SESAR Solution #118 - SPR/INTEROP-OSED - Part V - Performance Assessment Report

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BASIC EXTENDED ATC PLANNING FUNCTION

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Abstract

This document provides the Performance Assessment Report (PAR) for **Solution #118**: **Basic EAP (Extended ATC Planning) function.**

The basic EAP (*b*EAP) function concept describes an **automated tool supporting the basic communication** between the Local DCB position and the Controllers' Work Positions to be deployed in En-route operating environments of **Medium** and **High complexity**.

The basic EAP function is expected to facilitate the implementation of ATFCM measures to better match capacity to predicted demand and to reduce the complexity of traffic presentation in order to suit available capacity.

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1 Executive Summary

This document provides the Performance Assessment Report (PAR) for **Solution #118**: **Basic EAP (Extended ATC Planning) function.**

DISCLAIMER

This PAR presents the Performance assessment results from the SESAR1 validation exercise VP-687 performed in Reims ACC in June 2015 by the project P04.07.08. This issue of the PAR has been prepared in order to meet the requirements of a SESAR Solution datapack for V3 phase; it is however the simple adaptation of the existing results presented in the V3 Validation Report for exercise VP-687 [44].

Description:

The basic EAP function is expected to facilitate the implementation of ATFCM measures to better match capacity to predicted demand and to reduce the complexity of traffic presentation in order to suit the available capacity.

The Basic EAP (Extended ATC Planning) concept consists in the definition of an automated tool supporting the basic communication between the Local DCB position and the Controllers' Work Positions to be deployed in En-route operating environments of Medium and High complexity.

The PAR is consolidating Solution performance validation results addressing KPIs/PIs and metrics from the SESAR2020 Performance Framework.

More Information can be found in Chapter 2!

Assessment Results Summary:

The following table summarises the assessment outcomes per KPI and puts them side-by side to Validation Targets from PJ19:

- An assessment result of **0** with confidence level **N/A**, for not applicable, indicates that the Solution is **not expected to impact the KPI**;
- An assessment result of 0 with confidence level other than N/A means that the Solution was expected to (possibly) impact the KPI but has been assessed not to do so.

KPI	Validation Targets – Network Level (ECAC Wide)	Performance Benefits Expectations at Network Level (ECAC Wide)[1]	Confidence in Results[2]
FEFF1: Fuel Efficiency – Fuel burn per flight		0	N/A
CAP1: TMA Airspace Capacity – Throughput / airspace volume & time		0	N/A
CAP2: En-Route Airspace Capacity – Throughput / airspace volume & time	**+6,50%**	**0**	**N/A**
CAP3: Airport Capacity – Peak runway throughput (mixed mode) flights/hour		0	N/A
PRD1: Predictability – Flight duration variability, against RBT		0	N/A
PUN1: Punctuality – % AOBT within +/- 3 minutes of SOBT	**-**	*****	**High**
RES1: Airport Resilience – % avoided loss of capacity		0	N/A
RES2: Airspace Resilience – % Avoided loss of capacity		0	N/A
CEF2: ATCO Productivity – Flights per ATCO hour	**+2,50%**	**+2%**	**High**
CEF3: Technology Cost – Cost per flight		0	N/A

Table 1: KPI Assessment Results Summary

[1] Negative impacts are indicated in red.

[2] High – the results might change by +/-10%
Medium – the results might change by +/-25%
Low – the results might change by +/-50% or greater
N/A – not applicable, i.e., the KPI cannot be influenced by the Solution

2 Introduction

2.1 Purpose of the document

The Performance Assessment covers the Key Performance Areas (KPAs) defined in the SESAR2020 Transition Performance Framework [7], with the exception of Safety, which is discussed in a dedicated assessment report. Assessed are at least the Key Performance Indicators (KPIs) and the mandatory Performance Indicators (PIs), but also additional PIs as needed to capture the performance impacts of the Solution. It considers the guidance document on KPIs/PIs [3] for practical considerations, for example on metrics.

The purpose of this document is to present the performance assessment results from the validation exercises at SESAR Solution level. The KPA performance results are used for the performance assessment at strategy level and provide inputs to the SESAR Joint Undertaking (SJU) for decisions on the SESAR2020 Programme.

In addition to the results, this document presents the assumptions and mechanisms (how the validation exercises results have been consolidated) used to achieve this performance assessment result.

One Performance Assessment Report shall be produced or iterated per Solution.

DISCLAIMER

This PAR presents the Performance assessment results from the SESAR1 validation exercise VP-687 performed in Reims ACC in June 2015 by the project P04.07.08. This issue of the PAR has been prepared in order to meet the requirements of a SESAR Solution datapack for V3 phase; it is however the simple adaptation of the existing results presented in the V3 Validation Report for exercise VP-687 [44].

2.2 Intended readership

The intended audience for this PAR is:

- The SESAR performance management process is PJ19, which will collect and combine KPI results at network level, and provide the data to PJ20 for considering the performance data for the European ATM Master Plan;
- The key stakeholders targeted by the Solution, i.e.
    - Airspace Users who will be directly impacted by the deployment of the *basic* EAP function in En-Route airspace;

- Air Traffic Controllers who will benefit from a smoothed workload and less complex traffic situations thanks to the STAM or decomplexification measures enabled by the *basic* EAP function, especially in hotspot areas;

- SESAR 2020 PJ09.02 members
- SESAR 2020 Projects developing solutions that can benefit from the deployment of the *basic* EAP function.

2.3 Inputs from other projects

PJ19 will manage and provide common assumptions and aggregation assumptions which are needed for producing this report.

2.4 Glossary of terms

See the AIRM Glossary [1] for a comprehensive glossary of terms.

