Final MTCD/TCT Safety and Performance Requirements_4

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DFS; DSNA; NATS; Honeywell	

Abstract

This document records the activities and results of SESAR WP4.7.2 T099 & T093, which is part of solution #27. T099 & T093 represent the development of safety and performance requirements for concepts involved in the Separation Task in En Route Trajectory based environment, during build 4, E-OCVM lifecycle phase V3. This document records the requirements for only one of the three operational concepts namely the TC aid.

2 Authoring & Approval

Prepared By - *Authors of the document.*		
Name & Company	**Position & Title**	**Date**
███ NATS	███	26/07/2016
███ Think Research on behalf of NATS		26/07/2016

Reviewed By - *Reviewers internal to the project.*		
Name & Company	**Position & Title**	**Date**
███ DSNA	███	14/06/2016
███ NATS		14/06/2016
███ THINK RESEARCH on behalf of NATS		14/06/2016
███ DFS		14/06/2016
███ THALES		14/06/2016
███ EUROCONTROL		14/06/2016
███ HONEYWELL		14/06/2016
███ AIRBUS		14/06/2016
███ DSNA		14/06/2016
███ DSNA		14/06/2016

Reviewed By - *Other SESAR projects, Airspace Users, staff association, military, Industrial Support, other organisations.*		
Name & Company	**Position & Title**	**Date**
███ NATS	███	01/07/2016
███ NATS		01/07/2016
███ INDRA		01/07/2016
███ HONEYWELL		01/07/2016
███ THALES		01/07/2016
███ SELEX		01/07/2016
███ SELEX		01/07/2016
███ EUROCONTROL		01/07/2016
███ THALES		01/07/2016
███ AIRBUS		01/07/2016
███ DSNA		01/07/2016
███ SICTA		01/07/2016
███ DASSAULT		01/07/2016
███ NOVAIR		01/07/2016
███ MINISTERO DELLA DIFESSA		01/07/2016
███ ELFAA		01/07/2016
███ TURKISH AIRLINES		01/07/2016
███ ATCEUC		01/07/2016

███████████ HONEYWELL	████████████████	01/07/2016
██████ DSNA		01/07/2016
██████ EUROCONTROL		01/07/2016
██████ EUROCONTROL		01/07/2016

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Approved for submission to the SJU By - *Representatives of the company involved in the project.*		
Name & Company	Position & Title	Date
<Name / Company>	<Position / Title>	<DD/MM/YYYY>

6

Rejected By - *Representatives of the company involved in the project.*		
Name & Company	Position & Title	Date
<Name / Company>	<Position / Title>	<DD/MM/YYYY>

7

Rational for rejection
None.

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Document History

Edition	Date	Status	Author	Justification
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00.01.01	25/03/2015	Updated Draft		Update following SJU assessment and internal review.
00.01.02	27/04/2015	Updated Draft		Update following internal and external review.
00.01.03	17/06/2015	Update Draft		Update following SAR review.
00.02.00	19/06/2015	Issue		Update for issue to SJU.
00.02.01	27/08/2015	Updated Draft		Updated with the past validation exercises' results for internal review.
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00.03.01	29/01/2016	Updated Draft		Updates following SJU comments
00.03.02	10/06/2016	Update Final Draft		Update following VP-501 and VP-798
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| 00.03.05 | 21/07/2016 | Update Final Draft | | Moved all MTCD requirements to Appendix E. |
| 00.04.00 | 25/10/2016 | Final Issue | | Update following SJU comments |

9 # Intellectual Property Rights (foreground)

10 This deliverable consists of SJU Foreground.

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Executive summary

This version:

This version includes the results of the V3 activities and the assessment of the results of V3 validation exercises.

Foreword: Although 4.7.2 concept includes three Separation Services, requirements for the "CD/R aid to the PC" and the "TRACT" services are not in the main body of this SPR because they have not yet reached V3 maturity. As a consequence, TRACT has been moved to a separate SPR [18] and the requirements related to the PC aid have been moved from the main body of this document to Appendix E.

Scope:

This document records the activities and results of SESAR WP4.7.2 T099 & T093, which is part of solution #27. T099 & T093 represent the development of safety and performance requirements for services involved in the Separation Task in En Route Trajectory based environment, during iteration 4, E-OCVM lifecycle phase V3 based on the concept as described in the OSED_4 [12]. This document is therefore limited in scope to the assessment of the following services in terms of their 'service to aircraft', or functional level. It does not assess the specific implementations proposed for these services at a system or physical level.

The overall concept of P4.7.2 is built around three services and these have been assessed within WP4.7.2 T099 & T093. These are:

- Trajectory Adjustment through Constraint of Time (TRACT);
- Conflict Detection and Resolution Aid to PC (CD/R aid to PC);
- Conflict Detection and Resolution Aid to TC (CD/R aid to TC).

Method:

For the Separation Task in En Route Trajectory based environment, the pre-existing hazards were identified, along with existing mitigations.

For each of the services the assumptions were elicited, and the relevant accident model was identified based on which pre-existing hazard the service effected. The SAfety Criteria (SAC) were then derived by analysing, with respect to each type of relevant accident:

- The contribution to aviation safety of the ATM services;
- The potential impact of the change on that contribution.

Following this V1 work, the services were each analysed in the Success Case and Failure Case. This was done by translating the OSED Operational Requirements (ORs) into a logical model and distilling this model into a set of functional requirements. These functional requirements were then analysed for hazards, and each hazard's severity identified. This resulted in the Safety Objectives (functional requirements for the safe operation of the concept). The requirements were then compared to the Mid-Air Collision En-Route (MAC-ER) Accident Incident Model (AIM) in order to ensure completeness and quantify the requirements.

