



EPISODE 3

Single European Sky Implementation support through Validation



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DOCUMENT CONTROL

Approval

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0 GENERAL INFORMATION ON EPISODE 3 PROJECT

The project Episode 3 has been selected in the 4th call for proposals in the area of Aeronautics and Space of the European Community's 6th Framework Programme for Research and Development and has received an initial grant of 17.4 million euros.

Episode 3 objectives are to detail and to validate several elements of SESAR's Concept of Operations. During the SESAR Definition Phase, which lasted from 2006 until May 2008, Episode 3 underwent a lengthy process of re-aligning its Description of Work towards the SESAR's concept.

This process of re-alignment resulted in changing the officially binding version of Description of Work (version 2.7) towards a new version 2.8, submitted to the European Commission for acceptance in February 2008.

SESAR Joint Undertaking made a technical assessment of the proposed new version (2.8) in March 2008 in order to ensure that Episode 3 objectives are aligned with SESAR's Concept of Operations. As a result of this review, the consortium partners and the European Commission decided to amend the proposed version 2.8 in order to reflect the SESAR's JU recommendations:

Make better use of innovative validation methods, such as gaming exercises, expert groups and prototyping

Limit the use of traditional validation tools such as fast and real time simulations

Limit the duration of the project to only one cycle of activities, leading to shortening the overall duration from 40 to 32 months and reducing the EC contribution from 17.4 million euros to 9.9 million euros. The initial validation activities will be carried out within Episode 3; and its initial findings will be taken over by the SESAR consortium in the Development phase and further exploited and developed.

The resulting final version of the Description of Work (3.0) was not available at the time the Activity Report was drafted. The reader should bear in mind that the present Activity Report describes progress towards objectives set in the Description of Work 2.7 and that it indicates the changes proposed in the version 2.8, which were due to the alignment process.



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1 PUBLISHABLE EXECUTIVE SUMMARY

1.1 INTRODUCTION

Recognising the challenges facing Air Traffic Management, the European Commission (EC), and EUROCONTROL launched the Industry led SESAR Programme in April 2006. Commissioner Barrot set the following stretch goals:

Safety	Increase 10 times
Capacity	Increase 3 times
ATM costs	Divided by 2
Environment impact	Reduce by 10%

Table 1 - European Commission goals for Air Traffic Management

SESAR's D1 Deliverable highlighted the system bottlenecks, lack of common architecture and expressed concern that operators would be unable to cope with future traffic and complexity levels. D1 recommended that the future system should be built on a common Network Plan operating in a comprehensive performance framework where system design treats airborne and ground systems as one.

SESAR's D2 Deliverable presented the 2020 Vision of the Air Transport Industry aimed at achieving the performance targets (described here above) for the future ATM system.

The SESAR Concept of Operation (D3) will incorporate performance goals set in D2 to resolve the above problems. The scope covers strategic and tactical planning, Air Traffic Control, Airport and Airspace User Operations.

In preparation for the validation of the SESAR concept, the Episode 3 Project (EP3) a thirty five (35) M€ three year project was launched by the European Commission to undertake a first assessment of the concept.

Other EC projects conducted with key European stakeholders will be equally important sources of validation results and/or knowledge, complementing those obtained through Episode 3, thereby ensuring the validation of the mid-term operational concept.

1.2 OBJECTIVES OF THE PROJECT

Episode 3 scientific and technical objectives are to:

- Provide evidence that the SESAR operational concept is "safe in principle" or otherwise;
- Define a performance validation framework based on SESAR performance targets;
- Provide evidence of the performance of the operational concept against these targets;
- Provide evidence of the operational viability, or otherwise, of the SESAR target concept;
- Provide evidence of the technical viability, or otherwise, of the SESAR target concept, and
- Consolidate and detail the SESAR operational concept in accordance with assessment results.



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The Episode 3 contractors will perform Validation within the framework of the European Operational Concept Validation Methodology (E-OCVM) in accordance with the EUROCONTROL/EC Joint Programme Board decision for its application to all subsequent European research projects.

Episode 3 will provide results against the SESAR Key Performance Requirements structured according to the Key Performance areas, metrics and indicators identified in the ICAO ATM Performance Manual developed within the ATM Requirements and Performance Panel (ATMRPP). Many of these Key Performance Areas correspond to current day system performance indicators measured on an annual basis by the Performance Review Commission and published in their Annual Report.

Episode 3 will develop and operate within a performance validation framework based on the performance requirements identified in SESAR whilst current day baseline data will be extracted from the Performance Review Report. The concept assessment will be measured against SESAR goals and baseline, with the resulting data providing the support for trade-off studies and concept evolution.