2.5 Acronyms and Terminology

Term	Definition
ANS	Air Navigation Service
ANSP	Air Navigation Service Provider
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
BAD	Benefits Assessment Date
BAER	Benefit Assessment Equipment Rate
BIM	Benefit and Impact Mechanism
CBA	Cost Benefit Analysis
DOD	Detailed Operational Description
E-ATMS	European Air Traffic Management System
ECAC	European Civil Aviation Conference
DB	Deployment Baseline
KPA	Key Performance Area
KPI	Key Performance Indicator

N/A	Not Applicable
OI	Operational Improvement
PAR	Performance Assessment Report
PI	Performance Indicator
PRU	Performance Review Unit
QoS	Quality of Service
RBT	Reference Business / Mission Trajectory
SESAR	Single European Sky ATM Research Programme
SJU	SESAR Joint Undertaking (Agency of the European Commission)
SESAR2020 Programme	The programme which defines the Research and Development activities and Projects for the SJU.

Table 2: Acronyms and terminology

3 Solution Scope

3.1 Detailed Description of the Solution

The SESAR **Solution #118 - Basic EAP (Extended ATC Planning) function** is defined in the applicable version of EATMA (Dataset 18) as follows:

Solution #118 — Basic EAP (Extended ATC Planning) function

The basic Extended ATC Planner aims at bridging the gap between Air Traffic Flow and Capacity Management (ATFCM) and Air Traffic Control (ATC) providing real-time and fine-tuning measures to solve ATFCM hotspots and to perform early measures to alleviate complexity closest to ATC activities.

The solution consists of an automated tool and associated procedures supporting the basic communication between the Local DCB position and the Controllers' Work Positions allowing the EAP and the ATC team in identifying, assessing and resolving local complexity situations. The basic EAP relies on a real time integrated process for managing the complexity of the traffic with capability to reduce traffic peaks through early implementation of fine-tuned solutions to solve workload imbalances at the local level, compatible with the short term timeframe of execution phase of the flights.

Operational improvement and expected benefits

The basic EAP (Extended ATC Planning) function introduces an **initial automated interface** together with the related procedures that will facilitate the communication between local DCB position and the Controllers' Work Positions through the provision of optimised solutions to solve workload imbalances compatible with the short term timeframe of execution phase of the flights.

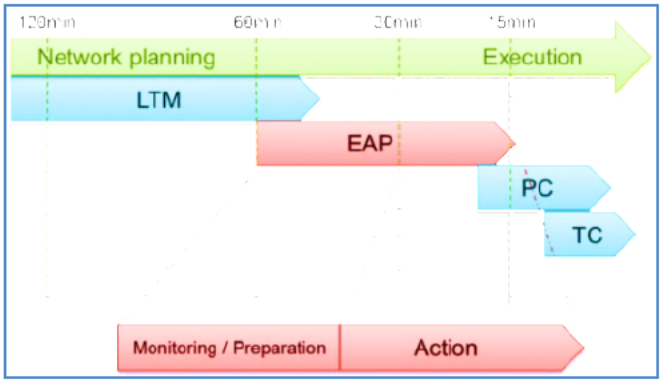

Figure 1: The EAP role fills the gap between ATFCM and ATC

The basic EAP concept introduces also a **new role**, the EAP role (Extended ATC Planning), which is intended to **fill the gap between ATFCM and ATC** as illustrated on Figure 1 above:

- The **EAP is not an additional staff**: it is a **role** covering a set of services/functions that can be assumed by different personnel of the ATSU (already existing actors, like TC or new actors like MSP or LTM);

- It is **highly recommended** that the EAP is holding or has held an **ATCO rating** in the concerned ATSU's airspace

The main benefits expected from the basic EAP function are principally:

- To help providing a better service to airspace users through **reduced delays**, **better punctuality**, less **ATFCM regulations**, whilst maintaining or even **increasing safety**.
- To **increase the controllers' productivity** contributing thus to increase of the overall en-route **capacity** of the ACC.

In addition, the basic EAP concept can be considered as a **potential enabler** for the deployment of functionalities such as **Extended AMAN** or **Free Routing** operations.

3.2 Detailed Description of Interactions with other Solutions

N/A

3.3 Detailed Description and Issues of the OI Steps

OI Step ID	Title	Step	Consistency with latest Dataset
CM-0106	Initial support to INAP: basic EAP (Extended ATC Planning) function	1	Dataset 18

Table 3: OI Steps allocated to the Solution

3.4 List of Enablers

The enablers considered essential by the Solution project are provided below.

Enabler ID	Title	Related OI Step ID	Consistency with latest Dataset
ER-ATC-164	ATC tools to re-organize traffic flows to reduce complexity **in the execution phase**	CM-0106	Dataset 18
PRO-220a	ATC Procedures related to Detection and Resolution of Complexity, Density and Traffic Flow Problems	CM-0106	Dataset 18
PRO-220b	FCM procedures to describe how detection and resolution of complexity, density or traffic flow issues are managed.	CM-0106	Dataset 18

Table 4: Essential Enablers

Note on the OIs and Enablers linked to the Solution #118

The EAP concept has been initially developed by DSNA within SESAR 1 P04.07.08 (OIS CM-0104-A) and validated through the exercise VP-687 in Reims ACC in June 2015 as part of **Solution #19** in **R5**.

However, the R5 review has stated that the OIS **CM-0104-A** has only been **partly addressed** in Solution #19 in R5, and that consequently there was *"a need to submit a CR in Dataset 18 in order to review the scope of CM-0104-A, PRO-220a and PRO-220b (i.e. only address Traffic complexity resolution in the planning phase). The backlog of CM-0104-A, PRO-220a and PRO-220b should also be addressed by a CR in DS17."* The OIS **CM-0104-B** addresses the full EAP concept which is currently developed by **PJ9.02** in which DSNA is involved. In this context, DSNA has discussed with SJU the possible solutions to follow the recommendations of R5 review regarding the OIS CM-0104-A.