Results:

The SPR document describes the derived safety requirements for one, out of the three, concept services within project P4.7.2, namely the CD/R aid to TC. It is expected that these requirements will form an input to the later stages of the project and to support the growing maturity of these services. This will include the validation of the achievability of these requirements. It should be noted that this SPR has been conducted on the OSED_4 [12]. Partly as a result of this SPR, the concept and OSED have been the subject of on-going development in parallel with the analysis documented in this SPR.

148 Safety and performance requirements for the CD/R aid to PC service have been recorded in
149 Appendix E of this document. This is due to the CD/R aid to PC tool remains at V2 maturity level.
150 The main body of this SPR includes only the results of the V3 activities which took place in WP4.7.2.

151 For more information about MTCD and conformance monitoring tools please see the SESAR Release
152 5 document [20], Solution 27.

1 Introduction

1.1 Purpose of the document

This Safety and Performance Requirements (SPR) document provides the safety and performance requirements for Application and Information Services related to the operational Processes and Services defined in OSED_4 [12]. The SPR also provides their allocation to service functions and information services.

1.2 Scope

This document supports the operational services and concept elements identified in the Operational Service and Environment Definition (OSED) [12]. These services are expected to be operational (IOC) in the *2016-2018* time frame.

This is a working document, and as such its scope will evolve as it matures. The scope of the current version is limited to the WP4.7.2 operational concept under Build 4, which is within Step 1 of SESAR. In this version the concept is within E-OCVM lifecycle phase V3.
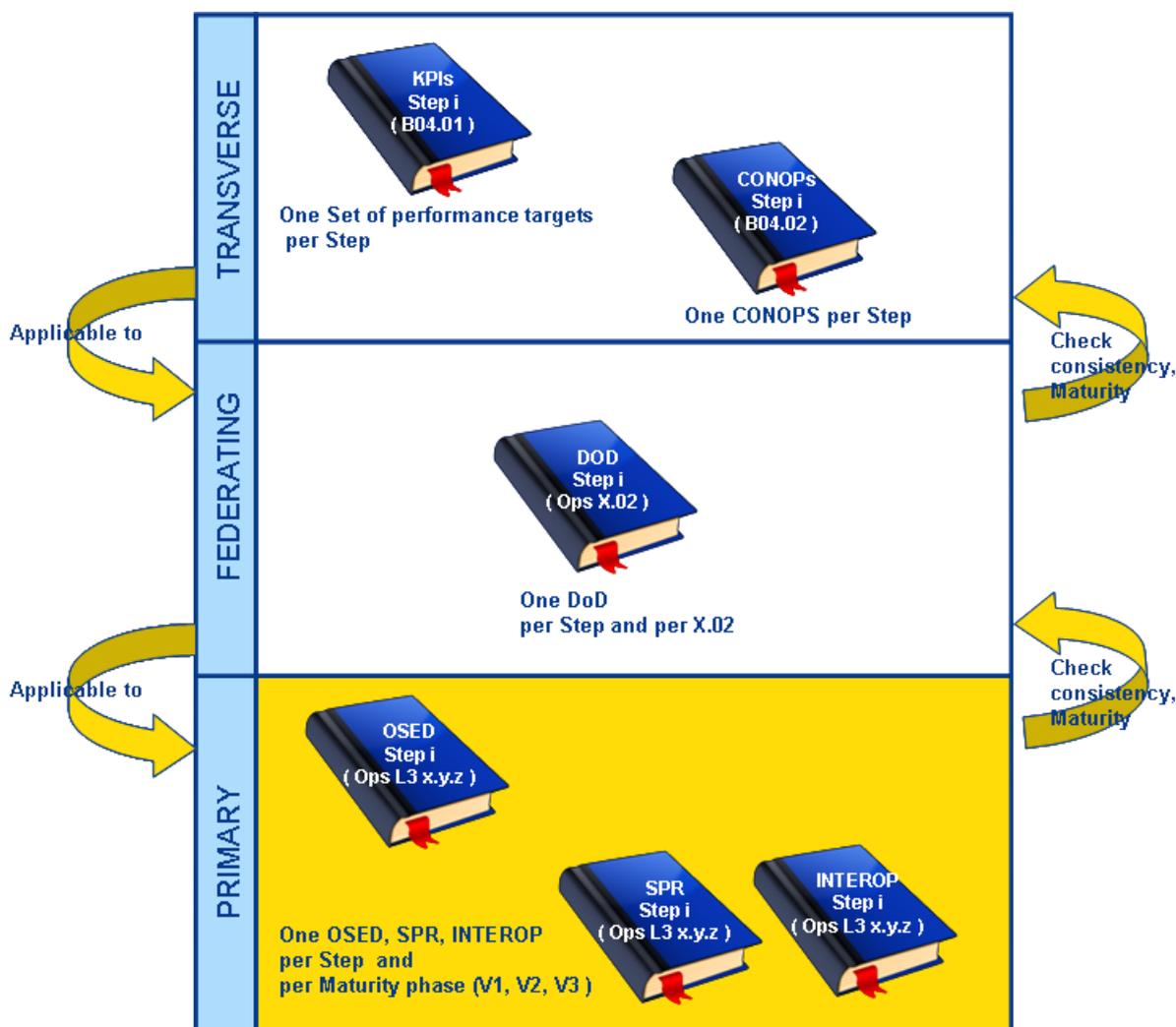
Figure 1: SPR document with regards to other SESAR deliverables

168 In Figure 1, the Steps are driven by the OI Steps addressed by the project in the Integrated Roadmap
169 document [11].

