



Episode 3

D4.3.3-01 - WP4 Gaming on Queue, Trajectory and Separation Management Consolidated Plan

Version : 1.02

EPISODE 3

Single European Sky Implementation support through Validation



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EXECUTIVE SUMMARY

This document describes the plan of the proposed Gaming exercise dedicated to Queue, Trajectory and Separation Management.

The internal stakeholders of the Gaming Exercise are the EP3 WP4 Expert Group (EG), Fast Time Simulation (FTS), and Prototyping Exercises that complete the validation activities included in EP3 WP4.3.

The main objective of the Gaming Exercise is to define the relevant procedures establishing:

- The roles and responsibilities of the different actors for identifying, measuring, monitoring, predicting and resolving the proposed “En-route Queue, Trajectory & Separation Management” processes;
- The interactions between the implied actors; and
- Assess the feasibility of new separation modes and associated procedures;

The objectives are met using a number of techniques:

- Role play;
- PROMAS, a process modelling tool; and
- A web based tool allowing re-execution of games played during role play.

The role play game will concentrate on Operational Scenario 38 (Flight in the execution phase in a 4-D environment). It will gather the main actors involved in En-Route Control, including the flight crew and the network managers, in addition to the ATCO's. Participants will play roles in relation to their current expertise. Many different scenarios will be run, each refined during the expert group meeting sessions.

PROMAS process simulation will play a number of predefined scenarios involving the Multi Sector Planner (MSP), the executive and planning controllers and the flight crew, and exercise a number of different conflict situations. It will allow confirming the feasibility of underlying processes defined in the role play games and providing some figures in terms of capacity and controller workload.

A flash game will be developed in order to capture the results of the role play for dissemination purposes.

Activities are planned between October 2008 and September 2009, grouped into 5 working sessions. Before each session, open issues from the previous game session will be inserted in the expert group questionnaires which will be sent to the experts. The gaming sessions will always be combined with the corresponding expert group meeting, to reduce overall travel and ensure experts are properly briefed for the game runs.

The conclusions of the Gaming Exercises will be summarised in the Gaming Exercises Report, including all information and conclusions extracted from the games.



1 INTRODUCTION

1.1 PURPOSE OF THE DOCUMENT

The goal of this document is to define the Exercise Plan of the proposed Gaming Exercise dedicated to Queue, Trajectory and Separation Management.

1.2 INTENDED AUDIENCE

The intended audience includes:

- EP3 WP4 En-Route and Traffic Management:
 - EP3 WP4.1 - WP4 management and Co-ordination Leader;
 - EP3 WP4.2.2 Operational Concept Refinement Leader;
 - EP3 WP4.3. WP4 Validation Activities Leader;
 - EP3 WP4.3.1 Expert Group on Queue, Trajectory and Separation Management Leader;
 - EP3 WP4.3.2 FTS on Strategic deconfliction and 4D Precision Trajectory Clearance -PTC Leader;
 - EP3 WP4.3.4 Prototyping on Queue, Trajectory and Separation Management Leader;
 - EP3 WP4.4 En-Route Results' Analysis and Report
- EP3 WP 2 System Consistency.
- Gaming Exercise partners.

1.3 DOCUMENT STRUCTURE

This introduction explains the document purpose and structure. It also provides general background and supportive information. Section 2 explains the fit with the EP3 WP4 validation strategy, as well as the objectives and expected outputs, justifying them. Section 3 shows the Gaming Exercise management while Section 4 gives a wide overview of the Process Simulation that will be used in this exercise. Section 5 gives the planning and management of the exercise and Section 7 and Section 8 give the analysis specifications and the detailed exercise design, respectively. Finally, Section 9 lists the references and applicable documents.

1.4 BACKGROUND

The EPISODE 3 project validation strategy [2] focuses more on establishing consistency of validation process and ensuring that the necessary enablers are in place to allow the effective, concept focussed validation activity, which must take place at the operational domain, WP3, 4 & 5. The validation activity is reflected through the following goals:

- Establish an understanding of SESAR Target Concept within the operational segment for which the WP is responsible.
- Identify validation activities and objectives based on existing research and best expert opinion on relevance for SESAR, to include:
 - a clear orientation towards objective data collection within the performance framework including the identification where possible of local targets;
 - provision of detail on key elements of the target concept;



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- o identification of issues of importance to the further development of the concept.

From these basic activities, the EP3 WP4 has derived a specific validation strategy for the work package [3]. It provides the necessary link between the SESAR Concept of Operations [4] and the validation activities in this project. The methodology is based on E-OCVM (European Operational Concept Validation Methodology) Steps 0, “State Concept and Assumptions”, and 1, “Set Validation Strategy”. This En-Route validation strategy describes an approach illustrating how the ATM Target Concept could be assessed and validated in terms of concept refinement and some selected performance areas.

The problem statement and the proposed solutions are derived from SESAR deliverable D3 and detailed in the relevant Detailed Operational Descriptions [5]. They are expressed in terms of Lines of Change and Operational Improvement steps. A first mapping and scoping of the envisaged validation exercises towards the Lines of Change and the Operational Improvement steps has been done.

As SESAR follows a performance-oriented strategy, the targets are set in terms of Key Performance Areas. A more detailed breakdown defines the Focus Areas and the associated Key Performance Indicators. The contribution of this validation strategy towards the focus areas is provided. Finally, the validation tools and techniques for each exercise are defined.

An expert group will provide clarification on SESAR concepts to support exercise leaders or to resolve aspects of the SESAR ConOps (concept of operations) [4] where there is a lack of common understanding. A model-based simulation will examine complexity management and determine the effects on the overall network of measures applied to individual flights. Gaming exercises will seek to clarify a range of SESAR trajectory and separation management measures by working through the SESAR ConOps [4], the DODs and OS in accordance with gaming practise. Finally, a series of prototyping exercises will provide a further level of detail by using prototype controller tools with operational ATCOs to determine the effectiveness of possible “decomplexification” solutions.

The clarification of operational concept elements to be used in the EP3 WP4.3 exercises is one of the tasks of the Gaming Exercises. Very generally speaking, the Gaming exercises will generate input for some of these exercises. Its key outputs will consist of a better understanding of how the concept needs to operate to be evaluated.

This Gaming Exercise is included in the EP3 WP 4.3 that addresses the operability and performance of the processes related to the day of operation when the plan developed through the collaborative planning processes is executed.

The Gaming exercise described in this document is the EP3 WP 4.3.3, “En-route Queue, Trajectory & Separation Management Gaming Exercise”, the objective of which is to explore en-route procedures for performing the related activities. The Gaming Exercise will be used as a tool to assess the viability of the different processes involved and to support the work and the findings of the WP4.3.1 Expert Group. The experts of EP3 WP4.3.1 will contribute to the games and to the interpretation of the results.

1.5 GLOSSARY OF TERMS

Term	Definition
ACC	Air Traffic Control Centre
ATCO	Air Traffic Controller
ATM	Air Traffic Management
ConOps	Concept of Operations
DOD	Detailed Operational Description
EG	Expert Group

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Term	Definition
E-OCVM	European Operational Concept Validation Methodology
EP3	Single European Sky Support through Validation Project Episode 3
FMP	Flow Management Position
FTS	Fast Time Simulation
KPA	Key Performance Area
OI	Operational Improvement
OS	Operational Scenario
PTC	Precision Trajectory Clearance
PROMAS	Processes Management Simulator
RBT	Reference Business Trajectory
RTS	Real Time Simulation
SESAR	Single European Sky ATM Research and Development Programme
WP	Work Package

Table 1-1: Glossary of Terms

2 EXERCISE SCOPE AND JUSTIFICATION

2.1 STAKEHOLDERS

There are two groups of stakeholders involved: the external ones to Episode 3 and the internal project participants.

The main external stakeholder groups in the air transport industry involved in the “En-route Queue, Trajectory & Separation Management” process are described in Ref. [6].

The internal stakeholders of this Gaming exercise are:

- Validation exercises within EP3 WP4 using the outputs from this Gaming. These internal stakeholders are -see Section 2.6:
 - Expert Group on Queue, Trajectory and Separation Management -i.e. EP3 WP4.3.1 led by ISDEFE;
 - Fast Time Simulation (FTS) Strategic De-Confliction using 4D PTC -i.e. EP3 WP4.3.2 led by DSNA;
 - Prototyping on Queue, Trajectory and Separation Management –i.e. EP3 WP4.3.4 led by EEC;
 - Operational Concept Refinement –i.e. EP3 WP4.2.2 led by NATS;
 - En-Route Result Analysis and Report –i.e. EP3 WP4.4 led by DFS.
- Diverse representatives of the air transport industry are involved in the preparation and conduct of this Gaming, see Section 8.1. This ensures a realistic operational feedback and evaluation of the results.



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2.2 DESCRIPTION OF AIR TRAFFIC MANAGEMENT (ATM) PROBLEM AND CONCEPT

Since the EP3 WP4.3.3 Gaming is closely coupled to the results from the EP3 WP4.3.1 Expert Group, the complete description of the ATM problem and concept is almost the same. Feedback from one WP to other is continuing along the project.

More precisely the following ATM section of the DODs and OS are addressed:

- Specifically the Expert group will directly address the DOD on “Conflict Management in En-Route High & Medium/Low Density Operations” E6 [7]:
 - DOD E6, section 4.1, “En-Route Support to De-Conflict and Separate Traffic”
- DOD on “Network Management in the Execution Phase” E4 [8]
 - DOD E4, sections 4.1.4.2 “Assess DCB Complexity”
 - DOD E4, sections 4.2.4.1 “Adjust RBT”
- Operational Scenario: “OS-38 Flights in the Execution Phase in a 4D Environment”.

2.2.1 KPAs addressed

Key Performance Areas required supporting the development of the Queue, Trajectory and Separation Management procedures are primarily Capacity and Efficiency.