The following updates of the EATMA have therefore been decided:

- The creation of a specific solution (#118) to cover the part not covered by solution #19;
- The creation of a specific OIS, **CM-0106**, to cover the part of OIS CM-0104-A not properly addressed in solution #19 and
- The creation of a specific enabler **ER-ATC-164** attached to **CM-0106.**

The results of these changes for solution #118 are illustrated on Figure 2 below.

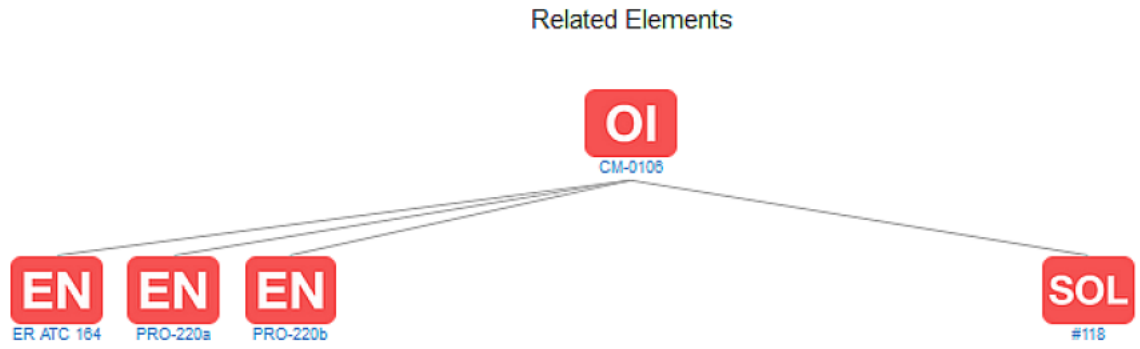

Figure 2: Solution #118 – Related OI and Enablers

4 Solution#118 Performance Assessment

4.1 Assessment Sources

No SESAR 2020 Validation Exercise is planned for Solution #118.

The previous Validation Exercises (pre-SESAR2020) relevant for this assessment are listed below.

Organisation	Document Title	Publishing Date
DSNA	04.07.08 - D78 - Validation Report **V2** VP-687, Edition 00.01.02 ([42]	23/03/2016
DSNA	SESAR Solution#118 – Validation Report **V3** - Basic Extended ATC Planning – 00.01.00 ([44])	31/01/2018

Table 5: Pre-SESAR2020 Exercises

The two VALRs listed above in Table 5 describe the results of the validation exercise **VP687** (as defined in the relevant Validation Plan [41]) prepared by the project P04.07.08) and performed by DSNA in June 2015 in the Reims UAC. To achieve a **V3 maturity level**, the VP687 VALR (D78) has been enriched with the outcomes from the **4ME system**, a tool **operationally deployed in Reims UAC since 2016**, which is used as an enabler for *basic* EAP (to display information on CWPs).

The objectives of the validation exercise VP687 were:

1. To assess the added value of the EAP role for the management of hotspots regarding the following aspects:
   - Human performance, and
   - Capacity
2. To assess the roles and responsibilities of the different actors involved in the STAM process.
3. Exercise VP687 contributed to validate OFA 05.03.04 "Enhanced ATFCM Processes" and more precisely covered OI **CM-0106** "*Initial support to INAP: basic EAP (Extended ATC Planning) function*".
4. Project B04.01 has defined the following Validation targets for the OFA:

KPA01.01	Safety	SAF1	% Change in accidents and incidents with ATM contribution per year	-1,89%
KPA02.01	Environment - Fuel Efficiency	ENV1	% Change in average fuel burn per flight	-0,05%
KPA03.01	Airspace Capacity - TMA	CAP1	% Change in TMA throughput per time unit (challenging airspace)	3,00%
KPA03.02	Airspace Capacity - En-Route	CAP2	% Change in En-Route throughput per time unit (challenging airspace)	6,50%

KPA03.03	Airport Capacity	CAP3	% Change in busy hour declared capacity at best-in-class airports	0,00%
KPA05.01	Predictability	PRD1	% change in variance of differences between actual and flight plan or RBT durations	0,00%
KPA06.01	Cost Effectiveness - ATCO Productivity	CEF2	% Change in flights per ATCO-hour on duty	2,50%

Table 6: B04.01 Validation targets for OFA05.03.04

In this scope, VP687 investigated the following KPAs:

- Safety;
- Airspace Capacity – En-route;
- Predictability and more precisely the new KPA defined by B05: Punctuality;
- Cost Effectiveness was only partially addressed.

4.2 Conditions / Assumptions for Applicability

4.2.1 Benefits Assessment Date (BAD)

The technical solution recommended for the basic EAP function support tools is not fully integrated into the operational equipment and systems deployed in an ACC as illustrated on the Figure 3 below.