The SESAR performance validation framework was built through influence diagrams showing how each of SESAR Operational Improvements was contributing to the performance improvements. Episode 3 will therefore use this information to select exercises that can confirm the benefits of these Operational Improvements.

The overall validation strategy will be organised around two main assessment cycles, the first cycle representing generic validations, the second cycle dedicated to local specific assessment activities. These cycles are scheduled to maximise synergy and cross fertilisation with the SESAR definition project.

The purpose of Episode 3 is to validate that the SESAR concept brings the expected benefits and is achievable. Because this objective is so large, the project needs to select areas of validation that are of high priority and can be achieved within the constraints of the project. The main constraints have been set during project negotiations:

- Fixed budget;
- Fixed consortium;
- 40 months timeframe;
- Requirement to minimize the evolutions made to the validation platforms and concentrate effort on validation itself. (Platform evolution are around 10% of the overall budget);
- Because the project is only 50% funded by the commission, it is necessary to accommodate the expectations of individual consortium members and their own objectives to a certain extent.

The project has been initially proposed in order to validate the C-ATM operational concept, which had been detailed in the C-ATM OSED's. However, during project negotiations, the EC has asked to realign the project to the SESAR concept. This realignment has not been possible before the start of the project as the SESAR concept was not yet finalised. One of the challenges of the project is to do this re-alignment while we are setting up the project.

During the first months of Episode 3, a number of key inputs from SESAR are becoming mature enough for use:

- WP 2.2.2: The SESAR CONOPS is being released in its version 1 in July 2007;
- WP 2.2.2: A list of research issues identified while developing the SESAR CONOPS;



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- WP 2.2.3: A list of operational scenarios illustrating in more details how the concept should be working, expressed by the users;
- WP 2.2.4: SESAR list of Operational Improvements and identification of Implementation packages provide the evolutions steps towards the target concept and identify how each OI (Operational Improvement) addresses the SESAR performance targets;
- WP 2.3: A SESAR performance validation framework demonstrating how global performance are met by linking together all evaluations for performance improvements at the level of each OI;
- WP 2.3.2: a list of validation exercises providing at high level the main topics that should be studied to validate SESAR.

Episode 3 shall select a list of exercises for validation, using these inputs, and taking into account the expectations of the contractors, as well as the constraints listed above. The selection process will be done in an open manner and during this process; Alignment to SESAR shall be maintained.

In order to conduct validation, it will be necessary to detail the SESAR concept. This detailing activity shall use SESAR inputs (additional information provided in 2.2.4, 2.2.3 and other SESAR work packages, but uppermost, this detailing activity shall be done with Episode 3 partners. This detailing activity shall also ensure that this refinement does not betray the authors and stakeholders of the SESAR CONOPS by maintaining a close co-operation with SESAR stakeholders.

This process of refinement will necessarily elicit more questions, and identify different interpretations of the concept. This will provide more topics for validation through exercises that will allow to select between various interpretations or to answer specific questions raised in the refinement.

Based on the discussions with stakeholders, it has been decided to concentrate on the initial SESAR time horizon, i.e. the 2020 period. This period has now been redefined by SESAR as the deployment of features of ATM capability 3. Episode 3 shall target the overall validation of the ATM system scheduled to be deployed at this period, and defined as such in SESAR work packages 2.2.4 and 3.3.3.

Some performance work shall also tackle the SESAR target concept (i.e. 2025 and beyond), when we need confirming that the target will bring the expected benefits to deploy intermediate steps. In the same mindset, we shall also look at ATM capabilities to be deployed before 2020 in order to check them

1.3 PROJECT STRUCTURE

Episode 3 is broken into six (6) work packages – WP0 through to EP3 WP5:

- EP3 WP0: Management;
- EP3 WP1: Validation Infrastructure Development;
- EP3 WP2: System Consistency;
- EP3 WP3: Collaborative Planning;
- EP3 WP4: En-Route and Traffic Management;
- EP3 WP5: E-TMA, TMA, and Airport.

The general principle is that each of the validation work packages (i.e. EP3 WP3, EP3 WP4, and EP3 WP5) has four sub-packages (figure 2):

- Management;



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- Requirements;
- Validation; and
- Systems and Technology Validation.