1.3 Intended readership

171 The intended audience for this document are other P04.07.02 team members and also members from
172 P10.04.01 "Enhanced Tools for Conflict Detection and Resolution" and P10.04.02 "Precision
173 Conformance Monitoring" as they will be the ones to develop the tools presented in this document.

174 At a higher project level P04.02 "Consolidation of Operational Concept Definition and Validation
175 Including Operating mode and air-ground task sharing", B05 "Performance Analysis of ATM Target
176 Concept" and experts from the corresponding transversal areas of the WP16 "R&D Transversal
177 Areas" are expected to have an interest in this document.

178 Stakeholders are to be found among:

179 • ANS providers;

180 • Airspace users;

181 • ATM infrastructure and equipment suppliers;

182 • Appropriate NSA;

183 This SPR is suitable for the V3 validation task to consult. Note this is a working document and the
184 intended audience will change as the document matures.

1.4 Structure of the document

186 The document is structured as a main body containing the results for the SPR task and a series of
187 appendices which record the work undertaken:

188 • Section 1 introduces the document.
189 • Section 2 provides a summary of the operational services.
190 • Section 3 lists the safety and performance requirements which have been developed under
191   Task 20 and updated under T099 & T093. These are based on the ORs listed in the OSED_4
192   [12], and should be considered with reference to the ORs.
193 • Section 4 provides the list of references and applicable documents.
194 • Appendix A briefly describes the method followed in developing the safety and performance
195   requirements. It is included to help in showing briefly the traceability of the requirements. For
196   more detailed information about the process undertaken in performing the SPR task please
197   see the corresponding Safety Assessment Report (SAR) [17]. The SAR will also provide a
198   detailed justification of the traceability of the requirements.
199 • Appendix B provides the results of a two day safety workshop which took place to
200   review/amend/add to the existing 4.7.2 safety analysis.
201 • Appendix C provides a justification as to the security risk assessment undertaken at this
202   stage.
203 • Appendix D provides a justification as to why an environmental impact assessment was not
204   undertaken at this stage, and provides a placeholder for one when the document project
205   reaches suitable lifecycle maturity.
206 • Appendix E contains the safety requirements for the V2 CD/R aid to PC service and the
207   requirements, relevant to the 4.7.2 concept, from the WP04.03 VP-798 exercise.
208 • Appendix F contains requirements that have been deleted to reflect deletions made in the last
209   update of the OSED [12].

210 1.5 Glossary of terms

211 1.5.1 Overview

212 The terms used in this document are consistent with those used in the OSED_4 [12]. As a result, the
213 following section is a direct copy of the same section within the OSED_4 [12]. The terms are
214 replicated here purely for the benefit of the reader.

Separation Related Terms.

Figure 2: Separation related Entities.

Term	Definition
Separation Criteria	A generic term which covers the *Separation Minima* and the thresholds used for problem identification.
Separation	Spacing between an aircraft and a *Hazard*.
Lateral Separation	*Separation* expressed in terms of horizontal distance and function of angular convergence/divergence between tracks

Vertical Separation	*Separation* expressed in units of vertical distance
Separation Minima Related Terms <u>Note</u>: that the separation minima define the legal separation between hazards in a controlled airspace.	
Separation Minima	The minimum displacements between an aircraft and a *Hazard* which maintain the risk of collision at an acceptable level of safety. <u>Note</u>: ICAO Doc 9689 describes the methodology to be used for the determination of *Separation Minima*.
Minimum Lateral Separation	The *lateral separation* threshold above which the *separation minima* are fulfilled
Minimum Vertical Separation	The *vertical separation* threshold above which the *separation minima* are fulfilled <u>Note</u>: Different thresholds are applied above and below the *RVSM* limit. Any non-RVSM aircraft that is authorized to fly within an RVSM airspace shall be subject to the thresholds that are applied below the RVSM limit.
Reduced Vertical Separation Minimum (RVSM)	A reduction to 1000 feet *vertical separation* between flights, which is used at least in Europe and on the North Atlantic, between FL290 and FL410.
Separation of Interest	The *separation* threshold below which the proximity of a pair of aircraft is considered to be of interest to a controller, for the airspace and conditions concerned. <u>Note</u>: At this point there may be no actual risk that *separation minima* are infringed. The values chosen for the various controller activities and tools are larger than the separation criteria in order to provide an adequate margin of safety. The controller and the aids used need to have awareness of the applicable separation minima for the airspace concerned. <u>Note</u>: This is a generic term, independent of the planning or tactical layers of separation activity. Particular instances of the *Separation of Interest* may be applied for each level of separation activity. The actual *separation* values used will take into account aspects such as the type of clearance issued, the requested navigation precision and the airspace rules. They will also relate to the type of trajectory used at the specific layer of concern. They may vary according to circumstances such as the geometry of the *conflicts*/*encounters* and prevailing conditions such as adverse weather.
Planning Separation (of Interest)	A particular instance of the *Separation of Interest* which is applied during planning activities. <u>Note</u>: This is a generic term relevant to the planning layers of separation activity. Particular instances of this may be applied for each level of layered planning separation activity. The actual *separation* values used will vary according to the circumstances. For instance, in the case of Planner Controllers coordinating traffic into and out of sectors, it is the horizontal distance/time interval threshold below which the proximity of a pair of aircraft is considered to be of interest to a Planner Controller when determining the acceptability of sector entry or exit co-ordination. The TC may choose to increase this **Planning Separation**, in which case the PC must re-coordinate the relevant aircraft.
Tactical Separation (of Interest)	A particular instance of the *Separation of Interest* which is applied by Tactical Controllers when controlling traffic under their responsibility.