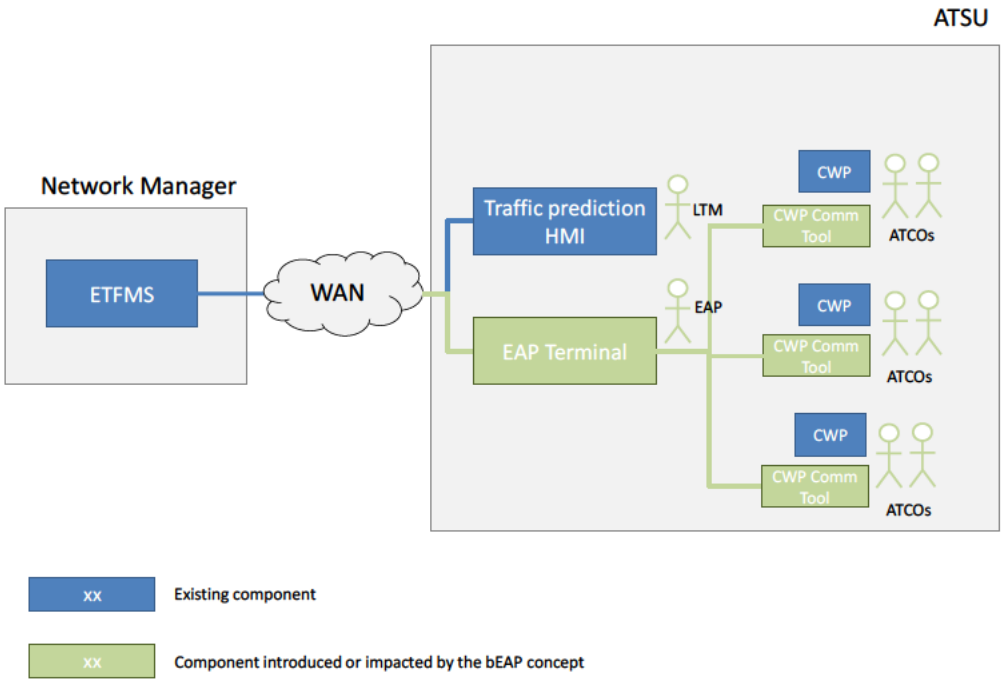

Figure 3: The Solution #118 — Basic EAP (Extended ATC Planning) function

Indeed, the basic EAP support tool is based on software used to fulfil communication needs between the EAP role and the CWPs; therefore it does not necessarily require to be integrated in the existing operational environment and hence will not require expensive and time-consuming safety studies.

Taking account of the time required by the industry to develop a commercial solution, it is assumed that the operational implementation of the basic EAP function should be possible from early 2020 and onwards. This analysis allows concluding that the timeframe up to the Initial Operational Capability (IOC) should be relatively short. It is also assumed that the Full Operational Capability (FOC) should occur the same year.

Hence the Benefits Assessment Date (BAD) is considered to be **2020**.

4.2.2 Operating Environments (OE)

The Solution #118 - Basic EAP (Extended ATC Planning) function is defined with reference to **En-route operating environments of Medium and High complexity.**

The following Table 7 summarises the applicable operating environments.

OE	Applicable sub-OE	Special characteristics
En Route	En-Route High-Complexity	In the PRR 2013 [47] , these operating environments are defined according to complexity and traffic volume by a **traffic complexity score** which is as follows: • En-Route High Complexity: traffic complexity score higher than 6 • En-Route Medium Complexity: traffic complexity score higher than 2 but lower than 6. This complexity indicator is therefore representative of the level (and characteristics) of the traffic demand in the airspace (and the need for Enhanced DCB including Complexity Management at regional/sub-regional/local level and/or Enhanced Conflict Management and Automation at local level).
	En-Route Medium-Complexity	

Table 7: Applicable Operating Environments

4.2.3 Geographical Scope

The Solution #118 - Basic EAP (Extended ATC Planning) function is defined for En-route operating environments of Medium and High complexity, with the aim to decrease the traffic complexity level and cope with high level traffic demand through the assessment and resolution of local complexity situations.
In the PRR 2013 [47] , these operating environments are defined according to complexity and traffic volume by a **traffic complexity score** which is as follows:

- En-Route High Complexity: traffic complexity score higher than 6

- En-Route Medium Complexity: traffic complexity score higher than 2 but lower than 6.

This complexity indicator is therefore representative of the level and characteristics of the traffic demand in the airspace and the need for Enhanced DCB including Complexity Management at regional/sub-regional/local level and/or Enhanced Conflict Management and Automation at local level.

The validation results obtained for the bEAP function in the Reims ACC (score between 7 and 8) correspond to a **high complexity En-route environment**.

In order to properly extend these results at ECAC level, it is necessary to consider a geographical scope that will encompass the ACCs managing traffic of similar complexity. Hence the geographical scope of the CBA will focus on high complexity and/or high demand ACCs. The analysis of the Monthly Annual Network Operations Reports [50] and of the Performance Result Report [51] allows identifying the 12 ACCs with the highest delays (See Table 8) that will be used to extend the results at ECAC level.

The following Table 8 summarises the essential deployment details.

Benefits Assessment Date (BAD)	Specific geographical and/or stakeholder deployment
2020[3]	Main target is en-route operating environments of Medium and High complexity ACCs managing traffic complexity similar to Reims UAC (i.e. high complexity and/or high demand ACCs)

Geographical scope of the Benefit Assessment
ATHINAI & MACEDONIA
BARCELONA
BREST UACC
KARLSRUHE UAC
LANGEN ACC
LISBOA ACC UAC
MAASTRICHT UAC
NICOSIA ACC
PARIS ALL ACC
REIMS UACC
WARSZAWA ACC
ZAGREB ACC

Table 8: Deployment details

The quantification of benefits takes also into account the traffic evolution forecast based on the STATFOR analysis of published in February 2017. According to this Medium-term traffic forecast, the most-likely of the 3 scenarios forecast for 2023 is 11.6 million annual IFR flight movements in Europe, which represents **17.2% more than in 2015.**

[3] See Cost Benefits Analysis for Solution#118 ([46])

The Table 9 below presents the forecasted annual growth rate for the 12 ACCs that define the geographical scope for the benefits assessment.

Geographical Scope	STATFOR annual growth forecast (2017-2023)
ATHINAI & MACEDONIA	3.2%
BARCELONA	3%
BREST U ACC	1.8%
KARLSRUHE UAC	1.7%
LANGEN ACC	1.7%
LISBOA ACC UAC	2.5%
MAASTRICHT UAC	1.4%
NICOSIA ACC	4.4%
PARIS ALL ACC	1.8%
REIMS U ACC	1,8%
WARSZAWA ACC	3.0%
ZAGREB	2.6%

Table 9: Forecasted annual growth rate per selected ACC (Source STATFOR 2017)

4.3 Summary of Validation Exercise Performance Results

The following table provides a summary of information collected from available performance outcomes.