The contributions of this Exercise to each KPAs appear in [9] and are summarised in Table 2-1 and Table 2-3.

EP3 WP4 Exercise Title	Contribution to Capacity
WP4.3.3 Gaming Exercise on en route complexity management	Estimate potential capacity increases by reducing the controller conflict management task load through the reduction of complexity. Estimate potential capacity increases by reducing the controller conflict management task load through the use of new separation modes.

Table 2-1: Contribution of WP4.3.3 to Capacity KPA

EP3 WP4 Exercise Title	Contribution to Safety
WP4.3.3 Gaming Exercise on en route complexity management	Number of ATC tactical interventions. Number of times an ATC tactical intervention is needed in order to avoid a potential conflict on air; Number of losses of minimum separation

Table 2-2: Contribution of WP4.3.3 to Safety KPA

EP3 WP4 Exercise Title	Contribution to Efficiency
WP4.3.3 Gaming Exercise on en route complexity management	Estimation of Efficiency impact estimation of the complexity, trajectory, and separation management measures through the evaluation of the distortion of UPT.

Table 2-3: Contribution of WP4.3.3 to Efficiency KPA

2.2.2 OIs addressed

The OI steps required to support the development of the QTSM procedures have changed since the previous Experimental Plan [1] due to the technique used to carry out the gaming sessions.

The following OIs will be addressed in this exercise:

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OI	Title
AOM-0801	Flexible Sectorisation Management
CM-0103	Automated Support for Traffic Complexity Assessment
CM-0301	Sector Team Operations Adapted to New Roles for Tactical and Planning Controllers
CM-0302	Ground based Automated Support for Managing Traffic Complexity Across Several Sectors
TS-0103	Controlled Time of Arrival (CTA) through use of datalink

Table 2-4: OIs addressed

2.3 GAMING EXERCISE OBJECTIVES

The objective of this Gaming Exercise is to:

- Investigate, assess and explore the implications of the EP3 WP4.3.1 Expert Group;
- Estimate potential capacity increases by reducing the controller conflict management task load through the reduction of complexity;
- Assess the feasibility of high-complexity operations and procedures;
- Refine the evaluation of complexity and trajectory management techniques, such as re-routing or alternative levels/time previously explored by the expert group, EP3 WP4.3.1, in a previous iteration;
- Validate the related negotiation processes;
- Assess the feasibility of new separation modes and associated procedures;
- Explore and support the clarification and refinement of the different processes and roles involved in "Dynamic Airspace Reorganisation" in high-density, high-complexity situations;
- Explore the use of serious gaming technique to analyse and describe new operational concepts;
- Reach a high-level of interaction between all the participants involved in the games in order to obtain all the possible points of view for the same topic and develop a useful discussion;
- The consortium will use the PROMAS, Processes Management Simulator¹, tool as part of the gaming exercises to confirm the results obtained from the role-based games. Section 4 further describes this simulation;
- A Flash game will be design as an interactive tool that summarises the main concepts and procedures agreed along the exercise. It could be seen as a dissemination tool helping to understand the future en-route environment.

These objectives are directly linked with the expected outputs described in next section.

¹ PROMAS is a tool to represent the operation of any type of organisation or system by means of fast time simulations based on discrete events. The tool provides a detailed event log referring to the system operations. After processing the simulation output data, the required information will be extracted to evaluate relevant indicators.



2.4 EXPECTED OUTPUTS

Gaming will address DOD on “Conflict Management in En-Route High & Medium/Low Density Operations” E6 [7] section 4.1 “En-Route Support to De-conflict and Separate Traffic” and the following Operational Scenario “OS-38 Flights in the Execution Phase in a 4D environment”.

The Gaming Exercise will produce the following results:

Technical clarifications concerning:

- It is expected to provide a better description of the gaming technique after all gaming sessions. It is the first time this role-based technique will be used to clarify concepts, process or procedures in the ATM world, for this reason an expected output will be to establish the usefulness or useless of this technique to clarify concepts in the ATM field.

Operational clarifications concerning:

- The definition of “En-route Queue, Trajectory & Separation Management”, the part of the 4D trajectory concept that will be available in 2020, this is “Initial 4D function”, and specifically of the scenario “OS-38 Flights in the Execution Phase in a 4D environment”;
- Operational Hypotheses or/and assumptions identified in the EP3 WP4.3.1 Expert Group;
- The Timeline associated with the operation of “En-route Queue, Trajectory & Separation Management”;
- The Roles, Responsibilities, Strategies, Objectives, Interactions and Procedures involved in “En-route Queue, Trajectory & Separation Management” and Dynamic Airspace Reorganisation.

Validation clarifications concerning:

- Assessment of expected impact in SESAR KPAs, analysing the effects and considering the necessary trade-off between them due to the implementation of Queue & Trajectory Management, Separation Management and Complexity Management;
- The criteria needed to identify and categorise high-complexity operations, zones and/or volumes. The criteria will consist of a list coupled with the conditions needed to use each item;
- The criteria to select a separation mode ensuring the best compromise between foreseen technical feasibility and perceived benefits. This will be identified in WP4.3.1 but WP4.3.3 will help it being more precise.

The minimum useful outcome would be a clear definition of the steps that define the Queue & Trajectory Management, Separation Management and Complexity Management procedures with all actors and their responsibilities identified in each step.

2.5 CHOICE OF INDICATORS AND METRICS

The role-based technique used in gaming sessions is not a good way to obtain quantitative measurements. What it can be reached are qualitative results that give an overall idea of the concepts.

The only metrics used within this exercise are those that PROMAS may measure. See section 4).



2.6 OVERVIEW OF ANY INTERACTIONS, RELATIONSHIPS OR DEPENDENCIES

Conclusions and outputs obtained in this WP will be used by the EP3 WP4.3 exercises to obtain deeper knowledge and first indications about the potential of these Queue, trajectory and Separation management procedures. Figure 2-1 summarises the global structure for EP3 WP 4.3 and the relationships among all tasks.

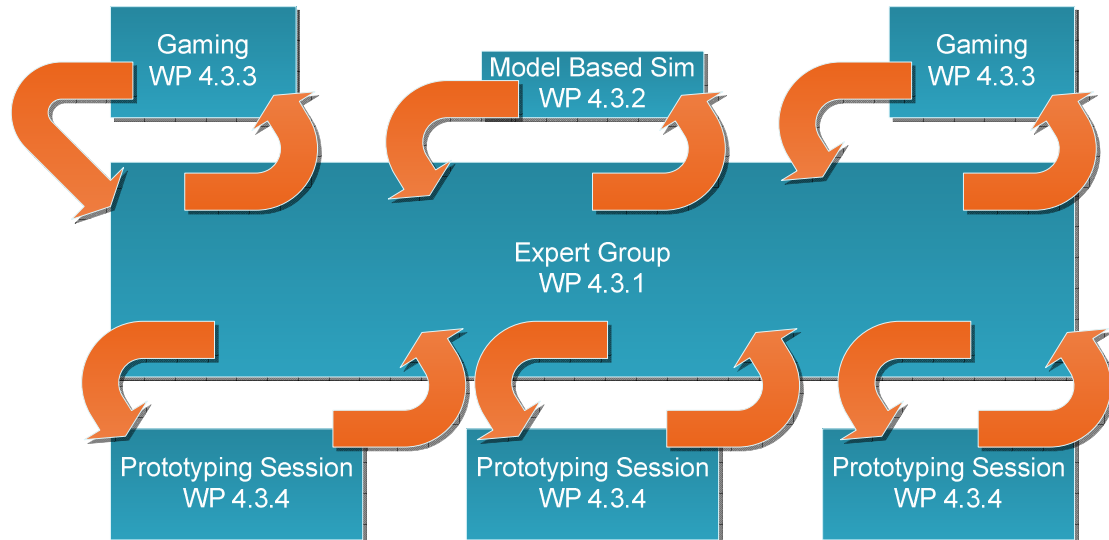


Figure 2-1: Sequence of Validation Activities in WP4.3.1

The Gaming Exercise provides direct input for the following exercises within EP3 WP4.3:

- Expert Group on Queue, Trajectory and Separation Management, EP3 WP4.3.1 led by ISDEFE.

Figure 2-2 summarises the interactions between EP3 WP4.3.3 and the other work packages. The figure highlights the relationship with WP 3.3.2 “Business Trajectory Management and Dynamic DCB”. This WP will provide the transition from the planning to the en-route phase

