Episode 3

Single European Sky Implementation support through Validation

Document information	
Programme	Sixth framework programme Priority 1.4 Aeronautics and Space
Project title	Episode 3
Project N°	037106
Project Coordinator	EUROCONTROL Experimental Centre
Deliverable Name	Detailed Operational Description - Collaborative Airport Planning - M1
Deliverable ID	D2.2-042
Version	3.00
Owner	
Rosalind Eveleigh	EUROCONTROL
Contributing partners	

- This page is intentionally blank -

DOCUMENT CONTROL

Approval

Role	Organisation	Name
Document owner	EUROCONTROL	Rosalind Eveleigh
Technical approver	EUROCONTROL	Giuseppe Murgese
Quality approver	EUROCONTROL	Frédérique Sénéchal
Project coordinator	EUROCONTROL	Philippe Leplae

Version history

Version	Date	Status	Author(s)	Justification - Could be a reference to a review form or a comment sheet
1.00	17/12/2009	Approved	Eduardo Goñi Ros Eveleigh	Approval of the document by the Episode 3 Consortium.
2.00	01/02/2010	Approved	Ros Eveleigh	Alignment with ATM Process Model
3.00	14/04/2010	Approved	Ros Eveleigh	Alignment with ATM Process Model and across DODs. Approval of the document by the Episode 3 Consortium.

Issued by the Episode 3 consortium for the Episode 3 project co-funded by the European Commission and Episode 3 consortium.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

Airports are seen as constraints to growth in the future air transport system. In the context of a significant increase in traffic within the SESAR time horizon, increased investment, development and research will be needed to support the necessary improvements in airport throughput, efficiency and punctuality with continued safety considerations. The development of future airport operational concepts will cover the three principal time horizons of SESAR namely the business development cycle, the medium/short term planning phase and the execution phase.

The present document describes the operational enhancements which are foreseen specifically within the medium/short term planning phase of airport operations. Within the medium/short term planning phase particularly, it is necessary that airport processes be fully integrated within the Air Traffic Management (ATM) network, so airport planning processes shall be integrated within the ATM planning operations. In such a collaborative environment, the priorities of different actors at an airport, their operational constraints and the interface with the wider ATM network will all be taken into account during the decision making process at the planning level. Main activities covered by the airport in the medium/short term planning phase will be to plan traffic and airspace requirements, refine airport resources, balance demand and capacity, and support the preparation of the flight to departure.

Airports are the nodes of the air transport system. A philosophy of performance-based airport management is needed as a pre-requisite for a future performance-based ATM system. Therefore future concepts aim at an integrated airport management, where all major aircraft operator, airport, aerodrome ATC and ground handling processes are conducted using common data sets and agreed procedures. The future “integrated” method of airport management is referred to as “Total Airport Management” (TAM). Within the TAM concept, the Airport Operations Centre (APOC) is seen as the heart of the operation. Within the APOC, operators will constantly communicate and co-ordinate, develop and maintain dynamically joint plans and execute those in their respective area of responsibility. Different possible APOC-implementations are expected, ranging from a distributed virtual APOC to a high-tech physical APOC, even with new operator roles.

The core information basis of Total Airport Management is the Airport Operations Plan (AOP). The Airport Operations Plan is an en-route-to-en-route-conversion of the Network Operations Plan (NOP), enriched by airport specific data. It ranges from agreed airport performance targets, constraints of the different stakeholders to a detailed event-resource-usage description enabling the airport to be operated as a time-ordered system. Different implementation options of the Airport Operations Plan exist according to the size of the operation of a given airport. The Airport Operations Plan is a result of a dynamic and repetitive layered planning process of several stakeholders. The APOC is the forum which facilitates the generation, discussion, commitment to and maintenance of the Airport Operations Plan.

This document builds on previous work performed as a joint initiative between DLR and EUROCONTROL. Furthermore, the EUROCONTROL medium-term Airport Operational Concept document constitutes a visionary description of airport operations for the medium-term timeframe - i.e. deployable from 2012 onwards. The Total Airport Management concept described in this document is therefore the result of a convergence between the SESAR Concept of Operations and the medium term Airport Operational Concept. The objective of the document is to describe the SESAR concept related to airport management in medium/short term planning phase in sufficient detail to permit the definition of validation exercises within Episode 3.

Issued by the Episode 3 consortium for the Episode 3 project co-funded by the European Commission and Episode 3 consortium.

1 INTRODUCTION

1.1 PURPOSE OF THE DOCUMENT

This document provides a refined description of the SESAR concept of operations regarding operational processes taking place at airports during the medium/short term planning phase. Referred as "Collaborative Airport Planning – M1", this document is part of a set of Detailed Operational Description (DOD) documents which refine and clarify the high level SESAR ConOps concept description in order to support the Episode 3 exercises, which have the objective of developing a better understanding of the SESAR Concept. This set of DODs can be considered as step 0.2 of E-OCVM [1] - i.e. the description of the ATM Operational Concept(s). The DOD document structure and content is derived from the one of the OSED (Operational Service and Environment Definition) described by the ED-78A guidelines [2]. According to the ED-78A: "*the OSED identifies the Air Traffic Services supported by data communications and their intended operational environment and includes the operational performances expectations, functions and selected technologies of the related CNS/ATM system*". The structure of the DOD has been defined considering the level of details that can be provided at this stage – i.e. the nature and maturity of the concept areas being developed.

The complete detailed description of the mode of operations is composed of ten documents according to the main phases defined by SESAR – i.e. Long Term Planning phase, Medium/Short Term Planning and Execution Phase (the complete set of documents is available from the Episode 3 portal home page [3]):

- The General DOD (G DOD) [4];
- The Long Term Network Planning DOD (L DOD) [5];
- The Collaborative Airport Planning DOD (M1 DOD), this document;
- The Medium & Short Term Network Planning DOD (M2 DOD) [7];
- The Runway Management DOD (E1 DOD) [8];
- The Apron & Taxiways Management DOD (E2/3 DOD) [9];
- The Network Management in the Execution Phase DOD (E4 DOD) [10];
- The Conflict Management in Arrival & Departure High & Medium/Low Density Operations DOD (E5 DOD) [11];
- The Conflict Management in En-Route High & Medium/Low Density operations DOD (E6 DOD) [12];
- The Episode 3 Lexicon (Glossary of Terms and Definitions) [13].

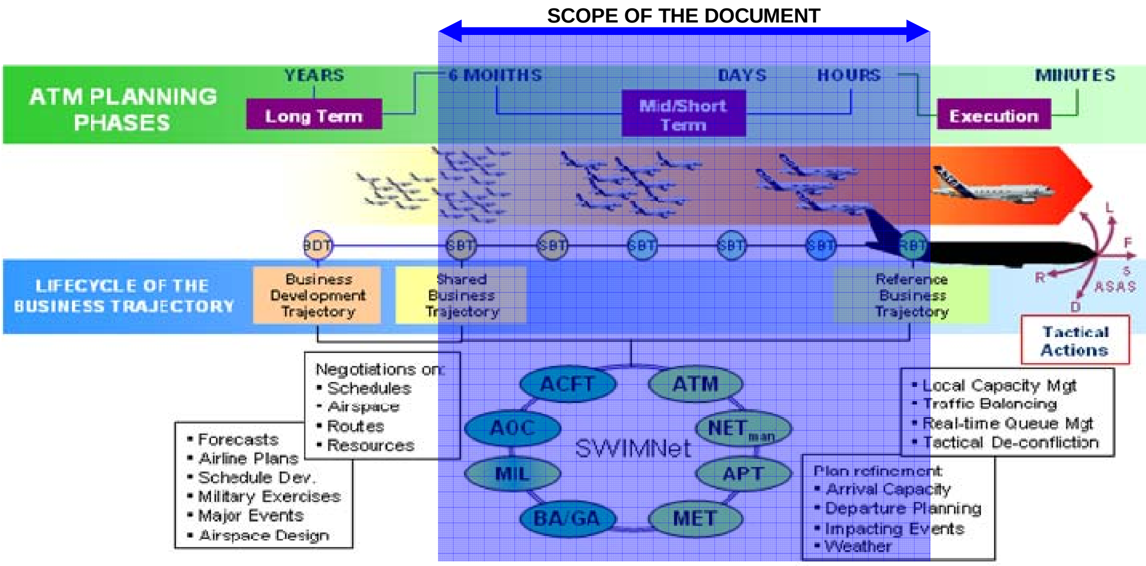


Figure 1: Scope of the document as part of Collaborative Layered Planning (SESAR ConOps)

The SESAR Operational Concept states clearly that airport operations during the medium/short term planning phase are built upon the framework of Collaborative Decision Making (CDM) but with further enhancements in terms of data sharing (SWIM) and performance based airport management (Total Airport Management) through the direct participation of key stakeholders.

The target horizon addressed in this document is the 2020 timeframe, not taking into account transition elements. Thus, this document considers a restricted list of OI steps for which the Initial Operating Capability (IOC) time frame is until 2020. This is thus mainly related to ATM Service/Capability Levels 3 and 4. Services linked to level 5 are considered out of the scope of the DOD.

Final iteration of the document will further refine the operational concept but particularly, in the case of collaborative airport planning, will refine the “who” (actors), “what” (working procedures) and “how” (required data and individual responsibilities) of Total Airport Management (TAM) during the medium/short term planning phase.

1.2 Intended Audience

The intended audience includes:

- Episode 3 partners;
- The SESAR community.

1.3 Document Structure

The structure of the document is as follows:

- §2 of this document provides an overview of the functions addressed in this document;
- §3 provides a description of how today's operation will be changed with the implementation of the concept area under analysis;
- §4 gives a description of the future operating principles. It details the benefits, the constraints, the human factors aspects, the enablers, the actors and the operating methods;

Issued by the Episode 3 consortium for the Episode 3 project co-funded by the European Commission and Episode 3 consortium.

- §5 gives environment constraints of interest to the DOD (a general document provides this information at the global level);
- §6 lists roles and responsibilities applicable to this concept area;
- Annex A provides the list of the various scenarios relevant to this document;
- Annex B provides the summary of the Use Cases defined in this document;
- Annex C the traceability table of the SESAR Operational Improvement (OI) steps addressed by this document.

1.4 BACKGROUND

The Episode 3 project, also called "Single European Sky Implementation Support Through Validation", was signed on 18th April 2007 between the European Community and EUROCONTROL under the contract N° TREN/07/FP6AE/S07.70057/037106. The European Community has agreed to grant a financial contribution to this project equivalent to about 50% of the cost of the project.

The project is carried out by a consortium composed of EUROCONTROL, Entidad Publica Empresarial Aeropuertos Espanõles y Navegacion Aérea (AENA); AIRBUS France SAS (Airbus); DFS Deutsche Flugsicherung GmbH (DFS); NATS (EN Route) Public Limited Company (NERL); Deutsches Zentrum für Luft und Raumfahrt e.V.(DLR); Stichting Nationaal Lucht en Ruimtevaartlaboratorium (NLR); The Ministère des Transports, de l'Equipement, du Tourisme et de la Mer de la République Française represented by the Direction des Services de la Navigation Aérienne (DSNA); ENAV S.p.A. (ENAV); Ingenieria y Economia del Transporte S.A (INECO) ISA Software Ltd(ISA); Ingeneria de Sistemas para la Defensa de Espana S.A (Isdefe); Luftfartsverket (LFV); Sistemi Innovativi per il Controllo del Traffico Aereo (SICTA); THALES Avionics SA (THAV); THALES AIR SYSTEMS S.A (TR6); Queen's University of Belfast (QUB); The Air Traffic Management Bureau of the General Administration of Civil Aviation of China (ATMB); The Center of Aviation Safety Technology of General Administration of Civil Aviation of China (CAST); Austro Control (ACG); Luchtverkeersleiding Nederland (LVNL). This consortium works under the co-ordination of EUROCONTROL.

With a view to supporting SESAR Development Phase activities whilst ensuring preparation for partners SESAR JU activities, Episode 3 focuses on:

- Detailing key concept elements in SESAR;
- Initial operability through focussed prototyping exercises and performance assessment of those key concepts;
- Initial supporting technical needs impact assessment;
- Analysis of the available tools and gaps for SESAR concept validation; and
- Reporting on the validation methodology used in assessing the concept.

The main SESAR inputs to this work are:

- The SESAR Concept of Operations (ConOps): T222 [34];
- The description of scenarios developed: T223 [31] & [32];
- The list of Operational Improvements allowing to transition to the final concept: T224 [36];
- The definition of the implementation packages: T333 [35] & [36];
- The list of performance assessments exercises to be carried out to validate that the concept delivers the required level of performance: T232 [37];

- The ATM performance framework, the list of Key Performance Indicators, and an initial set of performance targets: T212 [33].

The objective of detailing the operational concept [33] is achieved through the development of the DODs. These documents are available for the SESAR development phase and are produced through the System Consistency work package of Episode 3. The life cycle of the DOD documents is defined through three main steps:

- Initial DODs provided as the first inputs to the Episode 3 project;
- Interim DODs containing first refinement and consolidation from Episode 3 partners aligned to the prototyping/evaluation work, provided by mid-project duration;
- Final DODs updated by the findings and reports produced by the prototyping/evaluation activities, provided at the end of the project.

1.5 Glossary of Terms

The Episode 3 Lexicon contains lists of agreed acronyms and definitions [13].

2 OPERATING CONCEPT-CONTEXT AND SCOPE

2.1 TOTAL AIRPORT MANAGEMENT OVERVIEW

Airports are seen as constraints to growth in the future air transport system. In the context of a significant increase in traffic within the SESAR time horizon, increased investment, development and research will be needed to support the necessary improvements in airport throughput, efficiency and punctuality with continued safety considerations. The development of future airport operational concepts will cover the three principal time horizons of SESAR namely the Long Term Planning phase, the Medium/Short Term Planning phase and the Execution phase.

The philosophy of CDM forms the cornerstone of the planning phases since it is necessary that the different airport processes comprising resource allocation and management be performed by taking into account the state of other "systems" both at the airport and in the wider ATM network. For example, when planning the allocation of airport resources, the priorities and/or operational constraints of other actors should be known and wherever possible taken into account in the decision making process.

A philosophy of performance-based airport management is needed as a pre-requisite for a future performance-based ATM system. Therefore future concepts aim at an integrated airport management, where all major aircraft operator, airport, aerodrome ATC and ground handling processes are conducted using common data sets and agreed procedures. The future "integrated" method of airport management is referred to as Total Airport Management (TAM). Within the TAM concept, the Airport Operations Centre (APOC) is seen as the heart of the operation. The APOC will provide the forum whereby operators will communicate and co-ordinate, develop and maintain dynamically joint plans and execute those in their respective area of responsibility. Different possible implementations of the APOC are expected, ranging from a distributed virtual APOC to a high-tech physical APOC, even with new operator roles.

Those airports which have implemented the EUROCONTROL guidelines relating to CDM will have created a framework for improved information sharing and data quality [30].

Nevertheless, despite the improved data sharing, there still remains the reality that operational decisions within an airport are implemented on an "ad-hoc" basis. Invariably the "solution" is limited to maximising the immediate interests of those responsible for making a given decision. The main aim behind the APOC is the creation of a platform whereby operational decisions, particularly those during periods of reduced capacity, taken by any given principal airport actor may be made in the full knowledge of the operational constraints and/or priorities of other actors who may be impacted by the decision, coherent with the principals of CDM. The management of degraded situations will therefore be improved, coupled with a faster recovery to normal operations.

The actors and focus considered in this document could be reflected as relating to a major airport, typically comprising a hub operation with the various peaks and troughs in arrival/departure demand that this entails. It should be clear from the outset that some of the functionality, particularly the specific implementation of the APOC and associated actor roles and responsibilities will change according to the size of airport and nature of the operation.

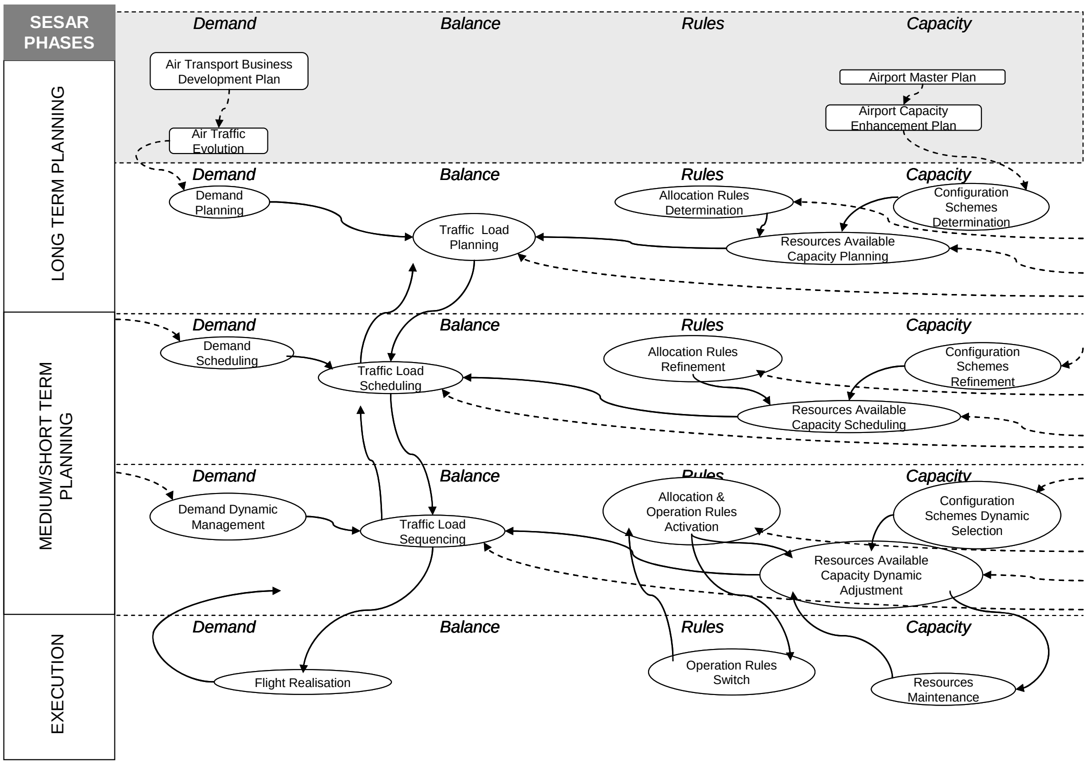


Figure 2: Airport Process Model

Figure 2 indicates the various "processes" taking place at an airport across a number of different "planning" layers. The model is resource driven and characterised by a central process which can be referred to as "demand and capacity balancing". This process takes place at a number of different time horizons although the rules which define how the balancing will be performed will differ at each stage. Each individual process will receive/provide data from/to both the "outside world" i.e. the network or airline/airport specific data (dotted lines) or from the results of the demand and capacity balancing process conducted in an earlier planning cycle (solid arrows). For example, the results of the demand and capacity balancing process during the sequencing phase will effectively define the nature of the demand at the execution phase. At the same time, feedback to earlier planning cycles will be provided as part of the collaborative planning process.

The agents inside the APOC, or connected to it (refer to Section 6), will be directly interconnected with one system for situation assessment and diagnosis, Airport Operations Plan (AOP) generation and implementation. In addition co-ordination and communication will be facilitated through an appropriate infrastructure and common data presentations.

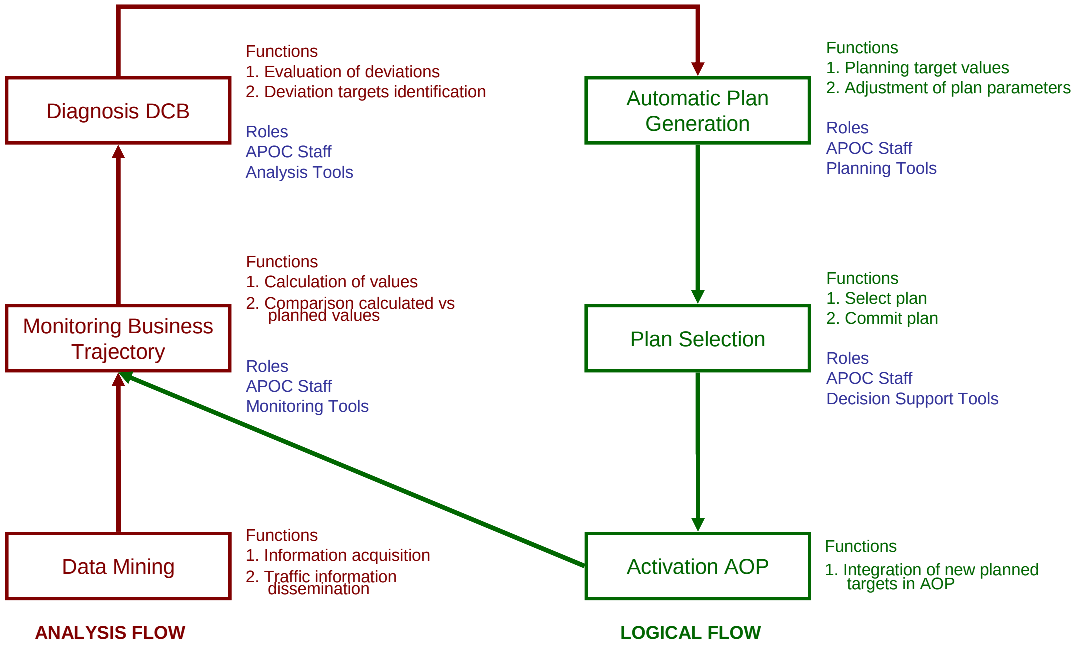


Figure 3: Collaborative Generation of the Airport Operations Plan (AOP)

The logical planning flow (green part of Figure 3) in the generic cycle could be described as follows: The **Airport Operations Plan** (AOP) Generation is carried out based upon higher level target values and detected deviations from inner cycle targets. The result can be a tentative plan with new target values. Through the Plan Selection the choice of the *plan* occurs which should be active, either to take place of the old active plan or the new tentative plan that is the alternative plan. This process includes the negotiation and commitment between the different stakeholders. In the Activation process, the new planned targets will be integrated in the current plan.