System Separation (of Interest)	A particular instance of the *Separation of Interest* which is applied by automated system tools for the detection of *Encounters*. E.g. the *separation of interest* used by the TRACT tool.

Conflict management Related Terms
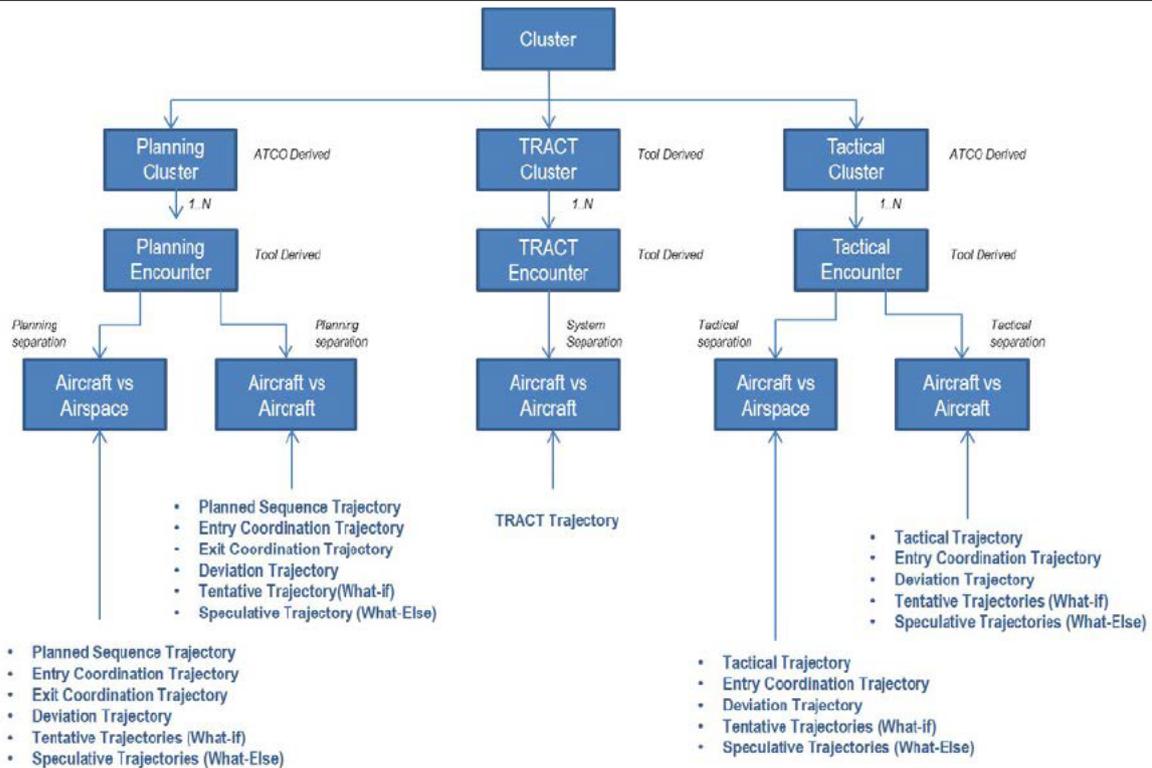
Notes :
1. The cardinality for trajectory instances is not shown. An applicability matrix is provided in the 4.7.2 OSED for this purpose.
2. In the case where one of the trajectories is a deviation trajectory the controller concerned will need to be made aware of this.
3. The Planning and Tactical Separations used will depend on circumstances such as the geometry of the encounter and conditions such as adverse weather.

Figure 3: Encounter Management related Entities.

		Subject Flight				
		Planned Sequence Traj.	**Entry Coordination Traj.**	**Exit Coordination Traj.**	**Deviation Traj.**	**Context Traj.**
Environmental Flight	**Planned Sequence Traj.**	Planned Sequence Encounter	--	--	--	--
	Entry Coordination Traj.	--	Planning Encounter	Planning Encounter	Planning Deviation Encounter	--
	Exit Coordination Traj.	--	Planning Encounter	Planning Encounter	Planning Deviation Encounter	--

		Tactical Traj.	Deviation Traj.	Entry Traj.	
	Deviation Traj.	--	Planning Deviation Encounter	Planning Deviation Encounter	Planning Deviation Encounter	--
	Context Traj.	--	--	--	--	Context Encounter

Figure 4: Planning Aircraft vs. Aircraft Encounters.

		Subject Flight		
		Tactical Traj.	Deviation Traj.	Entry Traj.
Environmental Flight	Tactical Traj.	Tactical Encounter	Tactical Deviation Encounter	Coordination Encounter
	Deviation Traj.	Tactical Deviation Encounter	Tactical Deviation Encounter	Coordination Encounter
	Entry Traj.	--	--	Coordination Encounter

Figure 5: Tactical Aircraft vs. Aircraft Encounters.

(note that speculative/tentative trajectories are not considered in Figure 4 and Figure 5 for the sake of simplicity)[1]

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[1] There is scope for Planner What-If/What-Else probes to build Tactical Tentative/Speculative trajectories.
An example would be when the Planner performs a What-If on the XFL of FL350 with a heading coordination constraint of HDG090, while the Tactical has the flight currently cleared at FL330 flying on its own navigation. The PC Aid would show the results of the What-If and also (some components of) the Planner's TC Aid would show the results of a tentative tactical clearance of FL350, HDG090. When the Planner What-If ends (either by the Planner committing or cancelling the instruction) then the corresponding Tactical What-If shall end.