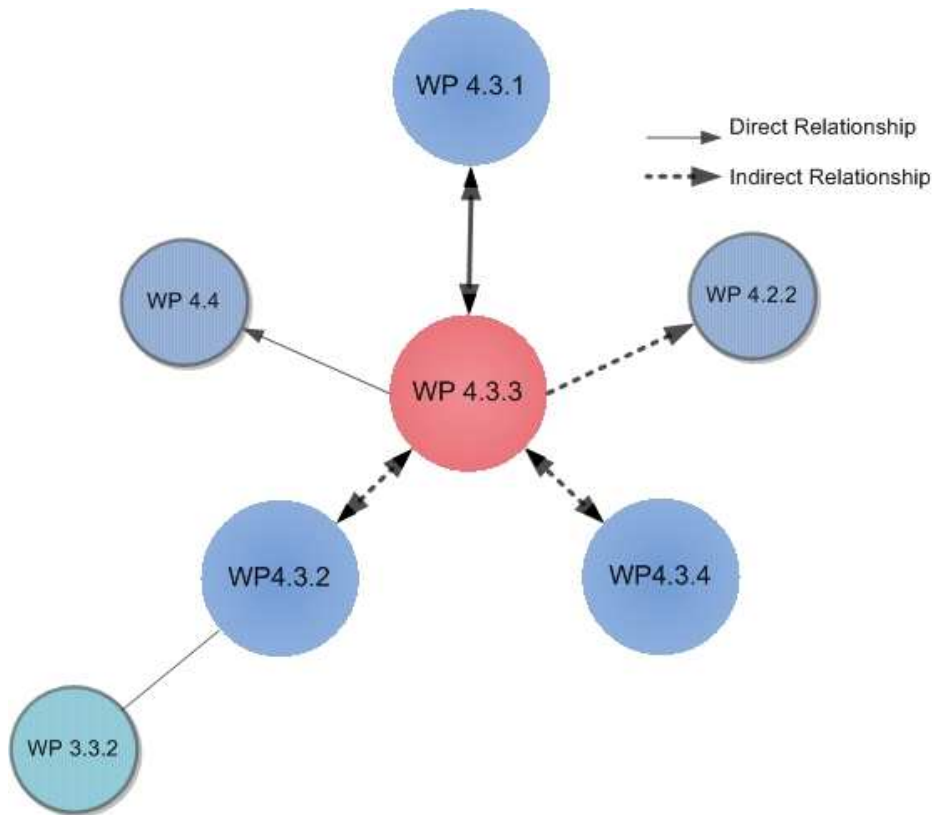


Figure 2-2: Inputs and Relationships of EP3 WP4.3.3

3 GAMING EXERCISE

3.1 VALIDATION SCENARIO

As many different games are going to be played along the different workshops, it is not possible to explain here the different validation scenarios which are going to be used. In the design of all types of games (role-based, FTS or Flash games) constraints and guidelines from the DOD E4 and E6, as well as OS-38 will be kept in mind.

However many changes may happen due to the results and conclusions the experts agree in the WP4.3.1 EG workshops.

For all reasons explained above, hypotheses, airspace or traffic information as well as the equipment may vary from one scenario to other. All this information will appear in the WP4.3.3 Gaming Final Report.

3.2 TOOL(S) AND TECHNIQUE(S) USED TO CONDUCT THE GAMING EXERCISES

3.2.1 Background

Before proceeding with the description of the Gaming Technique that will be used to design, implement and perform the Gaming Exercises, the reader must be cautioned about what the Gaming Exercises is not. The Gaming Exercises will:

- Not be useful to obtain accurate values of the different KPAs - i.e. only estimations will be provided.



- Not present an accurate simulation of the airspace and the operational processes involved.

Gaming will be used as a technique that promotes non-routine thinking, thus enabling out-of-the-box thinking. Gaming will provide additional insight to the findings of the EP3 WP4.3.1 Expert Group results, whilst validating the principles behind “En-route Queue, Trajectory & Separation Management”. The gaming design technique that has been defined allows improving on the goals (i.e. either by refining them or by changing the processes that lead to them), replacing the goals (if they prove unfeasible) or changing the game altogether (if the approach or the results do not prove to be viable)

The main hypotheses that will be used to design and build the game, is that the “En-route Queue, Trajectory & Separation Management” game will be a group game, which is goal seeking, finite, and cooperative. The participants as described in Section 8.1 will work together with the goal of achieving the stated objectives (Section 2.3). The gaming exercise participants are expected to cooperate when creating value, and to compete when dividing it up; success will come from *playing the right game*.

The game is finite because it is over when the goal² is reached. The next gaming exercise will either improve the attained goals, replace them, or be completely replaced.

The game is cooperative because the people on the team help each other to reach the goal. The measure of their quality as a team is how well they cooperate and communicate during the game.

Participants will receive inquiries at the end of the gaming sessions to provide feedback on the design and technique.

Everything mentioned above is related with the role-based games, which will be the most important input for this exercise. However, two other types of simulations will be performed within this WP: a FTS using PROMAS and a flash game.

3.2.2 Game Design

The role-based game design will be based on two main structures: The “game design principles” and the “game fundamental structure”. The “game design principles” will be used to provide a framework for the gaming exercises through the provision of the information necessary to prepare and conduct the game. The “game fundamental structure” identifies and describes the components that will constitute a particular game.

The following “game design principles” will be used to prepare the gaming exercise items:

- Winning conditions for both the group and the individual players. These conditions will be linked to the KPAs. The conditions will be used to spark the occurrence of conflicts;
- Game rules describing when and how a player can take an action;
- Initial Game setup describing the validation scenario as defined by the EP3 WP4.3.1 Expert Group;
- Metrics³ used to measure the success of the game;

² A gaming goal could be the definition of the processes related to queue management. Another example of a game goal, could be minimising the number of changes resulting from an RBT review process.

³ The metric used in the games is the number of issues raised –i.e. items related to the Queue Trajectory and Separation Management operational description-. This metric indicates the participation and the effectiveness of the game. It must be noted, that once the operational concept description reaches maturity, this metric will tend to zero.



- Expected game output.

The “game fundamental structure” will be presented through four component groups:

- Actors / Roles of the players. Each one will have a brief note about their expected value to the game;
- Inputs and outputs to the game;
- Processes involved in the game;
- Information Sets available to the actors / roles including the restrictions and conditions of use.

Three different types of games will be used in a sequence⁴:

- A role play style game played with actors at a table. It will be used to define initial roles and responsibilities;
- Using a process modelling tool (PROMAS) to analyse the role of the components in the scenario and to reproduce the system operation activities. See Section 4;
- Using a web based tool⁵ (Flash designed game) to model and execute the processes simulations defined in the role-based games. It will not be a new game, but a tool helping the understanding of the results obtained using previous games. The idea is use this flash game as a dissemination tool. To this purpose, it will be needed experts feedback about the game. However, as a dissemination tool it may be used join to WP2.5. It has not a time constraint as the rest of the games.

3.2.3 Game

Each “En-route Queue, Trajectory & Separation Management” game will consist of:

- A set of actors / roles (as derived from the EP3 WP4.2.2 and 4.3.1 validation scenarios);
- A set of game “items” that represent available processes and information;
- A set of winning conditions. Group conditions are public; while each participant’s winning conditions must be private. This facilitates the anticipated conflicts between public knowledge on ATM system performance premises and the individual airspace user competitive strategy;
- A rule set.

The game will be organised and conducted by a Game Manager. The Game Manager will be responsible for distributing the actor / roles, the game items and the winning conditions. He / She will also ensure that the rule set is enforced. Figure 3-1 and Figure 3-2 present a summary of the game and a set of possible game items respectively.

Figure 3-1 shows some of the interaction between the different game actors and the different available processes. A game item will represent each one of the actors and of the processes.

⁴ The use of each specific game type will be based on the maturity of the operational concept description. The decision to use each type of game will be based on the stability of the available ConOps descriptions.

⁵ Once the operational concept description is stable, it will be possible to produce the design for a game based on flash that can be used in the web. This game will allow to expose more people to the game, and will be useful also as a dissemination tool.

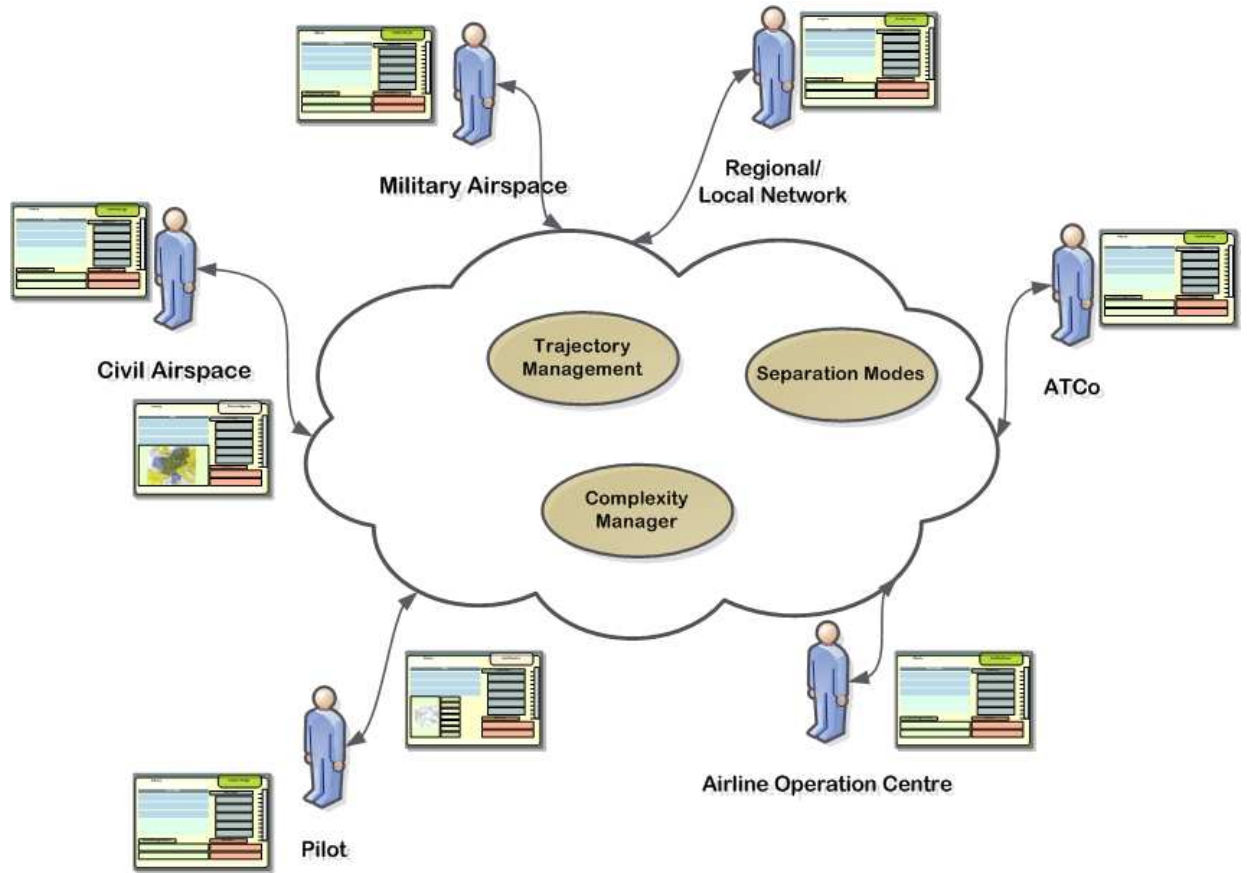


Figure 3-1: Game Execution

Figure 3-2 presents some game items' examples. The figure includes brief explanations about each game item component. The game rules will include the description of each item and its usage.



