	• Is informed about the impact of deviations from the plan. • Is informed about the impact of what-if solutions • Participates to the decision making process in case of collaborative decision process. • Take appropriate decisions to remove any alert / warning under their sole area of responsibility. Note: decisions / actions will ultimately result in the update of the AOP.
	Perform Post-operations analysis	• Run searches through data mining and capture data according to their access rights (data privacy policy). • Run post-operations analysis and generate performance reports.
Airport Slot Coordinator	General view	The Airport Slot Coordinator role in ATM is three-fold: • To prepare the allocation of airport slots to Aircraft Operators wanting to operate from/to a fully coordinated airport on a seasonal basis, in a neutral, non-discriminatory and transparent way. This responsibility occurs during the Long-term Planning phase. • To facilitate the operations of Aircraft Operators at schedule facilitated airports. The corresponding responsibility (Airport Slot Negotiation) is to negotiate with the Aircraft Operators the allocation of airport slots in accordance with the rules and regulations and to define the airport slot allocation plan. This responsibility occurs during all phases. • To monitor the use of airport slots and adherence of Aircraft Operators to allocated schedules. The corresponding responsibility (Airport Slot Monitoring) is to monitor that the utilisation of airport slots by the Aircraft Operators is in accordance with the airport slot allocation plan. This responsibility occurs during the Execution phase.
	Steer Airport Performance	Provides operational targets, thresholds, rules, etc. for the performance baseline and maintains the system supporting the AOP.
	Monitor Airport Performance	• Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings. • Provides the approved operational airport slot specification.
	Manage Airport Performance	• Are informed about the impact of deviations from the plan. • Are informed about the impact of what-if solutions • Participates to the decision making process in case of collaborative decision process. • Take appropriate decisions to remove any alert / warning under their sole area of responsibility. Note: decisions / actions will ultimately result in the update of the AOP.

Role name	Summary of responsibility	
	Perform Post-operations analysis	• Run searches through data mining and capture data according to their access rights (data privacy policy). • Run post-operations analysis and generate performance reports.
Airport Operations Centre (APOC)	General view	An operational management structure that permits relevant airport stakeholders to have a common operational overview and to communicate, coordinate and collaboratively decide on the progress of present and near term airport operations. The APOC hosts the roles of APOC Supervisor and Airport CDM Project Manager. The APOC, through the APOC Supervisor role, also acts as the Ground Coordinator and provides a focal point at the airport to ensure coordination among airport stakeholders, including the Network Manager.
	Monitor Airport Performance	Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings.
	Manage Airport Performance	• Facilitator and communicator for airspace users and ground handlers in case of capacity shortfall or special events. • Supervises the resolution of inconsistencies in the AOP. • Is informed about the impact of deviations from the plan. • Is informed about the impact of what-if solutions. • Supervises, coordinates and arbitrates whenever necessary between airport stakeholders during decision-making process. • Take appropriate decisions to remove any alert / warning under their sole area of responsibility. Note: decisions / actions will ultimately result in the update of the AOP.
Stand Planner	General view	The Stand Planner has the role to of assigning flights/aircraft to their stands on a given airport, taking into account inter alia: aircraft type, aircraft load (e.g. passenger vs. cargo), gate assignment to airlines, origin / destination of flight (e.g. Schengen, international, etc…). The Stand Planner modifies the plan dynamically to comply with real time constraints (stand usage conflicts, stand out-of-service etc.). The stand plan is generated during the medium/short-term phase and updated throughout the execution phase.
	Steer Airport Performance	Provides operational targets, thresholds, rules, etc. for the performance baseline and maintains the system supporting the AOP.
	Monitor Airport Performance	• Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings. • Updates the AOP information that is responsible for.
	Manage Airport Performance	• Is informed about the impact of deviations from the plan. • Is informed about the impact of what-if solutions • Participates to the decision making process in case of collaborative decision process. • Take appropriate decisions to remove any alert / warning under their sole area of responsibility. Note: decisions / actions will ultimately result in the update of the AOP.
	Perform Post-operations analysis	• Runs searches through data mining and capture data according to their access rights (data privacy policy). • Runs post-operations analysis and generate performance reports.
Apron Manager	General view	The Apron Manager is responsible for guidance of aircraft to and from the stands (e.g. providing push-back approval), ensuring the safe and efficient movement of aircraft and vehicles within his area of responsibility according to local procedures. The Apron Manager also maintains close coordination with Tower Ground Controller, AOC and APOC on planned aircraft movements. Normally, control of the activities and the movement of aircraft and vehicles rest with ATC with respect to the manoeuvring area. In the case of aprons, such responsibility sometimes rests with the apron management.
	Steer Airport Performance	Provides operational targets, thresholds, rules, etc. for the performance baseline and maintains the system supporting the AOP.

Role name	Summary of responsibility	
	Monitor Airport Performance	• Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings. • Defines and updates taxiways and runways allocation. • Defines and updates operational taxiways and runways capacities based on collaborative process. • Provides and updates Airport Transit View (ATV) information (e.g. taxi route).
	Manage Airport Performance	• Is informed about the impact of deviations from the plan. • Is informed about the impact of what-if solutions • Participates to the decision making process in case of collaborative decision process. • Take appropriate decisions to remove any alert / warning under their sole area of responsibility. Note: decisions / actions will ultimately result in the update of the AOP.
	Perform Post-operations analysis	• Run searches through data mining and capture data according to their access rights (data privacy policy). • Run post-operations analysis and generate performance reports.
De-icing Agent	General view	The specific responsibility for the De-icing Agent is to ensure that the departing aircraft is free of snow and ice and that the point in time for start of holdover time is communicated to the pilot in command of the A/C.
	Steer Airport Performance	Provides operational targets, thresholds, rules, etc. for the performance baseline and maintains the system supporting the AOP.
	Monitor Airport Performance	• Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings. • Updates the AOP information that is responsible for.
	Manage Airport Performance	• Is informed about the impact of deviations from the plan. • Is informed about the impact of what-if solutions • Participates to the decision making process in case of collaborative decision process. • Take appropriate decisions to remove any alert / warning under their sole area of responsibility. Note: decisions / actions will ultimately result in the update of the AOP.
	Perform Post-operations analysis	• Run searches through data mining and capture data according to their access rights (data privacy policy). • Run post-operations analysis and generate performance reports.
Ground Handling Agent	General view	The Ground Handling Agent has the role to execute the aircraft turn-round agreements established with the Aircraft Operators and is responsible for the turn-round of all arriving aircraft. Ground Handling covers a complex series of processes that are required to separate an aircraft from its load (passengers, baggage, cargo and mail) on arrival and combine it with its load prior to departure.
	Steer Airport Performance	Provides operational targets, thresholds, rules, etc. for the performance baseline and maintains the system supporting the AOP.
	Monitor Airport Performance	• Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings. • Updates the AOP information that is responsible for.
	Manage Airport Performance	• Is informed about the impact of deviations from the plan. • Is informed about the impact of what-if solutions • Participates to the decision making process in case of collaborative decision process. • Take appropriate decisions to remove any alert / warning under their sole area of responsibility. Note: decisions / actions will ultimately result in the update of the AOP.
	Perform Post-operations analysis	• Runs searches through data mining and capture data according to their access rights (data privacy policy). • Runs post-operations analysis and generate performance reports.
Local ANSP	General view	N/A (not included in DOD)
	Steer Airport Performance	Provides operational targets, thresholds, rules, etc. for the performance baseline and maintains the system supporting the AOP.

Role name	Summary of responsibility	
	Monitor Airport Performance	• Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings. • Updates the AOP information that is responsible for.
	Manage Airport Performance	• Is informed about the impact of deviations from the plan. • Is informed about the impact of what-if solutions • Participates to the decision making process in case of collaborative decision process. • Take appropriate decisions to remove any alert / warning under their sole area of responsibility. Note: decisions / actions will ultimately result in the update of the AOP.
	Perform Post-operations analysis	• Runs searches through data mining and capture data according to their access rights (data privacy policy). • Runs post-operations analysis and generate performance reports.
Executive Controller	General view	The Executive Controller is part of the sector team responsible for a designated area (e.g. control sector, multi sector area). He is responsible for the safe and expeditious flow of all flights operating within his area of responsibility. His principal tasks are to separate and sequence known flights operating within his area of responsibility and to issue instructions to pilots for conflict resolution and segregated airspace circumnavigation. Additionally, he monitors the trajectory (4D and 3D) of aircraft according to the clearance they have received. He is assisted in these tasks by automated tools for conflict detection and resolution, trajectory monitoring and area proximity warning (APW). The responsibilities of the Executive Controller are focused on the traffic situation, as displayed at the Controller Working Position (CWP), and are very much related to task sharing arrangements within the sector team.
	Monitor Airport Performance	• Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings. • Defines and updates taxiways and runways allocation. • Defines and updates operational taxiways and runways capacities based on collaborative process. • Provides and updates Airport Transit View (ATV) information (e.g. taxi route).
	Manage Airport Performance	• Is informed about the impact of deviations from the plan. • Is informed about the impact of what-if solutions • Participates to the decision making process in case of collaborative decision process. • Take appropriate decisions to remove any alert / warning under their sole area of responsibility. Note: decisions / actions will ultimately result in the update of the AOP.
	Perform Post-operations analysis	• Runs searches through data mining and capture data according to their access rights (data privacy policy). • Runs post-operations analysis and generate performance reports.
ACC/Approach Supervisor	General view	The ACC/Approach Supervisor is responsible for the general management of all activities in the Operations Room. He decides on staffing and manning of controller working positions in accordance with expected traffic demand.
	Monitor Airport Performance	• Supported by simulations of traffic load and of traffic complexity he decides about the adaptation of sector configurations to balance capacity to forecast demand. Based on the results of simulations required flow control measures may be implemented by ATFCM through a CDM process. • Monitors forecast demand against declared capacity. • Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings. • Defines and updates taxiways and runways allocation. • Defines and updates operational taxiways and runways capacities based on collaborative process. • Provides and updates Airport Transit View (ATV) information (e.g. taxi route).