Additionally, it is possible to perform a What-Else on top of a What-If (therefore requiring speculative tentative trajectories). For example, during a heading What-If, there may be a simultaneous What-Else probing different levels along that tentative heading. This applies to both the PC Aid and the TC Aid.

The controller may also wish to perform multiple flight What-If/What-Else probes, for instance perform a heading What-If on one flight and then a heading What-Else on another. During a multiple flight What-If/What-Else, all existing primary, deviation, tentative and speculative trajectories shall be probed against each other:
- During a What-If, the subject flight's primary and deviation (if it exists) trajectories will be *replaced* by the tentative trajectory;
- During a What-Else, the subject flight's primary and deviation (if it exists) trajectories will be *augmented* by speculative trajectories.

A multiple flight What-Else could be performed when the controller selects an encounter and asks the PC Aid to suggest a solution. The PC Aid would then run heading What-Else probes on both flights and display a set of acceptable headings to the controller (i.e. either a pair of headings that require

Hazard	The objects or elements that an aircraft can be separated from.
	Note: In En-Route, these can be: other aircraft, airspace with adverse weather conditions, or airspace with incompatible airspace activity.
Separation Violation	A separation violation relates to a situation where the applicable *separation minima* have actually been infringed
	Note: e.g. Short Term Conflict Alert (STCA) or Minimum Safe Altitude Warning (MSAW). These situations are not within the scope of Separation Management as covered in the 4.7.2 OSED_4 [12].
Conflict **Potential Conflict** **Predicted Conflict**	These terms relate to any situation involving aircraft and hazards in which the applicable *separation minima* may be compromised.
	Note**:** These terms are in general widespread usage and within the context of this glossary are synonymous. They relate to potential *infringements of separation minima.* More specifically they are used in the context of ATCO activities where actions are performed in order to anticipate and resolve conflicts (potential/predicted) for separation management purposes. This is in contrast to the situations detected and processed by CD&R tools where the terminology used is '*encounters',* which relates to the applicable *Separation of Interest* used by the tool-set, rather than *Separation Minima*.
Encounter	A situation where an aircraft is predicted to be below the applicable *separation of interest* with respect to another aircraft, or a designated volume of airspace, classified respectively as "aircraft-to-aircraft" and "aircraft-to-airspace" encounters.
	Notes: Encounters are related to the various detection tools and may work to different look-ahead time horizons with different separation criteria, using different trajectories. Different tool configurations can therefore be expected to yield different encounters.
	The *Separation of Interest* thresholds are considered with respect to any applicable *uncertainty volumes* around the predicted aircraft position(s).
TRACT Encounter	A specific instance of an *Encounter* which is predicted using the *TRACT Trajectory* and the particular *System Separation.*
Planning Encounter	A specific instance of an *Encounter* which is predicted using any of the planning related *trajectories* and the *Planning Separation*.
[Tactical/Planning] Context Encounter	To support the controllers' traffic management task, environmental flights which may be of interest due to their anticipated vertical and lateral profiles, known as **[Tactical/Planner] Context flights** (or alternatively "[Tactical/Planner] Traffic"), will be highlighted to controllers.
	Planner Context flights may not currently be involved in an encounter with the subject flight based on their current clearance or existing coordinated levels but may

the minimum deviation to each flight's route, or a range of possible headings that are free of encounters).

This could also apply when the controller is performing a level What-If (so What-If plus a multiple flight What-Else). It may be possible to extend this to multiple flight What-If & What-Else probes, e.g. if two flights are involved in level What-Ifs and the PC Aid detects an encounter, then a multiple flight heading What-Else probe could then be run.

The controller may add additional flights into the probe set, e.g. if all solutions to one encounter cause (or fail to resolve) an encounter with another flight, then the controller could decide to perform a What-Else probe including that flight too (i.e. the system would then attempt to identify a set of clearances that would resolve the encounters between all flights in the probe set).