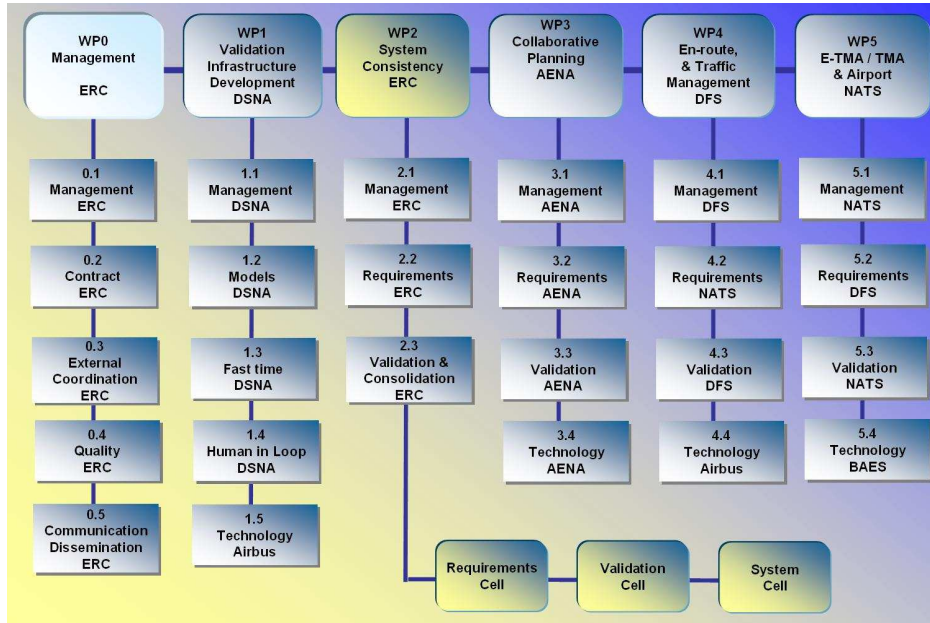


Figure 1 – EP3 Work Breakdown Structure

EP3 WP3, 4, 5 are the validation work packages and they provide the bulk of the validation results of Episode 3.

EP3 WP1 and EP3 WP2 are engineering work packages.

EP3 WP1 is responsible for the provision and development of the validation platforms. Coordinate with the other WP for the required adaptation linked to their validation objective and with SESAR T2.3.2, which studies SESAR validation needs.

EP3 WP2 builds the system view on 6 axes:

- Ensure that validation is designed through a top-down approach, by development of a validation strategy, a common validation framework and performance validation framework;
- Provides a consistent approach to refine the SESAR concept into Detailed Operational Descriptions;
- Conduct system wide performance validation;
- Build a system wide model showing how the various processes interact;
- Develop environmental, safety and human factors cases, and undertake specific assessments in these areas, as well as consolidate the assessments made for related Key Performance Areas in the work packages EP3 WP3, EP3 WP4 and EP3 WP5;
- Assembles the deliverables of the other work packages in system level work-packages that constitute the EC deliverables.



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1.4 PROJECT DELIVERABLES

Each work-package in Episode 3 has defined in the DOW a list of deliverables, associated with target dates for delivery.

Deliverables in Episode 3 include:

- Management plans;
- Periodic reporting;
- Requirements documents;
- Validation plans (one per cycle)
- Validation reports;
- EP3 WP2 "case-type" reports (i.e. transversal reports focusing either on safety, human factors, or environment);
- Consolidated reports developed by EP3 WP2 from the EP3 WP3, EP3 WP4 and EP3 WP5 validation reports.

1.5 WORK PERFORMED AND RESULTS ACHIEVED

During year 1 of the project, a lot of effort has been devoted to the re-alignment of the project objectives to the SESAR CONOPS, which was being defined mid-2007. This alignment to an unstable target, has caused some redrafting of planning and validation documents. The initial description of work has been re-written to cover SESAR priorities, that the project team has studied in collaboration with SESAR experts and stakeholders.

In parallel to this re-alignment, management procedures have been set up, and the project plans for all work packages have been issued. Co-ordination between work packages has been set up under the guidance of WP2. The validation strategy documents have been issued in all work packages and consolidated in a global validation strategy (under finalisation at the end of year 1.

The Detailed Operational Descriptions, initially scheduled to be provided in draft forms at the beginning of the project, could only be started once the SESAR concept was sufficiently stabilised, and only available in February 08. This constitutes a first version, that need to be improved with the description of scenarios and use case developed in all validation work packages.

In all validation work packages, expert groups have started to identify validation issues and provided information to develop their operational scenarios.

A number of experimental plans have been developed or are well progressed.