Role name	Summary of responsibility	
	Manage Airport Performance	• Supports decision on runway in use in co-operation with Airport Operator (APOC) and Tower Supervisor. • Adapts the arrival and departure flows according to the new runway configuration validated by the Airport TWR supervisor. • Is informed about the impact of deviations from the plan. • Is informed about the impact of what-if solutions • Participates to the decision making process in case of collaborative decision process. • Take appropriate decisions to remove any alert / warning under their sole area of responsibility. Note: decisions / actions will ultimately result in the update of the AOP.
	Perform Post-operations analysis	• Runs searches through data mining and capture data according to their access rights (data privacy policy). • Runs post-operations analysis and generate performance reports.
Airport Tower Supervisor	General view	The Tower Supervisor is responsible for the safe and efficient provision of air traffic services by the Tower crew. He decides on staffing and manning of controller working positions in accordance with expected traffic demand. He represents the Tower when coordinating with the Airport Operator on operational issues. Other general tasks: • Maintains close liaison with the Airport Operator with respect to the daily inspection of the movement area, the aerodrome lighting system, the marking of obstructions, snow clearance etc. • Coordinates with the Airport Operator regarding traffic emergencies/incidents on the movement area. • Implements and discontinues limited visibility operations (CAT II or CAT III) after liaison with Airport Operator and ACC/Approach Supervisors.
	Monitor Airport Performance	• Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings. • Defines and updates taxiways and runways allocation. • Defines and updates operational taxiways and runways capacities based on collaborative process. • Provides and updates Airport Transit View (ATV) information (e.g. taxi route).
	Manage Airport Performance	• Decides on runway(s) for landing and take-off in co-operation with all concerned partners. • Coordinates with the ACC/Approach Supervisors and Local Traffic Manager regarding the implementation of traffic smoothing measures (i.e. spacing between same direction departures). • Initiates Airport traffic smoothing procedures (i.e. restricted push backs, perimeter holds, taxi routings, tug movements) in coordination with Airport Operator and the Tower Ground Controller. • Is informed about the impact of deviations from the plan. • Is informed about the impact of what-if solutions • Participates to the decision making process in case of collaborative decision process. • Take appropriate decisions to remove any alert / warning under their sole area of responsibility. Note: decisions / actions will ultimately result in the update of the AOP.
Tower Ground Controller	General view	The Tower Ground Controller is part of the controller team responsible for providing an Air Traffic Service (ATS) at controlled aerodromes. His main task is the provision of ATS to aircraft and vehicles on the manoeuvring area. The TWR Ground Controller must also ensure that ensure airport maintenance vehicles and manoeuvring aircraft are separated. Use of an advanced surface movement guidance and control system (A-SMGCS) by the Tower Ground Controller will be generalized.
	Monitor Airport Performance	• Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings. • Defines and updates taxiways and runways allocation. • Provides and updates Airport Transit View (ATV) information (e.g. taxi route).

Role name	Summary of responsibility	
	Manage Airport Performance	• Is informed about the impact of deviations from the plan. • Is informed about the impact of what-if solutions • Take appropriate decisions to remove any alert / warning under their sole area of responsibility. Note: decisions / actions will ultimately result in the update of the AOP.
Tower Clearance Delivery Controller	General view	The Clearance Delivery Controller is responsible for verification of Flight data (e.g. FPL, CTOT, Stand, TSAT, etc.), delivery of ATC Clearance (Departure Clearance) and Start Up Approval.
	Monitor Airport Performance	• Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings. • Defines and updates taxiways and runways allocation. • Provides and updates Airport Transit View (ATV) information (e.g. taxi route).
	Manage Airport Performance	• Is informed about the impact of deviations from the plan. • Is informed about the impact of what-if solutions • Take appropriate decisions to remove any alert / warning under their sole area of responsibility. Note: decisions / actions will ultimately result in the update of the AOP.
Tower Runway Controller	General view	The Tower Runway Controller is responsible for the provision of air traffic services to aircraft within the control zone, or otherwise operating in the vicinity of controlled aerodromes (unless transferred to Approach Control/ACC, or to the Tower Ground Controller), by issuing clearances, instructions and permission to aircraft, vehicles and persons as required for the safe and efficient flow of traffic. The Tower Runway Controller will be assisted by arrival, departure and surface management systems, where available.
	Monitor Airport Performance	• Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings. • Defines and updates taxiways and runways allocation. • Provides and updates Airport Transit View (ATV) information (e.g. taxi route).
	Manage Airport Performance	• Is informed about the impact of deviations from the plan. • Is informed about the impact of what-if solutions • Take appropriate decisions to remove any alert / warning under their sole area of responsibility. Note: decisions / actions will ultimately result in the update of the AOP.
Network Manager	General view	In the Execution Phase the Network Manager has to assure the stability of the NOP, reacting to unexpected events, which impact on overall network performance, such as unusual meteorological conditions are loss of significant assets (e.g. runways, airports), among other means, activating pre-agreed scenarios will enable the Network Manager to restore Network stability.
	Steer Airport Performance	Checks consistency for proposed Current Airport Performance Framework with network.
	Monitor Airport Performance	• Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings. • Updates the AOP information that is responsible for. • Maintains the consistency of the NOP information with the AOP information.
	Manage Airport Performance	• Can input event messages • Is informed about the impact of deviations from the plan. • Is informed about the impact of what-if solutions • Provides impact assessment of candidate solutions • Participates to the decision making process in case of collaborative decision process or is represented by the APOC supervisor • Take appropriate decisions to remove any alert / warning under their sole area of responsibility • Can initiate UDPP through the APOC and porposes the initial set of measures as a basis to begin negotiations among affected users. Note: decisions / actions will ultimately result in the update of the AOP.

Role name	Summary of responsibility	
	Perform Post-operations analysis	• Runs searches through data mining and capture data according to their access rights (data privacy policy). • Runs post-operations analysis and generate performance reports.
Local Capacity Manager	General view	The Air Navigation Service Providers perform their own local capacity planning coordinated with the Network Management function. Local Capacity Management is a planning role, which contributes to the sub-regional (e.g. FAB) capacity planning. NOTE: Role not included in the DOD.
	Steer Airport Performance	The main tasks of the Local Capacity Manager are performed in the Business Development and in the Medium/Short-term Planning Phase and are to participate in strategic DCB planning meetings, to analyse and establish traffic flows and local capacity values for various sector configurations and airport capabilities and to establish local DCB procedures and practices.
	Monitor Airport Performance	• Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings. • Updates the AOP information that is responsible for.
	Manage Airport Performance	• Is informed about the impact of deviations from the plan. • Is informed about the impact of what-if solutions • Participates to the decision making process in case of collaborative decision process. • Take appropriate decisions to remove any alert / warning under their sole area of responsibility. Note: decisions / actions will ultimately result in the update of the AOP.
	Perform Post-operations analysis	• Runs searches through data mining and capture data according to their access rights (data privacy policy). • Runs post-operations analysis and generate performance reports.
MET Service	General view	N/A (not included in DOD)
	Steer Airport Performance	Presents available weather data (observations and forecasts) to be selected by the other stakeholders as specific fields in the AOP.
	Monitor Airport Performance	• Consults the evolution of KPIs and PDIs and receives appropriate alerts and warnings. • Updates weather forecasts and observations information.
	Manage Airport Performance	• Is informed about the impact of deviations from the plan. • Is informed about the impact of what-if solutions • Participates to the decision making process in case of collaborative decision process. • Take appropriate decisions to remove any alert / warning under their sole area of responsibility. Note: decisions / actions will ultimately result in the update of the AOP.
	Perform Post-operations analysis	• Runs searches through data mining and capture data according to their access rights (data privacy policy). • Runs post-operations analysis and generate performance reports.
Airport Performance Board (APB)	General view	N/A (not included in DOD)
	Steer Airport Performance	The ***Airport Performance Board (APB)*** is made up of board level (i.e. Strategic) representatives from the various airport stakeholders organisations. The representatives must have the ability to agree performance decisions for the airport operation and accept that the collaborative result may/may not equal strategic agreements between the airport and the individual stakeholder. As per the detail provided in table 1, representatives of the APB are expected to be the Chief Operating Officer of the company or a delegate for this position. As the APB is making collaborative decision about the high level (Strategic) focus of the airport performance, it is suggested that MET Providers and Ground Handler Organisations are not appropriate participants. MET Providers do not have a strategic interest in the performance of the airport, they are, however an operational process provider. Ground Handler Organisations are contracted individually by the Airspace Users, and hence it is expected that the Airspace User representatives in the APB will be seeking the same strategic airport focus from their Ground Handling provider/s as they are from the Airport Operator and ANSP.
Operational	General view	N/A (not included in DOD)

Role name	Summary of responsibility	
Steering Board (OSB)	Steer Airport Performance	The ***Operational Steering Board (OSB)*** is made up of Operational based Managers/representatives from the airport stakeholders' organisations and will meet more regularly e.g. monthly or as it is deemed necessary by the local airport. It is expected that the airport stakeholders' representatives participating in the ***Operational Steering Board (OSB)*** should have a good understanding of the operational processes and performance drivers. For this reason the MET Provider and Ground Handler organisations are included. The Slot coordinator and the Regulator are not required as it is felt that they operate at a more strategic, long term planning level. The ***Operational Steering Board (OSB)*** will use the high level (Strategic) agreed parameters from the ***Airport Performance Board (APB)*** and extend this to define performance metrics to be measured, the performance levels (thresholds) against which warnings / alerts are generated and the target values for the KPsI/PDIs included in the ***Current Airport Performance Framework***.
Airport Steering Administrator (ASA)	General view	N/A (not included in DOD)
	Steer Airport Performance	The person responsible for coordinating the stakeholder representatives, the meetings and the documents (revision, supervision and distribution) needed to manage the ***Steer Airport Performance*** service. This involves: • Identifying and communicating with the stakeholder representatives in the ***Airport Performance Board (APB)*** and ***Operational Steering Board (OSB)*** • Coordinating/facilitating the ***Airport Performance Board (APB)*** and ***Operational Steering Board (OSB)*** meetings. • Recording and documenting the board meeting decisions and outcomes. • Circulating the board meeting decision and outcomes for approval. • Publishing the approved board meeting decisions and outcomes. • This person also ensures the communication with the ***Airport Platform Administrator*** (role, see section 3.2.2.3.1), Prepare Performance Report and the Airport Operations Centre Supervisor.
APB Representative	General view	N/A (not included in DOD)
	Steer Airport Performance	Member of the APB (Airport Performance Board) representing one of the airport stakeholders.
OSB Representative	General view	N/A (not included in DOD)
	Steer Airport Performance	Member of the OSB (Operational Steering Board) representing one of the airport stakeholders.
Administrator Airport System (AAS)	General view	N/A (not included in DOD)
	Steer Airport Performance	The ***Administrator Airport System (AAS)*** is the person that amends the rules, KPI / PDI equations, KPI / PDI targets, etc. in the ***Airport Performance Monitoring Platform***. He/she will fill in also the ***Post-Operations Analysis rules***.
APOC Supervisor	General view	N/A (not included in DOD)
	Monitor Airport Performance	Same role as APOC