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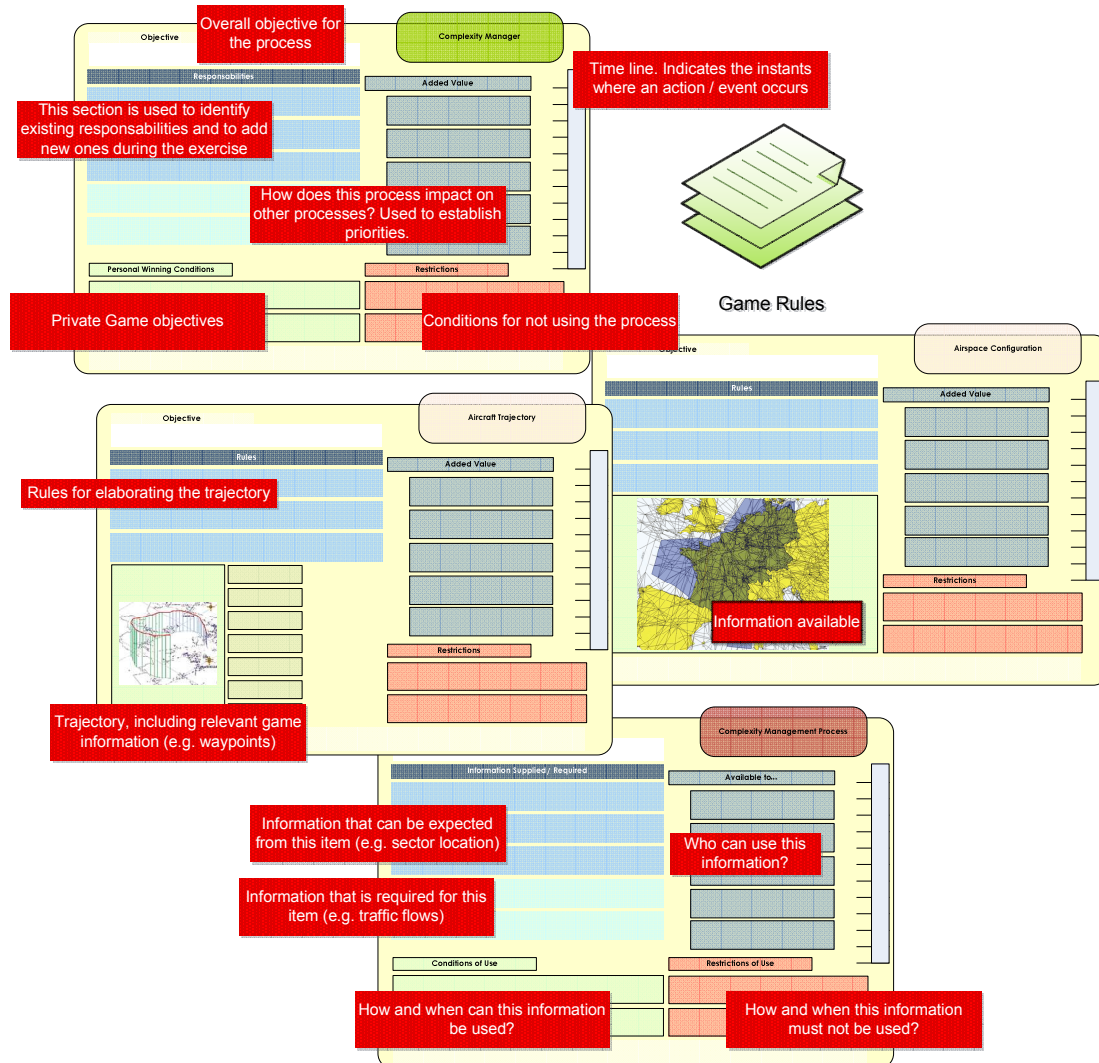


Figure 3-2: Sample Game Items for the Complexity Manager and the Complexity Management Process

Each of the actors/roles will have one of these cards with information related with their role description, main goals, responsibilities, tools available and their main interactions. This information may change along the gaming sessions, but it will be the starting point.

It is supposed that players will perform the game if they have available all the information describe above (initial game scenario, processes sequence and game-cards)

3.2.4 Game Development

The Gaming team will start its work with an analysis of the existing SESAR ConOps relevant information. This information will be used together with the analysis of the EP3 WP4.3.1 Expert Group results to identify the fundamental structure of the game and its main design principles. Next process will be the game design and as the last result of this process a Game Template will be elaborated to produce the actual games.

The Game Template will be tailored to the specific validation scenario and objectives identified by the Expert Group. The result will be the Game exercise. Once the Game exercise is prepared, a Gaming session will be held; the results from the Gaming session will be recorded and analysed to produce the Gaming Exercise Report. Figure 3-3 presents a graphical summary of this process.



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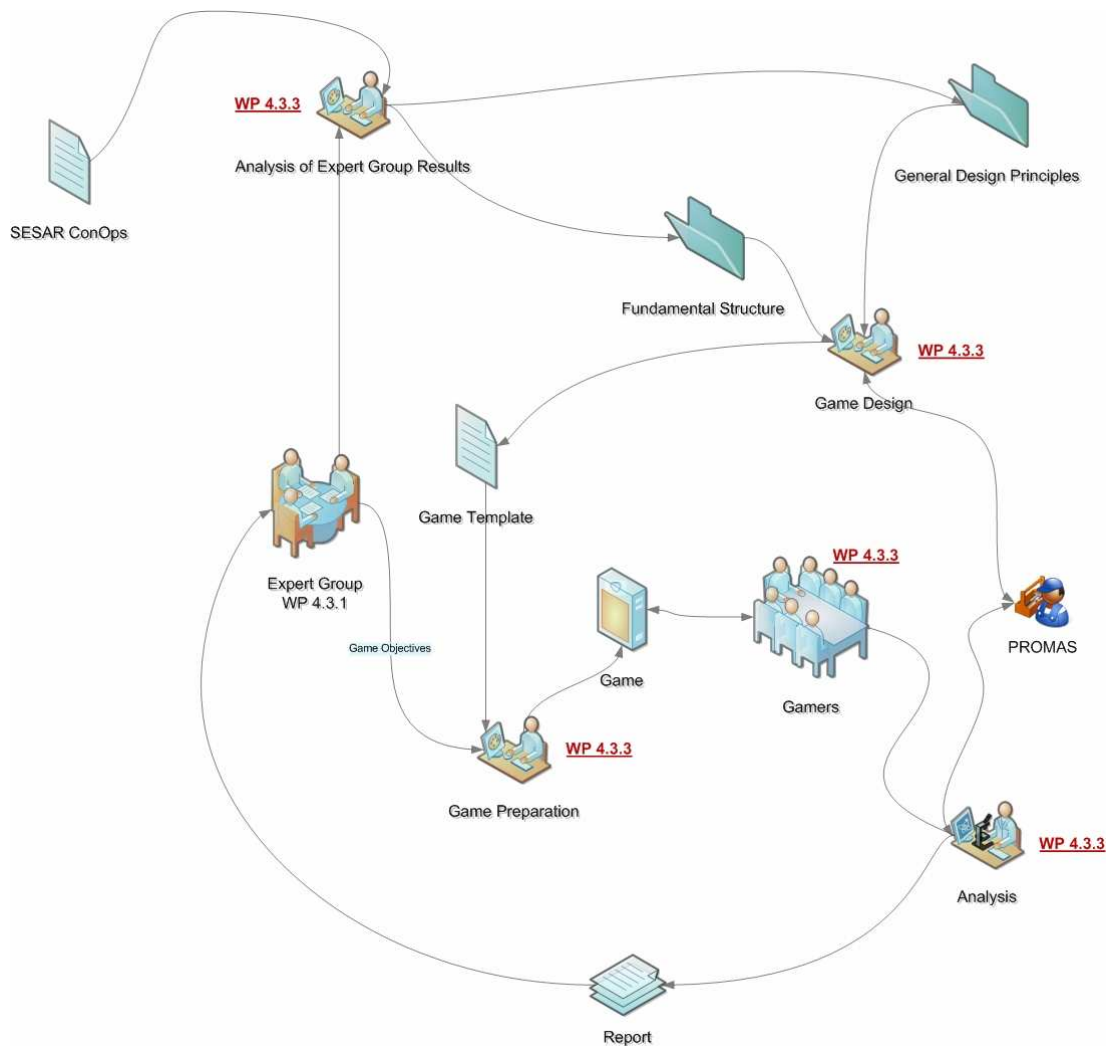


Figure 3-3: Game Development Process

As part of the design process, the gaming team will produce a “game package”. The game package will consist of the following information:

- Rule set;
- Game manager script: this document details the information that the game manager needs to know -e.g. game objectives, individual goals, information sought out of the game, information to be distributed, timing of the gaming events;
- Participant script: information for each participant regarding their goals, rules, restrictions, etc;
- Information set description, one per information item;
- Process description, one per process.

3.2.5 Data Collection

Data collection will be done through three main ways:

- The participant script available to the participants will have a place for comments/ amendments/ improvements on the processes, information description, and roles definition. The scripts will be collected at the end of the game.