Development of fast time simulation tools modification for the project are well progressed, and the development of the technology validation platforms for WP 4.4 and WP 5.4 is also well progressed, with integration of the TH-AV FMS simulator into the Airbus EPOPEE cockpit simulator completed, and integration of software components of the ground platform.

The technology validation work has started with 2 meetings to define the validation scenario to be used.

1.6 EXPECTED END RESULTS, INTENTIONS FOR USE AND IMPACT

Episode 3 will provide

- A first assessment of the SESAR concept in the area of collaborative planning, airport management, Enroute, TMA.;

- Feasibility results on technology enablers concerning 4D and ASAS;
- First instance of a performance framework pioneering a performance based approach in a concept validation;
- Feedback on the use of E-OCVM for validation of a global ATM concept;
- Investigation of new validation tools, such as gaming platform, process modelling, influence diagrams, macro-modelling, expert and prototyping sessions;
- Initial results including performance and operability assessments to be expanded by the full SESAR validation that will be undertaken by the SESAR JU; and
- Details of the SESAR concept supported by the project validation activities.

1.7 THE EPISODE 3 CONSORTIUM

The consortium is composed of a complementary list of partners:

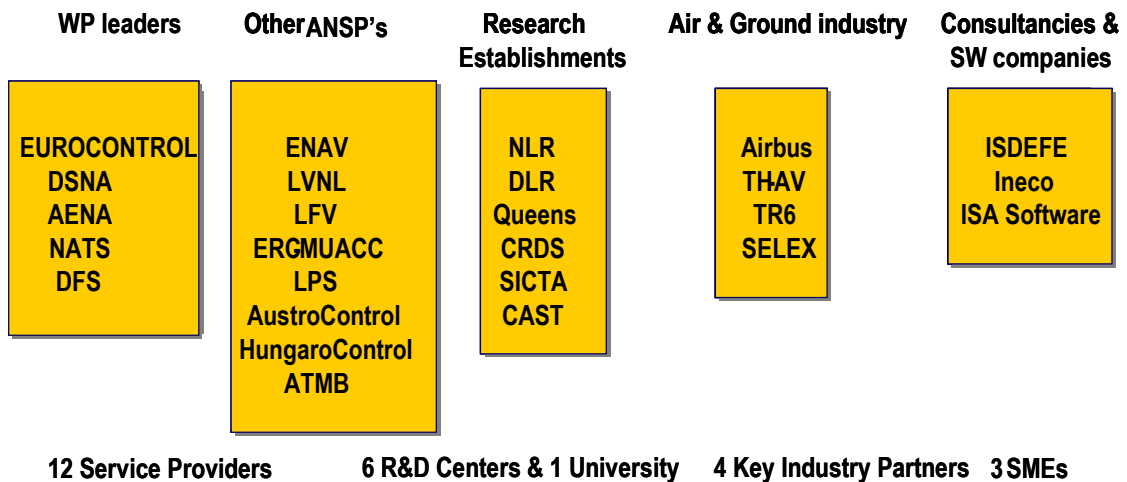


Figure 2 - Episode3 Consortium Composition

The project is being co-ordinated by EUROCONTROL Experimental Centre.

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More information can be found on EPISODE 3 web site: www.episode3.aero

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17	SICTA	SICTA	Mario CIABURRI <i>mciaburri@sicta.it</i>
18	none		none
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20	TR6	THALES AIR SYSTEMS S.A.	Franck LELIDEC <i>Franck.lelidec@thalesatm.com</i>



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23	CAST	Civil Aviation Authority of China Centre of Aviation Safety Technology	Liling YU <i>yull@mail.castc.org.cn</i>
24	ACG	AustroControl	Martin STIEBER <i>Martin.stieber@austrocontrol.at</i>
25	HGC	HungaroControl	Barnabas KIS <i>Kis.barnabas@hungarocontrol.hu</i>
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Table 2 - List of Contractors in the Consortium

1.8 DISSEMINATION ACTIVITIES

A website has been launched in the Summer 2008, and will be used to present our publishable results, www.episode3.aero.

A workshop has been organised with representatives of the airlines involved in the SESAR definition phase. This workshop was performed in order to ensure the user community knows about the project and has an opportunity to provide inputs in the setting up of our main objectives. This workshop was very useful in order to help us define our focus areas.

Meetings with the CIT and the SESAR EXCOM in September 2007 have allowed to present the project objectives.

We have participated in the FP6 projects workshop organised by the European Commission in November 2007.:

Episode 3 has been presented during the ERASMUS user forum the 21-22 January 2008.



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