Role name	Summary of responsibility	
	Manage Airport Performance	The APOC supervisor (short term and execution phases) will liaise with all APOC participants for the purpose of coordination and arbitration between actors in the management of the Airport Operations Plan (AOP). He will act as a mediator and a final decision maker in case of issues for which no consensus has been reached. The following roles and responsibilities are identified: • Liaison between airport operations and Network, • Liaison between airport stakeholders, • Ensures that total airport overview and information is available to all relevant stakeholders, • Initiates UDPP when appropriate, • Coordinate with the relevant AOP stakeholders on the feasibility of specific airport scenario's, • Ensures that agreed actions are taken by the appropriate stakeholder(s), • Monitors that expected benefits from agreed actions are reached and coordinates any new operational measure if appropriate, • Acts as arbitrator in case mutual agreed decision cannot be made in time, • Updates the AOP with information within the AOP sphere of responsibility. • Solves the inconsistencies between the different sources of information.
Assigned/involved Stakeholders	General view	N/A (not included in DOD)
	Manage Airport Performance.	They are APOC participants in the management of the Airport Operations Plan (AOP). The following roles and responsibilities are identified: • Liaison between airport operations and Network • Liaison between their entity and the APOC supervisor • To take the appropriate action(s) • To update the AOP with information within their AOP sphere of responsibility
Post-Operations Analyst	General view	N/A (not included in DOD)
	Perform Post-Operations Analysis	The Post Operations Analyst is an actor who belongs to either every airport stakeholder or some airport stakeholders or/and airport operator. He/she is empowered in this role by the correspondent stakeholder and has the experience to produce ***Post-Operations Analysis Reports***. The Post Operations Analyst is granted to access to all and only the data he/she needs to perform his/her tasks. If an ***ad-hoc Post-Operations Analysis report*** is requested by a specific airport stakeholder, the role of Post Operations Analyst may be assumed by a representative of the concerned airport stakeholder. If an ***ad-hoc Post-Operations Analysis report*** is requested by the APOC Supervisor, the role of Post Operations Analyst is assumed by a representative of the Airport Operator. In the case of ***standard Post-Operations Analysis reports***, the role of Post Operations Analyst is assumed either by a representative of the Airport Operator when the report is addressed to several stakeholders or by a representative of the concerned airport stakeholder. Tasks description: • Access and collect all relevant data for post-ops analysis • Perform post-operations analysis • Run searches through data mining and capture data according to their access rights (data privacy policy). • Triggers the ad hoc report process • Manage the provision of Post Operations Analysis reports according to predefined rules.
Responsible Stakeholders	General view	N/A (not included in DOD)
	Manage Airport Performance	Any airport stakeholder having a responsibility to deal with a performance alert/warning and to take action during the Manage Airport Performance process.

Table 33. List of roles and responsibilities

5 Detailed Operational Scenarios / Use Cases

5.1 Operational Scenario description: Long Term Planning Phase

5.1.1 Additional Information and Assumptions

The *Perform **Post Operations Analysis*** Service is implemented and the Post-Operations Analysis Report has been published and is available to the ***Steer Airport Performance*** Service through a connection link between these two services.

5.1.2 Scope of scenario

The introduction and refinement of the steering parameters that will be part of the Airport Performance Framework, the Airport Performance Baseline as well as the AOP content is done in the long term planning phase, by the ***Steer Airport Performance*** Service. Therefore, this scenario describes the process to set up the inclusion of new steering parameters or the modification of the existing ones in a collaborative manner by the airport stakeholders. Moreover, it indicates how both these steering parameters have to be continually checked and improved through seasonal or more regular performance boards by the airport stakeholders, taking into account some elements such as the Post-Operation Analysis Report elaborated in the post-operations phase by the ***Perform Post Operations Analysis*** Service.

The Airport Master Planning process is not part of the ***Steer Airport Performance*** Service but can be used as an input to adjust the Airport Performance Framework appropriately. Therefore, the ***Steer Airport Performance*** Service analyses the information developed and collected in the Airport Master Planning, so as to identify potential changes in the Airport Performance Framework, and when these changes should be included, not only the next season but also the following ones.

The ***Steer Airport Performance*** Service defines the performance parameters and rules for the usage of the airport resources on the basis of the available infrastructure and equipment. The Long Term Planning Phase addresses the activities necessary to start the Medium Term Planning Phase. This includes several planning assignments that take place briefly before the Medium Term Planning Phase. It also includes agreements with all involved stakeholders.

The Long Term Planning Phase is the determining factor for the subsequent operational phases. The planning process can be run through again only for permanent changes during the consecutive ATM planning phases (e.g. construction work or commissioning of new infrastructure). The decision for the revision of the determined rules and targets is agreed collaboratively by representatives of the various Stakeholders organisations.

The following activities in the Long Term Planning Phase do not deliver values to the ***Steer Airport Performance*** Service. However, they allow the airport stakeholders to cope with growing demand and take strategic decisions, like building a new infrastructure, which may take years:

- Determine and review future airport demand
- Review future airport capacities
- Identify the future airport demand and capacity imbalance
- Propose airport infrastructure enhancement plans

5.1.3 Scenario text

The first activity that takes place in the ***Steer Airport Performance*** service is the collection and distribution of all the relevant information which is necessary for the airport stakeholders in order to refine the Airport Performance Framework. The Airport Steering Administrator is the responsible for this task and includes the collection of the European or National performance scheme (Regulations),

published Post-Operations Analysis reports and previous agreements on the Airport Performance Framework.

The airport stakeholders use all these elements to agree on performance steering parameters in a continuous iterative process. Initially the Airport Performance Board, made up of representatives of various airport stakeholders' organisations, set the high level steering parameters such as KPI's and target performance levels. Afterwards, the Operational Steering Board, made up of operational experts from the airport stakeholders organizations, use those high level parameters to define and agree more detailed steering parameters. At the end, all these agreements on performance parameters will be collected by the Airport Steering Administrator to complete the current Airport Performance Framework.

The first activity to be taken into account by the Airport Performance Board (APB) when refining the Airport Performance Framework is the determination of the Airport Operational Configurations [UC 603. Establish preferred airport operational configurations] and standard capacity values [UC 635 05. Define standard capacity values – Look-up tables]. Usually there is no major change from one season to the next, except in case of new infrastructures, equipment or procedures commissioned that bring additional capacity. It includes the enquiry of all regulations like environmental obligations and other regulating factors especially of limiting factors through weather, terrain, available equipment as well as runway, taxiway and apron infrastructure.

Special attention is paid to bottlenecks of all kinds and constraining factors. This task is under the responsibility of the Airport Operator. It includes the infrastructure and the available usage as well as the connected TMA [UC 608. Planning for the management of external issues], that represent also a limiting factor especially if there are other busy airports operating within the same airspace. This includes the management of departures from airports in close proximity and the integration of ATM systems (AMAN and DMAN) where there are potential interferences between adjacent airports.

The airport stakeholders in the Operational Steering Board take into account the following activities:

1. **Establish agreed performance rules (e.g. rules, trade-off priorities, and constraints) as part of the Airport Performance Framework:** This comprises the establishment of mutually agreed performance rules (e.g. rules, trade-off priorities, and constraints). In a collaborative manner the airport stakeholders deliberate on the newly proposed performance rulers. [UC PSS 01. Establish performance rules]

   Examples of this activity cover the establishment of Night flight curfew rules and operational priorities covering the management of capacity, punctuality and environmental performance, the identification of possible aircraft types to parking stands coupling, depending of the wingspan of the aircraft, taxi routing on the apron for certain aircraft categories or terminal areas dedicated for particular airspace users, etc.

2. **Establish agreed performance baseline indicators and associated thresholds for alerts and warnings:** This comprises the establishment of mutually agreed thresholds for the performance framework, KPIs and PDIs according to the individual airport performance commitment. In a collaborative manner the airport stakeholders deliberate on the newly proposed thresholds. This includes alignment with already existing and/or aggregated thresholds to make sure that they are conflict-free (i.e., unambiguous in interpretation and understanding). [UC 601(a). Establish agreed performance indicators and associated thresholds for alerts and warnings].

   An example of this activity covers the monitoring of Departure Flight Delay (AOBT – SOBT) to ensure that average values are maintained within predetermined and agreed thresholds.

3. **Establish agreed performance baseline (KPI / PDI target and thresholds values).** This comprises the establishment of mutually agreed performance targets. In a collaborative manner the airport stakeholders deliberate on the newly proposed performance targets. This includes alignment with other (related) performance targets and to make sure that they are unambiguous and achievable. [UC 601(b). Establish or review local airport performance targets].

   An example of this activity covers the collaborative agreement of performance targets in relation to the key performance areas of the airport operations (capacity, flexibility, efficiency, etc.).

4. **Establish airport specific AOP content:** Airports are very different in shape and organisational structure. Thus, individual AOP content can be necessary to manage the airport efficiently. Before starting the Medium Term Planning Phase all responsible stakeholders are invoked to bring in additional AOP content elements into the plan if altered operation requires extended procedures with additional data. Using the post operations analysis reports, the Steer Airport Performance service will also identify the need for new AOP content elements, to improve the operational management of concrete aspects that have caused bad performances [UC PSS 02. Establish airport specific information elements that are not part of the AOP Core], [UC 661 11. Establish MET parameters for alert and warning generation], [UC 661 12. Refine MET parameters for alert and warning generation]. An example could be to establish specific local environmental restriction parameters.

Other agreements are found on trade-offs decisions between Key Performance Areas as well as constraints and limitation of responsibilities for all the airport stakeholders.

Moreover, the airport stakeholders also define the scenarios that will be used to manage the most frequent and most penalising adverse conditions.

On the basis of the European ATM performance framework, the airport stakeholders agree on performance targets in several iterations if necessary.