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- At least one observer will take notes during the game development. The observer will have two tools:
 - a copy of the manager script against which she/he will supervise the development of the game and the remarks done in each moment of the game;
 - a list of the main issues foreseen to be discussed.
- At the end of each game:
 - the most outstanding issues will be discussed after each gaming session and
 - they will be summarized for general agreement. Issues that were not solved will feed the expert group questionnaires;
 - Game Manager and his/her assistant will distribute evaluated questionnaires about the game technique. This information will help EP3 WP4.3.3 to improve their exercise.

Besides the above mentioned, the game will have white boards where the information flow will be duplicated. Any deviation from the script will be recorded and incorporated in the final summary.

3.3 GAME ASSUMPTIONS

It is assumed that the state of maturity of the SESAR Detailed Operational Descriptions for En-Route Execution Phase - i.e. main work document for the players participating in the exercise - at the beginning of the gaming will be sufficient for the achievement of the gaming objectives.

As each Game is designed new assumptions will be taken into account. These assumptions will appear justified in the WP4.3.3 Exercise Final Report.

4 PROCESSES SIMULATION

4.1 BACKGROUND

The design of a process model must be validated to assure the appropriate functionality and coherence of the management processes. For this reason, exercises are developed by means of expert groups, gaming exercises and real time simulation techniques, prototyping sessions and RTS.

Currently, the use of fast time simulation tools, FTS, in the ATM field is mainly focused on developing performance analyses instead of process assessments. The use of FTS tools to perform processes assessments will complement the gaming exercises.

Particularly, the process simulation that will be held within WP4.3.3 will focus on clarifying and assessing the processes related to En-route Queue, Trajectory & Separation Management. These processes have been analysed and explored by the experts both in the Expert group (EP3 WP4.3.1) and the Gaming Exercise (EP3 WP4.3.3). The PROMAS model will assess these processes and the involved actors and their roles, emphasizing with the role played by the Multi Sector Planner (MSP).

4.2 OBJECTIVES

The Process Simulation exercise has the following objectives:

- Clarification of the concept:
 - Refine MSP role;



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- Analyse usefulness of the current planning controller coexisting with MSP.
- Assessment of process feasibility:
 - Measure the number of information exchanges between the different involved actors and the number of triggered processes to detect the main processes and actors that could be supposed to be likely bottlenecks;
 - Define an initial conflict resolution process updating RBTs;
 - Analyse four events regarding with resolving conflicts:
 - When no conflict occurs: transfer baseline;
 - Immediate conflict;
 - Conflict in a sector near the border;
 - Conflict in a sector far from the border.
 - Asses the role of the involved actors in each process working in a 2020-traffic-situation situation, developing series of processes and not only individual ones.
- Exploration of new techniques:
 - Demonstrate that executive, planning and MSP processes can be linked by PROMAS to be used in future studies.

4.3 HYPOTHESES

The hypotheses below will be explored in the gaming sessions.

H1: The Multi Sector Planner role will lead to decrease the number of potential conflicts to be solved by the executive controller.

H2: The Multi Sector Planner role will lead to increase the capacity of the en-route sector under its responsibility.

4.4 METHOD

4.4.1 Overview of Method

PROMAS is a tool to represent the operation of any type of organisation or system by means of fast time simulations based on discrete events. This software provides a detailed event log referring to the system operations. After processing the simulation output data, the required information is extracted to evaluate relevant outputs.

By using one of the multiple capabilities of this application, it is possible to reproduce a game. The programme performs the role of the components in the scenario and reproduces the system operation activities.

To sum up, PROMAS offers a new Gaming-compatible technique, to assess complex systems by means of Fast-Time Process Simulations.

After analysing the processes used in the gaming sessions, the relevant Gaming part will be modelled, and subsequently the processes simulations will be executed. In the framework of this exercise, PROMAS will be supplied with the processes defined in the initial Gaming exercises. It will then model the processes and provide a first assessment of their viability.



4.4.2 Setting Up and Executing the Process Simulations

The Process Simulation exercise will not require experts to play the roles in the simulation. Six Process Simulations will be executed, and further detailed below:

- The PROMAS platform (with a specific configuration); each simulation will have its own specific configuration. The configuration will be used to test different options of the actors and aircraft behaviour when facing a conflict situation;
- A PROMAS Scenario: a scenario is composed by the set of rules, actors and the traffic sample, as well as the set of parameters that defines the strategy to be assessed; these scenarios will be based on the interim report and the OS-38. The simulation will include 6 scenarios:
 - Scenario 1: Executive and Planning, with 2 sectors;
 - Scenario 2: Executive and Planning, with 4 sectors;
 - Scenario 3: MSP, Executive and Planning, with 2 sectors;
 - Scenario 4: MSP, Executive and Planning, with 4 sectors;
 - Scenario 5: MSP and Executive, with 2 sectors;
 - Scenario 6: MSP and Executive, with 4 sectors.

In each scenario, four different triggers will be available, depending on the type of conflict.

- Trigger A: an aircraft is transferred from a sector to another without conflicts;
- Trigger B: an immediate conflict occurs. In this case, “immediate conflict” is understood as a conflict appearing in the sector where the aircraft belongs;
- Trigger C: a conflict occurs in another sector that belongs the MSP Area, near its entry border;
- Trigger D: a conflict occurs in another sector that belongs to the MSP Area, far from the entry border of the sector.

In Scenario 1 and 2 (Executive and Planning) all conflicts will be “immediate conflicts”, hence only triggers A and B will be launched. These scenarios will simulate the current controlling roles.

In scenario 3 and 4 (MSP, Executive and Planning), all types of conflicts may occur (immediate and non-immediate), hence triggers A, B, C and D will be launched depending of the conflict. In these scenarios, MSP will have a global view of all the sectors and will ease the work of the planning and the executive controllers.

In scenario 5 and 6 (MSP and Executive), all types of conflicts may occur (immediate and non-immediate), hence triggers A, B, C and D will be launched depending of the conflict. In addition, planning controller is not an actor in these scenarios and MSP will develop the functions of the planning controllers of all the sectors, with a global view.

- The sectors that will be used in the 6 different scenarios (selected by taking into account the number and type of conflicts, and traffic load) belong to Madrid ACC (LECM) and they will be:
 - DOM and TLU