Exercise	OI Step	Exercise scenario & scope	Performance Results	Notes
VP-687	CM-0106 Initial support to INAP: basic EAP (Extended ATC Planning) function	**Reference scenario** consisting in a simple recording of the actual operations in Reims UAC without the basic EAP function.	• 39 STAM requests were performed	Traffic values were similar for the two scenarios
		Solution scenario integrating the EAP role and its associated tools	• 52 STAM requests performed by the EAP. • **No capacity gain/reduction** obtained during the exercise • **The total delay** on measured sectors was dropped down by **65%** • Sight improvement of the Cost Effectiveness due to better ATCO productivity (+2% measured as "Flights	

			per En-Route ATCO-hour") • Working method clear and widely accepted **among controllers**: Working with an electronic device (the CWP tool) was preferred to the paper method • **LTM workload** slightly increased compared to the usage of CHMI	

Table 10: Summary of Validation Results.

4.4 Environment / Fuel Efficiency

N/A

4.5 Environment / Noise and Local Air Quality

N/A

4.6 Airspace Capacity (Throughput / Airspace Volume & Time)

4.6.1 Performance Mechanism

The Benefit and Impact Mechanism illustrated on Figure 4 and Figure 5 below has been investigated for Solution #118.

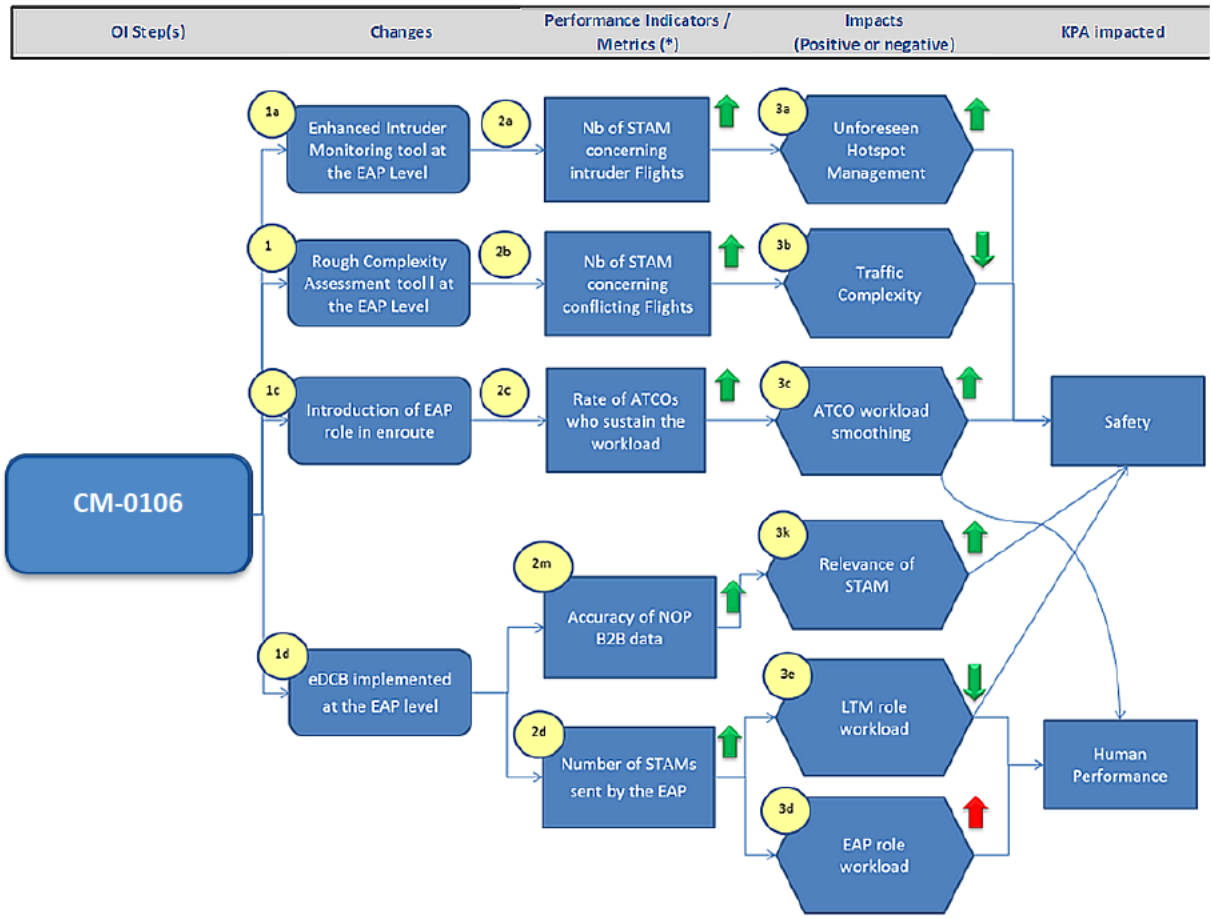

Figure 4: Solution #118 Benefit and Impact Mechanism - Part 1

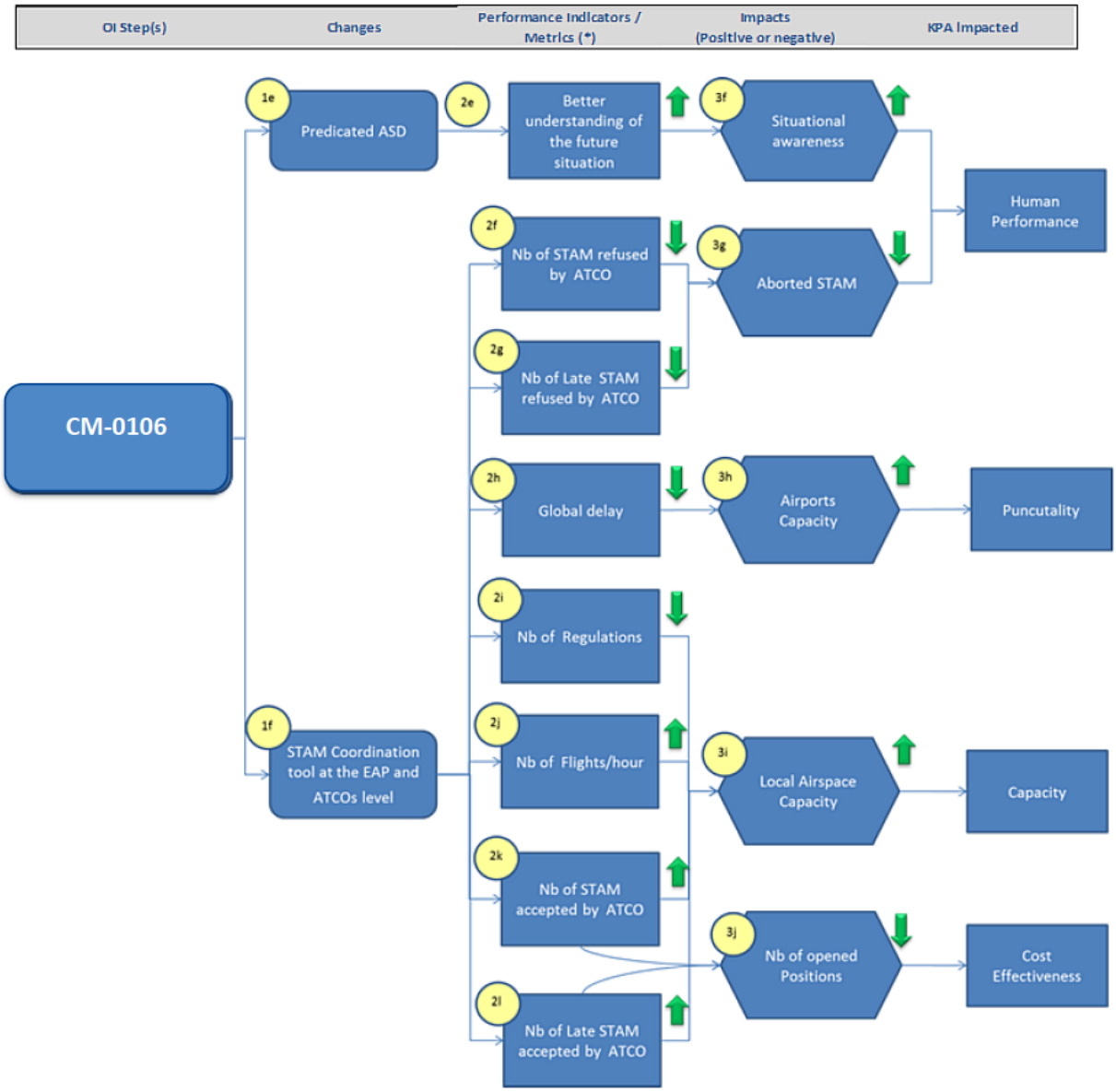

Figure 5: Solution #118 Benefit and Impact Mechanism - Part 2

In respect to **(Airspace) Capacity**, the following mechanisms apply:

(1f) The STAM coordination tool will replace pieces of paper physically brought by the LTM to the CWP. It is a key tool to ease the management of the whole STAM process.

(2i), (2j), (2k) and (2l) Thanks to a better STAMs coordination with the tool, the number of implemented standard or late STAM will increase, then the number of local regulations will consequently decrease and the number of flights/hour will increase

(3i) This will improve the local En Route Airspace Capacity which links to **Capacity**.

4.6.2 Assessment Data (Exercises and Expectations)