When refining the Airport Performance Framework during the Airport Performance Board meeting, the airport stakeholders address the Pre-Seasonal Capacity Declaration[36] [UC 610. Establish pre-seasonal capacity declaration]. The Airport Operator cooperates with key stakeholders like ANSP or the Slot Coordinator in order to define the appropriate airport capacity declaration. The airport capacity depends on local circumstances like environmental restrictions and the available infrastructure. The Airport Operator finally defines the overall airport capacity that not only depends on the runway capacity but also on other predominant limiting factors. Such limiting factors may include the taxiway, apron or terminal as well as other local constraining factors. When the capacity declaration has an impact on the Airport Performance Framework, rules or parameters, it is taken into consideration in the Operational Steering Board in order to adjust the performance steering parameters.

Once all the performance elements have been agreed, the Airport Steering Administrator builds and distributes the current Airport Performance Framework to the Administrator Airport System, who adjusts the agreed steering parameters on the ***AOP***.

The Airport Operator, who is in charge of facilitating the use of the airport infrastructure, mainly controls the Long Term Planning phase and participates in both, the Airport Performance board and the Operational Steering Board. The Airport Operator therefore is responsible for a consistent planning process to achieve safe operations during the Execution Phase.

5.1.4 Identification of Use Cases

The table below presents the Use Cases identified in the P6.2 DOD Step 1 document related to the Long Term Planning Phase and assesses their relevance against the Steer Airport Performance service. The relevant use cases developed in OSED Ed.00.01.00 document have been used as guidelines to update the UC description in order to adapt it to the rest of the OSED Ed.00.02.00 document.

Use Case ID	Use Case title	Use Case description
UC 601(a) [37]	Establish agreed performance indicators and associated thresholds for alerts and warnings	See Appendix D, part 2
UC 601(b)	Establish or review local airport performance targets	See Appendix D, part 2
UC 603	Establish preferred airport operational configurations	See Appendix D, part 2
UC 653 05	Define standard capacity values – Look-up tables	See Appendix D, part 2
UC 608	Planning for the management of external issues	See Appendix D, part 2
UC 610	Establish pre-seasonal capacity declaration	See Appendix D, part 2

[36] The Seasonal Capacity Declaration contains the winter capacity figures.
[37] UC 601 was split up into two parts because it covers a wider scope.

Use Case ID	Use Case title	Use Case description
UC PSS 01	Establish performance rules	See Appendix D, part 2
UC PSS 02	Establish airport specific information elements that are not part of the AOP core	See Appendix D, part 2
UC 661 11	Establish MET parameters for alert and warning generation	See Appendix D, part 2
UC 661 12	Refine MET parameters for alert and warning generation	See Appendix D, part 2

Table 34. Identified Use Cases for Long Term Planning phase

5.2 Operational Scenario description: Medium / Short Term Planning Phases

5.2.1 Additional information and assumptions

5.2.1.1 Additional information

The Medium / Short Term planning phases address the airport plan evolution from about 6 months prior to the execution of operations.

There are two main elements within the overall scenario:

1. The creation of the ***AOP***, taking place once a reasonably mature traffic prediction is available and in any case before the day of operations. This activity is characterised by a global approach to the demand and capacity balance assessment and the treatment of resource allocation in a generic way. [UC AOM 01. Instantiate the Airport Operations Plan].
2. The development of the ***AOP***, including the subsequent updates from the creation of the plan until one day prior to the day of operation. At this moment specific resources allocated for each flight can be performed, and the ***AOP*** becomes the reference for the ATM execution phase [UC AOM 02. Maintain the Airport Operations Plan].

The ***AOP*** is instantiated at the beginning of the Medium Term Planning phase – typically when the first accurate demand information for an airport becomes available. The ***AOP*** is a “rolling plan” which means that, at its creation, only a partial content is available. Subsequently, as more information becomes available and existing information becomes more accurate, then the ***AOP*** is populated with this information. This rolling nature of the plan is designed to ensure that ultimately it can be used as a principal tool in the process of airport management. The ***AOP*** has three fundamental characteristics and any scenarios addressing the creation and updating of the ***AOP*** must be defined in such a way as to ensure that these characteristics are realised, namely.

- The AOP is a common plan. As such, it is a single reference for all stakeholders
- The AOP contains accurate and up to date information
- The AOP integration into the NOP is one of the principal means by which airport and overall network integration can be enhanced

The consequence of these characteristics is therefore a significant degree of interaction between the stakeholders and the ***AOP*** throughout all of the planning phases from its creation through to execution. In addition, there must be appropriate mechanisms in place to ensure that the ‘right’ information from the ‘right’ stakeholder at the ‘right’ time is included in the ***AOP***. Besides, the ***AOP*** will include rules to ensure that the level of integrity of the information is appropriate. Therefore, when stakeholders include new data or update the existing one, the ***AOP*** is prepared to detect any potential information inconsistency and then the stakeholders will solve it. This is a main activity to ensure that the right information is presented in the ***AOP***.

However, the ***AOP*** is not only a ‘database’ but it also contributes to the airport performance management. In addition to the processes surrounding the stakeholder interaction with the ***AOP***, any future implementation will need to address how the airport performance will be managed from a strategic perspective so that appropriate performance targets can be fully integrated into the ***AOP*** in order to contribute to the airport performance management.

All data collected by the ***AOP*** during the Medium/Short Term phase are recorded by the Post Operations Analysis Record process in order to be used for any further analysis regarding the preparation of operations.

5.2.1.2 Assumptions

Whilst the tasks of managing the ***AOP*** and keeping it effectively up to date are similar in each planning phase, the degree of involvement of any specific actor may change over time. As a general

rule and to ensure the accuracy of the content, it is important that the responsibility to update the data within the ***AOP*** remains with the process owners.

In order to enhance the integration of airports into the overall network and therefore reap the benefits at the network level of enhanced operational predictability, it is important that each and every airport have an ***AOP*** – or at least they implement the procedures necessary to ensure that data shared with the Network Manager has the appropriate high degree of quality. The specific content of the ***AOP*** as well as the procedures associated to its management will be dictated by the airport characteristics and complexity. As part of this management approach, the specific role of "APOC Supervisor" could be envisaged, most probably a representative of the airport operator. The necessity for this role and the associated procedures should be the focus of future validation activities. The aim of this role would be to ensure that the airport performance will be achieved and guarantee that the ***AOP*** will be managed as defined among the airport stakeholders and in coordination with the Network Manager.

The Airport Operations Centre (APOC) is foreseen as the forum for improving the collaborative decision making process within airport operations management. As such, the ***AOP*** will be a principal source of information used in the APOC decision making process. The costs and benefits associated to the implementation of an APOC will vary according to the airport complexity. As a result, the ***AOP*** update scenarios described in this section do not explicitly assume that an APOC is implemented. Instead, the focus here is on the ***AOP*** interaction and the APOC is seen as a potential 'pre-filter' rather than as a necessary "actor" in the ***AOP*** creation and updating.

5.2.2 Scope of the scenario

As defined in the E-OCVM, an Operational Concept Scenario (OCS) tells the "story" of how the concept will operate to meet operational requirements. This Section describes the relevant Operational Concept Scenarios which will be used to develop the associated Use Cases.

Two scenarios have been identified. The first addresses how the ***AOP*** is created or instantiated. The second addresses specifically the notion that the ***AOP*** is a 'rolling' plan i.e. its content is updated over time as more accurate information becomes available. This updating process extends right up to the execution phase so as to permit the ***AOP*** to become the vehicle through which actual airport performance can be compared with the plan.

5.2.3 Scenario Text

This scenario is split into two parts:

- OCS1: Creation of the ***AOP***
- OCS2: Update of the ***AOP*** – development of the 'rolling plan'

5.2.3.1 OCS1: Creation of the AOP

5.2.3.1.1 Scenario Summary

The creation of the ***AOP*** [UC AOM 01. Instantiate the Airport Operations Plan] will most logically take place at the start of the Medium Term Planning Phase when the airlines have indicated their intended flight schedule for the coming season. Typically the following inputs will be considered:

- The first iteration of the expected traffic demand [UC AOM 15. Create expected operational traffic demand]
- Airport Performance Framework including the agreed targets – defined within the ***Steer Airport Performance*** service
- Strategic plan which includes the airport resources and available capacity profiles in service for the next season [UC AOM 14. Create expected Operational Resources and Capabilities]
- The airport configuration schemes, regulations and restrictions e.g environmental [UC AOM 16. Create expected Operational Airport Context]

The creation of the AOP consists of two main steps:

1. Creation of a performance baseline consisting of mutually agreed (i.e. by all airport stakeholders) performance targets, thresholds, rules, trade-off priorities, selected Key Performance Indicators (KPIs) and Performance Driver Indicators (PDIs) and finally the constraints for the coming season. This is done in the last few months of the Long Term Planning Phase and prior to the first instantiation of the AOP. This is essentially the function of the ***Steer Airport Performance*** service described in section 3.2.2.
2. The first instantiation of the AOP content, which will be available for sharing amongst the airport stakeholders.

5.2.3.1.2 Assumptions

1. The prerequisite for the establishment of an initial plan is the establishment of an operational framework, which is done during the Long Term Planning Phase prior to this Operational Scenario as described in section 3.2.2 (***Steer Airport Performance service***). During the Long Term Planning Phase the airport operational capabilities that an airport operator can provide to airport partners during the next operational season are established. This includes in particular the infrastructure of buildings, aprons, taxiways and runways, but also equipment and IT systems are also included. It is based on the existing infrastructure and the capacity of individual components. This information will be published and used as a basis for planning. The need for additional capacity in anticipation of a predicted growth in demand is the main driver for the expansion of individual components. The evolution of an airport is included in the Airport Master Plan - an essential input to the Long Term Planning Phase.
2. The first instantiation of the ***AOP*** will include the declared airline intentions for the coming season which if appropriate have been coordinated within the IATA Slot Conference.
3. The procedures around the collaborative definition of the actual content fields of the AOP [UC AOM 09. Create new element in the AOP].are a local issue and therefore lie outside the scope of this document. However, these procedures need to define clearly and unambiguously the responsibility that each stakeholder as in relation to the individual content elements of the AOP in terms of their updating and accuracy.

5.2.3.1.3 Actors

The Operational Scenario includes involvement of a number of actors listed in Chapter 4.2.