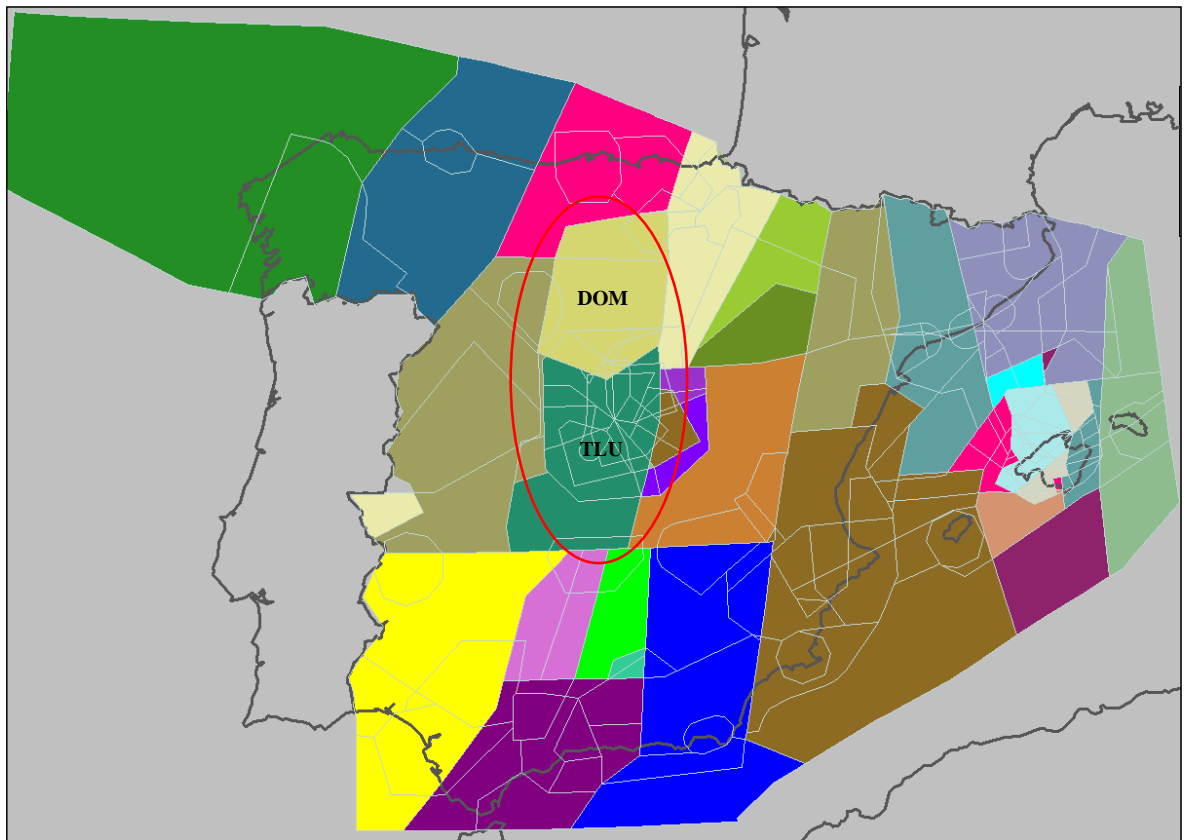


Figure 4-1: DOM and TLU sectors representation for scenarios 1, 3, and 5

- DOM, TLU, ZMU and PAU

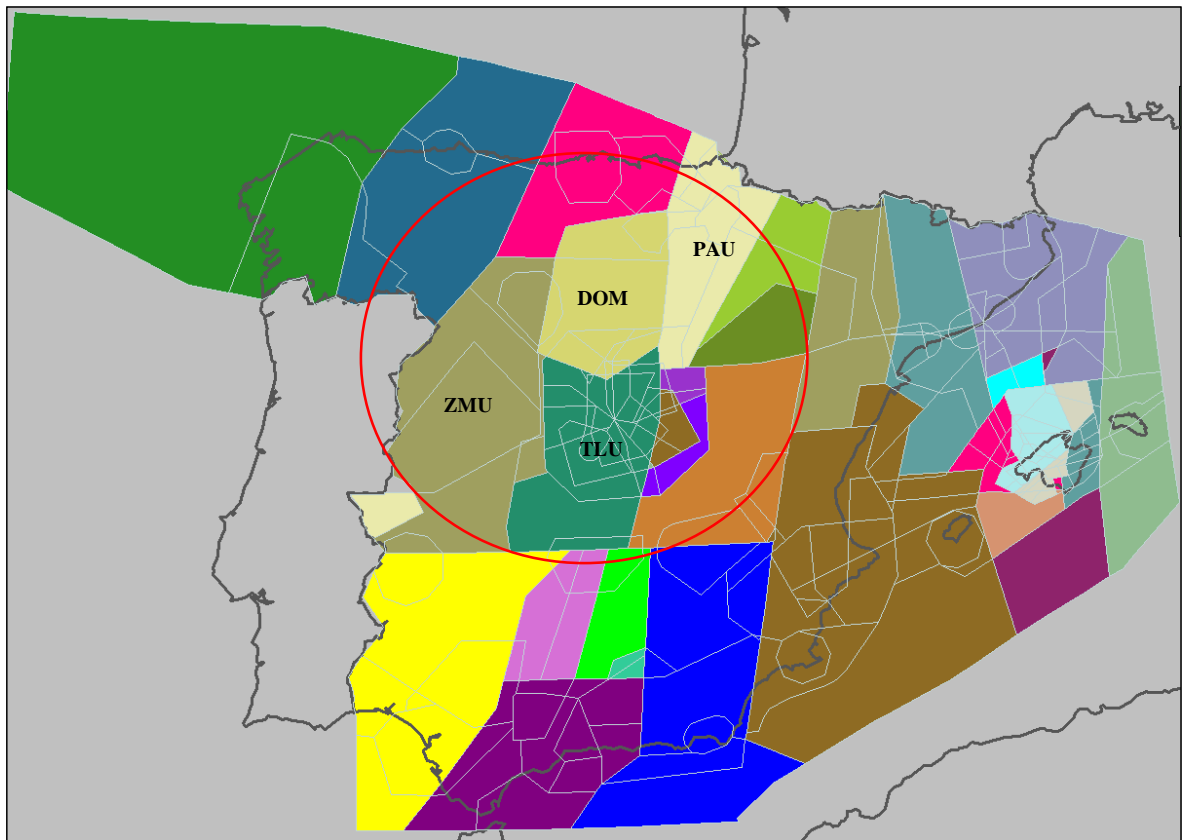


Figure 4-2: DOM, TLU, ZMU and PAU sectors representation for scenarios 2, 4, and 6

- A set of rules; these are necessary to specify the behaviour of actors;
- A traffic sample; there will be one 2020 traffic sample;
- Actors; each actor will have his/her own unique behaviour strategy that they must adopt. The actors involved are Flight Crew, MSP (if any), Executive Controller and Planning Controller (if any).

4.5 ASSUMPTIONS

A-01 MSPs may have under their responsibility up to 4 sectors at the same time

A-02 An immediate conflict (trigger B) may be resolved by a planning and an executive controller (with no MSP) in scenarios 1 to 4.

A-03 An immediate conflict (trigger B) may be resolved by a MSP and an executive controller in scenarios 5 and 6.

A-04 The RBT of the aircraft involved in conflicts may be updated by the flight crew after being agreed and instructed by the executive controller or MSP.

A-05 A conflict that will occur near the entry border of a sector where the aircraft has not entered yet and this sector belonging the MSP Area (Trigger C), may be resolved by the coordination of the MSP, a planner (if any) and an executive controller.

A-06 This type of conflict may be resolved by updating the RBT by the flight crew after being agreed and instructed by the executive controller. This resolution will imply a change in the RBT in the moment of the detection of the conflict.



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A-07 A conflict that will occur far from the entry border of a sector where the aircraft has not entered yet belonging the MSP Area (Trigger D), may be resolved by a MSP.

A-08 This type of conflict may be resolved by updating by the MSP the part of RBT within the sector where the conflict will occur.

4.6 ROLES AND RESPONSIBILITIES

The following are the roles and responsibilities that will be automated by means of PROMAS tool:

- MSP, responsible of the area. Depending on the scenario will contact directly to flight crew (trigger D) or to the executive controller (trigger C); S/he updates the RBT (when trigger D is launched);
- Executive controller, analyses the solution provided by the Planning Controller and takes a decision about it;
- Planning controller, offers a solution for an "immediate conflict" to the executive controller;
- Flight crew, receive the resolution of a conflict, analyse it and update the RBT (when trigger B or C are executed).

4.7 TIME PLANNING

The following table lists the main time planning that will be carried out in the Process Simulation exercise.

	May	June	July	August	September
Preparation					
Execution					
Post Exercise					

Table 4-1: Process simulation Time Planning

4.8 ANALYSIS SPECIFICATION FOR PROCESS SIMULATION

4.8.1 Data Collection and Analysis Method

Each Process simulation will provide the analyst with qualitative and quantitative information, that will be used to test the feasibility and coherency of the processes addressed and described in some of the gaming previously executed and reported. These different sorts of data are described separately below.

Qualitative Data

After each simulation, PROMAS will capture data in the following areas to help meet the hypotheses listed in section 4.3.

The qualitative data will be collated and summarised. The analyst will analyse these data in order to meet the objectives listed in section 4.2. Qualitative data will be faced by a group of experts (users and network experts) to the hypotheses established, and will accept/reject them. So that, by means of comparing the studied situations, the improvements and verifications will be shown.

Quantitative Data

Some quantitative data will be logged by PROMAS in an Events file. One of the objectives for this exercise is to demonstrate that numerical data offered by PROMAS can be processed to



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give useful metrics. The numerical data will be used to compare different scenarios (i.e., simultaneous tasks, overloaded actors).

The responsible for accepting/rejecting the quantitative data obtained on the basis of the hypotheses will be a group of experts. Several quantitative data will be provided so as to the experts will be able to verify/falsify the hypotheses. Furthermore, an internal INECO expert group will also validate the data.

4.8.2 Metrics of interests

The most important metrics PROMAS can measure are:

PI	Title
CAP.LOCAL.ER.PI 5	Estimated Airspace Volume Capacity
SAF.LOCAL.ER.PI 1	Number of hours with excessive ATC task demand
SAF.LOCAL.ER.PI 3	Number of ATC tactical interventions
EFF.LOCAL.ER.PI 7	Efficiency of routing service

Table 4-2: Related EP3 PIs

- CAP.LOCAL.ER.PI 5 measures the maximum number of aircraft that can enter an airspace volume in one hour, based on the maximum task demand the tactical controller can deal with in this period of time (threshold);
- SAF.LOCAL.ER.PI 1 measures the number of hours with excessive ATC task demand. Times the controller is saturated with different severities and therefore, there are risky situations and then safety precursors;
- SAF.LOCAL.ER.PI 3 measures the number of ATC tactical interventions. Number of times an ATC tactical intervention is needed in order to avoid a potential conflict on air; Number of losses of minimum separation;
- EFF.LOCAL.ER.PI 7: measures the efficiency of routing service. The number of flights that will change its 4D trajectory due to a conflict resolution.

5 FLASH GAME

5.1 OBJECTIVES

The flash game will be used to present and disseminate some of the results obtained by the WP4.3.3 validation exercise. The flash game will build on the main outputs of the WP4.3.3 role-based gaming sessions, related to SESAR concept validation and clarification.

The objective is twofold: to expose more people to the gaming techniques and to the specific outcomes found in the framework of WP4.3.3 validation exercise and to perform a comparative between paper-based games and flash-based games. Paper-based games have great flexibility, allow the exploration of concepts that are quite open and have different possibilities of implementation, but they also have limitations in the interface with the experts, meanwhile, the flash/web based games loose part of this flexibility but improves in the interface and presentation aspects.

5.2 SCENARIO

The flash game will develop a single scenario. To describe this scenario the main input will be the interim report that summarises the outputs of the first cycle of role-based games. This scenario will be refined with the outputs of the second cycle.



The game will take place in the execution phase, in a “typical” busy en-route airspace. It will follow the evolution of a complex problem detection, since its detection by the subregional manager, till the execution of the solution proposed and refined by the different actors.

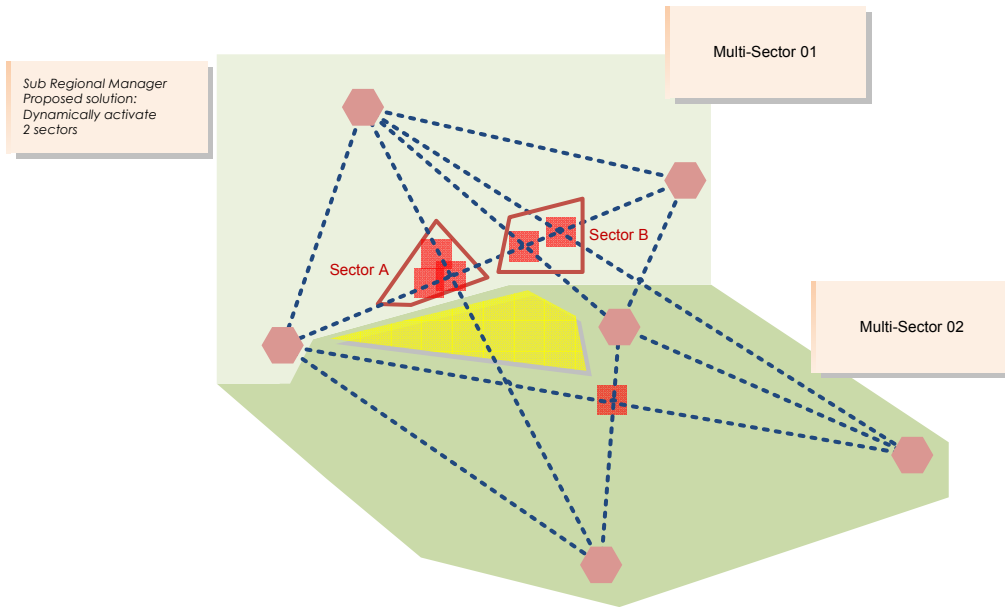


Figure 5-1: Part of the flash game scenario

The main actors of the game are:

- Subregional Manager
- AOC
- Multisector planner
- Executive controller
- Flight Crew

5.3 DATA COLLECTION AND ANALYSIS METHOD

No data will be collected using the flash game, nor will any output of it use be analysed. The use of a flash a flash game it is used here as an evolution from the paper-based, without entering in the development of a fast time simulation. The possibility of connecting a data-based to record the development of the actions and processed performed along the game will be studied but not implemented.