The exercise VP687 attempted to demonstrate *inter alia* that:

- The EAP role contributes to increase controllers' productivity by increasing **overall capacity** of the UAC;
- The EAP role brings an improvement in quality of service of ATS through a reduction of regulations, **a capacity increase** and a better punctuality of flights.

The overall methods and techniques used during the exercise VP-687 were as follows:

- Observation during the sessions from HF specialists
- Specific questionnaires to the participant controllers & FMPs
- Sessions debriefing
- Data logging and log analysis.

The following metrics have been logged during the experimentations.

[2]	Identifier
	Traffic volume
	Start time
	End time
	Flight List with all data in an array
	Deletion time
	Creation time
	Use of the hour sorting function : value of the time frame
	Use of criterions of flights sorting 1, 2 and 3
	Use of the function Update Flight List Hot spot
STAM	Identifier
	Hot spot identifier
	Selected flight id
	Selected flight trajectory
	Cross sectors (Reims sectors)
	Entry/Out time of crossed sectors
	STAM Type
	STAM Value
	Implementing Sector
	Time sending implementing sector
	Time sending back implementing sector at each sending back
	Late STAM?
	off loaded sector
	on loaded sector
	Time sending on loaded sector
	Deletion time
Tablet	STAM Identifier
	Late STAM?
	Display Time
	Answer Time
	Answer value
	No answer

Table 11: Exercise VP-687 – Metrics logged

Regarding **Capacity**, the rationale was that it could be increased thanks to the better traffic conditions created by the increased STAMs coordination enabled by the basic EAP function. Indeed, as the number of STAM would increase, the number of local regulations would then decrease allowing thus more flights per hour.

Hence, Capacity variations have been evaluated through the measure of the **Entry counts per hour** on the entire Reims airspace (i.e. the number of flights entering Reims airspace in one hour).

As shown on Table 12 below, the maximum scores observed during the trials are almost the same for the reference scenario (without the Basic EAP) and for the solution scenario.