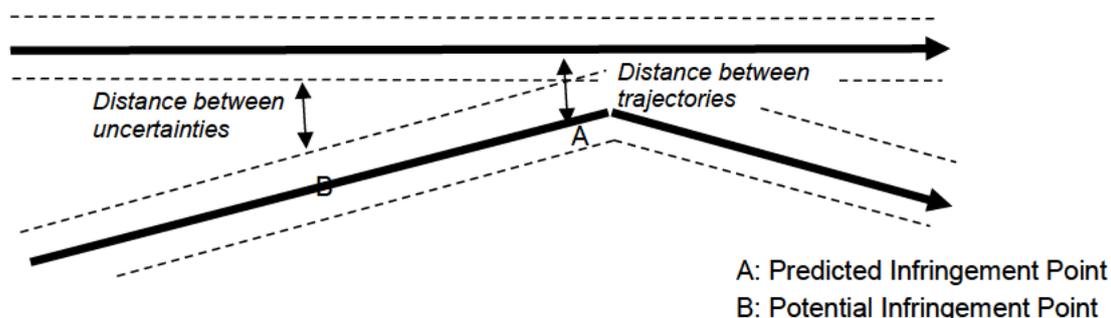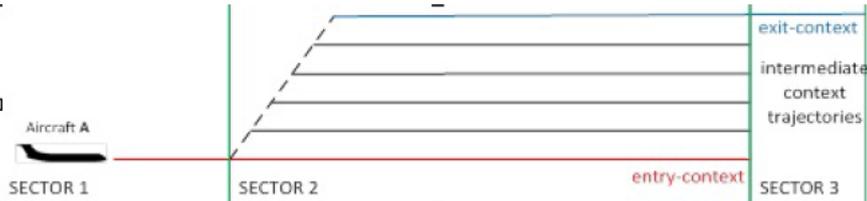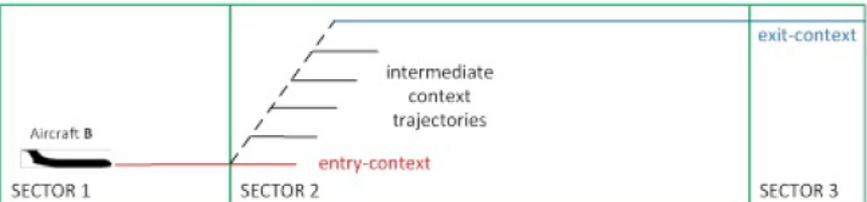|	need to be considered by the Planner when making coordination choices for their sector. **Context Encounters** are detected between Context Trajectories. With Planner Context there is only one separation threshold, "Context Separation", and therefore no such concept as a "Context Conflict". When referring to **Context Encounters** operationally the environmental flights may just be labelled as "Traffic".
Tactical Encounter	A specific instance of an **Encounter** which is predicted using any of the tactical related **trajectories** or the **Entry Coordination Trajectories,** and the **Tactical Separation.**
Planned Sequence Encounter	A specific instance of a **Planning Encounter** which is predicted between two **Planned Sequence Trajectories**.
Coordination Encounter	A specific instance of a **Tactical Encounter** which is predicted between two **Entry Trajectories**.
[Tactical/Planning] Deviation Encounter	A specific instance of a **[Tactical/Planning] Encounter** which is predicted using at least one **[Tactical/Planning] Deviation Trajectory**.
Cluster	A set of one or more **Encounters** that should be treated as a whole when determining their resolution.
Planning Cluster	A **Cluster** of **Planning Encounters**. Note: A **Planning Cluster** is an operational object that may be handled by ATCOs. The grouping of **encounters** is therefore likely to be an operational decision.
TRACT Cluster	A set of one or more **TRACT Encounters** that are treated as a whole when the TRACT determines their resolution.
Closest Point of Approach	The point on the **Trajectory**, which is being evaluated, where the distance to the **hazard** is predicted to be minimal. Note: In some cases the evaluation may be made on the basis of a trajectory segment, e.g. when two aircraft join the same route at the same speed. Subsequent points along the trajectory being evaluated, beyond the closest point of approach are separated from the hazard by progressively increasing distance.
Predicted Infringement Point	The point on the **Trajectory**, which is being evaluated, for a particular **Encounter**, where infringement of the applicable **Separation of Interest** is predicted at respective flight positions for the trajectories concerned.
Potential Infringement Point	The point on the **Trajectory**, which is being evaluated, for a particular **Encounter**, where infringement of the applicable **Separation of Interest** may potentially occur within the **uncertainty volumes** for the trajectories concerned.

Figure 6: Predicted Infringement Point vs Potential Infringement Point.

What-if Probing	A process where a private copy of a *Trajectory* that is in operational use and associated data is taken and used as a *Tentative Trajectory* to check the impact of changes to the flight data on the occurrence of predicted *Encounters*, without affecting the corresponding data for the actual flight.
	Note: On completion the what-if data and the *Tentative Trajectory* may be discarded or used to implement an update to the actual flight data and to construct the necessary clearance.
What-else Probing	A process where several *Speculative Trajectories* and associated data arising from *What-If Probing* are assessed for the impact on the occurrence of predicted *Encounters*.
	The *Speculative Trajectories* utilise flight data other than that currently committed or tentatively selected (during *What-If Probing* operations) by the controller.
Trajectory and Flight Related Terms See Figure 2 for an overview of the trajectory usage.	
Uncertainty, Uncertainty Volume	The volume of airspace, around the nominal predicted future position of a flight, within which a flight is expected to be contained to a given statistical confidence (e.g. 95%) at the time to which the prediction relates. The uncertainty relates to the trajectory prediction and may therefore be considered as a property of the particular trajectory concerned.
	Note: The zone can be decomposed into along-track (longitudinal), across-track (lateral) and vertical dimensions.
Trajectory	The predicted behaviour of an aircraft.
	Note: the *Trajectory* is usually modelled as a set of consecutive segments linking waypoints and/or points computed by the aircraft avionics (e.g. FMS) or by the ground system to build the vertical profile and the lateral transitions.
	Note: Each point is defined by a longitude, latitude, a vertical distance and a time.
ADS-C EPP Report EPP Data	ADS-C EPP (Extended Projected Profile) report is the ADS-C report containing the sequence of 1 to 128 waypoints or pseudo waypoints with associated constraints and/or estimates (altitude, time, speed, etc.), gross mass and min/max speed schedule, etc. as defined in WG78/SC214 standards.
	Note: The aircraft's predicted trajectory is down-linked in accordance with its ADS-C contract parameters. The EPP Data can be used for variety of ATC services (e.g. TRACT).
Tentative Trajectory	Tentative *trajectories* are created from another trajectory that is in operational use (Tactical, Planning or otherwise). They reflect tentative what-if flight data selected by the controller. If these conditions are then committed the Tentative trajectory and the associated data will be used to establish the new operational trajectory. If the conditions are discarded then it will also be discarded.
	Note: Tentative trajectories support *What-If probing* and are created during this process.
Speculative Trajectory	A *Trajectory* that uses flight data other than those currently committed or tentatively selected (during a *What-If Probing* operation), by the controller.
	Note: Speculative Trajectories are produced for the purpose of *What-Else probing*.
Tactical Trajectory	The *Tactical Trajectory* is calculated within a short look-ahead time (e.g. up to 15 minutes) during tactical ATC operations (sector planning layer). It therefore reflects an accurate view of the predicted flight evolution, starting from the current flight position (generally, as reported by surveillance), with low *uncertainty* and high precision. It is kept up to date with all clearances, including tactical instructions.