The analysis flow (brown part of Figure 3) starts with sensing of information of the next lower cycle. This traffic information could be actual and predicted process data and constraints on different aggregation levels. By using this information, higher aggregated information will be calculated and compared with the planned target values. Identified deviations are evaluated in the diagnosis process. Deviations from target values as results of this process close the cycle and trigger the plan generation.

To enable a CDM process between the stakeholders, it is necessary to achieve a common situation assessment in order to ensure common situation awareness. Situation Assessment and Diagnosis can be divided into the processes Data Mining, Monitoring and Diagnosis.

The main data becomes from:

- Data deriving from the Network Operation Plan (NOP):
    - SBTs;
    - SBTs and RBTs update, including early off-block information at the departure airport;
    - Demand and Capacity Balancing (DCB) for departing aircraft.
- Data deriving from stakeholders at the airport, including meteorology.

After new or updated information is available, the Airport Operation Plan (AOP) generation process starts with an automatic planning. If stakeholders adjust the constraints and therewith the actual parameter set of the last planning process manually, a recalculation of the affected parts of the AOP is launched. After Plan Generation with manual parameters, all stakeholders or their assigned agents choose between the actual and the tentative AOP and then have the option to activate the varied plan or not.

After the planning process with the altered constraints the new plan is displayed in the APOC for agreement of the agents. This request might be automatically generated and distributed. In this case the stakeholders or their agents have the possibility of accepting or rejecting the petition. The agents examine the solution concerning the overall performance targets and the performance targets of the stakeholders in the APOC. Either they agree upon the plan or they make new inputs. If they deem the given result insufficient, the agents might change the priorities and constraints to make adjustments to the automatic planning process. Otherwise they agree to the plan and distribute it to the stakeholders.

2.2 ATM PROCESSES DESCRIBED IN THE DOCUMENT

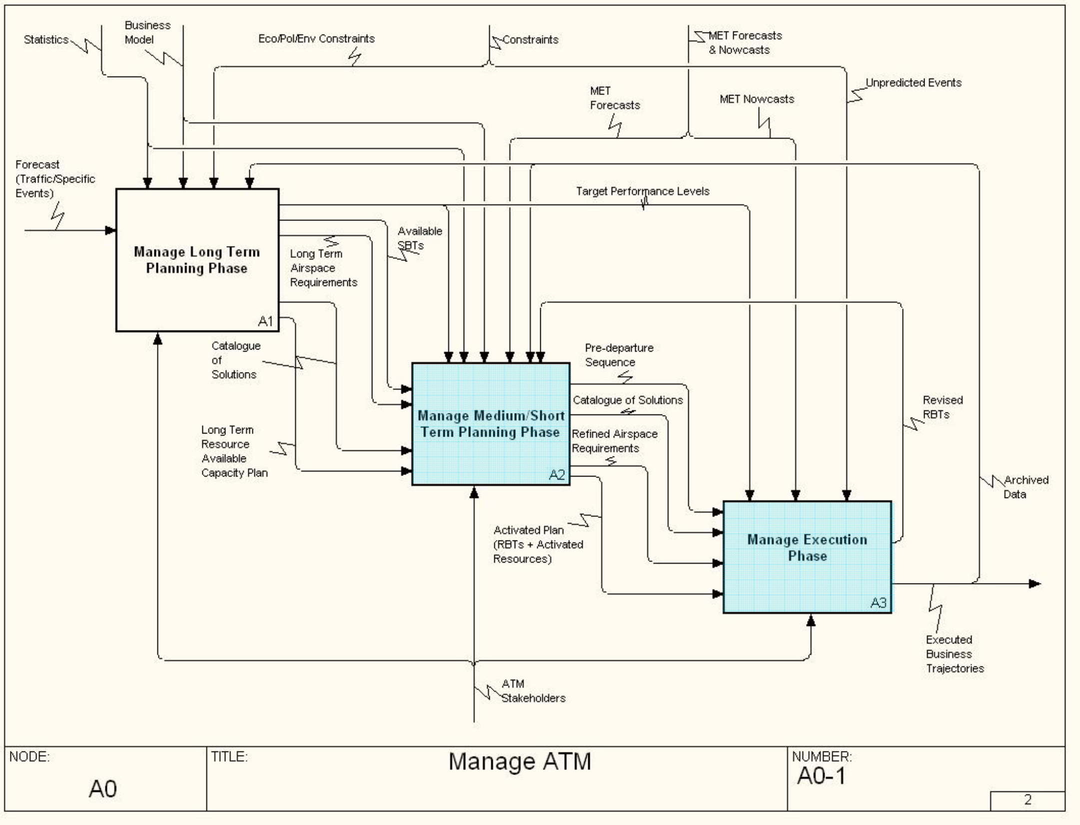
Collaborative Airport Planning global process covers all tasks where the Airport will be involved during the Medium/Short Term Planning phase. The main objectives of the Medium/Short Term Planning phase are to obtain an activated plan to be implemented during the Execution phase – updated Network Operations Plan (NOP), Reference Business Trajectories (RBTs) and activated resources – and to establish a Pre-departure Sequence.

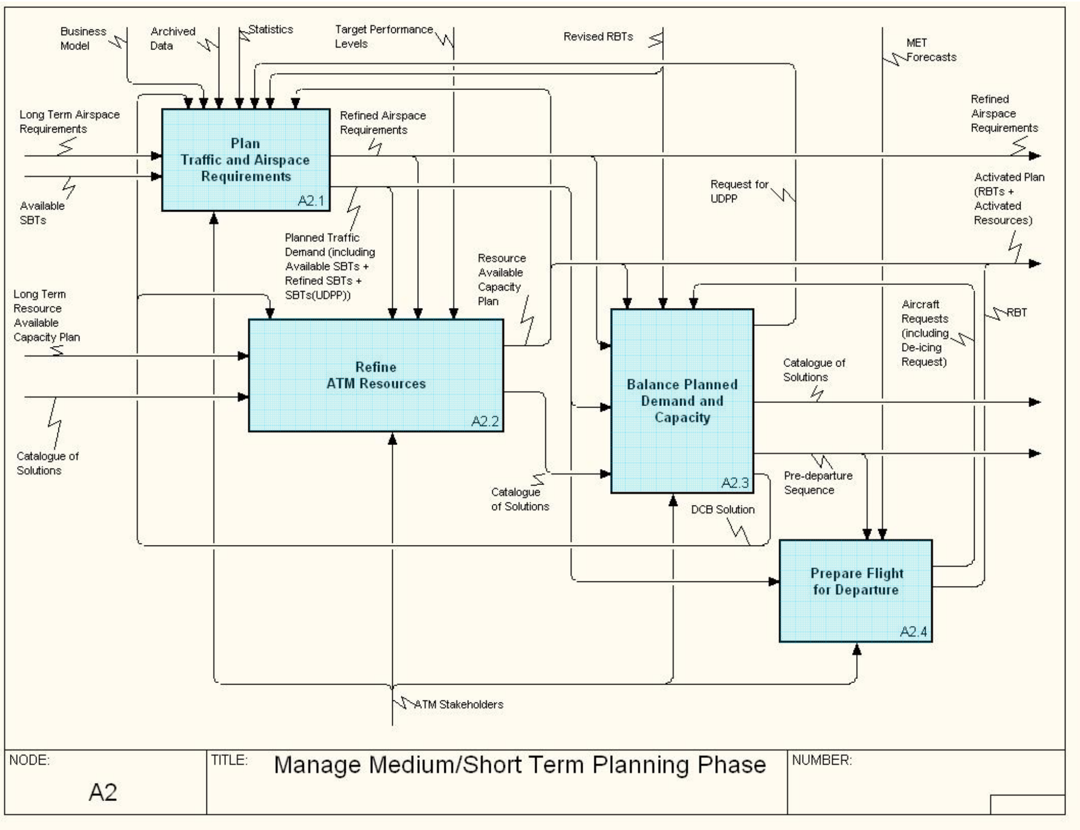
APOC will collaborate during the Medium/Short Planning phase with its participation in three main tasks:

- Refine local ATM resources. Airport will refine resources usage rules, configuration schemes and resources capacity plan relating with the airport operation;
- Balance planned demand and capacity. During this task, airport will detect demand and capacity imbalance associated to airport operation and will propose an airport DCB solution. As well, airport will participate in planning the turnaround process and establishing the pre-departure sequence;
- Prepare flight for departure. Airport will support the airspace users in obtaining the flight briefing, checking the aircraft requirements and publishing the Reference Business Trajectories (RBTs).

The high level ATM processes described below are those which are relevant to Collaborative Airport Planning by the appropriate airport actors during the medium/short term planning phase (refer to ATM process model [14]):

- **A2.1 Plan Traffic and Airspace Requirements;**
- **A2.2 Refine ATM Resources;**
- **A2.3 Balance Planned Demand and Capacity;**
- **A2.4 Prepare Flight for Departure;**
- **A3.1 Balance Actual Demand and Capacity;**
- **A3.2 Manage Traffic Queues.**


Statistics
Business Model
Eco/Pol/Env Constraints
Constraints
MET Forecasts & Nowcasts
MET Forecasts
MET Nowcasts
Unpredicted Events
Forecast (Traffic/Specific Events)
Target Performance Levels
Manage Long Term Planning Phase
A1
Long Term Airspace Requirements
Available SBTs
Catalogue of Solutions
Long Term Resource Available Capacity Plan
Pre-departure Sequence
Catalogue of Solutions
Manage Medium/Short Term Planning Phase
A2
Refined Airspace Requirements
Revised RBTs
Archived Data
Activated Plan (RBTs + Activated Resources)
Manage Execution Phase
A3
Executed Business Trajectories
ATM Stakeholders
NODE:
A0
TITLE:
Manage ATM
NUMBER:
A0-1
2


Business Model
Archived Data
Statistics
Target Performance Levels
Revised RBTs
MET Forecasts
Long Term Airspace Requirements
Plan Traffic and Airspace Requirements
A2.1
Refined Airspace Requirements
Refined Airspace Requirements
Available SBTs
Request for UDPP
Activated Plan (RBTs + Activated Resources)
Planned Traffic Demand (including Available SBTs + Refined SBTs + SBTs(UDPP))
Resource Available Capacity Plan
Long Term Resource Available Capacity Plan
Aircraft Requests (including De-icing Request)
RBT
Refine ATM Resources
A2.2
Balance Planned Demand and Capacity
A2.3
Catalogue of Solutions
Catalogue of Solutions
Pre-departure Sequence
Catalogue of Solutions
DCB Solution
Prepare Flight for Departure
A2.4
ATM Stakeholders
NODE:
A2
TITLE:
Manage Medium/Short Term Planning Phase
NUMBER:

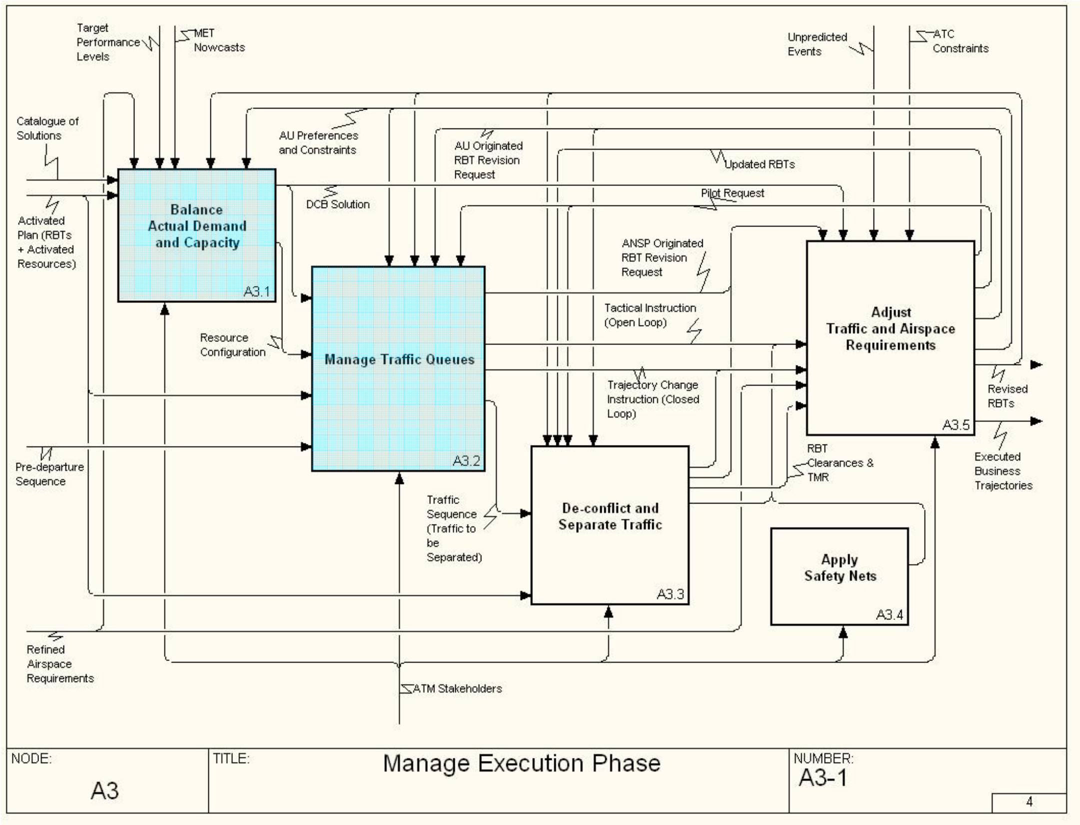


Figure 4: ATM Model diagrams and high level processes addressed

Each high-level process is broken down into low-level processes which are covered either by Runway Management (E1 DOD [8]), Apron & Taxiways Management (E2/3 DOD [9]), Network Management in the Execution Phase (E4 DOD [10]), Conflict Management in Arrival & Departure High & Medium/Low Density Operations (E5 DOD [11]), Conflict Management in En-Route High & Medium/Low Density Operations (E6 DOD [13]) or this document.

Mid-level processes, when present, usually encapsulate low-level processes supported jointly by the airport/airspace/ network execution activities.

A summary and a brief description of these lowest level ATM processes covered by the present DOD are presented in the following table:

Code[1]	ATM Process	Description	SESAR ConOps References
A2.1.2.1	Schedule Flights	This process focuses on flights scheduling, which includes cancellation/addition of flights.	F.1, F.2, F.2.1, F2.2, F.2.3, F.2.6.1, F.2.6.3, F.2.6.4, F.2.6.5.3 , F.2.6.6, F.3.1, F4.1

[1] This refers to the code associated to the process in the ATM Process Model SADT diagrams.

Code[1]	ATM Process	Description	SESAR ConOps References
A2.1.2.4	Schedule Aircraft Operations	This process is the equivalent of the Flight Scheduling for the aircraft resource. The Aircraft Operations Scheduling consists of a refinement of the strategic traffic plan by performing a first allocation of, e.g. aircraft types to repetitive SBTs.	F.1, F.2, F.2.2, F.2.3, F.2.6.3, F.3.1, F.3.2, F.5.1.3, F.5.1.4
A2.2.1.1	Refine Airport Resources Usage Rules	For each resource, the local allocation rules are first defined during the long term planning phase. However, most of the time already existing rules are adapted to the next season's needs. The runway allocation rules are, for example, the noise abatement procedures.	F.2.6.5.2, F.5.1.2, F.5.2
A2.2.2.1	Refine Possible Airport Configurations	The possible airport configurations refinement processes aim at refining the possible configurations established in the long term planning phase. For each airport resource, times of use are specified, e.g. per day type - e.g. week day, week-end, holiday, special event day.	F.2.6.4, F.5.1.1
A2.2.3.1.1	Refine Runway Available Capacity Plan	Runway Available Capacity Planning gathers for each airport runway possible configurations the available capacity, taking into account human resources plans, enhancement plans, etc.	F.2.6.4, F.2.6.5.2, F.5.1.1, F.5.1.2
A2.2.3.1.2	Refine Stand Available Capacity Plan	Stand Available Capacity Planning gathers for each airport stand possible configurations the available capacity, taking into account human resources plans, enhancement plans, etc.	F.2.6.4, F.2.6.5.2, F.5.1.1, F.5.1.2
A2.2.3.1.3	Refine De-icing Available Capacity Plan	De-icing Available Capacity Planning gathers for each airport de-icing possible configurations the available capacity, taking into account human resources plans, enhancement plans, etc.	F.2.6.4, F.2.6.5.2, F.5.1.1, F.5.1.2
A2.2.3.1.4	Refine Taxiway Available Capacity Plan	Taxiway Available Capacity Planning gathers for each airport taxiway possible configurations the available capacity, taking into account human resources plans, enhancement plans, etc.	F.2.6.4, F.2.6.5.2, F.5.1.1, F.5.1.2

Code[1]	ATM Process	Description	SESAR ConOps References
A2.2.3.1.5	Refine Airport Slots	This process describes how the APOC Staff refines the number of available airport slots according to each airport resource available capacity plan and possible DCB solutions.	F.2.6.4, F.2.6.5.2, F.5.1.1, F.5.1.2
A2.2.3.1.6	Consolidate Airport Available Capacity Plan	This process describes how the APOC Staff refines the overall airport capacity figures, a consolidation work of capacity refinement. It takes account of the runway, taxiway, stand, de-icing available capacity plans and thus is performed at the overall airport level after the capacity of each resource has been adjusted.	F.2.6.4, F.2.6.5.2, F.5.1.1, F.5.1.2
A2.3.1.1	Detect Airport Demand Capacity Imbalance	Demand capacity imbalance is identified within this process. In case of a detected imbalance, other processes of balance planned demand and capacity are triggered.	F.2.6.4, F.2.6.5, F.2.6.5.2, F.5.1.1, F.5.1.2, F.5.1.4, F.5.2
A2.3.2.1.1	Select/Refine/Elaborate a DCB Solution at Airport Level	This sub process aims at proposing a solution to a detected Demand capacity imbalance. Cost of solutions is associated with this solution. This solution can be selected from the Catalogue of solutions, and then be refined if required, or a new solution be elaborated if no pre-defined solution can apply. When the proposed solution comes from a refinement of a published DCB solution or when a new solution is elaborated, the catalogue of DCB Solution is updated.	F.2.6.4, F.5
A2.3.3	Manage Pre-departure Sequence	This process describes how the APOC Staff, in coordination with Airspace Users, determines and updates the pre-departure sequence. The main inputs are the Target Start-up Approval Time (TSAT), based on the TOBT provided by the Airline Station Manager or Ground Handling Agent and the Target Take-off Time (TTOT).	F.2.6.4, F.4.2, F.5.1.3, F.5.1.4, F.5.2
A2.4.1	Obtain Flight Briefings	This process allows the Flight Crew to collect briefing data - e.g. aeronautical information, aircraft payload, in order to adequately prepare the flight.	F.5.1.4.2, F.6.1

Issued by the Episode 3 consortium for the Episode 3 project co-funded by the European Commission and Episode 3 consortium.

Code[1]	ATM Process	Description	SESAR ConOps References
A2.4.2	Check Aircraft Requirements	This process allows the Flight Crew to identify required capabilities (RVR requirements) and to possibly initiate aircraft-related requests such as a request for remote de-icing before take-off.	F.5.1.4.2, F.6.1
A2.4.3	Publish RBT	When Target Off Block Time is not subject to change anymore, a RBT is published in a collaborative process, supported by FMS-calculation capability. Quotation from the CONOPS: "publishing of the RBT does not represent a clearance. It is the goal to be achieved and will be progressively authorised. The authorisation takes the form of a clearance by the ANSP or is a function of aircraft (crew/systems) depending on who is the designated separator".	F.1, F.2.2, F.2.3, F.2.4, F.2.4.1, F.4
A3.1.2.1.1.3	Switch Gate Operational Rules	This process is run when a change of real-time operation rules is necessary. As an example, it covers the case of a change in gates configuration.	F.2.6.4, F.5.1.3, F.5.1.4, F.5.1.4.2, F.6.1
A3.1.2.2.1.3	Coordinate Temporary Gate Closure	This process is run when maintenance works are actually performed on airport Gates. Variations that occur during this process have an impact on the sequence and dynamic management performed during the medium/short term planning phase.	F.2.6.4, F.5.1.4.2
A3.2.1.1.1	Change Pre-Departure Sequence	This process describes how the APOC Staff (in coordination with Airspace Users, i.e. Airline Station Manager and/or Ground Handling Agent) changes the pre-departure sequence. The main input is the current Pre-departure sequence, i.e. the Target Start-up Approval Time (TSAT), based on the TOBT provided by the Airline Station Manager or Ground Handling Agent and the Target Take-off Time (TTOT).	F.2.3.3, F.3.1, F.4.2.1, F.4.2.2, F.4.2.3, F.4.2.4.1, F.4.2.4.4, F.5.1.4.1, F.5.1.4.3, F.5.1.4.4, F.5.1.4.5

Table 1: ATM Model low level processes addressed

2.3 SESAR Concept Addressed in the Document

This document proposes a refined description of the SESAR concept of operations regarding operational processes taking place at airports during the Medium/Short Term Planning phase. SESAR concept addressed in this document is limited to 2020 horizon, not considering any transition elements.