5.2.3.1.4 Scenario Description

At the start of the Medium Term Planning Phase the ***AOP*** creation will ensure that the appropriate elements of the ***AOP*** are brought into existence. This entails the stakeholders entering relevant operational information into the ***AOP***. Whilst the ***AOP*** instantiation is seen as a ‘one off’ activity, it is important to note that the ***AOP*** is a ‘rolling plan’ and will therefore evolve up to and during the execution phase.

The following activities are carried out as part of the ***AOP*** Instantiation (not necessarily in this order and possibly simultaneously):

1. **Create expected Operational Airport Resources and Capabilities**. [UC AOM 14. Create expected Operational Airport Resources and Capabilities].The Operational Airport Resource and Capability elements are filled with expected operational data derived from capacity and demand information concerning the airport The cornerstones of the plan will be centred around:
    - Movements per hour
    - Permissible Aircraft types
    - Constraint such as night curfew

    Once these elements have been established, the next activity will concern the definition of the ground handling agent resource requirements, both human and equipment. In addition the

necessary capacity requirements relating to Passenger, Baggage and Cargo resources will be defined. The provided information is possibly augmented with expected operational planning information from involved stakeholders.

2. **Create expected Operational Traffic Demand.** [UC AOM 15. Create expected Operational Traffic Demand]. The operational traffic demand specification starts with the availability of the flight schedule (SBTs) provided by the airspace users. Based on this traffic demand elements it will be necessary to construct the equivalent airport transit views – linking the inbound flight information with the appropriate outbound flight information. This will require the active participation of the airspace users particularly in those airports where the 'home based' carrier has more flexibility in managing their flight operations.

3. **Create expected Operational Airport Context.** [UC AOM 16. Create expected Operational Airport Context]. The ***AOP*** Airport Operational Context elements are filled with expected operational data derived from airport configuration specification, the airport usage and restriction rules, and the performance baseline.

4. **Create new element in AOP.** [UC AOM 09. Create new element in AOP]. The ***AOP*** can be augmented with a new element (group of information fields) or a new information field. This can be done after a mutually agreed decision from the lead stakeholders. This means a local adaptation of the ***AOP*** system

5.2.3.2 OCS 2: Update of the AOP – development of the 'rolling plan'

5.2.3.2.1 Scenario Summary

The Operational Scenario describes how, after instantiation of the ***AOP***, the stakeholders can update and refine the data as new and more accurate information becomes available.

The update of the ***AOP*** is performed during all ATM planning phases. The updates differ only in the sense that different entities might be responsible for updating or different rules may be applicable. The procedures will be developed as rather generic Use Cases within this document but the implementation will necessitate the development and validation of specific 'local' procedures.

The Operational Scenario takes place during the Medium and Short Term Planning Phases.

In the period prior to execution more detailed information such as the links between arrival and departure flights, RWY configurations, weather forecasts, trajectory planning deviations, airfield maintenance work plans, etc. become available and their quality improves.

At this stage the seamless ATM concept (en-route to en-route) can be applied. The following steps are followed:

- Update the operational capacity according to the actual situation (i.e. airport configuration, weather)
- Evaluate the feasibility of the Performance Targets; [UC AOM 13. Refinement of Steering parameters]
- Balance demand and capacity
- Ensure alignment between Airport Operations and Network Operations

As the Medium Term Planning phase evolves and more appropriate data become available, stakeholders continuously refine and update the AOP [UC AOM 02. Maintain the Airport Operations Plan]. The Medium Term Planning phase ends when all the airport stakeholders agree on a reference one day before the day of operations. This plan is based on SBT information made available at the latest the day prior to execution - with possible refinements - by airspace users. At that stage, the plan includes, among other things, the planned configuration of the airport, allocation of airport resources to flights, pre-defined scenarios to manage the most frequent and the most penalising adverse conditions, etc.

Throughout the Medium Term Planning phase, the OSB (Operational Steering Board) refines the Current Airport Performance Framework (the OSB meetings take place regularly; i.e. monthly), evaluating the feasibility of the Performance Targets and updating it according with the information received from, among others, the Post-Operations Analysis reports. [UC AOM 13. Refinement of Steering parameters].

The Airport Operator and ANSP revise the usage rules, possible (runway) configurations, the resources availability, taking into account the updated traffic demand. Infrastructure and airspace capacity planning are refined taking into account the most recent traffic updates which will include specific traffic (e.g. charter flights and special event flights).

At the airport level, the Airport Operator, in coordination with the other actors, continuously refines the ***AOP*** as appropriate data become available. Foreseen airport capacity changes that are expected to have a significant impact on the traffic demand at the airport will be communicated by the process owner (ANSP: runway, airspace capacity etc., Airport Operator: stand, terminal capacity etc.). This applies to temporary (e.g. runway maintenance) as well as structural capacity modifications.

The Airport Operator and ANSP perform the global resources planning, and map the traffic demand onto the various airport resources (i.e. runways, taxiways, stands and de-icing pads, APP sectors, passenger facilities). In addition, specific resource allocation for planned special events is performed. [UC AOM 11. Resource refinement]

Throughout the entire Medium Term / Short Term planning phases, the appropriate airport actors (Airport Operator, ANSP, Airspace users, Ground handling and de-icing agents, Network manager) continue refining the ***AOP*** in an iterative manner all the way through to the actual execution of the specific operation. At this stage more reliable data become available, more detailed figures can be taken into consideration and planned mitigation actions in case of adverse conditions are refined.

During this continuous refining task, the system automatically and continuously records all the data and events produced and exchanged by all the processes and activities mentioned (Record Data and Event process) [UC AOM 06. Record and Store AOP information].

5.2.3.2.2 Assumptions

The AOP has been created.

The updating of the ***AOP*** will be performed at all times by the relevant stakeholder [UC AOM 02. Maintain the Airport Operations Plan]. Clearly, procedures will need to be in place, particularly in the more complex airports, to ensure the timeliness and quality of each update. The definition of such procedures is a ‘local issue’ and therefore lies outside the scope of the scenario definition.

5.2.3.2.3 Actors

The Operational Scenario includes involvement of all actors listed in Chapter 4.2.

5.2.3.2.4 Scenario Description

In this scenario the already created ***AOP*** will be refined as more accurate information becomes available. These updates will be driven by different events and act on different elements of the ***AOP*** [UC AOM 02. Maintain the Airport Operations Plan], notably ‘flight related’ elements and ‘resource related’ elements as described below.

Flight refinement. [UC AOM 10. Refine Scheduled flights]. The refinement of the flight information contained in the instantiated AOP will need to take into account all changes to the initial ‘schedule’ resulting from both airspace user fleet management, operational variations as well as flight information which is received nearer to the execution phase coming notably from General or Business Aviation and Charter flights.

Resource refinement. [UC AOM 11. Resource Refinement]. During the AOP lifecycle there may also be changes in the airport resources, covering refinement of usage rules, possible configurations and capacity plans. This refinement is needed because of more detailed information on Resource Availability, especially on the airport: usage, rules, configurations, expected works and available capacity.

During the Medium Term Planning Phase, and particularly into the Short Term Planning phase, the ***AOP*** will evolve as more information becomes available and as its accuracy improves. During the Short Term Planning phase, the ***AOP*** will be the principal source of information in the analysis of the compatibility between the traffic demand and the available resources in order to improve the level of predictive management. [UC AOM 03. Detect non-compliance of target performance level]

Regarding the DCB, during the Medium Term planning phase (i.e. before the day of operation), the demand – capacity balance tasks are very limited in comparison with the Short Term planning and Execution phases (see section 5.3 for the latter). In this period, DCB aims to detect periods of capacity shortage and, hence, negotiation processes with airspace users are triggered to solve those imbalances (through cancelations and flight re-scheduling) [UC AOM 04. Detect and Resolve demand and capacity imbalance during the Medium Term planning phase].

As a support to the ***Post-Operations analysis*** service, evolutions in the AOP during the Medium and Short Term Planning phases will need to be recorded. [UC AOM 06. Record and store AOP information]

5.2.4 Identification of Use Cases

OCS1: Creation of the AOP

Use Case ID	Use Case title	Use Case description
UC AOM 01	Instantiate the Airport Operations Plan (AOP)	See Appendix D, part 2
UC AOM 14	Create expected Operational Airport Resources and Capabilities.	See Appendix D, part 2
UC AOM 15	Create expected Operational Traffic Demand	See Appendix D, part 2
UC AOM 16	Create expected Operational Airport Context	See Appendix D, part 2
UC AOM 09	Create new element in AOP	See Appendix D, part 2

Table 35. Use Cases identified for the OCS1: Creation of the AOP

OCS 2: Update of the AOP – development of the 'rolling plan'

Use Case ID	Use Case title	Use Case description
UC AOM 12	Integration of landside process information in the AOP	See Appendix D, part 2
UC AOM 02	Maintain the Airport Operations Plan (AOP)	See Appendix D, part 2
UC AOM 04	Detect and Resolve demand and capacity imbalance during Medium Term planning phase.	See Appendix D, part 2
UC AOM 06	Record and store AOP information	See Appendix D, part 2
UC AOM 10	Refine Scheduled Flights	See Appendix D, part 2
UC AOM 11	Resource Refinement	See Appendix D, part 2
UC AOM 13	Refinement of Steering Parameters	See Appendix D, part 2

Table 36. Use Cases identified for the OCS2: Update of the AOP

5.3 Operational Scenario description: Airport Operations Management during the Execution Phase

The surface-in, turn around and surface-out scenarios described in the P6.2 DOD Step 1 document [8] take place during the Execution Phase and they were included in the OSED 1.0 as well. However, they are centred on one flight, which does not allow a complete description of all the services, processes and activities related to the Airport Operations Management. This explains why these three Operational Scenarios have not been included in the OFA 05.01.01 OSED. Besides, the Airport Operations Management during the Execution Phase operational scenario has been adapted according to the updated concept of the OSED 2.0.