5.4 TIME PLANNING

The following table lists the main time planning that will be carried out in the flash game.

	June	July	August	September
Preparation				
Development				
Refinement				

Table 5-1: Flash Time Planning



6 PLANNING AND MANAGEMENT

6.1 RESOURCES AND ACTIVITIES OF THE ROLE BASED GAME

6.1.1 Resources

This section lists the kind of expertise, skills and knowledge required of the participants from a SESAR point of view. Maximum expected number of participants in each gaming session is 15 and minimum is 6.

Role	Responsibilities
Civil Airspace Expert	<ul style="list-style-type: none">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;To collaborate with the Network management to plan airspace usage in a way that balances the impact on civil air traffic flow and capacity management with military needs.
Military Airspace Expert	<ul style="list-style-type: none">To collaborate with the Network management to plan airspace usage in a way that balances the impact on civil air traffic flow and capacity management with military needs.
Regional Network Expert	<ul style="list-style-type: none">To assure stability of the whole network in the face of traffic demand, facilitating dialogue between airspace users, ANSPs and airport operators so that traffic demand and capacity balancing issues can be resolved in an efficient manner;To check unexpected network effects of sub-regional decisions prior to their implementation.
Local Network Expert	<ul style="list-style-type: none">To determine the optimum deployment of regional resources to meet the airspace users actual or predicted demands;To resolve situations where sufficient capacity cannot be provided by means of Collaborative Decision Making processes involving all stakeholders;To develop scenarios to cope efficiently with diverse events.
Planning Air Traffic Controller	<ul style="list-style-type: none">To check the planned trajectory of aircraft intending to enter the sector for potential separation risk;Facilitate Flight according to RBT and applicable rules ;Coordinate sector entry/exit conditions, Flight Crew requests with adjacent sectors;Optimize Queuing.
Executive Air Traffic Controller	<ul style="list-style-type: none">To control the traffic flow in the sector under consideration;To maintain the traffic within safety rules;To manage the traffic according to RBTs agreed whenever possible.
Airline Pilot	<ul style="list-style-type: none">To ensure compliance with safety rules;To implement / derive the RBT.
Airline Operations Centre	<ul style="list-style-type: none">To determine and maintain the RBT;To identify the optimum airline options.
SESAR ConOps Expert	<ul style="list-style-type: none">He/she should be involved in the development of the ATM Planning process defined in the SESAR ConOps.



Table 6-1: Roles and responsibilities in the gaming exercise

6.1.2 Activities to Be Undertaken

The Gaming exercises are structured as an iterative process aiming to clarify what “En-route Queue, Trajectory & Separation Management” means, and its operational viability. Isdefe’s role in the Gaming exercises is as that of both a referee for the game and facilitator in the discussions, interfering as little as possible in the final conclusions extracted.

The activities will be grouped in five phases, each one following an iterative sequence composed by the following steps:

- Game preparation;
- Game set-up including briefing;
- Game performance,
- Game debriefing;
- Result analysis;

Each Game will take place in at least a single session, depending on the size and complexity of the game; it might be possible to hold more than one gaming session. To reduce travel, gaming sessions will be combined with other meetings, preferably with WP4.3.1 En-Route QTSM Expert Group meetings, as both WPs are interrelated.

6.1.2.1 Game Preparation

Using the information generated during the game design and elaboration activities, the Game manager will prepare the different information packages and tools he/she will use for the correct development of the game. He / She will distribute the agenda and deliver the information needed to prepare the gaming session.

6.1.2.2 Game Set-up Including Briefing

Before the Gaming session starts, the Game manager will prepare the tools, the information sets and the processes. Once it is prepared, he / she will proceed to explain the game through a presentation, which will include:

- Objectives of the game;
- Scenario in which it will be based and;
- Which are the rules and mechanics to the participants?

Before the game starts, the Game Manager and his/her assistant will assign the roles to each participant and provide them each information package, explaining their mission in the game. Questions and comments will be addressed at this stage.

6.1.2.3 Game Performance

The game will proceed according to the script (used for the events) and the already described rules.

The game will start when the Game Manager finish his/her explanation and indicate to the first actor involved in the action that he/she can start the game. It will be a fix initial time to complete the game, but it does not matter if time is longer if game discussions are so interesting than the Game Manager may obtain more results and conclusions from them than with the current development of the game.

Discussions not directly referred to the game execution will be avoided. The Game manager and his/her assistant will record proposed changes in the processes, information sets, issues raised, etc.



The PROMAS tool will perform the role of the components of a complex system and will reproduce the activities involved in it. The results from PROMAS will be focused on the study of inconsistencies, process bottle-necks, useful procedures, information flows, actions triggered by modifications of parameters, etc.

6.1.2.4 Game Debriefing

Once the game is completed or at some cases, time is over, a short discussion will be held to ensure that the participant opinions and comments are known and taken into account.

In some special occasions, a specific assessing questionnaire might be distributed to give feedback about the game technique and their usefulness to achieve the initial game objectives. If there is no time to distribute the questionnaires, all participants will be invited to send their comments by email.

6.1.2.5 Result Analysis

An analysis of the information generated during the game, extracting from them the overall opinion of the Gaming exercise participants and preparing an interim report including the results analysis and preliminary conclusions. The interim report will then serve as a basis for two-day face-to-face meetings at which the experts will have the opportunity to discuss the results in detail and agree on the conclusions.

The information issued during these face-to-face meetings will be fed to the first draft version of the Gaming Exercise Report. This draft will be discussed and corrected in the course of a final meeting. The success of the exercise and of the final results will be evaluated against the degree of accomplishment of the initial objectives as well as in terms of the degree of final consensus reached.

If participants are not able to agree a conclusion of the results of a gaming session, these disagreements will be included in WP4.3.1 EG questionnaires trying to reach a common view of them.

6.1.3 Responsibilities in the Exercise

There are two different main roles involved in the execution of the gaming: the Game Manager / Organiser with his/her assistant and the Experts. The main responsibilities for each one are given below.

- Game Manager / Organiser and his/her assistant
 - To design and prepare the game, sending all the information the experts need to prepare the meeting;
 - To conduct the exercise as described in this document: Gaming Exercise Plan;
 - To manage the game;
 - To organise and facilitate the discussions recording all the issues given in them;
 - To consolidate the conclusions with the Experts in order to define a clear output;
 - To compile and issue the Gaming Report.
- Experts.
 - To prepare the workshops with the information the Game Manager should provide before each meeting;
 - To participate in the games;
 - To consolidate conclusions;
 - To review and comment the Gaming Report (Interim Report and Final Report).



6.2 TIME PLANNING

To save on costs and to maximise the time and the availability of the Experts that are needed to perform the game, all gaming sessions have been planned in coordination with the EP3 WP4.3.1 Expert Group meetings [1].

The following table summarises both the Expert Group and Gaming planned meetings and supporting questionnaires deadlines. Q1 to Q5 refers to Questionnaire numbering sent to the Expert Group.

	Send Questionnaire	Answer Questionnaire	Expert Meeting	Group	Gaming Exercise
Q1	01/10/2008	15/10/2008	15/10/2008		16/10/2008
Q2	22/10/2008	05/11/2008			
Q3	12/11/2008	17/11/2008	19/11/2008		20/11/2008
Q4	23/12/2008	08/01/2009	15/01/2009		16/01/2009
Q5	25/03/2009	07/04/2009	14/04/2009		
Q6	26/04/2009	14/05/2009	23/06/2009		24/06/2009
Q7	23/06/2009	11/07/2009	15/07/2009		16/07/2009

Table 6-2: Time Planning Role games

Given the support nature of both the Expert Groups and of the Gaming exercises, new meetings might be added if needed.

The time planning of the PROMAS simulation is presented in section 4.7

The time planning for the Flash Game is presented in section 5.4

Table 6-3 presents the delivery dates corresponding to the Experimental Plans and Exercise Reports along the project.