The SESAR target concept of operations is a trajectory based concept. All planning activities, collaborative decision making processes and tactical operations will always be based on the latest trajectory data. A trajectory integrating ATM and airport constrains will be elaborated an agreed for each flight resulting in the trajectory that a user agree to fly and the ANSP agrees to facilitate. Airspace users will have the necessary freedom to change their business trajectories and the service providers, such as airspace and ANSPs, will adjust their resource plans to facilitate those changes resulting in the minimum delay or distortion to all trajectories. Collaborative layered planning, mediated by network management and based on collaborative decision making, has the goal of achieving an agreed, stable, demand and capacity situation.

The management of trajectories on the surface of airports will be subject to a layered planning scheme. Configurations and rules etc will be decided collaboratively. An example of this process may be the decision to apply noise abatement exceptions for certain flights which will be decided between the airlines, airport authorities and implemented by ATC. The management of trajectories during the execution phase will still remain the sole responsibility of ATC using whichever decision support tools and processes that may be appropriate.

CDM, in the SESAR concept, means sharing of information as well as acting on the shared information. Decisions will be made on the basis of common situational awareness and consequently an improved understanding of the network effects of the decisions. This improves the general quality of the decisions, helping to more accurately achieve the desired results. This approach to decision making empowers new and innovative solutions of which the User Driven Prioritisation Process (UDPP) is an example. In UDPP, airspace users among themselves could recommend a priority order for flights affected by delays caused by an unexpected reduction of capacity, which will be then communicated to the Network Management function.

The sharing of information of the required quality and timeliness in a secure environment is an essential enabler to the SESAR ATM concept. A net-centric operation will be proposed where the ATM network is considered as a series of nodes providing or consuming information; this includes the aircraft. The System Wide Information Management (SWIM) will be the system proposed to support this SESAR concept. The scope extends to all information that is of potential interest to ATM including trajectories, surveillance data, aeronautical information of all types, meteorological data etc.

SWIM proposes implement an open, flexible, modular and secure data architecture that support users and their applications in a transparent and efficient manner. Conceptually, the SWIM environment will provide a foundation upon which data and services can be added as necessary to support ATM stakeholders' requirements. In addition, SWIM will provide the mechanisms which support the partners in managing the Rules, Roles and Responsibilities (the 3R's) of information sharing. This determines which kind of information is shared by whom, with whom, where, when, why, how, how much, how often, at which quality level, in what form, for which purpose, at which cost, under which liability, under which circumstances, security levels The 3R's must also be properly addressed both in terms of institutional and Information Communication Technology (ICT) aspects.

All airport processes during Medium/Short Term Planning phase will work collaboratively, embodied in a physical or virtual Airport Operations Centre (APOC) using CDM principles in a SWIM environment.

The Medium/Short Term Planning phase will be based upon increasingly mature data quality (trajectory information, meteorological information etc) as the day of operations becomes nearer. Similarly information coming from the airports (configuration schemes, intended maintenance, potential manpower shortages etc) as well as ANSPs (airspace capacities, route availability, local capacity shortfalls and potential constraints) will all become available.

At the level of an individual airport, the Airport Operations Plan (AOP) will be continually refined as appropriate data becomes available. The main characteristic of this phase is that events either predictable or otherwise which may have an impact on the AOP will be analysed in a collaborative manner by all of the concerned stakeholders. The plan is consolidated through a process of demand and capacity balancing based on the Shared Business Trajectories and known "supply" constraints at the airport or in the network and which may directly impact airport operations. If demand exceeds capacity, the consequences are analysed and aircraft operators revise their plans through a collaborative process. In case of severe capacity shortfalls, at either the network level, notified via the Network Operations Plan (NOP), or airport level, notified by the AOP, airlines may elect to specify the flight priorities according to the severity of the constraint, referred to in SESAR as the User Driven Prioritisation Process (UDPP).

Whilst UDPP is likely to be widespread during periods of severe capacity reduction, it will also be necessary to support the creation of Pre-departure sequences based on specific airline requirements relating to individual flight and this during "normal" operations. Examples where airlines may wish to specify individual flight priorities include airport slot compliance, airline connectivity preferences, night curfew, crew roster restrictions, etc. The resulting pre-departure list will be used by ATC while sequencing departing aircraft, as and when feasible.

According to SESAR, the Medium/Short Term Planning phase ends with the creation of the Reference Business Trajectory (RBT)[2] – which the user agrees to fly and the ANSP agrees to facilitate. At this point the Execution phase commences. In the specific context of airport planning and therefore for the purposes of this document, it is considered that the scope of this document is until push-back/taxi from its parking or remote stand[3], although the validity of this should be considered during the validation exercises. SESAR describes the Execution layer as starting once the agreed trajectory is uploaded by the flight crew into the FMS although this event may happen before boarding has started and so the precise push-back time is still subject to a wide number of uncertainties.

In Episode 3 WP3 Collaborative Airport Planning Expert Group it was addressed the TAM concept mainly focus on the AOP. The findings described below were validated in plenary session within the WP3 Expert Group.

The TAM concept should be based on three "pillars":

- A collaborative Airport Operations Plan (AOP);
- An Airport Performance framework with specific performance targets;
- An Airport Operations Centre (APOC). Within the TAM concept, the APOC is seen as the platform which permits operators to communicate and co-ordinate, to develop and maintain dynamically joint plans and to execute those in their respective area of responsibility. The main information source shared between the actors in the APOC is therefore the AOP. The APOC should therefore be equipped with a real-time monitoring system, a decision support system and a set of collaborative procedures which will ensure a fully integrated management of landside & airside airport processes.

The integration of these pillars will therefore lead to the provision of a number of "services" as follows:

- Performance Planning Service;
- Monitoring and alerting Service;
- Decision Support Service;

[2] SBT iterations until it becomes RBT are defined in the SESAR Definition Phase-Report. Performance Objectives and Targets. [38].

[3] An aircraft which experiences a problem during the taxi-out phase will most likely re-enter the planning phase, notably it may be entered into a local UDPP process in order to accelerate its subsequent, late departure.

- Analysis Service.

The AOP will be one of the two main references used in the management of the airport operations. It should include traffic demand, the availability of resources and the updated knowledge of any element or event that may affect airport operation. The agreed Airport Performance Targets constitute the other key reference to be used in the airport management, firstly in the elaboration of the AOP and secondly in the real time process of updating the AOP.

In order to facilitate the above services, the AOP content has been divided into a number of themes defined as follows:

AOP theme	High level Content
AOP 1	**Demand / Capacity Assessment**. Assessment of demand and resource availability. Comprising flight plans, airport slots, special events, work in progress, strategic planning, airport configurations, capacities, …
AOP2	**Performance Trade-off Assessment**. Priority setting between the selected performance areas (Safety, Capacity, Time-Efficiency, Predictability, Environmental Sustainability and Flexibility).
AOP3	**Monitoring the AOP**. Detection of deviations from planning and raising of alerts, supported by: • A Common Traffic Situational Awareness ('aircraft monitor'); • A Common Passenger Situational Awareness, provided by landside monitoring systems ('passenger monitor').
AOP4	**Decision making support**. Appropriate algorithms to assess potential impact of proposed changes to the AOP. This will be closely linked to the performance trade-off assessment (AOP2).
AOP5	**Management**. Implementation of existing A-CDM procedures, particularly the pre-departure sequence based on the Target Off block Time (TOBT). Also integration of new TAM procedures to improve TOBT accuracy and fully integrate landside and airside processes.

Table 2 : Proposed AOP themes

2.4 Related SESAR Operational Improvements (OIs)

A table listing the SESAR Operational Improvements steps that are relevant to this DOD, and the associated processes, is provided in Annex C (refer to 10).

2.5 Related SESAR Performance Requirements

SESAR has defined several Key Performance Areas (KPAs) and Performance Requirements (objectives, indicators and targets) which are defining system wide effectiveness and thus, for most of them, affect the various components of the future 2020 ATM target system.

The KPAs and performance requirements are shown here with the description of how the scope of collaborative airport management addresses them (refer to SESAR D2 [33]):

Key Performance Area (KPA)	Description[4]
Safety	Safety will not be impacted as a result of the introduction of TAM. Indeed the philosophy is to retain the responsibility for decision making with the actor in the best place for making that decision but that more information will be available during the process. The number of ATM induced accidents and serious or risk bearing incidents do not have to increase and, where possible, have to decrease, as a result of the introduction of SESAR concepts. In order to maintain a constant accident rate the overall safety level would have to increase an improvement factor of x3 in order to meet the safety objective of traffic levels in 2020. The overall safety level should reach an improvement factor 3 in order to meet the safety objective **SAF1.OBJ1.IND1**.
Security	Security requirements can and do have a major impact on passenger connections and airline delay performance. The APOC will draw on information from the terminal including information relating to passengers flows notably in relation to security and check-in so as to enable a more optimal assignment of resources as well as allowing airlines to optimise their fleet management.
Environmental Sustainability	Airport operation balancing user requirements and environmental constraints will be facilitated by the APOC. Increase the degree in which local environmental rules affecting ATM are respected (e.g. aircraft type restrictions, night movement bans, noise routes and noise quotas). The percentage of cases in which local environmental rules affecting ATM are respected has to increase. Local environmental rules affecting ATM are to be 100% respected **ENV3.OBJ1.IND1**.
Cost Effectiveness	The introduction of the APOC and systems required to facilitate data sharing should provide benefits outweighing their costs. Better planned, user driven trajectories and use of aircraft capabilities should provide cost-effectiveness. The cost of equipping resulting better adherence to plans and preferred business trajectories. Halve the direct European gate-to-gate ATM costs through progressive reduction **CEF1.OBJ1.IND1**.

[4] SESAR Performance Requirements (as defined by SESAR D2 [33]) are presented in this column; Performance objectives in black, performance targets in blue, along with the corresponding performance indicator ID in brackets.

Key Performance Area (KPA)	Description[4]
Capacity	Capacity should be optimised and balanced according to user requirements. The impact of adverse conditions should be minimised and the return to normal operations should be as speedy as possible. Strategies concerning future capacity evolutions should be shared with all users of the platform. Meet or exceed the growth of the busy-hour demand of individual airports. In line with physical airport capacity increases, the overall growth of IFR demand, and the traffic pattern changes in time and space. Hourly number of IFR movements (departures plus arrivals), as possible during low visibility (IMC) conditions **CAP2.OBJ1.IND1**. Daily number of IFR movements (departures plus arrivals), as possible during a 15-hour day (between 0700 and 2200 hrs local time) during low visibility (IMC) conditions **CAP2.OBJ1.IND2**.
Efficiency	The efficiency of individual flight operations will be improved through Collaborative Decision Making / Data sharing elements of TAM. Concerted decision making in the framework of the APOC should provide enhanced efficiency of fleet operations. Continually reduce the departure delay due to ATM. Occurrence (Punctuality): At least 98% of flights departing on-time **EFF1.OBJ1.IND1**. Severity (Delays): The average departure delay of delayed flights will not exceed 10 minutes **EFF1.OBJ1.IND2**. Conform to the Shared Business Trajectory Timing to the greatest extent. Occurrence: At the regional level, more than 95% of flights with a normal flight duration **EFF1.OBJ2.IND1**. Severity: At the regional level, the average flight duration extension of flights with an extended flight duration will not exceed 10 minutes **EFF1.OBJ2.IND2**.
Flexibility	Flexibility to modify operator preferences as well as more flexible approach to operational decision making are characteristics of TAM and the AOP. Utilising, for example, dynamic processes, capacity headroom. At least 98% (European-wide annual average) of the non-scheduled flight departures will be accommodated with a delay penalty less than 3 minutes **FLX2.OBJ1.IND1**. The average delay (European-wide annual average) of such scheduled flights (with a delay penalty of more than 3 minutes) will be less than 5 minutes **FLX2.OBJ1.IND2**.

Key Performance Area (KPA)	Description[4]
Predictability	Predictability is enhanced for all users based on common information contained in the AOP. This Focus Area covers the variability of the flight operation: departure and arrival punctuality, and the variability of flight phase durations (turnaround time, taxi time, airborne time). Improve the arrival punctuality to the greatest extent. Occurrence: Less than 5% (European-wide annual average) of flights suffering arrival delay of more than 3 minutes **PRD1.OBJ1.IND1**. Severity: The average delay (European-wide annual average) of delayed flights (with a delay penalty of more than 3 minutes) will be less than 10 minutes **PRD1.OBJ1.IND2**. Taxonomy of service disruption is necessary to refine the focus area: adverse weather (airport closure), system failure, industrial action. Prevent and mitigate service disruption to the greatest extent. Number of cancelled flights per type of disruption: At regional level, reduce cancellation rates by 50% by 2020 compared to 2010 baseline **PRD2.OBJ1.IND1**. Number of diverted flights per type of disruption: At regional level, reduce diversion rates by 50% by 2020 compared to 2010 baseline **PRD2.OBJ1. IND2**. Total delay due to disruption per type of disruption: At regional level, reduce total disruption delay by 50% by 2020 compared to 2010 baseline **PRD2.OBJ1.IND3**.
Access and Equity	Access to specific airport resources e.g. de-icing facilities, parking stands for airspace users should be provided in an equitable, transparent and more efficient manner as a result of the SESAR CDM processes followed in the APOC and described in the AOP.
Participation	Fundamental to the TAM concept is the participation of the airport user community on the decision making process through collaborative planning.

Issued by the Episode 3 consortium for the Episode 3 project co-funded by the European Commission and Episode 3 consortium.

Key Performance Area (KPA)	Description[4]
Interoperability	Although not a "first level" indicator of performance, individual users of the APOC may wish to ensure some degree of interoperability between their own internal systems and data being shared through the APOC. An example could be the automatic updating of departure information within the operational control centre of an airline with data coming from the CDM milestones approach. Application of standards and uniform principles. Level of compliance of ATM operations with ICAO CNS/ATM plans and global interoperability requirements: All European ATM operations are compliant with ICAO CNS/ATM plans and global interoperability requirements **IOP3.OBJ1.IND1**. Level of seamlessness of ATM service to the user: Provide a seamless service to the user at all times, throughout Europe **IOP3.OBJ2.IND1**. Level of uniformity of ATM service: Operate on the basis of uniformity throughout Europe **IOP3.OBJ3.IND1**. Technical and operational interoperability of aircraft and ATM systems. Timeliness of delivery of standards, specifications and procedures for ATM, CNS and associated avionics requirements: All standards, specifications and procedures for ATM, CNS and associated avionics requirements available as required in the ATM Master Plan **IOP4.OBJ1.IND1**.

Table 3: Key Performance Areas addressed

3 CURRENT OPERATING METHOD AND MAIN CHANGES

Airport planning activities have not been harmonized in Europe. The main formalised process is through EUROCONTROL Airport CDM (A-CDM) and the degree to which this philosophy is integrated across Europe varies significantly between airports. A number of airports are well advanced in the introduction of A-CDM processes and data exchange but the application of CDM in degraded operations is still very much at the conceptual stage.

Current airport planning processes can therefore be categorised according to a number of characteristics each of which may be true to varying degrees in individual airports:

- Limited data sharing;
- Limited knowledge of operational constraints of different actors;
- Decisions taken by individual actors are limited to their own sphere of operations;
- Airport operations generally oriented toward throughput within the allowable envelope of environmental constraints;
- Limited visibility concerning future operations e.g. return to normal operations after a period of capacity shortfall.

3.1 Aspects of today's operations that will remain

There is no intent that those actors who are currently responsible for certain decisions will have that power removed. For example, the Tower Supervisor will still be responsible for that decisions related to assure the safety of operations. The aim is that, where flexibility is possible, such decisions will be taken in a more collaborative manner and in an attempt to minimise the impact on other actor’s operations.

The controllers will keep their way of working but the planning activities of other staff will be harmonized between the stakeholders with a sensitisation to the airport processes.

3.2 Aspects of today's operations that will change

The main impact on today’s airport planning processes will be:

- Move from a function oriented aircraft management to a continuous process oriented management;
- Insert airports into the ATM Network by linking the airborne segments of the aircraft trajectory with the turnaround process;
- Install where appropriate a dedicated Airport Operations Centre (APOC);
- Reinforcement of the decision making process in the planning phase;
- More user-centric operation, notably the introduction of UDPP and collaborative pre-departure sequences;
- Evolution toward a “performance based” airport management system where the particular focus of performance (or targets to be achieved) can be agreed between the stakeholders according to their own operational constraints, requirements and prevailing conditions;
- Airports will play a key role to manage aircraft turn-round and flight operations as a single continuous event;

Issued by the Episode 3 consortium for the Episode 3 project co-funded by the European Commission and Episode 3 consortium.

- All airport processes will work collaboratively using CDM principles in a SWIM environment.

The "performance target level" represents a trade-off agreement between the stakeholders on the key performance indicators of the airport operations. This Quality of Service (QoS) agreement must also take into account (in fact, it may be driven by) specific requirements coming from the "network". The most desirable key performance indicator for each party at an airport may differ at any given time and will vary over time. Issues of collaboration and arbitration are therefore important. From an economic perspective, reduced costs, increased throughput and increased efficiency are important for each actor. Improved predictability, stability of operations and punctuality are important issues for passengers and therefore the commercial interests of the airline operators. Furthermore, increased environmental awareness and urbanisation around existing airports means that operations which minimise both noise and pollution may be considered as advantageous at certain times at the expense of efficiency and punctuality.

It should be possible to develop between the CDM stakeholders a number of different Airport Operations Plans each which privilege different quality of service criteria. At any time therefore, the implementation of a particular plan will be a collaborative process between the different (including remote) APOC Staff, as discussed in Section 6, taking into account the specific operational requirements of each as well as the prevailing and predicted weather conditions. For example, a shortage in capacity due to runway closure might lead to a new compromise between environment and throughput in order to guarantee the integrity of the airline operator's flight programme. Alternatively during certain periods when airlines can tolerate slight reductions in punctuality, emissions might temporarily get a higher weight than throughput through the implementation of Continuous Descent Approaches for example.

3.3 Aspects of today's operations that will disappear

The following are the main aspects on today's airport planning processes that will disappear:

- Multiple planning (flight plans vs. airport slots) will be substituted by one single plan: the Business Trajectory;
- DLY messages will be substituted by SBT/RBT management, which probably could be performed through A-CDM procedures including DPI messages at major airports.

4 PROPOSED OPERATING PRINCIPLES

The section exposes the decomposition of airport operations planning activities within the ATM medium/short term planning phase into a series of collaborative processes between airport actors (Airport Operator, Aircraft Operators and Airport ATC).

4.1 AIRPORT SUPPORT TO PLAN TRAFFIC AND AIRSPACE REQUIREMENTS (A2.1)

4.1.1 Scope and Objectives

In the medium/short term, the demand is planned, meaning that the flight intentions for the day of operation are progressively shared by the Airspace Users and gathered by the Regional Network Manager and the Airport.

Process A2.1 Plan Traffic and Airspace Requirements is mainly fed in by Available SBTs and the Long Term Airspace Requirements; both of them outputs from the long term planning phase.

Constraints applying to the process are either linked to historical data - i.e. Statistics, airspace users' preferences - i.e. Business Model, outputs from process A2.2 Refine ATM Resources - i.e. Resource Available Capacity Plan, and process A2.3 Balanced Planned Demand and Capacity - i.e. DCB Solution, or results coming from the execution phase leading to adjust the traffic - i.e. Revised RBTs and Archived Data.

Process Plan Traffic and Airspace Requirements at airport level describes demand and related airport planning processes in medium and short term horizons. Airport will collaborate as secondary actor with the airspace users and the network managers (primary actors) in the process of filing and refining Shared Business Trajectories (SBTs).

As mentioned in section 2, the scope of M1 (this DOD) is related to airport processes during the medium/short term planning phase, thus the following sections will only focus on planning traffic and airspace requirements at collaborative airport planning level.

Plan traffic and airspace requirements activities at Network level are covered by Medium/Short Term Network Planning (M2 DOD [7]), focusing on refining/defining airspace reservation demand, filing and refining SBTs, performing UDPP on SBTs and building/refining reference traffic demand.