5.3.1 Assumptions

In this scenario, the following features are considered as implemented:

- An ***AOP*** containing the latest information on the planned airport operations is available. All the airport stakeholders have access to the elements of the ***AOP*** relevant to their operations and business needs
- The shared part of the ***AOP*** is fully aligned with the NOP, allowing the Airport and the Network to share accurate information in a timely manner
- An APOC is available and equipped with impact assessment tools and decision support tools. The airport stakeholders are represented in the APOC where they collaboratively manage the Airport Operations in the Execution Phase
- ***The Steer Airport Performance*** Service has defined and published the Airport Performance Framework and Airport Performance Baseline (i.e. OSB agreed parameters)

The temporal scope of this scenario is “the day of operations”. It is assumed that actual operations start and end at specific times. This is a simplification of the reality, in particular for airports operating 24/7. The reason for such a simplification is to clearly mark the boundaries of the scenario. In reality, the ***AOP*** will be a rolling plan where the limits between the planning and the execution phases are not as neat as in this scenario. This scenario must be seen as the description of one out of much iteration.

5.3.2 Scope of scenario

The scenario starts on the day of operations, when the Airport Transit Views (ATV’s) representing the airport segments of a Business Trajectory which are planned in the ***AOP*** is executed. The scenario ends at the end of the day of operations, when the ATV’s planned in the ***AOP*** have been executed (e.g. landing / in-block / off-block / take off of the last flights of the day).

The following Airport Operations Management Services are addressed in this scenario:

- Monitor Airport Performance Service
- Manage Airport Performance Service

This scenario describes the management of the Airport Operations as established in the planning phases. It explains how the actual operations are monitored against the agreed plan (***AOP***) and how deviations are managed through collaborative decision making in the APOC.

Moreover, this scenario describes the de-icing process which considered as optional.

5.3.3 Scenario text

5.3.3.1 General

The scenario starts on the day of operations, when the first events planned in the ***AOP*** start occurring (e.g. landing / in-block / off-block / take off of the first flights of the day).

Using the rules and the Operational Steering Board (OSB) agreed parameters (defined in the ***Steer Airport Performance*** Service in the planning phase at the beginning of the season or monthly revised if necessary), the system automatically monitors the following aspects of the actual and forecasted/expected operations against the latest plan contained in the ***AOP*** [UC AOM 07. Compare actual operations vs. planned operations].

- The overall airport performance, through the Key Performance Indicators and Performance Driver Indicators defined in the planning phases by the Steer Airport Performance service.
- The aircraft processes, through the comparison of the actual events / milestones against the plan during the different phases of the ATV, i.e. surface in, turn around and surface out (aircraft process monitoring).
- The passenger process, through the comparison of the actual events / milestones against the plan. In this process monitoring, the main focus is put on the passenger processes directly related to the airside (e.g. boarding, disembarkation) but it also looks at the landside aspects impacting the airside (e.g. potential delays in the passenger security check processes that may impact boarding, potentially even caused by check-in, border control and/or landside airport access issues).
- The baggage / cargo process, through the comparison of the actual events / milestones against the plan[38]. In this process monitoring, the system primarily focuses on the baggage / cargo processes directly related to the airside (e.g. loading, unloading) but it also looks at the landside aspects impacting the airside (e.g. potential delays in the baggage sorting processes that may impact loading).
- The demand / capacity balancing process, through the comparison of the actual and the forecasted (for the next X hours ahead) demand and capacity figures against the plan (Monitor Demand / Capacity Balancing Processes activity). In this process monitoring, capacity is expressed at runway level and the focus is put on the runway DCB[39], on the basis of predefined KPIs.
- The weather data, through the comparison of the weather observations with the forecasts and observations (weather monitoring). In this data monitoring, the system primarily focuses on the elements impacting the Airport-DCB processes and the management of adverse conditions.

In case of deviation between the ***AOP*** and the actual/forecasted operations, the system automatically assesses its magnitude by comparing this actual/forecasted data with the relevant thresholds set by the Operational Steering Board (OSB agreed parameters) during the planning phases by the ***Steer Airport Performance*** service. The Monitor Airport Performance service also assesses demand and capacity imbalances using Airport-DCB functions [UC DCB 02. Detect and Resolve demand and capacity imbalance during Short Term planning and Execution phases] and/or passenger throughput discrepancies [UC AOM 12].

If the threshold is not exceeded, the ***Monitor Airport Performance*** service provides to the AOP the calculation of the different OSB agreed parameters to make it available to all airport stakeholders to support the common situational awareness of the actual and forecasted overall airport situation. If the threshold is exceeded, the system automatically triggers a warning or an alert according to the thresholds defined in the OSB agreed parameters. This warning or alert message with an alert/warning code and description of the problem and the responsible stakeholder will be send to the ***Manage Airport Performance*** service to trigger the reaction of the responsible stakeholder in order

[38] The baggage / cargo process is not yet defined in detail.
[39] In the execution phase, not only the runway DCB is performed: all capacities (TMA, taxi and runway) are calculated and ,hence, it is expressed the bottleneck transferred on the runway.

to assess the impact and make a decision [UC AOM 03. Detect non-compliance of target performance level]. A flag is raised on the APOC HMI and this message is stored in the ***AOP*** which will enable the ***Perform Post-Operation Analysis*** service to analyse the problem later. This message is also sent to the Manage Airport Performance service. [UC AOM 08. Alert the relevant stakeholder in case of significant deviation from the plan]. Apart from the automatic monitoring, any stakeholder can also send an event report, by any means, to inform directly the APOC of a problem. This message is another trigger for the ***Manage Airport Performance*** Service.

The responsible stakeholder identified in the warning or alert message starts analysing the message with support from an initiated overall impact message [UC 654 01a/b/c/d. Analyse alert and create Overall Impact Message activity in order to determine the impact on deviations from the plan]. This message will contain all the detailed information resulting of the analysis of the problem. If another expertise is needed the responsible stakeholder can perform his analysis with the help of another stakeholder.

To go further in the impact assessment they retrieve all overall impact messages of similar event that happened in the past, and analyse the impact they had. Then using their own tools or with the DCB tool they assess the impact of the alert on the KPI's.

At the end of this process, the severity level of the impact on the current and future airport operations will be defined. [UC 654 02. Analyse any deviation from the plan on APOC level from 654 01 a/b/c/d and complete the Overall Impact Message]

All the information used and found during this process is written in the overall message which is then stored in the ***AOP*** and sent to the Make Decision Process to find a solution. After completion of the process, the ***Perform Post-Operation Analysis*** service will analyse the course of actions.

On the basis of the Overall Impact Message, the stakeholders can start making a decision. This decision is taken collaboratively if the severity level is B, C or D. If it's severity level A the solution can be found on his own by the relevant stakeholder.

After a common acknowledgment on the impact assessment, the stakeholders initiate a standardized message, the Solution Message. [UC 654 03. Acknowledgement of the Overall Impact Massage and instantiation of a Solution Message].

This message will contain all the detailed information resulting of the analysis of pre-defined solution or even ad-hoc solutions if no pre-defined one exists. [UC 661 01. Search and Find pre-defined Candidate Solution for adverse condition event] [UC 661 02. Develop an ad-hoc candidate solution for adverse condition event].

In all cases, each airport stakeholder analyses the consequences of each solution identified on their operations and business / mission needs. Each airport stakeholder prioritises the candidate solutions according to their impact on their operations and business / mission needs. The airport stakeholders and the APOC Supervisor agree on a preferred solution to implement. If no collaborative solution can be found, the APOC Supervisor will make a final decision.

The involved airport stakeholders perform the actions contained in the agreed solution. Amongst these actions, some or all the relevant airport stakeholders update the ***AOP*** with the information under their responsibility, either at trajectory level or at resource level [UC AOM 02. Maintain the Airport Operations Plan (AOP)]. The system automatically monitors the new plan contained in the ***AOP*** against the actual operations, following the same principles and steps as at the beginning of the scenario [UC AOM 07. Compare actual operations vs. planned operations]. A new iteration starts if a deviation is detected.

During these iteration cycles, the system automatically and continuously records all the data and events produced and exchanged by all the processes and activities mentioned (Record Data and Event process) [UC AOM 06. Record and Store AOP information].

The use of TTA (Target Times) is considered as a first procedure to achieve the objective of enhancing the airport arrivals management and of reducing the knock-on effect on the aircraft next departure [UC 631 01 On Time Arrival under congested situation], [UC 631 02 Early Arrival with no airport impact under congested situation], [UC 631 03 Early Arrival with impact on AOP under congested situation], [UC 631 04 Late Arrival with knock-on effect under congested situation], [UC 631 05 Late arrival without Knock-on effect under congested situation].

The scenario ends at the end of the day of operations, when the last events planned in the ***AOP*** have occurred (e.g. landing / in-block / off-block / take off of the last flights of the day) and after several iterations of the steps described earlier.

5.3.3.2 Optional

Unplanned increase in demand.

The Monitor Airport Performance service detects an imbalance between capacity and demand [UC DCB 02. Detect and Resolve demand and capacity imbalance during Short Term planning and Execution phases], considering the actual (runway) configuration and mode of operation. After assessing the importance of the imbalance the Airport-DCB monitor (part of the Monitor Airport Performance service) issues a warning (tendency of degraded performance) indicating that KPI for (Runway) Delay will deviate from the performance target. (An alert should be given in case of a large deviation requiring immediate action).

The Airport-DCB Monitor detects that the deviation exceeds the KPI target but the severity is considered low by the Airport Tower Supervisor (in coordination with the FMP), leading to an imbalance which can be solved by the Airport Tower Supervisor using Airport-DCB while the APOC Supervisor stays aware and monitors the global airport situation.

The Airport Tower Supervisor checks the Meteorological conditions and confirms that they will remain unchanged by the time the diverted flights will approach the airport.

The Airport Tower Supervisor performs a what-if assessment by changing the departure runway [UC 653 02. Change Runway Operating mode] to mix mode for a defined time period. With this option, the what-if assessment shows that the KPI for runway delay returns to acceptance levels.

The Airport Tower Supervisor validates the Airport-DCB solution, the ***AOP*** (Airport capability & capacities section) and the KPIs values are updated accordingly taking into account the new runway mode, The APOC Supervisor is aware of these changes through the ***AOP*** Monitor and Life Cycle Management functionality.

Unplanned reduction in capacity

The Airport-DCB monitor warns with a low probability (warning case). The airport continues operating under nominal conditions but the Airport Tower Supervisor keeps following the evolution of the MET forecast. APOC Supervisor is aware of the situation in case APOC activity is required.