	During any open tactical manoeuvres it will also be reflecting those temporary conditions. It is usually determined with a fast update rate (e.g. 5 seconds) and with an optimised *Uncertainty* calculation; to maximise response and minimise the incidence of false alarms. Note: The Tactical Trajectory supports the tactical ATC operations when the flight follows its normal behaviour
[Tactical/Planning] Deviation Trajectory	The *Deviation Trajectory* provides the predicted profile of the aircraft based on the observed behaviour, extrapolated from the particular deviation from the current clearance (or deviation from coordination constraint for *Planning Deviation Trajectories*). Note: *Deviation Trajectories* are necessary for situations where non-compliance with a flight's expected tactical or coordinated behaviour is observed, with respect to an applicable tolerance threshold. *Deviation Trajectories* support Tactical/Planner ATC operations when the flight has deviated from its predicted behaviour. The *Tactical Deviation Trajectory* is useful for a short prediction horizon (e.g. 3-5 minutes). A *Planning Deviation Trajectory* follows the cleared route of the flight, irrespective of any coordination constraints (as the flight has been observed to be deviating from these constraints). During periods where a *Deviation Trajectory* is necessary it may also be used by TC/PC CD&R Aid.
Subject Flight	A flight that has been explicitly selected by the Controller concerned.
Subject Trajectory	The *Trajectory* of the *Subject Flight*
Environmental Flight	A flight of interest to the Controller which is not the *Subject Flight*. The *Subject Flight* will be checked for *encounters* with all *Environmental Flights*.
Context Flight	A flight that may need to be considered by the Planner ATCO when making coordination choices for the *Subject Flight*, due to the flights' anticipated vertical and lateral profiles. *Context Flights* are those *Environmental Flights* that are involved in a *Planning Context Encounter* with the *Subject Flight*. Note: *Context Flights* may not currently be involved in a *Planning Encounter* based on their current clearance or existing coordinated levels.
Environment Trajectory	The *Trajectory* of an *Environmental Flight*
Context Trajectory	*Context Trajectories* represent the expected utilisation of airspace by each flight. *Context Trajectories* are built for the *Subject Flight* and *Environmental Flights*. Note: Context Trajectories are similar to *Coordination Trajectories*. Each **Context Trajectory** maintains a single level and follows the lateral profile of the **Planned Trajectory**. **Context Trajectories** are built at every standard Flight Level from the entry-context level to the exit-context level. The identification of entry-context and exit-context levels is dictated by the information available in the system at the time of the probe. They represent the lowest and highest level at which the flight is anticipated to occupy in the sector. The Origin and Termination points on *Context Trajectories* depend on whether the flight is the *Subject flight* or an *Environmental flight* and on the flight's anticipated

vertical profile.

Example of Subject Flight **Context Trajectories**:

Example of Environmental Flight **Context Trajectories**:

Eligible flight for TRACT	A flight to which the TRACT may send a CTO
User Preferred Route	A preferred route that is provided by an Airspace User during the flight planning and agreement phase. In Step 1 it may take advantage from *Free Route Airspace (FRA)* for optimum routings. Note: A User Preferred Route may include published as well as non-published points defined in latitude/longitude or point bearing/distance. Such waypoints are inserted in the FMS for trajectory computation

Planning Trajectory Related Terms

Since the needs of the PC and TC differ in many respects, the trajectories produced to support the planning and tactical roles are different.

Planning Trajectories are used to predict encounters between flights that are of concern to the PC. They take account of the original flight plan, modified by agreed co-ordination constraints and standing agreements, but possibly unconstrained by tactical instructions.

Planned Trajectory	The *Planned Trajectory* represents the stable medium to long term behaviour of the aircraft but may be inaccurate over the short term where tactical instructions that will be issued to achieve the longer term plan are not yet known. It takes into account the planned route and requested vertical profile, strategic ATC constraints, *Closed Loop Instructions/Clearances*, co-ordination conditions and the current state of the aircraft. Assumptions may be made to close *Open Loop Instructions/Clearances* issued by tactical controllers. It is calculated within the planning look-ahead timeframe, starting from the Area of Interest of the unit concerned, or the aircraft's current position (whichever is later). It is constrained during all phases of flight by boundary crossing targets (e.g. standing agreements between the Units concerned). Note: The *Planned Trajectory* supports the ATC planning operations. It is used primarily to support data distribution within the system and in the determination of the top of descent point. As such, uncertainty does not need to be calculated for this trajectory. It is also used as the starting point for derivation of more specific local ATC trajectories.