4.1.2 Assumptions

Not far identified.

4.1.3 Expected Benefits, Issues and Constraints

Expected benefits of co-operative working and decision processes in Plan Traffic and Airspace Requirements could be:

- Possibility of direct verbal communication and discussion;
- Representation of information by means of common used displays;
- Common computer aided simulations;
- Transmission of planning orders, action proposals or action instructions;
- Better negotiation and solution of conflicts and communication of interests.

Issued by the Episode 3 consortium for the Episode 3 project co-funded by the European Commission and Episode 3 consortium.

4.1.4 Overview of Operating Method

In the following sections, an overview of the entire Plan Traffic and Airspace User Requirements process is firstly presented and then each of the lowest levels process covered by the airport are described in detail.

During the planning phase information on traffic demand from various stakeholders will be collated and compared with historical data. Data for military and civil airspace reservations will be inserted as soon as made known. Inputs for reservations for military and civil airspace reservations could be inserted by those who are not in a position to plan in advance. Also airport data will be made available. Features for revisions which could be made at any time in the planning phase as well as in the execution phase will be available.

Process A2.1 Plan Traffic and Airspace Requirements, from the airport side, will be aligned to the extent possible with the development phases of the business trajectory that feeds the airport with accurate and reliable demand information. This demand forecast will be based on:

- Aircraft operator's intentions as specified by the intended schedule of operations and supported by the 4D operational planning;
- Airport information on landing time, constraints, turnaround time, airport capacity and taxiing time provided by a system wide information system and supporting CDM processes.

This high level process will be developed as primary actors by the Airspace User (airlines) and the Network Management Units and will be structured in the following processes:

- A2.1.1 Refine/Define Airspace Reservation Demand;
- A2.1.2 File/Refine SBT;
- A2.1.3 Perform UDPP on SBT;
- A2.1.4 Build/Refine Reference Traffic Demand.

A2.1.2 File/Refine SBT is the only processes partially covered by Collaborative Airport Planning (M1 – this DOD). The operating method for this process, at airport level, is developed below. Processes A2.1.1 Refine/Define Airspace Reservation Demand, A2.1.3 Perform UDPP on SBT and A2.1.4 Build/Refine Reference Traffic Demand are covered by Medium/Short Term Network Planning (M2 DOD [7]).

Airport will be involved uniquely in File/Refine SBT process, while Refine/Define Airspace Reservation Demand, Perform UDPP on SBT and Build/Refine Reference Traffic Demand process will be developed by the Airspace Users in collaboration with Network.

4.1.4.1 Schedule Flights (A2.1.2.1)

Process A2.1.2 File/Refine SBT process is to update the Shared Business Trajectory (SBT), available as a result of the Long Term Planning Phase, which were performed on the basis of allocated airport slots. The objective is to file/refine SBT to be best possible outcome for the user.

Four main tasks will be developed within the File/Refine SBT process:

- A2.1.2.1 Schedule Flights;
- A2.1.2.2 Optimise SBT;
- A2.1.2.3 Validate SBT;
- A2.1.2.4 Schedule Aircraft Operations.

Processes A2.1.2.2 Optimise SBT and A2.1.2.3 Validate SBT will be managed by the Airspace Users in collaboration with Network. These processes are out of the scope of

Issued by the Episode 3 consortium for the Episode 3 project co-funded by the European Commission and Episode 3 consortium.

Collaborative Airport Planning (M1 – this DOD) and are covered by Medium/Short Term Network Planning (M2 DOD [7]).

Processes A2.1.2.1 Schedule Flights and A2.1.2.4 Schedule Aircraft Operations will be developed by the Airspace Users and the Airport.

Scheduled Flights process focuses on flights scheduling, which includes cancellation/addition of flights. Airport slot requests can be issued in the medium/long term planning phase, as there can still be slot allocation updates after the IATA slot allocation conference.

Scheduled Flights process allows to the airspace users to allocate new flights or to cancel existing ones in the system. This process will be managed by the airspace user in coordination with the APOC Staff of the related airports, according to Operational Improvement Step DCB-0301.

Scheduled Flights process presents the following main drivers:

- Inputs:
  - Available SBTs.
- Control constraints:
  - Business Model;
  - Refined Airspace Requirements.
- Human actors[5]:
  - APOC Staff;
  - AOC Staff.
- Outputs:
  - Updated SBTs (Schedule).

The following Use Case has been identified for Schedule Flights process:

Use Case	Description
Schedule Flights by owner	This Use Case describes how an AOC Staff schedules, reschedules, cancel flights... depending on available/refined SBTs and RBTs through operational drift, queue management and according to the marginal cost of each flight (business model). Rescheduling, cancelling a flight can also be the result of an AOC Staff decision for self need.

Table 4: Use Case for Schedule Flights

4.1.4.2 Schedule Aircraft Operations (A2.1.2.4)

Once new SBTs provided by the Airspace Users are validated by the System, as a result of the Validate SBT process, Scheduled Aircraft Operations process will be activated. Airspace Users will allocate aircrafts to the validated SBTs and airport related data such as the Stand Allocation Plan or the Target Off-Block Time will be updated, according to Operational Improvement Step DCB-0302.

Scheduled Aircraft Operations process presents the following main drivers:

- Inputs:
  - Refined SBTs.

[5] Actors, roles and responsibilities are described in detail in Section 6.

- Control constraints:
  - Revised RBTs (e.g. Inbound In-Block Time);
  - Business Model.
- Human actors:
  - Sub-Regional Network Manager;
  - AOC Staff;
  - Ground Handling Agent;
  - Airline Station Manager;
  - APOC staff.
- Outputs:
  - Aircraft-SBT allocation;
  - Airport Turn-round Plan.

Firstly, the Airline Station Manager uses the System to link inbound flights with outbound flights and indicates the aircraft turn-around information that will be used by the APOC Staff (Stand Planner) to establish/optimise the stand allocation plan.

Secondly, APOC Staff (Stand Planner) uses the System to establish a stand allocation plan. APOC Staff (Stand Planner) will request to the System to establish the stand allocation plan. The System will compute a tentative plan based on the seasonal stand plan (if available), AOC Staff (Aircraft Operator) stand planning preferences, flight information (including aircraft turn-around information), Ground Handling Agent's capability for the planning period and airport infrastructure configuration. Once the APOC Staff validates the stand allocation plan computed by the System, the concerned Ground Handling Agent(s) and the AOC Staff (Aircraft Operator) will confirm the stand allocation plan based on their internal capabilities.

Finally, AOC Staff (Aircraft Operator) uses the System to refine the Target Off-Block Time (TOBT) of a flight in order to improve the predictability and accuracy of off-blocks. The TOBT is determined from the analysis of the actual aircraft operational status, Ground Handling Agent's internal turn-around milestones, airport operational situation and AOC Staff's (Aircraft Operator) operational decisions.

The following Use Cases have been identified for Schedule Aircraft Operations process:

Use Case	Description
Determine / Revise Turn-round Plan	This Use Case describes how the Airline Station Manager links inbound flights with outbound flights and indicates the connecting information that can be used by the Stand Planner to optimise the stand allocation.
Refine a Target Off Block Time	The Use Case describes how an Aircraft Operator uses the System to refine the TOBT of a flight in order to improve the predictability and accuracy of off-blocks. The TOBT is determined from the analysis of the actual aircraft operational status, Ground Handling Agent's internal turn-round milestones, airport operational situation and Aircraft Operator's operational decisions.
Request Unscheduled Arrival	This Use Case deals with all the emergencies that may occur on an inbound flight. The issue has been identified, as far as emergencies occur at least several times per week on large airports.

Table 5: Use Cases for Schedule Aircraft Operations

4.1.5 Enablers

The main enablers to support Plan Traffic and Airspace Users Requirements within the SESAR concept are:

- SWIM;
- CDM;
- Network management function in support UDPP;
- TAM.

4.1.6 Transition issues

IP1 OI steps related to Plan Traffic and Airspace Requirements are considered as already implemented.

4.2 AIRPORT SUPPORT TO REFINE ATM RESOURCES (A2.2)

4.2.1 Scope and Objectives

This process aims at refining the Resource Available Capacity Plan, which encompasses 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 and available capacity may be adjusted due to more reliable weather forecast, as well as stand and taxiway availability becomes more detailed - e.g. plans may be defined hourly in the short term period but not before.

Process A2.2 Refine ATM Resources is mainly fed in by the Catalogue of Solutions and the Long Term Resource Available Capacity Plan; both of them outputs from the long term planning phase.

Constraints applying to the process are either linked to the performance objectives - i.e. Target Performance Levels, outputs from process A2.3 Balanced Planned Demand and Capacity - i.e. DCB Solution, or results coming from the previous process A2.1 - i.e. Available SBTs, Refined SBTs and UDPP on SBTs.

As mentioned in section 2, the scope of M1 (this DOD) is related to airport processes during the medium/short term planning phase, thus the following sections will only focus on refining ATM resources at collaborative airport planning level. Airport will participate as primary actor in the processes of filing and refining airport resources usage rules, refining airport possible configurations and refining airport available resource capacity plan.

4.2.2 Assumptions

Not far identified.

4.2.3 Expected Benefits, Issues and Constraints

Expected benefits of co-operative working and decision processes in Refine Airport Resources could be:

- Possibility of direct verbal communication and discussion;
- Representation of information by means of common used displays;
- Common computer aided simulations;
- Transmission of planning orders, action proposals or action instructions;

- Better negotiation and solution of conflicts and communication of interests.

4.2.4 Overview of Operating Method

Process A2.2 Refine ATM Resources aims at refining resources availability plans, i.e. usage rules, possible configurations and resources available capacity of the first allocations and definitions made during the previous Long Term Planning Phase. This refinement is needed because of more detailed information on resources availability, especially on the airport: usage rules, configurations and available capacity may be adjusted due to more reliable weather forecast, as well as stand and taxiway availability becomes more detailed - e.g. plans may be defined hourly in the short term period but not before.

This high level process will be structured in the following processes:

- A2.2.1 Refine Resources Usage Rules;
- A2.2.2 Refine Possible Configurations;
- A2.2.3 Refine Available Resource Capacity Plan.

All these processes are partially covered by Collaborative Airport Planning (M1 – this DOD). The operating method for these processes, at airport level, is developed below. At Network level these processes are covered by Medium/Short Term Network Planning (M2 DOD [7]).

Refine ATM Resources process, at the airport level, will be based on capacity figures of available resources, provided by the APOC Staff (Airport Operator) and the (local) ANSP, and a refined Airport Resource Allocation and Capacity Plan is proposed. This plan will contain:

- The availability of resources (for example maintenance scheme);
- A number of standard airport configuration schemes (including runways, taxiways, gates and terminal buildings/ facilities);
- Capacity figures for each main process in each configuration taking account of external conditions like traffic mix, weather conditions, etc.

4.2.4.1 Refine Airport Usage Rules (A2.2.1.1)

Process A2.2.1 Refine Resources Usage Rules aims to update during the Medium/Short Term Planning Phase possible usage of resources including e.g. refinement of separation rules or refinement of a taxiway usage.

Three main tasks will be developed within the Refine Resources Usage Rules process:

- A2.2.1.1 Refine Airport Usage Rules;
- A2.2.1.2 Refine Airspace Usage Rules;
- A2.2.1.3 Refine Network Usage Rules.

Processes A2.2.1.2 Refine Airspace Usage Rules, A2.2.1.3 Refine Network Usage Rules are out of the scope of Collaborative Airport Planning (M1 – this DOD) and are covered by Medium/Short Term Network Planning (M2 DOD [7]).

In process A2.2.1.1 Refine Airport Usage Rules, for each resource, the local allocation rules are first defined during the long term planning phase. However, most of the time already existing rules are adapted to the next season’s needs. The runway allocation rules are, for example, the noise abatement procedures as addressed in the Operational Improvement Steps:

- AO-0703 related to noise management and mitigation;
- AO-0704 related to fuel use and emissions management;

- AO-0801 addressing environmental sustainability in the earliest phase of flight planning.

Refine Airport Usage Rules process presents the following main drivers:

- Inputs:
  - Long Term Resource Available Capacity Plan (Usage Rules).
- Control constraints:
  - Target Performance Levels;
  - Refined Airspace Resource Usage Rules.
- Human actors:
  - APOC Staff.
- Outputs:
  - Refined Airport Resource Usage Rules.

The following Use Cases have been identified for Refine Airport Usage Rules process:

Use Case	Description
Refine Runway Allocation Policy	This Use Case describes how the APOC Staff defines and updates the runway allocation policy - e.g. runway allocation according to weather conditions, departure and arrival rates.
Refine Stand Allocation Planning Policy	This Use Case describes how the APOC Staff defines and updates the stand planning policy - e.g. Schengen/non-Schengen stands, stand allocation rules according to aircraft type.
Refine Preferences for Stand Allocation	This Use Case describes how the Flight Schedule Department sets or updates its preferences for stand allocation - e.g. optimised stand allocation of connected flights.
Refine De-icing Allocation Policy	This Use Case describes how the APOC Staff defines and updates the de-icing allocation policy - e.g. de-icing time per aircraft type.
Refine Taxiway Allocation Policy	This Use Case describes how the APOC Staff defines and updates the taxiway allocation policy - e.g. speed limits, maximum weight per taxiway.
Refine Airport Slot Allocation Policy	This Use Case describes how the APOC Staff defines and updates the airport slot allocation policy - e.g. RWY capacity, apron capacity, passenger terminal capacity.

Table 6: Use Cases for Refine Airport Usage Rules

4.2.4.2 Refine Possible Airport Configurations (A2.2.2.1)

Process A2.2.2 Refine Possible Configurations aims to update the possible configurations established in the long term planning phase. For each resource, times of use are specified, - e.g. per day type such as week day, week-end, holiday, special event day.

This process is related to the environmental Operational Improvement Steps AO-0704, AO-0705, AO-0706.

Two main tasks will be developed within the Refine Possible Configurations process:

- A2.2.2.1 Refine Possible Airport Configurations;

- A2.2.2.2 Refine Possible Airspace Configurations.

Process A2.2.2.2 Refine Possible Airspace Configurations is out of the scope of Collaborative Airport Planning (M1 – this DOD) and is covered by Medium/Short Term Network Planning (M2 DOD [7]).

Process A2.2.2.1 Refine Possible Airport Configurations aims to refine the possible configurations established in the long term planning phase. For each airport resource, times of use are specified - e.g. per day type such as week day, week-end, holiday, special event day.

Refine Possible Airport Configurations process presents the following main drivers:

- Inputs:
  - o Possible Airport Configurations;
  - o Catalogue of Solutions.
- Control constraints:
  - o Planned Traffic Demand (including Available SBTs + Refined SBTs + SBTs (UDPP)).
- Human actors:
  - o APOC Staff.
- Outputs:
  - o Refined Possible Airport Configurations;
  - o Catalogue of Solutions.

This process aims to establish and update in the system the possible airport configuration schemes that could be applicable for the day of operations.

The system is provided with the configuration schemes previously established in the Long Term Planning Phase and holds all necessary up-to-date airport environment data.

Firstly, the System retrieves and presents all necessary information regarding airport environment data, such as: identified runway directions, runway lengths, landing assistance equipments, maximum speeds in taxiways versus aircraft category, number of stands (contact and remote), aircraft-related de-icing standard time, holding bay areas.

Secondly, the APOC Staff considers the airport runways as the main data and determines, with possible assistance from the System, all possible airport configurations, each one corresponding to a specific usage of the available runways covering both arrival and departure traffic. The identification of all possible airport configurations is performed taking into account many criteria such as: airport operational rules, segregated or traffic mix situations, weather conditions which need to be assessed together with the availability of airport surveillance tools.

When each airport runway configuration has been identified, the APOC Staff assesses additional dimensioning aspects, such as:

- Taxiing routes (from the departure stand to the departure runway holding point and from the arrival runway exit and the arrival stand) may be defined for a group of stands rather than for each individual stand on the airport (depending on the layout of the terminal buildings);
- Corresponding taxiing times computed thanks to the total length of all composing taxiing segments as well as to associated taxiing speeds. If the required information is available, the taxi times will depend on the aircraft type, weather conditions and the type of parking stand;

- De-icing areas identification;
- Hot spot identification: runway/runway crossings, runway/taxiways crossings, taxiway/taxiways crossings, cul-de-sac apron zones.

Finally, the APOC Staff records in the System each possible airport configuration scheme applicable for the day of operations. While the Medium/Short Term Planning Phase evolves, new or more accurate data may be available and trigger a new iteration and update of those airport configuration schemes.

The following Use Cases have been identified for Refine Possible Airport Configurations process:

Use Case	Description
Refine Possible Runway Configurations	This Use Case describes how the APOC Staff establish and update the list of available runways, their characteristics (e.g. runway length) and the Possible Configurations that could be applicable for the day of operations.
Refine Possible Stand Configurations	This Use Case describes how the APOC Staff determine the availability of the stands with their characteristics (e.g. which aircraft can be accommodated) and the Possible Configurations that could be applicable for the day of operations. Stand resource includes both remote parking stands and contact stands.
Refine Possible De-icing Configurations	This Use Case describes how the APOC Staff determine the de-icing configurations that are feasible given the stands and remote de-icing areas available and aircraft constraints.
Refine Possible Taxiway Configurations	This Use Case describes how APOC Staff establish and update the list of available taxiways, their characteristics (e.g. maximum weight per taxiway) and the Possible Configurations that could be applicable for the day of operations.

Table 7: Use Cases for Refine Possible Airport Configurations

4.2.4.3 Refine Runway Available Capacity Plan (A2.2.3.1.1)

Process A2.2.3 Refine Resource Available Capacity Plan aims to gather for each possible configuration the available capacity, taking into account human resources plans, enhancement plans, etc....

Two main tasks will be developed within the Refine Resource Available Capacity Plan process:

- A2.2.3.1 Refine Airport Resource Available Capacity Plan;
- A2.2.3.2 Refine Airspace Resource Available Capacity Plan.

Process A2.2.3.2 Refine Airspace Resource Available Capacity Plan is out of the scope of Collaborative Airport Planning (M1 – this DOD) and is covered by Medium/Short Term Network Planning (M2 DOD [7]).

Process A2.2.3.1 Refine Airport Resource Available Capacity Plan aims to gather for each airport resource possible configurations the available capacity, taking into account human resources plans, enhancement plans, etc.

Firstly, the System retrieves and presents the available possible airport configurations schemes and the constraints already identified for the day of operations.

Secondly, the CDM team, composed of the APOC Staff (Airport ATC and Airport Operator) and ATC (Approach & En route), analyses and assesses each possible airport configuration scheme for determining the capacity limit of the airport for the day of operations. The starting point is to define the maximum runway capacity for each runway defined in the airport configuration scheme for departure traffic, arrival traffic or mixed traffic. This maximum runway capacity is then refined to the following constraints: weather conditions (visibility, shower, snow/frost/ice), gate/stand capacity, presence of hot spots, airspace constraints, demand and capacity balancing constraints.

Finally, the System (NOP) records all related capacity figures for each possible airport configuration scheme applicable for the day of operations. For each configuration, the capacity figures may be decomposed as the following:

- Nominal arrival/departure capacity;
- Reduced arrival/departure capacity for limited visibility & cloud cover;
- Degraded arrival/departure capacity for low visibility procedures.

While the Medium/Short Term Planning Phase evolves, new or more accurate data may be available and trigger a new iteration for the update of those capacity figures.

Six main tasks will be developed within the Refine Airport Resource Available Capacity Plan process:

- A2.2.3.1.1 Refine Runway Available Capacity Plan;
- A2.2.3.1.2 Refine Stand Available Capacity Plan;
- A2.2.3.1.3 Refine De-icing Available Capacity Plan;
- A2.2.3.1.4 Refine Taxiway Available Capacity Plan;
- A2.2.3.1.5 Refine Airport Slots;
- A2.2.3.1.6 Consolidate Airport Available Capacity Plan.

Process A2.2.3.1.1 Refine Runway Available Capacity Plan gathers for each airport runway possible configurations the available capacity, taking into account human resources plans, enhancement plans, etc...

Refine Runway Available Capacity Plan process presents the following main drivers:

- Inputs:
  - Long Term Resource Available Capacity Plan;
  - Refined Resource Usage Rules;
  - Refined Possible Configurations.
- Control constraints:
  - DCB Solution.
- Human actors:
  - APOC Staff.
- Outputs:
  - Runway Available Capacity Plan.

The following Use Case has been identified for Refine Runway Available Capacity Plan process:

Use Case	Description
Refine Runway Capacity	This Use Case describes how the APOC Staff refines the capacity figures for the various Possible Runway Configurations applicable for the day of operations. Those capacity figures are refined for example, according to various weather conditions, airspace constraints, potential demand and balancing capacity constraints (network constraints that may be already identified/anticipated for the day of operations) and maintenance plans. This Use Case does not take into account any other constraints at the airport as it focuses only on the runway capacity.