The probability for fog increases during the last three hours after the initial prediction to a level that initiation of action is required. The Airport Tower Supervisor contacts the Flow Manager to propose possible flow management restrictions associated to Low Visibility Conditions (LVC) to prevent demand exceeding a pre-defined arrival rate [UC 653 03. Change Runway/Taxiway Configuration] [UC 653 04. Refine Capacity]. The proposed flow restriction entails a reduction of arrival capacity from the time the fog is expected to appear. To determine this preventive rate the Airport Tower Supervisor performs a “What-if” assessment considering the current and forecasted situation. The APOC supervisor is informed and acknowledges to "activates" the APOC process. The APOC supervisor is informed and acknowledge to "activates" the APOC process. The APOC Supervisor starts a collaborative impact assessment and decision process with all stakeholders well before any Low Visibility Procedure (LVP) is activated. Outcome of the collaborative process is agreement of the flow management restriction as also to time stamp from which this flow restriction will become active.

Actual visibility conditions reaches pre-defined levels and LVP is activated. The Airport Tower supervisor coordinates with the ACC/Approach supervisor to increase of spacing for arrival flights (separation minima). The Airport Tower Supervisor informs the APOC Supervisor and the AOP is updated. All relevant actors take the necessary corrective actions resulting from balancing their business needs to the degraded situation.

The Airport Tower supervisor keeps monitoring the visibility degradation and adjusts the necessary flow restriction in close coordination with the APOC, the FM and the ACC/Approach Supervisor.

The Airport-DCB automatically updates the KPIs according to the new situation and compares it with the common accepted KPI thresholds. It will show KPI values clearly above the threshold as DCB solutions to be taken are not able to recuperate those target limits. The APOC, already active,

requests a collaborative what if assessment with all relevant stakeholders (including the Airport Tower supervisor) to face with the disrupted situation. Additional delaying of flight or even cancellation might be the outcome.

The airport keeps operating under LVC. A new MET information update informs about an improvement, visibility parameters are recovering to nominal conditions. The tower supervisor assesses the forecasted situation and decides of lifting the flow restriction ahead of de-activating LVP. Airspace users, in a collaborative manner within the APOC, can participate on the improving situation in order to recover to normal operations as soon as possible LVP has been canceled.

The Airport Tower supervisor performs a what-if assessment to validate new arrival/departure capacities to recover to nominal conditions. As soon as the DCB solution is validated and the ***AOP*** (capacity section) is updated, the departure and/or arrival rate is increased. All AOC staffs readapt their operations to the new situation in close coordination with TWR Supervisors and APOC staff.

The scenario ends when the operations have returned to nominal conditions.

Adverse conditions

Depending on the circumstances, the airport stakeholders decide that the airport operations take place under adverse conditions in the Manage Airport Performance Service. In that case, the APOC Staff assesses the nature of the adverse condition.

The APOC Staff and all relevant stakeholders use the outcome of the impact assessment to collaboratively identify candidate solutions to solve the issue using the APOC decision support tool and the ***AOP***. The solutions are chosen amongst a catalogue of pre-defined solutions corresponding to the most frequent and most penalising adverse conditions at the airport. If possible, the most appropriate pre-defined solution is adapted to the specific situation encountered. [UC 661 03. Create and/or Update of the pre-defined solution table with a candidate].

If necessary, an airport resource prioritisation process is set up [UC 661 10. Prioritise an airport resource in adverse conditions]. This process is managed in the APOC. On the basis of the outcome of the Assess Overall Impact Process, the APOC Staff identify an airport resource severely impacted by the adverse conditions. They evaluate its capacity and they agree on a prioritisation of the resource, balancing the reduced capacity and the demand and trying to limit as much as possible the impact on the operations.

In addition, the APOC Staff will identify, agree on, implement and monitor a recovery management plan [UC 661 07. Identify and manage a recovery management plan], [UC 661 08. Agree on and implement a recovery management plan in adverse weather conditions], [UC 661 09. Agree on and implement a recovery management plan after a technical incident].

De-icing Operations

The triggering event for the transition from de-icing planning to de-icing execution is identified as when the Airspace User makes the actual request for de-icing.

The pre-defined (calculated) de-icing order needs to be either confirmed or cancelled by the Airspace User and/or de-icing company.

The de-icing management tool will calculate the EDIT for each aircraft to be de-iced. This information will be shared with all stakeholders through the A-CDM platform using information services and will be used as critical information for planning the pre departure sequence.

For sporadic de-icing the pilot will request de-icing. ATC and de-icing coordinator will be informed. Based on the calculated EDIT, a TOBT is again set by the A-CDM process. There are three types of de-icing: on-stand de-icing, de-icing after push-back and remote de-icing. [UC 662 02. Handle after Push back De-icing], [UC 662 03. Handle On Stand De-icing], [UC 662 04. Handle remote De-icing]

A renewed de-icing will be needed if the HOT (Hold Over Time) of the first de-icing, established by the pilot according to the aircraft operator rules, is exceeded for any reason. This operation can be performed on stand, after push or remote [UC 662 01. Handle De-icing after exceeded HOT].

5.3.4 Identification of Use Cases

Use Case ID	Use Case title	Use Case description
UC AOM 03	Detect non-compliance of target performance level	See Appendix D part 2
UC AOM 07	Compare actual operations vs planned operations	See Appendix D part 2
UC AOM 08	Alert the relevant stakeholder in case of significant deviation from the plan	See Appendix D part 2
UC 653-02	Change Runway Operating Mode	See Appendix D part 2
UC 653-03	Change Runway/Taxiway Configuration	See Appendix D part 2
UC 653-04	Refine Capacity	See Appendix D part 2
UC DCB 01	Optimizing Runway Closure	See Appendix D part 2
UC DCB 02	Detect and Resolve demand & capacity imbalance during Short Term planning and Execution phases.	See Appendix D part 2
UC 662 01	Handle De-icing after exceeded HOT	See Appendix D part 2
UC 662 02	Handle After Push back De-icing	See Appendix D part 2
UC 662 03	Handle On Stand De-icing	See Appendix D part 2
UC 662 04	Handle Remote De-icing	See Appendix D part 2
UC 654 01 a/b/c/d	Analyse alert and create Overall Impact Message activity in order to determine the impact on deviations from the plan (Normal operations)	See Appendix D part 2
UC 654 02	Analyse any deviation from the plan on APOC level from 654 01a/b/c/d and complete the Overall Impact Message	See Appendix D part 2
UC 654 03	Acknowledgement of the Overall Impact Message and initiation of a Solution Message	See Appendix D part 2
UC 661 01	Search and find pre-defined Candidate Solution for adverse condition event and finalise Solution Message	See Appendix D part 2
UC 661 02	Develop an ad-hoc candidate solution for adverse condition event if no pre-defined solution is available	See Appendix D part 2
UC 661 03	Create and/or Update of the pre-defined solution table with a candidate solution	See Appendix D part 2
UC 631 01	On time Arrival under congested situation	See Appendix D part 2
UC 631 02	Early Arrival with no airport impact under congested situation	See Appendix D part 2
UC 631 03	Early Arrival with impact on AOP under congested situation	See Appendix D part 2
UC 631 04	Late Arrival with Knock-on effect under congested situation	See Appendix D part 2
UC 631 05	Late arrival without Knock-on effect under consegted situation	See Appendix D part 2
UC 661 10	Prioritise an airport resource in adverse conditions	See Appendix D part 2
UC 661 07	Identify and manage a recovery management plan	See Appendix D part 2
UC 661 08	Agree on and implement a recovery management plan in adverse weather conditions	See Appendix D part 2
UC 661 09	Agree on and implement a recovery management plan after a technical incident	See Appendix D part 2

Table 37. Identified Use Cases for the Execution phase

5.4 Operational Scenario description: Post Operations Phase

5.4.1 Additional information and assumptions

The Post Operations Analysis Platform is implemented and a series of operational reports are provided to the Steer Airport Performance Service. The data connection link to the following services is available.

- ***Steer Airport Performance*** Service
- ***Monitor Airport Performance*** *Service*
- ***Manage Airport Performance*** Service

Moreover, the requested data are available in the ***AOP***.

5.4.2 Scope of scenario

In the previous phases (Medium/Short Term and Execution phases), performance values are obtained and aggregated from the operational airport services following pre-defined measuring methods and they are compared with thresholds.

All values are registered and recorded for ***Perform Post-Operations Analysis*** service. In the Post Operations Analysis phase, the performance values (i.e.: Actual Airport Performance Framework) are being analysed against the Airport Performance Baseline (target values and threshold values), which is part of the current Airport Performance Framework. The results of analysis will be reported to the ***Steer Airport Performance*** service.

This Operational Scenario describes the processes and interactions of the Post Operations Analysis Service with the actors of:

- ***Manage Airport Performance*** service
- ***Steer Airport Performance*** service
- ***Monitor Airport Performance*** service

in order to provide performance reports, within the context of OFA 05.01.01 – OSED Ed.3 concept of SESAR airport operations management.

This Scenario focuses on how the actors interact (requesting and delivering data) within the Post Operations Analysis phase. In addition, all interactions between human actors and automated functions are described.

The Post-Operations Analysis scenario is seen as the means to capture performance based information and to provide feed-back to the planning as well about the actual operations, enabling a learning cycle, so that all involved stakeholders can fully understand the airport performance against the performance plan and identify the root causes of any deviation.

It is designed to support other Operational Scenarios in achieving their objectives in terms of Operational Improvements. This scenario covers the direct link between the ***Steer Airport Performance*** Service and the ***Perform Post-Operations Analysis*** service regarding the achievement of an appropriate Airport Performance Framework, based on the analysis of real operations and past experience.

Furthermore it details how the ***Steer Airport Performance*** service will initiate and receive the reports created during the Post Operations Analysis phase to identify amendments that need to be implemented regarding the Airport Performance Framework. The process by which these changes are fixed and justified is also addressed.

The reports are then the result of various analyses. The knowledge deriving from these reports is used in the long-term planning phase through the ***Steer Airport Performance*** service to establish/update the (current) Airport Performance Framework. The airport stakeholders will take the

analysis results into account when taking decisions for adapting the Airport Performance Framework and Airport Performance Baseline.

For complex and critical need of Post Operations Analysis reports, any stakeholder can request for an ad hoc Post Operations Analysis report and all the concerned airport stakeholders collaborate to produce an analysis and reach conclusions that will benefit the overall airport community.

5.4.3 Scenario text

This scenario starts, when ***Steer Airport Performance*** Service defines the Post Operation Analysis rules and enters them in the Post Operations Analysis Platform.