Maximum entry count	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Mean
Reference scenario	178	190	191	219	214	203	**199.2**
Solution scenario	188	195	185	199	214	202	**197.2**

Table 12: Maximum entry count/h on Reims airspace (LFEE)

The small difference existing (1% of reduction for the solution scenario) is considered as non-significant (Student's t-test, p=0, 40) for comparable traffic.

Hence no significant capacity gains/loss was demonstrated during the exercise.

4.6.3 Aggregation

The overall rationale to transpose at network (ECAC wide) level the benefit values obtained at Solution validation level is to apply the filters described in section 4.2 regarding:

- The **operating environment** (i.e. Medium and High complexity En-route) and
- The **geographical scope** (i.e. the list of the 12 ACCs managing traffic of similar complexity than Reims ACC that could deploy the basic EAP function in order to generate the maximum benefits at ECAC level).

Based on the metrics obtained in the Reims ACC for the KPI, the results can be extrapolated to the 12 selected ACCs taking account their respective percentage of the managed traffic.

In the context of the CBA, the extrapolation shall be calculated over the number of years of operations retained for the Solution #118, taking into account the specific traffic forecast available for each ACC of the list for the considered period.

4.6.4 Discussion of Assessment Result

N/A

4.6.5 Additional Comments and Notes

N/A

4.7 Airport Capacity (Runway Throughput Flights/Hour)

N/A

4.8 Resilience (% Loss of Airport & Airspace Capacity Avoided)

N/A

4.9 Predictability (Flight Duration Variability, against RBT)

N/A

4.10Punctuality (% Departures < +/- 3 mins vs. schedule due to ATM causes)

4.10.1Performance Mechanism

The BIM investigated for Solution #118 is illustrated on Figure 4 and Figure 5. In respect to **Punctuality**, the following mechanisms apply:

(1f) The STAM coordination tool will replace pieces of paper physically brought by the LTM to the CWP. It is a key tool to ease the management of the whole STAM process.

(2h) The Overall delay at ACC level will decrease, thanks to an increase number of implemented STAMs through the use of the coordination tool.

(3h) This will improve the Airports Capacity because the flights will depart on time more often. This links to **Punctuality.**

4.10.2Assessment Data (Exercises and Expectations)

The exercise VP687 attempted to demonstrate *inter alia* that:

- The EAP role contributes to increase controllers' productivity by increasing overall capacity of the UAC;
- The EAP role helps to **better manage hotspot** situations;
- The EAP role brings an improvement in quality of service of ATS through a reduction of regulations, a capacity increase and **a better punctuality of flights.**

Regarding **Punctuality**, the rationale was that it could be increased thanks to the increased STAMs coordination that would contribute to reduce airborne delay. Hence, Punctuality variations have been evaluated through the measure of the **total delay** during the validation exercise. As shown in Table 13, it was observed that the total delay on the measured sectors, dropped down by 57% between the reference scenario and the solution scenario.

Minutes of delay	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Total
Reference scenario	565	45	0	1981	3848	3656	**10095**
Solution scenario	549	0	0	623	2563	690	**4425**

Table 13: Minutes of delay induced by regulations on measured sectors

It is difficult to say that the EAP role and tools were the only cause of this significant improvement. Hence, the improvements on punctuality observed should be considered **as trends** due to the relatively short duration of the exercise.

4.10.3Aggregation

The rationale presented in section 4.6.3 applies.

4.10.4Discussion of Assessment Result

N/A

4.10.5Additional Comments and Notes

N/A

4.11Civil-Military Cooperation and Coordination (Distance and Fuel)

N/A.

4.12Flexibility

N/A.

4.13Cost Efficiency

4.13.1Performance Mechanism

The BIM investigated for Solution #118 is illustrated on Figure 4 and Figure 5. In respect to **Cost-Efficiency**, the following mechanisms apply:

(1f) The STAM coordination tool will replace pieces of paper physically brought by the LTM to the CWP. It is a key tool to ease the management of the whole STAM process.

(2i), (2j), (2k) and (2l) Thanks to a better STAMs coordination with the tool, the number of implemented standard or late STAM will increase, then the number of local regulations will consequently decrease and the number of flights/hour will increase

(3j) As the number of implemented standard or late STAM will increase, there will be less need to split band boxed sectors. This links to **Cost Effectiveness**.

4.13.2Assessment Data (Exercises and Expectations)

The exercise VP687 attempted to demonstrate *inter alia* that:

- The EAP role contributes to increase **controllers' productivity** by increasing overall capacity of the UAC;

Regarding **Cost Efficiency**, the rationale was that it could be increased thanks to the increased STAMs coordination that would improve the ATCOs' productivity. Indeed the results of exercise VP-687 show a positive increase of **2%** of the ATCOs' productivity (CEF2.3 Flights per En-route ATCO-Hour) compared to the reference scenario.

This metric has been obtained as follows:

During the exercise, based on the sector opening logs maintained by Reims UAC for post operational use, the **number of ATCO-Hours** has been recorded (see Table 14), considering that each sector is controlled by 2 ATCOs.

ATCO hours	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Total
Reference scenario	278.4	286.2	303.7	293	330.6	299.7	**1791.6**
Solution scenario	274.8	297.2	281.9	312.6	300.5	287.9	**1754.9**

Table 14: ATCO hours on duty at Reims UAC

The number of ATCO-Hours has been then correlated to the number of flights (Table 16) to calculate the KPI CEF2.3 "number of **Flights per En-Route ATCO-hour**" (Table 15).