Table 8: Use Case for Refine Runway Available Capacity Plan

4.2.4.4 Refine Stand Available Capacity Plan (A2.2.3.1.2)

Process A2.2.3.1.2 Refine Stand Available Capacity Plan gathers for each airport stand possible configurations the available capacity, taking into account human resources plans, enhancement plans, etc...

Refine Stand Available Capacity Plan process presents the following main drivers:

- Inputs:
  - Long Term Resource Available Capacity Plan;
  - Refined Resource Usage Rules;
  - Possible Airport Configurations.
- Control constraints:
  - DCB Solution.
- Human actors:
  - APOC Staff.
- Outputs:
  - Stand Available Capacity Plan.

The following Use Case has been identified for Refine Stand Available Capacity Plan process:

Use Case	Description
Refine Stand Capacity	This Use Case describes how the APOC Staff refines the capacity figures for the various Possible Stand Configurations applicable for the day of operations. Those capacity figures are refined for example, according to various weather conditions, landside constraints and maintenance plans. This Use Case does not take into account any other airside resources constraints as it focuses on stand capacity only.

Table 9: Use Case for Refine Stand Available Capacity Plan

4.2.4.5 Refine De-icing Available Capacity Plan (A2.2.3.1.3)

Process A2.2.3.1.3 Refine De-icing Available Capacity Plan gathers for each airport de-icing possible configurations the available capacity, taking into account human resources plans, enhancement plans, etc...

Refine De-icing Available Capacity Plan process presents the following main drivers:

- Inputs:
  - Long Term Resource Available Capacity Plan;
  - Refined Resource Usage Rules;
  - Possible Airport Configurations.
- Control constraints:
  - DCB Solution.
- Human actors:
  - APOC Staff.
- Outputs:
  - De-icing Resource Available Capacity Plan.

The following Use Case has been identified for Refine De-icing Available Capacity Plan process:

Use Case	Description
Refine De-icing Capacity	This Use Case describes how the APOC Staff refines the de-icing capacity. This refinement is based, for example, on the equipments available (number of de-icing trucks, de-icing stands etc.) with their characteristics (or capacities). It takes account of the maintenance plans. This Use Case does not take into account any other airside resources constraints as it focuses only on de-icing capacity (in terms of equipment and installation).

Table 10: Use Case for Refine De-icing Available Capacity Plan

4.2.4.6 Refine Taxiway Available Capacity Plan (A2.2.3.1.4)

Process A2.2.3.1.4 Refine Taxiway Available Capacity Plan gathers for each airport taxiway possible configurations the available capacity, taking into account human resources plans, enhancement plans, etc...

Refine Taxiway Available Capacity Plan process presents the following main drivers:

- Inputs:
  - Long Term Resource Available Capacity Plan;
  - Resource Usage Rules;
  - Possible Airport Configurations.
- Control constraints:
  - DCB Solution.
- Human actors:
  - APOC Staff.
- Outputs:
  - Taxiway Available Capacity Plan.

Issued by the Episode 3 consortium for the Episode 3 project co-funded by the European Commission and Episode 3 consortium.

The following Use Case has been identified for Refine Taxiway Available Capacity Plan process:

Use Case	Description
Refine Taxiway Capacity	This Use Case describes how the APOC Staff refines the capacity figures for the various Possible Taxiway Configurations applicable for the day of operations. Those capacity figures are refined for example, according to various weather conditions and maintenance plans. This Use Case does not take into account any other airside resources constraints as it focuses only on taxiway capacity.

Table 11: Use Case for Refine Taxiway Available Capacity Plan

4.2.4.7 Refine Airport Slots (A2.2.3.1.5)

Process A2.2.3.1.5 Refine Airport Slots describes how the APOC Staff refines the number of available airport slots according to each airport resource available capacity plan and possible DCB solutions. Refine Airport Slots process presents the following main drivers:

- Inputs:
  - Runway Available Capacity Plan;
  - Stand Available Capacity Plan;
  - De-icing Resource Available Capacity Plan;
  - Taxiway Available Capacity Plan;
  - Refined Airport Resource Usage Rules (Slot Allocation Policy);
  - Demand SBTs/RBTs.
- Control constraints:
  - DCB Solution.
- Human actors:
  - APOC Staff.
- Outputs:
  - Airport Slots.

The following Use Case has been identified for Refine Airport Slots process:

Use Case	Description
Refine Airport Slots	This Use Case describes how the APOC Staff refines the number of available airport slots according to the airport capacity and possible configurations. This is done through a consolidation of each resource capacity figures which lead to a revision of the available airport slots that can lead to new proposals to airspace users.

Table 12: Use Case for Refine Airport Slots

4.2.4.8 Consolidate Airport Available Capacity Plan (A2.2.3.1.6)

Process A2.2.3.1.6 Consolidate Airport Available Capacity Plan describes how the APOC Staff refines the overall airport capacity figures, a consolidation work of capacity refinement. It takes account of the runway, taxiway, stand, de-icing available capacity plans and thus is performed at the overall airport level after the capacity of each resource has been adjusted.

Issued by the Episode 3 consortium for the Episode 3 project co-funded by the European Commission and Episode 3 consortium.

Consolidate Airport Available Capacity Plan process presents the following main drivers:

- Inputs:
  - Runway Available Capacity Plan;
  - Stand Available Capacity Plan;
  - De-icing Resource Available Capacity Plan;
  - Taxiway Available Capacity Plan;
  - Airport Slots.
- Control constraints:
  - DCB Solution.
- Human actors:
  - APOC Staff.
- Outputs:
  - Airport Resource Available Capacity Plan.

The following Use Case has been identified for Consolidate Airport Available Capacity Plan process:

Use Case	Description
Refine Airport Capacity	This Use Case describes how the APOC Staff refines the overall airport capacity figures, a consolidation work of capacity evaluation (including new airport slots if any). It takes account of the runway, taxiway, stand, de-icing and landside capacity plans and thus is performed at the overall airport level after the capacity of each resource has been evaluated (using the relevant preceding refinement Use Cases).

Table 13: Use Case for Consolidate Airport Available Capacity Plan

4.2.5 Enablers

The main enablers to support Refine Airport Resources within the SESAR concept are:

- SWIM;
- CDM;
- Effective Collaboration between ATM Stakeholders Supported by Environmental Management Systems;
- TAM.

4.2.6 Transition issues

IP1 OI steps related to Refine Airport Resources are considered as already implemented.

4.3 Airport Support to Balance Planned Demand and Capacity (A2.3)

4.3.1 Scope and Objectives

This process aims at balancing demand and capacity both on airport resources. It includes the Airport Resource Capacity Plan, which is consolidated through a balanced mapping of

Business trajectory demand on the various airport resources. When focussed on short term planning, this should include pre-departure sequencing activities, as well as preparing ground movement sequence and runway sequence.

Process A2.3 Balance Planned Demand and Capacity is mainly fed by refined Airspace Requirements and Planned Traffic Demand (Available SBTs, refined SBTs and UDPP on SBTs), outputs from previous process A2.1 Plan Traffic and Airspace Requirements; and by Resource Available Capacity Plan and Catalogue of Solutions, coming from previous process A2.2 Refine ATM Resources.

Constraints applying to the process are either linked to outputs from process A2.2 Refine ATM Resources - i.e. Resource Available Capacity Plan, requests from airspace users coming from following process A2.4 Prepare Flight for Departure - i.e. Aircraft Requests, or results coming from the execution phase leading to adjust the traffic - i.e. Revised RBTs.

As mentioned in section 2, the scope of M1 (this DOD) is related to airport processes during the medium/short term planning phase, thus the following sections will only focus on balancing planned demand and capacity at collaborative airport planning level. Airport will participate as primary actor in the processes of selecting, refining and elaborating an airport DCB solution.

4.3.2 Assumptions

Not far identified.

4.3.3 Expected Benefits, Issues and Constraints

Expected benefits of co-operative working and decision processes in Balance Airport Planned Demand and Capacity could be:

- Possibility of direct verbal communication and discussion;
- Representation of information by means of common used displays;
- Common computer aided simulations;
- Transmission of planning orders, action proposals or action instructions;
- Better negotiation and solution of conflicts and communication of interests.

4.3.4 Overview of Operating Method

Process A2.3 Balance Planned Demand and Capacity aims at balancing demand and capacity both on local resources (runway, stands, ACC) and at network level. It includes the Airport Resources and Capacity Plan, which is "consolidated through a balanced mapping of Business trajectory demand on the various airport resources". When focussed on short term planning, this should include pre-departure sequencing activities, as well as preparing ground movement sequence and runway sequence.

This high level process will be structured in the following processes:

- A2.3.1 Detect Demand Capacity Imbalance;
- A2.3.2 Propose a DCB Solution;
- A2.3.3 Manage Pre-departure Sequence.

Processes A2.3.1 Detect Demand Capacity Imbalance and A2.3.2 Propose a DCB Solution are partially covered by Collaborative Airport Planning (M1 – this DOD). The operating method for these processes, at airport level, is developed below. At Network level these processes are covered by Medium/Short Term Network Planning (M2 DOD [7]).

Process A2.3.3 Manage Pre-departure Sequence is only covered by Collaborative Airport Planning (M1 – this DOD).

4.3.4.1 Detect Airport Demand Capacity Imbalance (A2.3.1.1)

Process A2.3.1 Detect Demand Capacity Imbalance aims to identify possible demand capacity imbalance and in case of a detected imbalance, other processes of balance planned demand and capacity will be triggered.

Two main tasks will be developed within the Detect Demand Capacity Imbalance process:

- A2.3.2.1.1 Detect Airport Demand Capacity Imbalance;
- A2.3.2.1.2 Detect Airspace Demand Capacity Imbalance.

Process A2.3.2.1.2 Detect Airspace Demand Capacity Imbalance is out of the scope of Collaborative Airport Planning (M1 – this DOD) and is covered by Medium/Short Term Network Planning (M2 DOD [7]).

Process A2.3.2.1.1 Detect Airport Demand Capacity Imbalance aims to balance demand and capacity for each airport resource. For each day of operation, flights are scheduled over time periods according to scheduled available capacity. Then, resource scheduling is consolidated in order to refine the operational airport plan with the more stringent resources.

Detect Airport Demand Capacity Imbalance process presents the following main drivers:

- Inputs:
  - None.
- Control constraints:
  - Planned Traffic Demand (Including Available SBTs + Refined SBTs + SBTs (UDPP));
  - Revised RBTs;
  - Resource Available Capacity Plan;
  - Refined Airspace Requirements.
- Human actors:
  - Airline Station Manager;
  - APOC Staff;
  - Ground Handling Agent.
- Outputs:
  - Detected Imbalance.

The refined airport operational plan presents the results of mapping the traffic demand on to the various airport resources:

- Arrival, departure and surface throughputs;
- Stand, pushback, de-icing and holding bay capacity;
- Ground resources such as passenger buses, baggage handling, refuelling, catering, cleaning, etc.

For large or busy airports handling medium/short term planning of all airport resources in one big step may prove very difficult, if no impossible. That is why the process proposed for the establishment of the various parts of the pre-tactical airport operational plan is stepwise:

- Airport resources at the gate level are particularly addressed in the gate capacity plan;

Issued by the Episode 3 consortium for the Episode 3 project co-funded by the European Commission and Episode 3 consortium.

- Airport resources at the surface & runway levels are particularly addressed in the runway capacity plan (Which encompasses the hot spot and taxiways capacity plans);
- Gate and runway capacity plans make the core of the medium/short term refined airport operational plan.

The following Use Cases have been identified for Detect Airport Demand Capacity Imbalance process:

Use Case	Description
Detect non-compliance of a Target Performance Level	This Use Case describes how the System detects and informs the APOC Staff in case of a non-compliance of a Target Performance Level.
Determine/Revise Runway Load Schedule	This Use Case describes how the APOC Staff shall plan the detailed runway sequence allocation for each flight scheduled for the day of operations, taking into account the airport operational plan, the latest demand and capacity balancing constraints and weather forecasts that are available during this scheduling phase.
Determine/Revise Stand Load Schedule	This Use Case describes how the APOC Staff allocates flights to groups of stands taking account of the flight demand and stand available capacity.
Determine/Revise De-icing Resources Load Schedule	This Use Case describes how the APOC Staff assigns a number of flights to de-icing areas per time slots, taking account of the flight demand and de-icing Resource Available capacity.
Determine/Revise Taxiway Load Schedule	This Use Case describes how the APOC Staff defines aircraft flows on taxiways for different airport configurations, taking account of the flight demand and taxiway available capacity. The aim of this Use Case is to identify hot spots on the taxiways and check that the demand does not exceed the capacity.
Refine the Airport Operational Plan	This Use Case describes how the APOC Staff consolidates the runway, stand, de-icing and taxiway load schedules in a refined airport operational plan. They take account of landside constraints. The refined airport operational plan identifies hot spots between the resources. The Use Case ends when the flight schedule is recorded in the system.

Table 14: Use Cases for Detect Airport Demand Capacity Imbalance

4.3.4.2 Select/Refine/Elaborate a DCB Solution at Airport Level (A2.3.2.1.1)

Process A2.3.2 Propose a DCB Solution aims to provide a solution to a detected demand capacity imbalance. When the proposed solution comes from a refinement of a published DCB solution or when a new solution is elaborated, the catalogue of DCB Solution is updated.

Two main tasks will be developed within the Optimise Capacity Usage process:

- A2.3.2.1 Select/Refine/Elaborate a DCB Solution;
- A2.3.2.2 Implement the DCB Solution.

Process A2.3.2.2 Implement the DCB Solution is out of the scope of Collaborative Airport Planning (M1 – this DOD) and is covered by Medium/Short Term Network Planning (M2 DOD [7]).

Process A2.3.2.1 Select/Refine/Elaborate a DCB Solution aims to propose a solution to a detected demand capacity imbalance. This solution can be selected from the Catalogue of solutions, and then be refined if required, or a new solution be elaborated if no pre-defined solution can apply. When the proposed solution comes from a refinement of a published DCB solution or when a new solution is elaborated, the catalogue of DCB Solution is updated.

Select/Refine/Elaborate a DCB Solution process will be divided in three tasks:

- A2.3.2.1.1 Select/Refine/Elaborate a DCB Solution at Airport Level;
- A2.3.2.1.2 Select/Refine/Elaborate a DCB Solution at Airspace Level;
- A2.3.2.1.3 Select/Refine/Elaborate a DCB Solution at Network Level.

Processes A2.3.2.1.2 Select/Refine/Elaborate a DCB Solution at Airspace Level and A2.3.2.1.3 Select/Refine/Elaborate a DCB Solution at Network Level are out of the scope of Collaborative Airport Planning (M1 – this DOD) and are covered by Medium/Short Term Network Planning (M2 DOD [7]). The process addressing the implementation of the selected airport DCB solution is described in details in the Medium & Short Term Network Planning DOD (M2 DOD) [7]).

Process A2.3.2.1.1 Select/Refine/Elaborate a DCB Solution at Airport Level allows the selection/refinement/elaboration of a DCB Solution at the Airport level. Taking into account the detected Demand/Capacity Imbalance, the resulting Airport DCB Solution is provided with an associated cost.

Select/Refine/Elaborate a DCB Solution at Airport Level process presents the following main drivers:

- Inputs:
  - Catalogue of Solutions.
- Control constraints:
  - Planned Traffic Demand (including Available SBTs + Refined SBTs + SBTs (UDPP));
  - Detected Imbalance;
  - Target Performance Levels;
  - Resource Available Capacity Plan;
  - Cancelled DCB Solution.
- Human actors:
  - APOC Staff.
- Outputs:
  - Proposed Airport DCB Solution;
  - Catalogue of Solutions.

The following Use Cases have been identified for Select/Refine/Elaborate a DCB Solution at Airport Level process:

Use Case	Description

Use Case	Description
Resolve Airport Demand Capacity Imbalance	This Use Case describes how the APOC Staff resolves an overload at the level of the airport by selecting/refining/elaborating a DCB solution. This/these solution(s) can be based on maximal arrival rates at the airport level or at the level of entry points in the TMA, or required minimal spacing between a/c, a specific airport configuration.
Use Airport Extra Capacity	This Use Case describes how the APOC Staff takes advantage of a capacity opportunity by selecting/refining/elaborating a DCB solution. This/these solution(s) can be based on acceptable peak rates during a time period at the airport level or at the level of entry points in the TMA, or reduced required minimal spacing.
Refine Airport Catalogue of Solutions	The use case describes how the catalogue of DCB solutions is refined in light of experience and new needs.

Table 15: Use Cases for Select/Refine/Elaborate a DCB Solution at Airport Level

4.3.4.3 Manage Pre-departure Sequence (A2.3.3)[6]

Process A2.3.3 Manage Pre-departure Sequence describes how the APOC Staff (in coordination with Airspace Users) determines and updates the pre-departure sequence. The main inputs are the Target Start-up Approval Time (TSAT), based on the TOBT provided by the Airline Station Manager or Ground Handling Agent and the Target Take-off Time (TTOT).

Pre-departure sequencing allows ANSP to handle the Target Off-Block Times (TOBTs) obtained from the turn-round process in a way that flights can depart from their stands in a more efficient and optimal order. Based on aircraft progress by using the TOBT, as well as the operational traffic situation on the aprons, taxiways and near runways, ATC can provide a TSAT which places each aircraft in an efficient pre-departure sequence (off-blocks) as reflected in Operational Improvement Step AO-0602 Collaborative Pre-departure Sequencing.

Manage Pre-departure Sequence process presents the following main drivers:

- Inputs:
  - Planned Traffic Demand (Including Available SBTs + Refined SBTs + SBTs (UDPP)).
- Control constraints:
  - Aircraft Requests (Including de-icing request).
- Human actors:
  - APOC Staff;
  - Airline Station Manager;
  - Ground Handling Agent.
- Outputs:
  - Pre-departure Sequence.

The "real" traffic demand provided by AOC Staff (aircraft operators) at least 3 hours before the TOBT, is used to initiate the process of translating the airport operational plan into a pre-departure sequence, although further refinement will take place. The establishment and

[6] Detail on pre-departure sequence concept and how planning traffic queues and managing pre-departure sequence work can be found in the EUROCONTROL CDM Manual.

Issued by the Episode 3 consortium for the Episode 3 project co-funded by the European Commission and Episode 3 consortium.

maintenance of the pre-departure sequence is a collaborative and iterative process involving Airport, ATC, Network but also AOC Staff (aircraft operators) who may propose sequence swaps or negotiate new rank in the sequence in case of aircraft turnaround delay and APOC Staff (airport operator) who may propose changes in the per-departure sequence due to events at the level of the terminal building processes.

The following Use Case has been identified for Manage Pre-departure Sequence process:

Use Case	Description
Determine/Update Pre-departure Sequence	This Use Case describes how the APOC Staff (in coordination with Airspace Users) determines and updates the pre-departure sequence. The main inputs are the Target Start-up Approval Time (TSAT), based on the TOBT provided by the Airline Station Manager or Ground Handling Agent and the Target Take-off Time (TTOT).

Table 16: Use Case for Manage Pre-departure Sequence

4.3.5 Enablers

The main enablers to support Balance Airport Planned Demand and Capacity within the SESAR concept are:

- SWIM;
- CDM;
- TAM.

4.3.6 Transition issues

IP1 OI steps related to Balance Airport Planned Demand and Capacity are considered as already implemented.

4.4 Airport Support to Prepare Flight for Departure (A2.4)

4.4.1 Scope and Objectives

This process covers the whole preparation of the flight that occurs before departure.

Process A2.4 Prepare Flight for Departure is mainly fed in by Planned Traffic Demand (Available SBTs, refined SBTs and UDPP on SBTs), output from previous process A2.1 Plan Traffic and Airspace Requirements.

Constraints applying to the process are either linked to outputs from process A2.3 Balance Planned Demand and Capacity - i.e. Pre-departure Sequence, or meteorological data - i.e. MET forecasts.

As mentioned in section 2, the scope of M1 (this DOD) is related to airport processes during the medium/short term planning phase, thus the following sections will only focus on preparing flight for departure at collaborative airport planning level. Airport will collaborate as secondary actor with the airspace users (primary actor) in the processes of obtaining flight briefing, checking aircraft requirements and publishing the RBT.

4.4.2 Assumptions

Not far identified.

Issued by the Episode 3 consortium for the Episode 3 project co-funded by the European Commission and Episode 3 consortium.

4.4.3 Expected Benefits, Issues and Constraints

Expected benefits of co-operative working and decision processes in Prepare Flight for Departure could be:

- Possibility of direct verbal communication and discussion;
- Representation of information by means of common used displays;
- Common computer aided simulations;
- Transmission of planning orders, action proposals or action instructions;
- Better negotiation and solution of conflicts and communication of interests.

4.4.4 Overview of Operating Method

Process A2.4 Prepare Flight for Departure covers the whole preparation of the flight that occurs before departure.

This high level process will be structured in the following processes:

- A2.4.1 Obtain Flight Briefings;
- A2.4.2 Check Aircraft Requirements;
- A2.4.3 Publish RBT.

Processes A2.4.1 Obtain Flight Briefings, A2.4.2 Check Aircraft Requirements and A2.4.3 Publish RBT are only covered by Collaborative Airport Planning (M1 – this DOD).