Gaming exercise on Queue, Trajector...	31/10/08	30/09/09	
D4.3.3-01; Experimental Plan 1	31/10/08	31/10/08	31/10
D4.3.3-01; Experimental Plan 2	31/05/09	31/05/09	31/5
Gaming platform ready	31/12/08	31/12/08	31/12
D4.3.3-02; exercise report 1	28/02/09	28/02/09	28/2
D4.3.3-02; exercise report 2	30/09/09	30/09/09	30/9

Table 6-3: Gaming Exercise documents schedule



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6.3 RISKS

Risk 1	DODs and ConOps maturity and knowledge by players		
Description	The information available about the processes on which gaming is based does not provide sufficient detail to elaborate the game. Additionally, it is also possible that the gaming participants are not fully aware about this information.		
Impacted Area	<input type="checkbox"/> Own Exercise	<input type="checkbox"/> Other Exercise	<input checked="" type="checkbox"/> WP
Level	<input type="checkbox"/> Low	<input checked="" type="checkbox"/> Medium	<input type="checkbox"/> High
Possibility of occurrence	<input type="checkbox"/> Low	<input checked="" type="checkbox"/> Medium	<input type="checkbox"/> High
Contingency Actions	Coordinate with EP3 WP 2.2 to ensure that the DOD information is aligned with the Gaming exercise needs.		
Mitigation Actions	Use the same participants in both the Expert and the Gaming groups to ensure that the game participants are fully aware of the ConOps contents. Involving the Expert group participants also ensures that the required ConOps information is identified and described.		
Responsible	EP3 WP4.3.3 Gaming exercise leader.		

Risk 2	Interaction with FTS and prototyping		
Description	Information obtained from the gaming exercise is not transmitted to either the FTS or the prototyping exercises.		
Impacted Area	<input type="checkbox"/> Own Exercise	<input type="checkbox"/> Other Exercise	<input checked="" type="checkbox"/> WP
Level	<input type="checkbox"/> Low	<input checked="" type="checkbox"/> Medium	<input type="checkbox"/> High
Possibility of occurrence	<input type="checkbox"/> Low	<input checked="" type="checkbox"/> Medium	<input type="checkbox"/> High
Contingency Actions	Coordinate with EP3 WP 4.3.2 and EP3 WP 4.3.4 to ensure that the information is aligned with the Gaming exercise.		
Mitigation Actions	Include the gaming exercise status as part of the EP3 WP4 coordination meetings.		
Responsible	EP3 WP4.3.3 Gaming exercise leader and EP3 WP4 leader.		

Risk 3	Interaction with the expert group		
Description	There is no interaction with the expert group		
Impacted Area	<input type="checkbox"/> Own Exercise	<input checked="" type="checkbox"/> Other Exercise	<input type="checkbox"/> WP



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Level	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Medium	<input type="checkbox"/> High
Possibility of occurrence	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Medium	<input type="checkbox"/> High
Contingency Actions	Facilitate that experts belonging to the Expert group also participate in the Gaming.		
Mitigation Actions	Coordinate Expert group and Gaming meetings		
Responsible	EP3 WP4.3.3 Gaming exercise leader and EP3 WP4.3.1 Expert group leader		

Risk 4	No experts feedback for flash game		
Description	There is no feedback from experts to define and clarify the flash game		
Impacted Area	<input type="checkbox"/> Own Exercise	<input type="checkbox"/> Other Exercise	<input checked="" type="checkbox"/> WP
Level:	<input type="checkbox"/> Low	<input checked="" type="checkbox"/> Medium	<input type="checkbox"/> High
Possibility of occurrence	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Medium	<input type="checkbox"/> High
Contingency Actions	Present initial results to experts in Gaming meetings.		
Mitigation Actions	Send a flash game initial version to get comments from the experts.		
Responsible	EP3 WP4.3.3 Gaming exercise leader		

Risk 5	The exercise produces no useful data because of a lack of relevant information for each process.		
Description	In any study, to obtain interesting and non-obvious results depends strongly on the quality and detail of the inputs.		
Impacted Area	<input checked="" type="checkbox"/> Own Exercise	<input type="checkbox"/> Other Exercise	<input type="checkbox"/> WP
Level of Impact	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Medium	<input type="checkbox"/> High
Possibility of occurrence	<input type="checkbox"/> Low	<input checked="" type="checkbox"/> Medium	<input type="checkbox"/> High
Contingency Actions	Using internal expertise and the sensitiveness analysis technique, some useful and relevant results could be shown.		
Mitigation Actions	Ask to experts arising issues as soon as possible.		
Responsible party	INECO		



Risk 6:	The exercise takes more time than expected.		
Description:	PROMAS is a new platform based on a new technique so there is a risk that the exercise takes more time than expected.		
Impacted Area:	<input checked="" type="checkbox"/> Own Exercise	<input type="checkbox"/> Other Exercise	<input type="checkbox"/> WP
Level of Impact	<input type="checkbox"/> Low	<input type="checkbox"/> Medium	<input checked="" type="checkbox"/> High
Possibility of occurrence	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Medium	<input type="checkbox"/> High
Contingency Actions	To perform only the 4-sector scenario.		
Mitigation Actions:	Firstly, to perform the 4-sector scenarios and once they are finished, to start with 2-sector scenarios.		
Responsible party:	INECO		

Table 6-4: Risks Identification

7 ANALYSIS SPECIFICATION

7.1 TRAINING REQUIREMENTS

In order to reduce to the minimum the risk related to SESAR ConOps, a brief training for the experts focused on “En-route Queue, Trajectory & Separation Management” in En-Route High & Medium/Low Density Operations will be conducted during the first meeting. This brief training consists in a trial game that represents how a real game should be.

There is no need of training for the use of the process simulation.

The flash game will incorporate a help file with instructions for the players.

7.2 MEASUREMENT AND ANALYSIS METHODS

There is no specific method to collect the information and extract conclusions. The way to compile the results obtained from the gaming sessions is simple. Both the Game Manager and particularly his/her assistant take notes along each session about what experts say and about the statements, they agree.

Process, procedures, relations, statements or anything else that is not clear enough may feedback WP4.3.1 questionnaires. As it has been said before, both WP are very close to each other, whereby conclusions and output from one may be used as input for the other WP.

Qualitative techniques used to do the analysis of the results apart from the notes written down by the Game Manager and his/her assistant are:

- During the game, all the participants have a twofold mission; on one hand they have to complete/improve/correct the game cards they will have to play and on the other hand, they will write down all their comments or recommendations about both, the technique and the way the game has been developed.
- When a gaming session ends, the Game Manager will use a white board to write down main conclusions and agreements reached along the game. Those may be such how to define a process or procedure as the definition of the relations between roles.



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- As final step, after a gaming session, all the participants will be asked to complete a questionnaire that will complement information obtained in the previous two bullets. This questionnaire will include questions related to:
 - Technique (useful, reliable, accurate, understand, like, easy);
 - Confidence on the results obtained;
 - Technique abilities to clarify En-Route concepts, tools capabilities, process...
 - Propose changes.

The measurement method for the process simulation is presented in section 4.8

The data collection method for the flash game is presented in section 5.3

7.3 GAMING REPORT

This Gaming Exercise will generate two reports, a first Interim Report compiling the result analysis and preliminary conclusions and a final report, the Gaming Exercise Report that will include the final results.

The final report will include the conclusions of the three different gaming methods performed in WP4.3.3 validation exercise.

The structure of both reports will be in accordance with the following main sections:

- Introduction:
 - Purpose of the document;
 - Exercise Background;
- Scope and objectives of the games:
 - Links to other Validation Exercises;
 - Description of the ATM Concept Being Addressed;
 - Objectives;
 - Validation Scenario;
 - Exercise Tool, Technique and/or Platform.
- Game Design
 - Elements of the role-based technique;
 - Information Set Distributed.
- Results and Discussions.
 - Generally only high level meaningful results, details will be included as annex;
 - Any problems encountered during the activity;
 - As in the analysis contributions, results should be related back to the original criteria and placed in operational context;
 - Proposed changes and updates to the DOD and scenarios.
- Conclusions and recommendations.



8 DETAILED EXERCISE DESIGN

This section contains the list of participants (both the players and the manager) and the main issues to be discussed during the gaming sessions.

8.1 GAMING EXERCISE COMPOSITION

The same experts that participate in the WP 4.3.1 Expert Group are expected to participate in the Gaming exercise. The reader is referred to Expert Group Plan [1] for further information.

8.1.1 Gaming Manager

- Raquel García Lasheras [RGL]
 - Company: Isdefe;
 - Profession: System Engineer;
 - Education: Polytechnic University of Madrid (2004);
 - Areas of professional expertise:
 - ATM systems analysis;
 - ATM System Validation & Verification;
 - Aircraft systems.

Ms Raquel García is a system engineer in Isdefe in the area of Architecture and Simulation. She has worked since 2007 in Isdefe in different projects mainly related to Air Traffic Management (ATM) including SESAR. Previously she worked in Indra with technical information regarding aircraft maintenance.

Within Episode 3, she coordinates the En-route expert group, and has participated in the TMA expert group and in the Performance Framework.

She coordinates a simulation group at Isdefe



9 REFERENCES AND APPLICABLE DOCUMENTS

Ref.	Document	Name	Applicability
1.	E3-WP4-D4.3.3-01-PLN-V1.00	Episode 3 WP4.3.3 Gaming Exercise Plan – Queue, Trajectory and Separation Management	Applicable
2.	E3-WP2-D2.0-01-REP-V0.04	Episode 3 D2.0-01 - EP3 Consolidated Validation Strategy	Applicable
3.	WP4 Validation Strategy	Episode 3 D42-01 WP4 Validation Strategy	Applicable
4.	SESAR D3	SESAR-DLM-0612-001-02-00a	Applicable
5.	DLT-0612-222-01-00	SESAR ConOps contribution to D3	Applicable
6.	SESAR WP2.4.2 Description of Responsibilities	SESAR- DLT-0612-242_00_09-Roles and Responsibilities	Applicable
7.	E3-D2.2-028	Episode 3 Conflict Management in En-Route High & Medium/Low Density Operations – E6	Applicable
8.	E3-WP2-D2.2-026	Episode 3 Network Management in the Execution Phase – E4	Applicable
9.	E3-WP4-D4.2.1-01-PLN-V2.02	Episode 3 WP4 Validation Strategy	Applicable
10.	E3 DOW v2.8	Episode 3 Annex 1 – Description of Work	Applicable

Table 9-1: References and Applicable Documents



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END OF DOCUMENT