CEF2.3 Flights per En-route ATCO-Hour	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Mean
Reference scenario	9.159	9.158	8.719	9.133	8.413	9.275	**8.976**
Solution scenario	9.403	9.173	9.402	8.905	8.779	9.201	**9.144**

Table 15: Flights per En-route ATCO-Hour (CEF2.3)

Date	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Mean/day
REFERENCE SCENARIO							
Declared # of sectors	15	16	15	15	15	14	15
# of flights	2550	2621	2648	2676	2781	2780	2676
SOLUTION SCENARIO							
Declared # of sectors	15	16	15	16	15	14	15
# of flights	2584	2726	2650	2784	2638	2649	2672

Table 16: Traffic values for LFEE during the exercise

Traffic values were nearly identical during both scenarios for the same offer of sectors (-0,15% of traffic in the solution scenario). The maximum values in both scenarios were also identical (2781 vs. 2784), avoiding a too strong impact of the extreme values during result analysis.

Even if the traffic repartition is not known (which part of the traffic crossed the sectors under test), the reference and the solution scenarios are comparable.

4.13.3Aggregation

The rationale presented in section 4.6.3 applies.

4.13.4Discussion of Assessment Result

N/A

4.13.5Additional Comments and Notes

N/A

4.14Airspace User Cost Efficiency

N/A

4.15Security

N/A

4.16Human Performance

The Human Performance assessment is presented in the Human Performance Assessment Report describes the results of the Human Performance assessment work for the Solution #118 ([44]).

4.17Other PIs

N/A

4.18Gap Analysis

N/A

5 References

5.1 Applicable Documents

[1] 08.01.03 D47: AIRM v4.1.0

[2] B05 Performance Assessment Methodology for Step 1

[3] B.05 D86 Guidance on KPIs and Data Collection support to SESAR 2020 transition.

[4] B.05 Guidance for Performance Assessment Cycle 2013

[5] B05 Updated Performance Assessment in 2015

[6] B05 Data Collection and Repository Cycle 2015

[7] B.04.01 D108 SESAR 2020 Transition Performance Framework

Content Integration

[8] B.04.01 D138 EATMA Guidance Material

[9] EATMA Community pages

[10]SESAR ATM Lexicon

Content Development

[11]B4.2 D106 Transition Concept of Operations SESAR 2020

System and Service Development

[12]08.01.01 D52: SWIM Foundation v2

[13]08.01.01 D49: SWIM Compliance Criteria

[14]08.03.10 D45: ISRM Foundation v00.08.00

[15]B.04.03 D102 SESAR Working Method on Services

[16]B.04.03 D128 ADD SESAR1

[17]B.04.05 Common Service Foundation Method

Performance Management

[18]B.04.01 D42 SESAR2020 Transition Validation

[19]16.06.06-D68 Part 1 –SESAR Cost Benefit Analysis – Integrated Model

[20]16.06.06-D51-SESAR_1 Business Case Consolidated_Deliverable-00.01.00 and CBA

[21]Method to assess cost of European ATM improvements and technologies, EUROCONTROL (2014)

[22]ATM Cost Breakdown Structure_ed02_2014

[23]Standard Inputs for EUROCONTROL Cost Benefit Analyses

[24]16.06.06_D26-08 ATM CBA Quality Checklist

[25]16.06.06_D26_04_Guidelines_for_Producing_Benefit_and_Impact_Mechanisms

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[26]03.00 D16 WP3 Engineering methodology

[27]Transition VALS SESAR 2020 - Consolidated deliverable with contribution from Operational Federating Projects

[28]European Operational Concept Validation Methodology (E-OCVM) - 3.0 [February 2010]

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[29]SESAR Requirements and V&V guidelines

Safety

[30]SESAR, Safety Reference Material, Edition 4.0, April 2016

[31]SESAR, Guidance to Apply the Safety Reference Material, Edition 3.0, April 2016

[32]SESAR, Final Guidance Material to Execute Proof of Concept, Ed00.04.00, August 2015

[33]SESAR, Resilience Engineering Guidance, May 2016

Human Performance

[34]16.06.05 D 27 HP Reference Material D27

[35]16.04.02 D04 e-HP Repository - Release note

Environment Assessment

[36]SESAR, Environment Reference Material, alias, “Environmental impact assessment as part of the global SESAR validation”, Project 16.06.03, Deliverable D26, 2014.

[37]ICAO CAEP – “Guidance on Environmental Assessment of Proposed Air Traffic Management Operational Changes” document, Doc 10031.

Security

[38]16.06.02 D103 SESAR Security Ref Material Level

[39]16.06.02 D137 Minimum Set of Security Controls (MSSCs).

[40]16.06.02 D131 Security Database Application (CTRL_S)

5.2 Reference Documents

[41]04 07 08-Validation Plan VP-687 , Edition 00.00.07, 01/06/2015

[42]04.07.08 - D78 - Validation Report VP-687, Edition 00.01.02, 23/03/2016

[43]SESAR Solution#118 – SPR/INTEROP/OSED V3 – Basic EAP - Part I Edition 01.00.01, 15/05/2018

[44]SESAR Solution#118 – SPR/INTEROP/OSED V3 - Basic EAP - Part IV – HPAR - Edition 01.00.01, 15/05/2018

[45]SESAR Solution#118 – Validation Report V3 - Basic Extended ATC Planning – Edition 01.00.01, 15/05/2018

[46]SESAR Solution#118 – CBA V3 - Basic Extended ATC Planning – Edition 01.00.01, 15/05/2018

[47]PRR 2013 - Performance Review Report, An Assessment of Air traffic Management in Europe during the Calendar Year 2013, May 2014

[48]PRR 2014 - Performance Review Report, An Assessment of Air traffic Management in Europe during the Calendar Year 2014, May 2015

[49]PRR 2016 - Performance Review Report, An Assessment of Air traffic Management in Europe during the Calendar Year 2016, Draft final report, April 2017

[50]EUROCONTROL, Monthly Network Operation Report of 2015

[51]EUROCONTORL, Performance Results Report of 2015

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