As the airport needs to compare the Airport Performance Framework to real operations and airport's needs, both elements are continually checked. Therefore, analysts from the relevant stakeholders feed the ***Steer Airport Performance*** service with Post Operations Analysis reports to continuously evaluate the Airport Performance Framework and adjust it when necessary.

The ***Steer Airport Performance*** service develops the performance standard (i.e. goals, targets, rules, thresholds, trade-off criteria and priorities) for the airport operations and sets an overall strategic direction. The airport stakeholders develop the "Operational Steering Board agreed parameters" on the basis of the performance regional and/or national scheme(s) and post operations analysis reports.

To create such a report the following data have to be collected and recorded:

- planned and actual operational data
- overall impact messages
- solution messages
- alert messages
- warning messages

This data collection is performed automatically and continuously by the ***AOP*** (without user interaction); their record is executed in the Post Operations Analysis phase.

OSB agreed parameters are entered manually in the Post Operations Analysis Platform and in the ***AOP*** by the responsible person.

This information is delivered by the following services:

- ***Steer Airport Performance*** Service (OSB Agreed parameters)
- ***Monitor Airport Performance*** Service (Warning and Alert messages)
- ***Manage Airport Performance*** (Overall Impact and Solution messages)

During the Execution phase, the planned and actual data are received/updated in the ***AOP*** from all airport stakeholders and recorded by the ***Post Operations Analysis*** service.

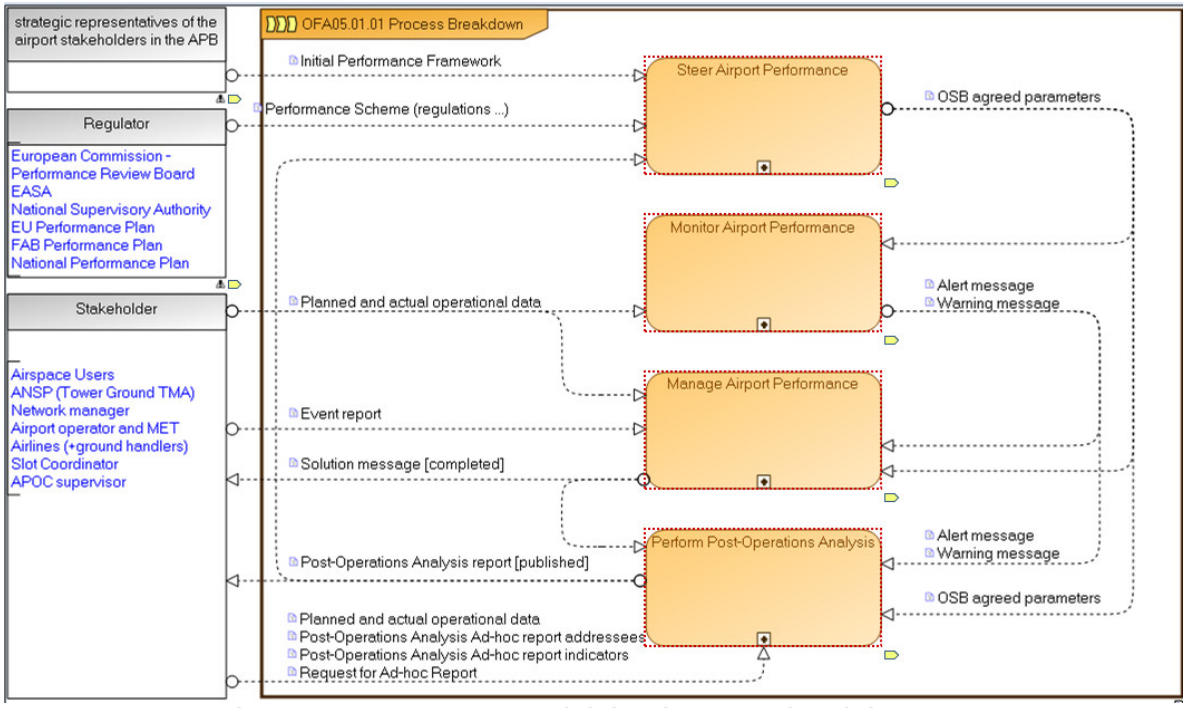


Figure 25. OFA 05.01.01 - High level process breakdown

Whenever a creation of a report is necessary, one of the following stakeholders can initiate this process:

- Operational Steering Board (OSB) for the standard reports
- Airport stakeholders for ad hoc reports
- APOC Supervisor for ad hoc reports

The following reports are available:

- Standard reports based on predefined templates and integrated in the OSB Agreed Parameters set, [UC 661 04. Prepare and publish a standard report]
- Ad-hoc reports, [UC 661 05. Prepare and publish an “ad-hoc” report]
- Ad-hoc reports with stakeholder involvement [UC 661 06. Prepare and publish an “ad-hoc” report with stakeholders’ involvement]

If a standard report is requested, the appropriate report template is selected automatically; otherwise an appropriate template will be created after the necessary data is identified.

After the Post Operations Analysis Platform automatically retrieves the data, a raw report is produced by using the previously selected template.

Then the Post Operations Analyst assesses/improves the quality and reliability of the raw Post Operations Analysis report using:

- if necessary, additional data and/or inputs from operational experts (stakeholders)
- by adding additional necessary information

It is assumed that a standard Post Operations Analysis report is no more commented before publication as the airport stakeholders will have reached an agreement on its content through the

OSB in the ***Steer Airport Performance*** service. Then, the Post Operations Analyst has to consider that the final standard Post Operations Analysis report can be published as it is.

In case of ad-hoc Post Operations Analysis report, the airport stakeholders may comment individually or after a common analysis which may be triggered, depending on the complexity and sensitivity of the report.

The addressees of a standard Post Operations Analysis report are decided by the OSB in the ***Steer Airport Performance*** service.

When an airport stakeholder or the APOC Supervisor asks for an ad-hoc Post Operations Analysis report he / she decide who the addressees are.

The final report is published to the pre-defined list of addressees and is recorded for later use.

Using the reports provided by the ***Perform Post-Operations Analysis*** service, the ***Steer Airport Performance service*** will assess opportunity to enhance not only the KPIs used at the airport but also the PDIs, thresholds linked to alerts or warnings, airport usage rules with a direct link to performances or trade-off priorities among different key performance areas and the baseline associated to each one of these elements. [UC POP 01. Propose modifications to the Airport Performance Framework following a post operations analysis].

5.4.4 Identification of Use Cases.

Identified Use Cases are provided in the following table:

Use Case ID	Use Case title	Use Case description
UC 661 04	Prepare and publish a standard report	See Appendix D, part 2
UC 661 05	Prepare and publish an “ad-hoc” report	See Appendix D, part 2
UC 661 06	Prepare and publish an “ad-hoc” report with stakeholders involvement	See Appendix D, part 2
UC POP 01	Propose modifications to the Airport Performance Framework following a post operations analysis	See Appendix D, part 2

Table 38. Identified Use Cases for the Post-operations phase

6 References

6.1 Applicable Documents

[1] Template Toolbox 03.01.01

[2] Requirements and V&V Guidelines 03.01.00

[3] Templates and Toolbox User Manual 03.01.01

[4] EUROCONTROL ATM Lexicon

[5] SESAR Operational Service and Environment Definition Template 03.00.00

6.2 Reference Documents

The following documents were used to provide input/guidance/further information/other:

[5] PB4.2 High Level Process Models. Edition 00.02.02. December, 2010.

[6] PB4.1 Performance Framework (Edition 1) – D40. Edition 01.00.00, 23 January 2013

[7] B.04.01, Integrated Roadmap DS16 Release Note, D84, 00.01.00, 25/05/2016.

[8] P6.2 DOD D100 Step 1. Edition 01.01.00. 07 March 2014.

[9] Eurocontrol. IP1 CDM Implementation Manual. Version 04 April 2012.

[10] PB4.2 Process and services D08. Edition 00.01.00, 10 September 2010

[11] SESAR ATM Target Concept. Definition Phase D3, 27 March 2007

[12] P6.5.4 OFA 05.01.01 OSED; D08; Edition 00.02.02, 09 October 2013.

[13] P6.5.3 DCB Preliminary OSED; D05, Edition 00.01.00; 16 April 2012.

[14] P6.6.2 De-icing Step 1 v2 OSED; Edition 00.01.00; 08 July 2011.

[15] SESAR data navigator Models ATM Master Plan Step 1 DS 16

[16] P6.5.2 FTS Validation Report; D09; Edition 00.01.00, 27 November 2012.

[17] P6.5.3 Initial Validation Report V1; D03; Edition 00.01.01, 01 June 2012.

[18] P6.5.4 Initial Validation Report V1; D05; Edition 00.02.00; 07 November 2011.

[19] P6.5.5 Validation Report V1; D05; Edition 00.00.03; 21 February 2012.

[20] P6.6.1 Validation Report V1; D04; Edition 00.00.04; 07 January 2013.

[21] SESAR Solutions Catalogue; First Edition; 14 June 2016

[22] P2232D003 Cyber-security application for SESAR OFA 05 01 01 - D2 Draft Final Report – 19 August 2016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[23] EXE-06.03.01-VP-010 Validation Report

[24] EXE-06.03.01-VP513 De-icing Step 1 - V3 Validation Report

[25] VALR EXE 549 (Airside - Landside integration)

[26] EXE-06.03.01-VP-757 Validation Report

[27] Operational Focus Area Programme Guidance; Edition 03.00.00; 4 May 2012

[28] Delivery of VALR EXE 669 ENAV proposition; D140; Edition 00.02.00; 31 August 2016

[29] VALR S1 R5 - Vol.2 Target Time Management40; D383; Edition 00.01.01; 30 September 2016

[30] OFA 05.01.01 Consolidated OSED Edition 3; D16; Edition 00.03.01; 31 March 2015

[31] APOC business process reengineering Big Data study, 10 November 2016

APOC BPR Big Data Study - Report.pdf

For Appendixes see part 2

[40] This Validation Report provides the synthesis of the validation exercises EXE-07.03.03-VP-632, EXE-07.03.02-VP-634 (Fairstream demonstrations), EXE-13.02.03-VP-723 and EXE-13.02.03-VP-749. It provides the overall conclusions and recommendations and provides the maturity state of Solution # 18 CTOT and TTA