4.4.4.1 Obtain Flight Briefings (A2.4.1)

This process allows the Flight Crew to collect briefing data - e.g. aeronautical information, aircraft payload, in order to adequately prepare the flight.

Obtain Flight Briefings process presents the following main drivers:

- Inputs:
  - Planned Traffic Demand (including Available SBTs + Refined SBTs + SBTs (UDPP)).
- Control constraints:
  - MET Forecasts;
  - Pre-departure Sequence.
- Human actors:
  - MET Data Manager;
  - AI Data Manager;
  - Flight Crew.
- Outputs:
  - Flight Briefing Data.

The goal is to get information from the SBT for a single flight. That information is validated, and then filed. When the SBT contains incomplete route segments, a number of available routes that best meet the AOC Staff (Aircraft Operator) preferences are proposed, from which the AOC Staff (Aircraft Operator) can select.

Obtaining a ‘Pre-Flight Update Briefing’ is a one-off process during which a pilot is supplied with all modifications to the information provided in a previous ‘Flight Briefing’ for a given SBT

Issued by the Episode 3 consortium for the Episode 3 project co-funded by the European Commission and Episode 3 consortium.

or for given ‘Flight Intent’ details. Once a ‘Pre-Flight Update Briefing’ has been provided for a selected SBT or entered flight intent details, before or during a flight, a pilot may select to be informed on any modification or new information related to the flight. This information will be conveyed via notification messages known as ‘Notification Briefings’.

The following Use Case has been identified for Obtain Flight Briefings process:

Use Case	Description
Obtain Flight Briefing	This Use Case describes how the Flight Crew (Pilot) is supplied with all relevant information in order to plan or to execute a given flight, or to obtain generic information related to flights. The process provides the knowledge to support the decision-making if a flight or a flight related action can be safely and efficiently performed. The briefing will be provided for the selected flight intentions and will contain the type of information as specified in the selected user profile. Before a flight, the Flight Crew (Pilot) will require detailed or updated information concerning the flight.

Table 17: Use Case for Obtain Flight Briefings

4.4.4.2 Check Aircraft Requirements (A2.4.2)

This process allows the Flight Crew to identify required capabilities (RVR-Runway Visual Range requirements) and to possibly initiate aircraft-related requests such as a request for remote de-icing before take-off.

Check Aircraft Requirements process presents the following main drivers:

- Inputs:
  - Flight Briefing Data;
  - Planned Traffic Demand (including Available SBTs + Refined SBTs + SBTs (UDPP)).
- Control constraints:
  - MET Forecast;
  - Pre-departure Sequence.
- Human actors:
  - Flight Crew.
- Outputs:
  - Aircraft Request (Including De-icing Request);
  - Aircraft Requirements.

The following Use Case has been identified for Check Aircraft Requirements process:

Use Case	Description
Check Aircraft Requirements	This Use Case describes how the Flight Crew identifies required capabilities (RVR requirements) and may initiate aircraft related requests, such as a request for remote de-icing before take-off.

Table 18: Use Case for Check Aircraft Requirements

4.4.4.3 Publish RBT (A2.4.3)

When Target Off Block Time is stable enough, a RBT is published in a collaborative process, supported by FMS-calculation capability. Publishing of the RBT does not represent a clearance. It is the goal to be achieved and will be progressively authorised. The authorisation takes the form of a clearance by the ANSP or is a function of aircraft (crew/systems) depending on who is the designated separator.

Publish RBT process presents the following main drivers:

- Inputs:
  - Aircraft Requirements;
  - Flight Briefing Data;
  - Planned Traffic Demand (including Available SBTs + Refined SBTs + SBTs (UDPP)).
- Control constraints:
  - MET Forecast;
  - Pre-departure Sequence.
- Human actors:
  - AOC Staff.
- Outputs:
  - RBT.

The following Use Case has been identified for Publish RBT process:

Use Case	Description
Publish RBT	When Target Off Block Time is not subject to change anymore, a RBT is published in a collaborative process, supported by FMS-calculation capability.

Table 19: Use Case for Publish RBT

4.4.5 Enablers

The main enablers to support Airport support to prepare flight for departure within the SESAR concept are:

- SWIM;
- CDM;
- TAM.

4.4.6 Transition issues

IP1 OI steps related to 'Prepare Flight for Departure' are considered to be already implemented.

4.5 Collaborative Airport Planning during Turnaround

4.5.1 Scope and Objectives

The turnaround process is an airspace user process that links the inbound and outbound flights and the intervening ground segments. Seamless progress of the turnaround process is a main factor affecting predictability and collaborative airport planning processes during this phase play a significant role in achieving this goal. Co-operative mechanisms, including milestone monitoring, gate/stand management and apron management play their part in improving visibility for ATM actors regarding the progress of the turnaround process milestones and result in better estimated times of subsequent events such as off-blocks and take-off.

The CDM turnaround process linking the flight and ground segments, improves current information and predicts forthcoming events. It concerns updates and revisions of the business trajectory when changes are anticipated and dissemination of the information in time to allow re-planning of the activities of the stakeholders involved.

4.5.2 Assumptions

None so far identified.

4.5.3 Expected Benefits, Issues and Constraints

Expected benefits of co-operative working and decision processes in turnaround management:

- Possibility of direct verbal communication and discussion;
- Representation of information by means of common displays;
- Common computer aided simulations;
- Transmission of planning orders, action proposals or action instructions;
- Better negotiation and solution of conflicts and communication of interests;
- Possible remaining bottlenecks will be identified, enabling operators to implement mitigation actions or adjust the demand to the available capacity;
- Closer analysis of likely what-if scenarios can be conducted and mitigation strategies prepared, reducing the operational cost in case if e.g. bad weather with reduced capacity;
- Improvement of efficiency, both in the air and on the ground, through the collaborative mechanism of the sharing of 4D trajectories all along the indented en-route to en-route operation;
- Improvement of the overall stability of the en-route to en-route operations.

4.5.4 Overview of Operating Method

The collaborative airport planning processes that take place during the aircraft turnaround are represented in Process A3.1 Balance Actual Demand and Capacity. These processes fine tune the AOP and are mainly fed by the Activated Plan (i.e. NOP, RBTs and Activated Resources) and the Catalogue of Solutions, both developed during the medium/short planning phase.

Constraints applying to the process are either linked to the performance objectives - i.e. Target Performance Levels, or the weather conditions or ATC Constraints leading to adjustment of the traffic and/or the airspace, by means of revised/updated trajectories - i.e. Updated RBTs, AU preferences and constraints.

As a result of this process, the airport will adjust capacity configurations for the various airport resources:

- Arrival, departure and surface throughputs;

Issued by the Episode 3 consortium for the Episode 3 project co-funded by the European Commission and Episode 3 consortium.

- Stand, pushback, de-icing and holding bay capacity;
- Ground resources such as passenger buses, baggage handling, refuelling, catering, cleaning, etc;
- Gates.

4.5.4.1 Switch Gate [7] Operational Rules (A3.1.2.1.3)

This process is run when a change of real-time operation rules at a gate level is necessary.

Switch Gate Operational Rules process presents the following main drivers:

- Inputs:
  - Possible Airport Configurations;
  - Activated Resources.
- Control constraints:
  - Activated Plan (RBTs + Activated Resources);
  - Detected Imbalance;
  - DCB Solution;
  - MET Nowcasts;
  - Constraints on Resources;
  - Unpredicted Events.
- Human actors:
  - APOC Staff;
  - Airline Station Manager;
  - Ground Handling Agent.
- Outputs:
  - Stand Configuration.

The following Use Cases have been identified for Switch Gate Operational Rules process:

Use Case	Description
Change of Stand Configuration	This Use Case describes the collaborative process initiated by the APOC Staff to change the stand configuration. The APOC Staff contacts other actors involved to negotiate conditions of the transition.
Change of De-icing Configuration (at the Gate)	This Use Case describes the collaborative process initiated by the APOC Staff to change the de-icing configuration. The APOC Staff contacts other actors involved to negotiate conditions of the transition.

Table 20: Use Cases for Switch Gate Operational Rules

[7] The terms stand and gate are used interchangeably in the DOD. The term stand is representative of all airports and so should be preferred.

4.5.4.2 Coordinate Temporary Gate Closure (A3.1.2.2.3)

This process is run when a gate has to be temporary closed - e.g. unexpected maintenance works. Variations that occur during this process have an impact on the sequence and dynamic management performed during the mid/short term planning phase.

Check Aircraft Requirements process presents the following main drivers:

- Inputs:
    - Possible Airport Configurations;
    - Airport Resource Configuration;
    - Activated Resources.
- Control constraints:
    - Activated Plan (RBTs + Activated Resources);
    - Unpredicted Events.
- Human actors:
    - APOC Staff.
- Outputs:
    - Resource Configuration (Resource Unavailability) (Gate).

The following Use Case has been identified for Coordinate Temporary Gate Closure process:

Use Case	Description
Coordinate Temporary Stand Closure	This Use Case describes how the APOC Staff coordinates the temporary closure of a gate - e.g. unexpected maintenance work. In order to be able to guarantee air traffic without or a minimum of delay, stands must be maintained in operational conditions at all times - e.g. kept clear of ice, snow and debris.

Table 21: Use Case for Detect Airport Demand Capacity Imbalance

4.5.4.3 Change Pre-Departure Sequence (A3.2.1.1.1)

Process A3.2.1 Manage Airport Departure Queue deals with all the activities related to the creation and execution of a final optimised Departure queue - i.e. sequencing surface movements, development of taxi movement plans and balancing departure queues - e.g. multiple runways. The main constraint here is the runway resource, but also complexity management constraints for departure metering from single or multiple airports (Departure metering constraints). This process is broken down into two processes:

- A3.2.1.1 Optimise Departure Queue;
- A3.2.1.2 Implement Departure Queue.

Process A3.2.1.2 Implement Departure Queue is out of the scope of Collaborative Airport Planning (M1 – this DOD) and is covered by Runway Management (E1 DOD [8]). Anyway, coordination between both processes is necessary since the main input for implementing departure queues is the optimised departure sequence, coming as an output of the previous optimise departure queue process.

Process A3.2.1.1 Optimise Departure Queue deals with all the activities related to creation of a final optimised departure sequence that may further be refined and implemented by the Tower Runway Controller. This process is broken down into two processes:

- A3.2.1.1.1 Change Pre-Departure Sequence;
- A3.2.1.1.2 Optimise Departure Sequence.

Process A3.2.1.1.2 Optimise Departure Sequence is out of the scope of Collaborative Airport Planning (M1 – this DOD) and is covered by Apron & Taxiways Management (E2/3 DOD [9]).

Anyway, coordination between both processes is necessary since one input for optimising the departure sequence is the pre-departure sequence, coming as an output of the change pre-departure sequence process.

Process A3.2.1.1.1 Change Pre-Departure Sequence describes how the Airspace user change the SBT/RBT and therefore the pre-departure sequence will be automatically revised by ANSP before the aircraft has pushed back. The main input is the current Pre-departure sequence, i.e. the Target Start-up Approval Time (TSAT), based on the TOBT provided by the Airline Station Manager or Ground Handling Agent and the Target Take-off Time (TTOT).) as reflected in Operational Improvement Step AO-0602 Collaborative Pre-departure Sequencing

Change Pre-Departure Sequence process presents the following main drivers:

- Inputs:
  - Pre-Departure Sequence.
- Control constraints:
  - ANSP Originated RBT Revision Request;
  - AU Originated RBT Revision Request.
- Human actors:
  - APOC Staff;
  - Airline Station Manager;
  - Ground Handling Agent.
- Outputs:
  - Pre- Departure Sequence.

The following Use Case has been identified for Change Pre-departure Sequence process:

Use Case	Description
Change Pre-Departure Sequence	This Use Case describes how the Airspace User change the SBT/RBT and therefore the pre-departure sequence will be automatically revised by ANSP. The main input is the current Pre-departure sequence, i.e. the Target Start-up Approval Time (TSAT), based on the TOBT provided by the Airline Station Manager or Ground Handling Agent and the Target Take-off Time (TTOT).

Table 22: Use Case for Change Pre-departure Sequence

4.5.5 Enablers

The main enablers to support Refine Airport Resources within the SESAR concept are:

- SWIM;
- CDM;
- TAM.

4.5.6 Transition issues

IP1 OI steps related to Manage Turnaround are considered as already implemented.

5 ENVIRONMENT DEFINITION

5.1 AIRSPACE CHARACTERISTICS

This section is covered by the General DOD [4].

5.2 TRAFFIC CHARACTERISTICS

This section is covered by the General DOD [4].

6 ROLES AND RESPONSIBILITIES

The section addresses the roles and responsibilities of organisations and human actors in the context of airport operations planning activities.

6.1 MAIN ROLES AND RESPONSIBILITIES

The central tool of Total Airport Management is the Airport Operation Centre (APOC). The APOC has two major functions. Firstly, all relevant information for the airport, air and land traffic, ground operations, weather conditions and so on are collected, monitored, and analysed in the centre. Secondly, this information is appropriately prepared for displaying to give the executive staff the necessary assistance in the collaborative planning and decision making process.

The APOC should be considered as an “agent-based” environment. These agents, effectively CDM representatives, will represent each of the principal actors at an airport. Not all agents will need to be physically present in the APOC even on a part-time basis but it should be possible for these actors to be contacted with a minimum of delay using appropriate technology (internet based “chat” for example). The meteorological information service provider will typically fall into this category.

Other agents will be physically present in the APOC. They will provide the interface between the APOC and the internal decision making bodies of their own organisation. For example, the CDM representative of an airline in the APOC will be the channel by which information will pass to and from the airline operations centre and hub control centre (if appropriate). The means by which this communication should take place is an airline internal decision but key to the success of the APOC is the quality and efficiency of this information exchange.

Similarly, for ATC, an interface between the APOC and the TWR AT Controller (Tower Supervisor) can be seen as necessary. Again, the best compromise needs to be found between the CDM agent having a ready access to appropriate decision making authorities whilst not impacting the smooth execution of operations within their representative organisation.

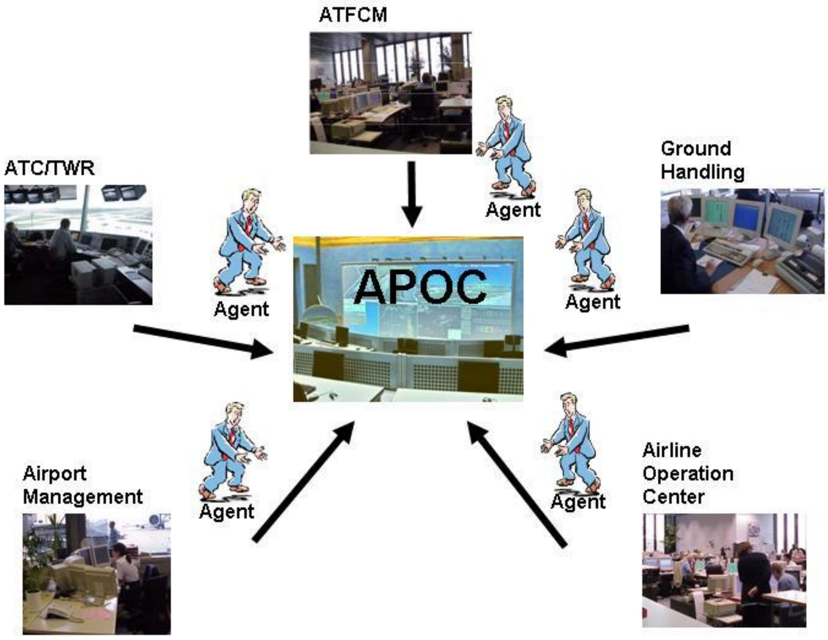


Figure 5: Agent based airport Operations Centre

The APOC is therefore an environment where a number of “CDM Agents” acting on behalf of specific airport / network functions will work together. These “external” functions are identified below.

The **Airport Operations Centre (APOC)** is the central organisational unit responsible for airport operations. It provides the roles of Resource Management, Flight Operations Management and Environment Management and is responsible for CDM with all relevant stakeholders

Airport Resources are planned and allocated iteratively and fed into the Network Operational Plan (NOP). The data has also to be collected into the airport information sharing database, which will be the entry-point for SWIM applications. On the day of operation the plan is consolidated through the balanced mapping of Business Trajectories demand on the various airport resources. If demand exceeds capacity the Resources Manager has to revise the plan through a collaborative process. He/she will be supported by the Flight Operations Manager who is aware of all the dependencies within the daily operations plan – e.g. Aircraft turnaround, transfer data.

Environmental issues play an important role in the vicinity of an airport. In order to guarantee environmental sustainability an Environment Manager needs to oversee airport operations in view of environmental impact. He/she has to develop and implement an airport wide environmental management policy and has to collaborate and communicate with all affected air transport stakeholders on measures to be taken and with local and national communities.

The APOC Staff will fulfil a number of roles, including agents from all the stakeholders (Airport, Airspace Users, Network, etc), linked to the process of collaborative decision making primarily in terms of coordination and arbitration between the different actors in the management of the Airport Operational Plan (AOP). In the shorter term, the role will be more dynamic in nature and will encompass the facilitation and communication of decision closer to “real-time”. The APOC Staff will also be responsible for coordinating the post-operational analysis and feedback processes as well as monitoring the quality of the data exchanges between the airport partners.

The **AOC** is an organisational unit of an airline and is run by a variety of professionals from different areas. 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.

The AOC Staff will be responsible for providing the interface between the collaborative decision making process within the APOC and their own organisation. According to the scale of operation at the airport, this liaison may need to encompass both the airline operations control centre and possibly a hub control centre. The CDM agent should be able to communicate issues surrounding airport resource planning to their own internal “systems” and also communicate their own internal priorities into the global decision making environment that is the APOC.

The **TWR AT Controller (Tower Supervisor)** is responsible for the safe and efficient provision of air traffic services by the TWR crew. He/she decides on staffing and manning of controller working positions in accordance with expected traffic demand. He/she represents the TWR when coordinating with the Airport Operator on operational issues. The ATC CDM Agent will therefore provide the interface between the operational decision making process by ATC and the other actors within the APOC.

The consistency of the AOP and the Network Operations Plan (NOP) will be ensured thanks to coordination between the airport CDM Agents within the APOC and the **Regional Network Manager Unit**. The Regional Network Manager Unit whose primary objective is to maximise the utilisation of available airspace by dynamic time-sharing and, at times, by segregating airspace among various categories of users based on short-term needs. This may include specific requirements for example event coordination and rehearsal etc. The network manager will be the central focal point between the airport and the network. The AOP will therefore be established through a CDM process within the APOC whilst ensuring that no network constraints are violated.

The **Ground Handling Agent** is responsible for providing a number of services to their contracted airlines during the aircraft turnaround period. They are heavily reliant on stable information concerning aircraft gate utilisation and expected arrival times. Similarly the timely execution of their tasks in relation to a given aircraft is a key parameter in the determination of the aircraft "ready" time for its next rotation. Whilst it is unlikely that a permanent ground handling representation be required within the APOC, it is necessary that pertinent information (airline departure priorities including UDPP, aircraft arrival times, gate allocation, etc) available within the APOC be disseminated to the appropriate ground handling authorities through the CDM data network.

The **MET Data Manager** and to a lesser extent the ANSP Staff will have a key role to play in the decision making process through the provision of timely and coherent information to each of the actors in the APOC. Neither will need to be present in the APOC but the appropriate technological means will need to be considered to ensure that both services can be contacted by individual APOC agents as and when appropriate. For example, following a weather alert or a possibility of improvement following a degraded situation, it should be possible to develop a number of different AOPs in a collaborative manner according to the potential weather evolutions which are foreseen. As the developing situation becomes more certain and following advice from the MET Data Manager in real-time, a convergence to one of the selected AOPs should be possible, allowing each actor to implement the strategies for their own operation that this AOP necessitates. Two possible examples are:

- A faster return to "normal" capacity by ATC than would have otherwise been the case based on confirmation from the MET Data Manager of a continued improvement in runway visual range and ceiling;
- The necessity for an airline to cancel certain flights based on advice from the MET Data Manager that low visibility procedures (and the resultant capacity reductions) will remain in force.

In the first phase of validation exercises within Episode 3, it will be necessary to define and study how the APOC will be organised on a daily basis, the technical support necessary and particularly the procedures to be put in place in order to define the AOP.

6.2 Actors Responsibilities in the ATM Process Model

The following table summarizes the main actors and roles involved in Collaborative Airport Planning:

Issued by the Episode 3 consortium for the Episode 3 project co-funded by the European Commission and Episode 3 consortium.

Organisation/Unit	Individual Actor	Related Process(es)	Main Role(s) & Responsibilities
Airport Operations Centre (APOC, Civil Aerodrome) WingOps (Military Aerodrome)	APOC Staff	A2.1.2.1 Schedule Flights A2.1.2.4 Schedule Aircraft Operations A2.2.1.1 Refine Airport Resources Usage Rules A2.2.2.1 Refine Possible Airport Configurations A2.2.3.1.1 Refine Runway Available Capacity Plan A2.2.3.1.2 Refine Stand Available Capacity Plan A2.2.3.1.3 Refine De-icing Available Capacity Plan A2.2.3.1.4 Refine Taxiway Available Capacity Plan A2.2.3.1.5 Refine Airport Slots A2.2.3.1.6 Consolidate Airport Available Capacity Plan A2.3.1.1 Detect Airport Demand Capacity Imbalance A2.3.2.1.1 Select/Refine/Elaborate a Airport DCB Solution A2.3.3 Manage Pre-departure Sequence A2.4.1 Obtain flight Briefing A2.4.2 Check Aircraft Requirements A2.4.3 Publish RBT A3.1.2.1.1.3 Switch Gate Operational Rules A3.1.2.2.1.3 Coordinate Temporary Gate Closure A3.2.1.1.1 Change Pre-Departure Sequence	Manage Pre-departure Sequence Manage Airport Resources Manage Environmental issues Manage Flight Data
Airport Ground Handling Unit	Ground Handling Agent	A2.1.2.4 Schedule Aircraft Operations A2.3.1.1 Detect Airport Demand Capacity Imbalance A2.3.3 Manage Pre-departure Sequence A3.1.2.1.1.3 Switch Gate Operational Rules A3.2.1.1.1 Change Pre-Departure Sequence	Manage Turnaround of Aircraft
Sub-regional Network Management Unit	Sub-regional Network Manager	A2.1.2.4 Schedule Aircraft Operations	Balance demand and capacity in planning phase

Organisation/Unit	Individual Actor	Related Process(es)	Main Role(s) & Responsibilities
MET Office	MET Data Manager	A2.4.1 Obtain flight Briefing	Provide MET information Support Trajectory Development
AIS Office	AI Data Manager	A2.4.1 Obtain flight Briefing	Provide Aeronautical information Support Trajectory Development
Airline, BA, GA, Military	Flight Crew, Pilot	A2.4.1 Obtain Flight Briefing A2.4.2 Check Aircraft Requirements	Conduct Flight according to RBT and applicable rules
Airline Operational Control AOC WingOps	AOC Staff	A2.1.2.1 Schedule Flights A2.1.2.4 Schedule Aircraft Operations A2.2.1.1 Refine Airport Resources Usage Rules A2.4.3 Publish RBT	Dispatch Flights Prioritise Flights Develop and Plan Trajectories Manage Flight Data Manage Environmental issues
Airline, BA	Airline Station Manager	A2.1.2.4 Schedule Aircraft Operations A2.3.1.1 Detect Airport Demand Capacity imbalance A2.3.3 Manage Pre-departure Sequence A3.1.2.1.1.3 Switch Gate Operational Rules A3.2.1.1.1 Change Pre-Departure Sequence	Manage Turnaround of Aircraft

Table 23: Actors roles and concerned processes

7 REFERENCES AND APPLICABLE DOCUMENTS

7.1 References

[1] **E-OCVM** E-OCVM version 2, EUROCONTROL, March 2007

[2] Guidelines for Approval of the Provision and Use of Air Traffic Services Supported by Data Communications, EUROCAE ED-78A, December 2000

[3] **Episode 3** Single European Sky Implementation support through Validation portal, www.episode3.aero

[4] **Episode 3** SESAR DOD G, General Detailed Operational Description, D2.2-040

[5] **Episode 3** SESAR DOD L, Long Term Network Planning Detailed Operational Description, D2.2-041

[6] **Episode 3** SESAR DOD M1, Collaborative Airport Planning Detailed Operational Description, D2.2-042

[7] **Episode 3** SESAR DOD M2, Medium/Short Term Network Planning Detailed Operational Description, D2.2-043

[8] **Episode 3** SESAR DOD E1, Runway Management Detailed Operational Description, D2.2-044

[9] **Episode 3** SESAR DOD E2/3, Apron and Taxiways Management Detailed Operational Description, D2.2-045

[10] **Episode 3** SESAR DOD E4, Network Management in the Execution Phase Detailed Operational Description, D2.2-046

[11] **Episode 3** SESAR DOD E5, Conflict Management in Arrival and Departure High & Medium/Low Density Operations Detailed Operational Description, D2.2-047

[12] **Episode 3** SESAR DOD E6, Conflict Management in En-Route High & Medium/Low Density Operations Detailed Operational Description, D2.2-048

[13] **Episode 3** SESAR DOD Lexicon, Glossary of Terms and Definitions, D2.2-049

[14] **Episode 3** SESAR/Episode 3 Information Navigator, November 2009

[15] **Episode 3** OS-16 Turn-round Management Operational Scenario - part of Annex to SESAR DOD G - Operational Scenarios - D2.2-050

[16] **Episode 3** OS-18 Airport Operational Plan Lifecycle for Medium/ Short/ Execution phases Operational Scenario - part of Annex to SESAR DOD G - Operational Scenarios - D2.2-050

[17] **Episode 3** OS-19 Severe (UDPP) Capacity Shortfalls impacting Departures in the Short-Term Operational Scenario - part of Annex to SESAR DOD G - Operational Scenarios - D2.2-050

[18] **Episode 3** OS-20 Airport Capacity Shortfalls in the Medium-Term Operational Scenario - part of Annex to SESAR DOD G - Operational Scenarios - D2.2-050

[19] **Episode 3** OS-21 Departure from non Standard Runway Operational Scenario - part of Annex to SESAR DOD G - Operational Scenarios - D2.2-050

[20] **Episode 3** OS-26 Non-Severe (No UDPP) Capacity Shortfalls impacting Departures in the Short-Term Operational Scenario - part of Annex to SESAR DOD G - Operational Scenarios - D2.2-050

[21] **Episode 3** OS-30 Handle Planned Closure of an Airport Airside Resource Operational Scenario - part of Annex to SESAR DOD G - Operational Scenarios - D2.2-050

[22] **Episode 3** OS-31 Handle Unexpected Closure of an Airport Airside Resource Operational Scenario - part of Annex to SESAR DOD G - Operational Scenarios - D2.2-050

[23] **Episode 3** Use-Case UC-22 Obtain Flight Briefing.doc V0.3, October 2008

[24] **Episode 3** Use-Case UC-31 Refine a Target Off-Block Time.doc V0.3, July 2008

[25] **Episode 3** Use-Case UC-33 Refine De-icing Capacity.doc V0.2, September 2008

[26] **Episode 3** Use-Case UC-35 Determine / Revise Runway Load Schedule.doc V0.3, December 2008

[27] **Episode 3** Use-Case UC-45 Refine the Airport Operational Plan.doc V0.5, December 2008

[28] **Episode 3** WP5 Expert Group Final Report - D5.3.2-02

[29] **Episode 3** WP3 Collaborative Airport Planning Expert Group Report - D3.3.1-05

[30] EUROCONTROL CDM Implementation Manual

7.2 Applicable documents

[31] **SESAR** Operational Scenarios and Explanations – Network Airline Scheduled Operation, v0.6, November 2007

[32] **SESAR** WP2.2.3/D3, DLT-0707-008-01-00 v1.0, July 2007

[33] **SESAR** The Performance Target (D2), DLM-0607-001-02-00a (approved), December 2006

[34] **SESAR** Concept of Operations, WP2.2.2 D3, DLT-0612-222-02-00 v2.0 (validated), October 2007

[35] **SESAR** The ATM Deployment Sequence (D4), DLM-0706-001-02-00 (approved), January 2008

[36] **SESAR** The ATM Master Plan (D5), DLM-0710-001-02-00 (approved), April 2008

[37] **SESAR** Investigate Needs for New Appropriate Modelling and Validation Tools and Methodologies, DLT-0710-232-00-01 v0.01, May 2008

[38] **SESAR** Definition Phase - Report. Performance Objectives and Targets. RPT-0708-001-01-02, November 2007

[39] **Episode 3** Description Of Work (DOW), v3.1, July 2009

8 ANNEX A: OPERATIONAL SCENARIOS

The detailed description of those scenarios will be provided through individual files - i.e. one per identified scenario.

This list could be refined according to the specific needs of Collaborative Airport Planning exercises.

The following table summarises the dedicated scenarios for Collaborative Airport Planning.

Scenario	Summary	Status
Turn-round Management	The turn-round process links the inbound and outbound flights. Seamless progress of the turn-round process is a main factor affecting punctuality. Co-operative mechanisms, including milestone monitoring, gate/stand management and apron management 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-blocks and take-off. This scenario describes the turn-round process, the link between the inbound and outbound flights and how it updates the AOP and the NOP. The turn-round management is a key element for seamless integration of ground and air processes to build the en-route to en-route concept. The aircraft process is continuously monitored to detect deviations from the AOP to correct the deviations (if possible) or to update the AOP (if necessary) and therefore the NOP. The aircraft process is visible for all the actors through the milestone approach. The turn-around takes place between in-block and off-block, and involves the aircraft process between these milestones. The scenario is focused on the actions to be taken at the milestones. As the process is monitored and updated continuously, the actions described below are extended also between two milestones. The turn-around management scenario focuses on the actions to be taken to ensure that the evolution of the aircraft across the In-Off (block) milestones takes place as close as possible to the expected (planned) situation. In this context two main collaborative objectives will be developed: ▪ A target arrival time to mitigate a detected time difference between SIBT and EIBT; ▪ A TOBT (Target Off-Block Time) to bring Off-Block Time as close as possible to the expected (planned) time; i.e. to mitigate the difference between SOBT and EOBT. Within the turn-around process the boarding process is the key, relevant activity which establishes the connection between the airport air side and land side activities. A boarding status milestone is included in the turn-around process to monitor the synchronism performance of the two major airport processes: the passenger process (check-in, security, etc) and the aircraft process.	**Produced (OS-16)**

Scenario	Summary	Status
Airport Operational Plan Lifecycle for Medium/ Short/ Execution phases	This Scenario provides an overview of all the planning activities required for the continuous refinement of the Airport Operational Plan (AOP) during the Medium/Short Term Planning Phase and the Execution Phase. In the Medium/Short Term Planning Phase, as the execution phase is getting closer more specific data is available: accurate traffic demand, links between arrival and departure flights, RWY configurations, weather predictions, RBT planning deviations, etc. At this stage the en-route to en-route concept can be applied, in other words the seamless ATM can be built. The main steps to follow are: ▪ Refine the declared capacity according to the actual situation - i.e. airport configuration, weather; ▪ Check if the Performance Targets can be achieved; ▪ Make the needed DCB decisions and actions if needed; ▪ Ensure coherence between AOP and NOP. The definition and initial refinement of the AOP is performed during the Long Term Planning Phase. Description of these processes is out of the scope of the present Scenario and will be covered by the specific Scenario “Airport Operational Plan lifecycle for Long Term Phase”. The scenario starts at the Medium Term Planning Phase 6 months before the day of operations, focuses on the medium term planning activities, especially during the last 10 days before the day of operation, details the short term activities until the last hours before the day operations and ends at the Execution Phase.	**Produced (OS-18)**

<table>
<tr><th>Scenario</th><th>Summary</th><th>Status</th></tr>
<tr><td>Severe (UDPP) Capacity Shortfalls impacting Departures in the Short-Term</td><td>Prioritisation for departure in the event of reduced capacity is the result of a collaborative process involving all partners. Airspace users among themselves can recommend a priority order for flights affected by delays caused by an unexpected reduction of capacity.

This process will be needed in case of disruptions at congested airports. This process leaves room for airspace users to trade slots if they individually agree to do so, based on agreements and rules that are transparent to the other actors but that respect sets of rules agreed by all parties. The process is permanently monitored by the Regional Network Manager in order to make sure that an acceptable solution is available in due time and that all concerned parties are aware of any adverse network wide effects that may develop.

This specific scenario is related to the departures during the reduced capacity period and during the recovery time after the capacity shortfall. During those periods there is more departure demand than departure capacity at the airport level without en-route constrictions. Two typical situations can be identified:

▪ During reduced departure capacity which is less than schedule (demand) due to weather conditions or runway restrictions;

▪ Or during recovering from a period of capacity shortfall when several aircrafts exceeding the normal capacity are waiting at the apron for the departure clearance.

In both situations, more than one aircraft is requesting the same departing time and new SBTs/RBTs have to be allocated to each flight without the presence of any relevant en-route restriction.

Due to the imbalance between the departure demand and capacity, a new AOP has to be built taking into account the possibilities from the network and the needs or preferences from the users following the previously agreed procedures and according to the airport agreed performance targets.

The AOP evolution is continuously monitored and the performance indicators are updated accordingly and are forecasted for the next hours. The UDPP process starts as soon as the capacity restriction affects the real time or forecasted performance targets producing an unacceptable result</td><td>Produced (OS-19)</td></tr>
</table>

Scenario	Summary	Status
Airport Capacity Shortfalls in the Medium-Term	The Operational Scenario describes the processes and interactions among actors during the medium term planning phase to respond to a capacity shortfall at the airport, within the context of SESAR 2020 concept of operations. The Scenario focuses on how the APOC Staff interacts with the Sub-Regional Network Manager and the airlines AOC Staff to respond to a capacity shortfall at the airport due to planned works on the airport surface and updates the Airport Operational Plan (AOP) as required. The Scenario description takes place at an airport with parallel runways, where works for the maintenance of one of the runways are planned to be executed during 3 days. During the execution of the maintenance works, airport capacity will be reduced to 55%. The Scenario starts one week before the beginning of the planned maintenance works, when the APOC Staff: ▪ Evaluates the actions and procedures required to respond to the expected capacity shortfall; ▪ Covers the definition and preparation of the airport plan of actions and the adjustment of the airlines schedules; ▪ Finishes with the publication of the updated Airport Operational Plan (AOP).	**Produced (OS-20)**

Scenario	Summary	Status
Departure from non Standard Runway	The Operational Scenario describes the processes and interactions among actors for the non-nominal case of departing from a non-standard runway, within the context of SESAR 2020 concept of operations. The Scenario focuses on how controllers – the Tower Ground Controller, the Tower Runway Controller and the Approach Planning Controller – interact between each other and with the Flight Crew and the APOC Staff to respond to the non-standard departure request and allocate the departing flight within the arrival and departure sequences. The Scenario description takes place at an airport with independent parallel runways; one of them dedicated for departures and the other one for arrivals, and covers the operation of one departing flight that requests permission to depart on the current arrival runway (longer than the current departing runway) in order to operate on a balanced field length adequate to the aircraft weight and the existing penalising wind conditions. The Scenario starts when the aircraft's Flight Crew requests to change the departure runway, after receiving the initial allocated TSAT, 10 minutes before the TOBT; covers the procedure of accommodating the departing flight within the arrival, pre-departure and departure sequences; and finishes with the execution of the taxi-out and take-off operations.	**Produced (OS-21)**

Scenario	Summary	Status
Non-Severe (No UDPP) Capacity Shortfalls impacting Departures in the Short-Term	The Operational Scenario describes the processes and interactions among actors for the nominal case of solving a non-severe capacity shortfall impacting departures on the day of operations (short term planning phase and execution phase), within the context of SESAR 2020 concept of operations. The Scenario focuses on how the APOC Staff, the Tower Ground Controller and the ATS Tower Supervisor, in coordination with the Sub-Regional Network Manager, interact with the AOC Staff, the Airline Station Manager and the Ground handling Agents to solve an airport capacity shortfall impacting departures by the activation of a departure queue management process. The Scenario description takes place at one European airport (Riviera Airport), which is strongly connected to a close airport (Sunshine Airport). Actions described by the present scenario at Riviera Airport are triggered by a previous capacity shortfall impacting arrivals at Sunshine Airport resulting from sudden adverse weather conditions (See Scenario “Non-Severe (No UDPP) Capacity Shortfalls impacting Multiple Nodes of the Network in the Short-Term” for further detailed description). The application of a Demand and Capacity Balancing (DCB) queue for arrivals at Sunshine creates an imbalance at Riviera Airport impacting departures. The Scenario starts when the capacity shortfall is triggered at Riviera airport caused by the remote imbalance at Sunshine airport; it covers the processes taken into account at Riviera airport to apply a DCB queue solution for departures, which implies a revision of the departure and pre-departure sequences; continues with the publication of the updated AOP and NOP into the SWIM; and finishes with the implementation of the new pre-departure and departure sequences.	**Produced (OS-26)**
Handle Planned Closure of an Airport Airside Resource	The Operational Scenario describes the processes and interactions among actors during the execution phase to handle a planned closure of an airport airside resource, within the context of SESAR 2020 concept of operations. The Scenario focuses on how the APOC Staff, the Tower Ground Controller, The Tower runway Controller and the Apron Controller interact with the airlines (Flight Crew, Airline Station Manager, Ground Handling Agent) and the Sub-Regional Network Manager to respond to a closure of one runway of the airport due to planned works. The Scenario description takes place at an airport with parallel runways, where works for the maintenance of one of the runways are being executed during 3 days. During the execution of the maintenance works, airport capacity is reduced to 55%. The Scenario takes place at the short term planning and execution phases and describes the final planning adjustments and the coordination actions between the different airports resources (runway, taxiway, apron, remote de-icing pad...) required when maintenance works are actually performed on one of the airport runways.	**Produced (OS-30)**

Scenario	Summary	Status
Handle Unexpected Closure of an Airport Airside Resource	The Operational Scenario describes the processes and interactions among actors during the execution phase to handle an unexpected closure of an airport airside resource, within the context of SESAR 2020 concept of operations. The Scenario focuses on how the Tower Runway Controller, the Tower Ground Controller, the Apron Controller and the APOC Staff interact with the airlines (Flight Crew, AOC Staff, Airline Station Manager, and Ground Handling Agent) and the Sub-Regional Network Manager to respond to an unexpected closure of one runway of the airport. The Scenario description takes place at an airport with parallel runways, where one of the runways is suddenly blocked and consequently closed for a temporary period of time. During the unexpected closure of the runway, airport capacity is reduced to 55%. The Scenario starts at the execution phase describing the coordination actions between the different airports resources (runway, taxiway, apron, remote de-icing pad...) required to cover the unexpected closure of the airport runway, and continues describing the impact of the sudden airport capacity shortfall on the short term planning phase.	**Produced (OS-31)**

Table 24: Operational Scenarios identified for Collaborative Airport Planning

9 ANNEX B: DETAILED USE CASE

The detailed description of those Use Cases will be provided through individual files - i.e. one per identified Use Case.

The following Collaborative Airport Planning Use Cases have been generated from the above higher-level processes in the Process Model.

Use Case	Status
Schedule Flights by owner	**Not Planned within Episode 3**
Determine / Revise Turn-round Plan	**Not Planned within Episode 3**
Refine a Target Off-Block Time	**Produced (UC-31)**
Request Unscheduled Arrival	**Not Planned within Episode 3**
Refine Airport Catalogue of Solutions	**Not Planned within Episode 3**
Refine Runway Allocation Policy	**Not Planned within Episode 3**
Refine Stand Allocation Planning Policy	**Not Planned within Episode 3**
Refine Preferences for Stand Allocation	**Not Planned within Episode 3**
Refine De-icing Allocation Policy	**Not Planned within Episode 3**
Refine Taxiway Allocation Policy	**Not Planned within Episode 3**
Refine Airport Slot Allocation Policy	**Not Planned within Episode 3**
Refine Possible Runway Configurations	**Not Planned within Episode 3**
Refine Possible Stand Configurations	**Not Planned within Episode 3**
Refine Possible De-icing Configurations	**Not Planned within Episode 3**
Refine Possible Taxiway Configurations	**Not Planned within Episode 3**
Refine Runway Capacity	**Not Planned within Episode 3**
Refine Stand Capacity	**Not Planned within Episode 3**
Refine De-icing Capacity	**Produced (UC-33)**
Refine Taxiway Capacity	**Not Planned within Episode 3**
Refine Airport Slots	**Not Planned within Episode 3**
Refine Airport Capacity	**Not Planned within Episode 3**
Detect non-compliance of a Target Performance Level	**Not Planned within Episode 3**
Determine / Revise Runway Load Schedule	**Not Planned within Episode 3**
Determine / Revise Stand Load Schedule	**Produced (UC-35)**
Determine / Revise De-icing Resources Load Schedule	**Not Planned within Episode 3**
Determine / Revise Taxiway Load Schedule	**Not Planned within Episode 3**
Refine the Airport Operational Plan	**Produced (UC-45)**
Resolve Airport Demand Capacity Imbalance	**Not Planned within Episode 3**
Use Airport Extra Capacity	**Not Planned within Episode 3**
Determine / Update Pre-departure Sequence	**Not Planned within Episode 3**
Obtain Flight Briefing	**Produced (UC-22)**
Check Aircraft Requirements	**Not Planned within Episode 3**

Issued by the Episode 3 consortium for the Episode 3 project co-funded by the European Commission and Episode 3 consortium.

Use Case	Status
Publish RBT	**Not Planned within Episode 3**
Change of Stand Configuration	**Not Planned within Episode 3**
Change of De-icing Configuration (at the Gate)	**Not Planned within Episode 3**
Coordinate Temporary Stand Closure	**Not Planned within Episode 3**
Change Pre-Departure Sequence during the Execution Phase	**Not Planned within Episode 3**

Table 25: Use Case summary

Issued by the Episode 3 consortium for the Episode 3 project co-funded by the European Commission and Episode 3 consortium.

10 ANNEX C: OI STEPS TRACEABILITY TABLE

The following table captures the SESAR Operational Improvements (OIs/OI Steps) addressed by the collaborative airport planning. Although most of the OI Steps should be IP2, some of them might be IP1 (if their implementation is still part of the target system context) or IP3 (if their implementation starts in 2020).

OI Step	Description	Rationale	Related ATM Model Processes
Improving Flight Data Consistency and Interoperability *[L01-01]*			
Improved Consistency between Airport Slots, Flight Plans and ATFM Slots ***[DCB-0301]***	Convergence is ensured between airport slots, ATFM slots together with airport slot monitoring process in order to improve consistency on a daily basis and to reduce delays.	The objective is to ensure realistic scheduling to meet airline demands in line with capacity declarations. Benefits will be found in slot adherence, delay reduction and ultimately cost efficiency.	A2.1.2.1 Schedule Flights A2.1.2.4 Schedule Aircraft Operations A2.4.3 Publish RBT
Collaborative Management of Flight Updates ***[DCB-0302]***	The interface between airports and ATFCM is reinforced at the tactical level in order to improve predictability of operations through exchanges of accurate departure and arrival times, CFMU providing airports with arrival estimates up to 3 hours prior landing (taking account of updated information on flight progress) whilst airports provide CFMU with flight data updates before take-off.	The objective is to enhance tactical capacity planning for the entire ATM network by ensuring completeness of information between en route and airport operations. Airports need to be seen as being a part of the whole ATM system in a gate-to-gate environment. As the tactical manager of the total network load, ATFCM has to collaborate with air traffic control, aircraft operators, and airport in a genuine partnership.	A2.1.2.1 Schedule Flights A2.1.2.4 Schedule Aircraft Operations A2.4.3 Publish RBT

OI Step	Description	Rationale	Related ATM Model Processes
Improved Flight Plan Consistency Pre-Departure ***[IS-0101]***	Airspace users, airport and ATM have a consistent view of the filed flight plan including late updates until departure.	Reprocessing and effective dissemination of flight plan amendments before EOBT together with defined responsibilities will ensure one single flight plan before departure supporting accurate and updated flight data for airspace users, airports and ATM. All partners should be able to access this data to calculate local profiles. The process will be sufficiently flexible to allow AOs to take advantage of airspace improvements or changed circumstances.	A2.1.2.1 Schedule Flights A2.1.2.4 Schedule Aircraft Operations A2.4.1 Obtain Flight Briefing A2.4.3 Publish RBT
Optimising Climb/Descent *[L02-08]*			
Advanced Continuous Descent Approach (ACDA) ***[AOM-0702]***	This improvement involves the progressive implementation of harmonised procedures for CDAs in higher density traffic. Continuous descent approaches are optimised for each airport arrival procedure. New controller tools and 3D trajectory management enable aircraft to fly, as far as possible, their individual optimum descent profile (the definition of a common and higher transition altitude would be an advantage).	Clean environmental approach paths, reduced noise level and emissions (although the accuracy with which paths are flown may exacerbate the impact for those directly under the route).	A2.2.1.1 Refine Airport Resources Usage Rules A2.2.1 Refine Possible Airport Configurations
Advanced Continuous Climb Departure ***[AOM-0705]***	Use of continuous climb departure in higher density traffic enabled by system support to trajectory management.	Managed Departures, managed thrust on take off, continuous climb departure routes all contribute to fuel efficiency and noise reductions.	A2.2.1.1 Refine Airport Resources Usage Rules A2.2.1 Refine Possible Airport Configurations

OI Step	Description	Rationale	Related ATM Model Processes
Collaborative Layered Planning Supported by Network Operations Plan *[L03-01]*			
Interactive Rolling NOP *[DCB-0102]*	The Network Operation Plan provides an overview of the ATFCM situation from strategic planning to real time operations (accessible from 6 months to the day of operation) with ever increasing accuracy up to and including the day of operations. The data is accessible online by stakeholders for consultation and update as and when needed, subject to access and security controls. The elements and formats of the NOP will be established taking into account the requirements of the users of these plans. It will be possible for them to access and extract data for selected areas to support their operation and, if required, to create their specific operations plan. The NOP will also be updated taking into account the actual traffic situation and real time flow and capacity management.	A validated consistent information relating to the intentions and decisions of stakeholders has to be available and widely shared in relation to the use and management of European airspace from strategic planning through to archiving data post flight. For example: military demand for route and airspace, implemented ATFCM scenarios to address demand / capacity imbalances.	
SWIM enabled NOP *[DCB-0103]*	The NOP is in fact a 4 dimensional virtual model of the European ATM environment. It is a dynamic, rolling picture that provides a relational image of the state of the ATM environment for past, present and future. The user, via the appropriate applications, is able to view this image, moving the window along the timeline and focusing on any particular aspect or aspects he or she is interested in.	The plan itself is the result of the complex interactions between the trajectories shared into the system, the capacity being offered, the actual and forecast MET conditions, resource availability, etc. and the automatic and manual negotiations that have been carried out. While a user will only need to see the part of the picture he is concerned with together with its broader implications in order to carry out an action on and with the plan, the applications themselves always use the totality of the information available in the SWIM environment.	A2.3.2.1.1 Select / Refine / Elaborate a DCB Solution at Airport Level A2.3.3 Manage Pre-departure Sequence

OI Step	Description	Rationale	Related ATM Model Processes
User Driven Prioritisation Process *[L03-02]*			
User Driven Prioritisation Process (UDPP) ***[AUO-0102]***	In the absence of any capacity shortfall, reference trajectories are handled on a first come first served basis. Prioritisation for departure in the event of reduced capacity is the result of a collaborative process involving all partners. Airspace users among themselves can recommend to the Network Management a priority order for flights affected by delays caused by an unexpected reduction of capacity. The airspace users will respond in a collaborative manner to the Network Management with a demand that best matches the available capacity.	This process will be needed in case of disruptions of the network and at congested airports. This process leaves room for airspace users to trade slots if they individually agree to do so based on agreements and rules that are transparent to the other actors but that respect sets of rules agreed by all parties. The process is permanently monitored by the Network Management function in order to make sure that an acceptable solution is available in due time and that all concerned parties are aware of any adverse network wide effects that may develop.	A2.1.2.1 Schedule Flights A2.1.2.4 Schedule Aircraft Operations A3.2.1.1.1 Change Pre-Departure Sequence
Enhanced Flight Plan Filing Facilitation ***[AUO-0201]***	Airspace users are assisted in filing their flight plans and in re-rerouting according to the airspace availability and ATFM situation, through collaboration with CFMU, ANS providers and airports. Airspace users can make more informed decisions when compromises are needed between delay, re-routing, trajectory limitations or costs. On the basis of the offered routings, they can select the offered routing which is best suited to their company policy for optimising flight time, fuel burn or other parameters.	Today, finding a valid route in the increasingly complex European airspace has become such a challenge that aircraft operators usually have visibility of several solutions only if they have access to sophisticated tools.	A2.1.2.1 Schedule Flights A2.1.2.4 Schedule Aircraft Operations A2.4.3 Publish RBT A2.4.1 Obtain Flight Briefing

OI Step	Description	Rationale	Related ATM Model Processes
Agreed Reference Business / Mission Trajectory (RBT) through Collaborative Flight Planning ***[AUO-0204]***	Airspace users can refine the Shared Business / Mission Trajectory (SBT) in a number of iterations taking into account constraints arising from new and more accurate information. They access an up-to-date picture of the traffic situation with the level of detail required for planning (incl. Historical data, forecasted data, already known intentions, MET forecast, current traffic, ASM situation). The collaborative planning process terminates when the Reference Business / Mission Trajectory (RBT) is published.	Refer to SESAR Concept of Operations.	A2.1.2.1 Schedule Flights A2.1.2.4 Schedule Aircraft Operations A2.4.3 Publish RBT
Improving Network Capacity Management Processes *[L04-01]*			
Coordinated Network Management Operations Extended Within Day of Operation ***[DCB-0206]***	After analysis of anticipated capacity shortfalls at local, regional or network wide levels, responses are selected from pre-defined scenarios and adjusted to the planned situation until day of operation. This relies on improved working relationship and processes between CFMU/FMPs/ATC supervisor especially during the anticipating and reacting phases to optimise capacity throughput in sector groups.	As it is the case today 10 to 40% of the traffic will remain uncertain until tactical phase is reached. This uncertainty suffices to create indeterminacy on the best activation / de-activation times of planned measures. Furthermore, the recourse to ground delays is expected to be considerably reduced thanks to alternative solutions for demand and capacity balancing offered by ATFCM collaborations incl. application of pre-defined scenarios and optimised sectors configurations (thanks to more flexible sector definition enabling dynamic ACC re-sectorisation).	A2.3.2.1.1 Select / Refine / Elaborate a DCB Solution at Airport Level

OI Step	Description	Rationale	Related ATM Model Processes
Management of Critical Events *[DCB-0207]*	Critical events refers to a sudden and usually unforeseen event leading to a high drop in ATFCM capacity, involving many partners and requiring immediate action to minimise consequences and to retrieve network stability. A pan-European procedure is established for managing Industrial Action events which can be tailored to individual countries needs/requirements thus leading to better utilisation of limited available capacity.	Management of critical events remains a key at European ATM network level as it is dependent on the willingness of all actors to participate in CDM processes. The management of critical events, be it pro-active (known events) or reactive (unplanned, but prepared) is essential to minimise their impact on the network situation.	A2.3.2.1.1 Select / Refine / Elaborate a DCB Solution at Airport Level
Improved Operations at Airport in Adverse Conditions Using ATFCM Techniques *[DCB-0303]*	Integrate ATFCM measures with optimised collaborative procedures at airports to manage cases of significant changes to airport capacity, and in particular sudden capacity shortfalls and recovery from that situation.		A2.3.2.1.1 Select / Refine / Elaborate a DCB Solution at Airport Level
Monitoring ATM Performance ***[L04-02]***			
Network Performance Assessment *[SDM-0101]*	Key Performance Indicators are developed and monitored to determine how effective ATM is meeting users' demand and to act as driver for further improvements of the ATM system. Both users and providers are able to assess the actual operation (routes flown, usage of allocated airspace, runway utilisation, etc.) against the forecast operation and to assess the adequacy of the capacity provision.	Post flight analysis will act as a trigger to develop new or alternative scenarios with regard to sector configurations, system efficiency, etc.	A2.2.1.1 Refine Airport Resources Usage Rules A2.2.2.1 Refine Possible Airport Configurations A2.3.1.1 Detect Airport Demand Capacity Imbalance

OI Step	Description	Rationale	Related ATM Model Processes
Sustainability Performance Management of the ATM Network ***[SDM-0103]***	Network efficiency indicators are developed and monitored to describe the environmental performance of the ATM network.	Sustainability policies shall remain determined at local level, which means that pan-European harmonisation can only be achieved for the definition of a 'Sustainability framework for ATM'. The dissemination of useful practices is facilitated by harmonised framework that takes fully account of the local specificities and pressures exercised by the neighbouring communities and enables to evaluate the current progress made on this improvement axis by local communities.	A2.2.1.1 Refine Airport Resources Usage Rules A2.2.2.1 Refine Possible Airport Configurations A2.3.1.1 Detect Airport Demand Capacity Imbalance
Departure Traffic Synchronisation *[L07-02]*			
Departure Management from Multiple Airports ***[TS-0302]***	The system provides support to departure metering and coordination of traffic flows from multiple airports to enable a constant delivery into the en-route phase of flight.	While basic departure management considers only the distribution of initial departure routes, there is a need for the consideration of the departure traffic flows into the en-route environment and interactions with other traffic flows.	A2.3.3 Manage Pre-Departure Sequence A3.2.1.1.1 Change Pre-Departure Sequence

OI Step	Description	Rationale	Related ATM Model Processes
Optimised Departure Management in the Queue Management Process *[TS-0306]*	With knowledge of the TTA (if applicable), the elapsed time derived from the trajectory, the departure and arrival demand for the runway(s) and the dependent departure route demand from adjacent airports, the system (DMAN) calculates the optimum take-off time and the SMAN will determine the associated start-up and push-back times and taxi route.	There will be no need to finalise a departure sequence earlier than necessary, flexibility being the key to maximum use of capacity. The take-off sequence is built as predicted take-off times achieve a required level of accuracy. The precise point at which take-off times are known with sufficient accuracy will depend on the accuracy and reliability of the data available on the status of the turn-round process. Initially the required level of accuracy may not be achieved until the aircraft has requested push-back. It is however expected that during the SESAR time-frame the improving view on the status of the turn-round process will enable valid departure sequences to be built earlier. This earlier sequencing will enhance departure and arrival queue management collaboration.	A2.3.3 Manage Pre-Departure Sequence A3.2.1.1.1 Change Pre-Departure Sequence A2.1.2.4 Schedule Aircraft Operations A2.4.3 Publish RBT
Managing Interactions between Departure and Arrival Traffic *[L07-03]*			
Integrated Arrival / Departure Management in the Context of Airports with Interferences (other local/regional operations) *[TS-0304]*	Integration of AMAN and DMAN with the CDM processes between airports with interferences.	The effectiveness of AMAN-DMAN will improve by including the operations of close airports with interferences.	A2.3.3 Manage Pre-Departure Sequence A3.2.1.1.1 Change Pre-Departure Sequence

OI Step	Description	Rationale	Related ATM Model Processes
Improving Traffic Management on the Airport Surface *[L10-02]*			
Surface Management Integrated With Departure and Arrival Management ***[AO-0207]***	The taxiing process is considered as an integral part of the process chain from arrival to departure and AMAN / DMAN is integrated with CDM processes between airport operator, aircraft operators and air traffic service provider at the same airport.	To improve the aerodrome throughput, Arrival and Departure Management need to be considered as a combined entity, itself closely linked to surface movement especially at airports with runways used for both arriving and departing flights.	A2.3.3 Manage Pre-Departure Sequence A3.2.1.1.1 Change Pre-Departure Sequence
Improving Airport Collaboration in the Pre-Departure Phase *[L10-03]*			
Improved Operations in Adverse Conditions through Airport Collaborative Decision Making ***[AO-0501]***	Systematic strategies are agreed and applied by CDM partners to deal with predictable (e.g. forecast bad weather, industrial action, scheduled maintenance) or unpredictable adverse conditions (e.g. unforeseen snow or fog, accident). This involves effective methods of exchanging appropriate information on the expected or actual arrival of such conditions, special procedures, and system support to facilitate the sequencing of operations where needed (e.g. de-icing).	In contrast with today's ad hoc solutions to unforeseen disruptions, prompt decision making, flexibility and adaptability of partners are facilitated during periods of reduced capacity, allowing for a faster recovery to normal operations.	A2.1.2.4 Schedule Aircraft Operations A2.3.3 Manage Pre-Departure Sequence A2.4.3 Publish RBT A2.2.1.1 Refine Airport Resources Usage Rules A2.2.2.1 Refine Possible Airport Configurations A2.2.3.1.3 Refine De-icing Available Capacity Plan

OI Step	Description	Rationale	Related ATM Model Processes
Improved Turn-Round Process through Collaborative Decision Making ***[AO-0601]***	A set of milestones in the turn-round process are established at airport and flight progress is monitored against those milestones. The information is shared by all involved partners, not only at the airport concerned but also in other relevant units such as the CFMU and destination airport. The completion of a milestone triggers decision making processes for downstream events. Shared information on the progress of turn-round will be used to estimate departure demand and enable arrival/departure balancing.	In the existing environment, there is often no visible link established between the airborne and ground segments of flights, known and shared by all partners. This result in changes in one segment not being communicated to all the partners and hence they are unable to anticipate the impact and take appropriate measures to re-plan resources and necessary activities. This results in poor data quality and predictability especially for departing aircraft.	A2.1.2.4 Schedule Aircraft Operations A2.3.3 Manage Pre-Departure Sequence A2.4.3 Publish RBT
Airport CDM extended to Regional Airports ***[DCB-0304]***	Airport CDM is extended to include interconnected regional airports. Relevant CDM-A airports at regional level and the Central Flow Management Unit exchange information, especially in support of improving the estimated time of arrival for all flights bound to the region.	Extending CDM comes in complement to local CDM implementations in the improvement of arrival times' predictability, enhances the network benefit and improves the flow management process.	A2.3.3 Manage Pre-departure Sequence

OI Step	Description	Rationale	Related ATM Model Processes
Implementing Sustainable Operations at Airport *[L10-08]*			
Aircraft Noise Management and Mitigation at and around Airports ***[AO-0703]***	The objectives are to ensure that: -Aircraft noise emissions are minimised both in the air and on the ground, -Any noise impact falls on the least number of people, -Unnecessary noise driven limits, restrictions or non-optimal operations are not imposed, -Any constraints, non-optimal procedures or economic burdens that are imposed strike the most appropriate balance between social, economic and environmental imperatives. Where a bigger strategic gain can be won by the voluntary adoption of lesser restrictions, that: -These are developed following the balanced approach and with the full input from all relevant ATM stakeholders, and -The option with the best sustainability balance is selected.	Performance improvements gained are not wasted by failure to protect airport environmental capacity.	A2.2.1.1 Refine Airport Resources Usage Rules A2.2.2.1 Refine Possible Airport Configurations A2.3.3 Manage Pre-departure Sequence

OI Step	Description	Rationale	Related ATM Model Processes
Aircraft Fuel Use and Emissions Management at and around Airports ***[AO-0704]***	The objectives are to ensure that: -Aircraft fuel use and gaseous emissions (both climate change and air quality) are minimised both in the air and on the ground, -The impacts considered associated with an airport reflect the emissions from that airport and not emissions from third party sources, -Gaseous emissions from airport-related non-aircraft sources (e.g. ground transport) are minimised and that where appropriate these reductions allow growth in aircraft movements, -Emissions are not emitted in locations where they can unnecessarily adversely impact local residents and that where this can not be avoided it is minimised and mitigated for, -any constraints, non-optimal procedures or economic burdens that are imposed strike the most appropriate balance between social, economic and environmental imperatives. Where a bigger strategic gain can be won by the voluntary adoption of lesser restrictions, that -These are developed following the balanced approach and with the full input from all relevant ATM stakeholders, and -The option with the best sustainability balance is selected.	Performance improvements gained are not wasted by failure to protect airport environmental capacity.	A2.2.1.1 Refine Airport Resources Usage Rules A2.2.2.1 Refine Possible Airport Configurations A2.3.3 Manage Pre-departure Sequence
Reduced Water Pollution ***[AO-0705]***	De-icing stations are created where the fluids, spoiled on the apron, can be collected and treated. Furthermore, technical solutions for the bio-degradation of de-icing fluids are implemented. Application techniques are developed in collaboration with airlines to improve the anti-icing treatment on aircraft at the stands so that the amount of glycol released in the storm water can be reduced.	De-icing fluids are spread out over the wing and tail surfaces of the aircraft. A large part of these fluids will drop of the aircraft at the de-icing stand. If the fluid from the stand is not collected and treated, pollution of ground and surface water will happen.	A2.2.1.1 Refine Airport Resources Usage Rules A2.2.2.1 Refine Possible Airport Configurations A2.3.3 Manage Pre-departure Sequence

OI Step	Description	Rationale	Related ATM Model Processes
(Local) Monitoring of Environmental Performance ***[AO-0706]***	The environmental performance (compliance to operational procedures, key performance indicators) of ATM stakeholders at the airport is recorded and monitored in support of continuous improvement process. In particular, it is possible to determine the amount of airport related versus external pollution. This improvement involves use of noise monitoring system, flight tracking and air quality monitoring system.		A2.2.1.1 Refine Airport Resources Usage Rules A2.2.2.1 Refine Possible Airport Configurations A2.3.3 Manage Pre-departure Sequence
Environmental Restrictions Accommodated in the Earliest Phase of Flight Planning ***[AUO-0801]***	Environmental sustainability restrictions are becoming more and more a significant restriction for the execution and planning of the business trajectories of aircraft operators. It is in the interest of all ATM-stakeholders (aircraft operators and airports) to take into account the (most often local) environmental restrictions in the early phase of flight planning.	4D-Trajectory management is not only about the business intention of the aircraft operator. Environmental sustainability restrictions have to be taken into account.	A2.2.1.1 Refine Airport Resources Usage Rules A2.2.2.1 Refine Possible Airport Configurations A2.3.3 Manage Pre-departure Sequence

Table 26: Operational Improvements addressed

11 ANNEX D: HOT TOPICS

The DOD discusses Pre-Departure Sequence considering SBT and RBT in isolation without the relationships between them. This is because the relationship between SBT and RBT is under debate. This issue is addressed in Episode 3 WP5 Expert Group Final Report [28], but the discussion did not get far enough to be a useful reference and the topic needs further development.

The SADT analysis identified the process Select/Refine/Elaborate a Dynamic DCB Solution at Airport Level (A3.1.3.1.1). The need for this intermediate process, after the medium-term airport planning but prior to departure queue management has not been established.

END OF DOCUMENT