Planned Sequence Trajectory	A *Trajectory* that is derived from the *Planned Trajectory* as it follows the vertical and lateral profile of the *Planned Trajectory*, truncated in time to an adaptable parameter (e.g. 25 minutes). *Uncertainty* is added (although the lateral uncertainty may be zero). Note: The Planned Sequence Trajectory is used for the determination of co-ordination levels and the sector penetration sequence. It is used for both manual coordination and integrated coordination purposes and may be used by the CD&R Aid (with the *Planning Separation*) for traversals of the sector concerned (CD&R for entry and exit to the sector are covered by the *Coordination Trajectory*).
[Entry/Exit] Coordination Trajectory Or **[Entry/Exit] Trajectory**	A *Trajectory* that is derived from the **Planned Sequence Trajectory.** It follows the lateral profile of the **Planned Sequence Trajectory**[2] but maintains a specific coordination level relevant to the boundary between two sectors. It represents the expected behaviour of the aircraft according to the entry/exit co-ordination conditions. **Entry** = A *Trajectory* that is built at levels associated with the sector entry coordination for the flight. **Exit** = A *Trajectory* that is built at levels ass*ocia*ted wi*th the sec*tor exit coordination for the flight. Note: The *Coordination Trajectory*: • Supports both lateral and vertical boundary co-ordinations; • Can have the origin and end truncated (e.g. at sector boundaries); • Is necessary for predicting *encounters* with flights that are co-ordinated with the sector but not yet in communication with that sector. Because it is only needed for boundary crossing conditions it can have a relatively short prediction horizon; typically up to the point where the flight is assumed by the sector concerned.
TRACT Trajectory	A *Trajectory* that is derived from the *Planned Trajectory.* It is similar to the *Planned Sequence Trajectory* in that it follows the vertical and lateral profile of the Planned Trajectory, truncated in time to an adaptable parameter (which is suitable for the TRACT process) and *uncertainty* is included. Note: It is used in support of the TRACT CD&R process.
Initial Reference Business Trajectory (iRBT for Step 1)	The representation of an airspace user's intention with respect to a given flight, guaranteeing the best outcome for this flight (as seen from the airspace user's perspective), respecting momentary and permanent constraints. The *Reference Business Trajectory* (RBT) refers to the Business Trajectory during the execution phase of the flight. It is the Business Trajectory which the airspace user agrees to fly and the Air Navigation Service Providers (ANSP) and Airports agree to facilitate (subject to separation provision) Note: The iRBT is the Step 1 attempt to move towards the full SESAR Reference Business Trajectory. It is shared between the Step 1 SWIM subscribers and is updated from down-linked aircraft trajectory updates. The extent to which this update, synchronisation and sharing is possible within Step 1 will depend on progress made by enabling projects. Likewise the extent to which guarantees can be made concerning best outcome will be subject to the same Step 1 development

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[2] It may be possible for the lateral profile of Coordination Trajectories to be altered from that of the Planning Trajectory to take into account relevant Coordination Constraints applied at the boundary between two sectors.

	progress and validation.
Constraint and Target Related Terms	
CTO	An ATM imposed time constraint over a point. <u>Note</u>: This constraint is sent by the ground system to the aircraft.
CTA/RTA	An ATM imposed time constraint on a defined merging point associated with an arrival runway. <u>Note</u>: This constraint is sent by the ground system to the aircraft.
Active CTO/CTA/RTA	A *CTO* or *CTA* or *RTA* that is currently taken into account by both, the avionics (e.g. FMS) and the Ground Systems. <u>Note</u>: It is considered to be active from the moment when both the air and the Ground Systems have taken it into account, until the application point of the constraint is over-flown or until it is cancelled in the Air and the Ground systems.
Level Block	A level or a range of levels that is blocked off to other traffic, e.g. crossers
Target Time of Arrival	An Arrival Time which is not a constraint but a progressively refined planning time that is used to coordinate between arrival and departure management applications. It is an ATM computed time.
Clearance and Instruction Related Terms	
Open loop Instruction/Clearance	An ATC clearance or instruction where a full trajectory extrapolation beyond the point or segment(s) affected is not possible using the normal prediction process, i.e. without special measures to assert a closure condition (e.g. time limit on headings and most probable point of return to original routing). Open loop instructions/clearances can be cancelled by a Closed-loop instruction/clearance. <u>Note</u>: Most tactical instructions/clearances take this form; they include heading (including track offset), level, and speed restrictions and exceptionally could also cover rates of climb or descent.
Closed loop Instruction/Clearance	An ATC clearance or instruction where a full trajectory extrapolation beyond the point or segment(s) affected is possible using the normal prediction process. <u>Note</u>: A typical example is a direct route from one point to another on the original route.
NFL, SFL	The NFL is the cleared level that the aircraft will have when it will arrive in the sector. The NFL is given by the upstream sector. The NFL is equal to the TFL of the upstream sector. The SFL is the second level that permits to determine the interval of flight levels in which the aircraft will arrive in the sector. So when arriving in the sector the aircraft will be between the SFL and the NFL.
Data-Link Related Terms	
ETA	Estimated Time of Arrival. The ETA is usually used not only for the arrival (i.e. last point of the Trajectory) but also for the "arrival" on any given trajectory point. In such a case and for Ground systems use only the acronym ETO – Estimated Time Over – should be preferred. In the current document, it is used in Air aspects (e.g. as an item of EPP data) only, although Ground systems namely Ground TP may use this acronym too.
TOAC	Time Of Arrival Control - the function of airborne system providing automatic speed control as to overfly given point on trajectory within given time constraint.

reliable RTA interval	The range of arrival times at a specified lateral fix which are achievable using TOAC function, with a level of confidence of 95% assuming standard meteorological uncertainty as specified in appendix J of WG85 - addendum to document ED75, and margins. This corresponds to the raw [ETAmin,max] amended with margins, and it is downlinked in the ADS-C messages as "ETAmin,max" field.
RTA Tolerance	Time tolerance around CTO/CTA/RTA constrained point defined by ATC in which airborne system overfly this point with 95% probability.

215   1.5.1 Safety Reference Material (SRM)

216   Many of the following definitions are taken from the SRM [8].

Term	Definition
SAfety Criteria	Explicit and verifiable criteria, the satisfaction of which results in acceptable safety following the change. They may be either qualitative or quantitative and either absolute or relative. They include not just specific risk targets but also safety (and other) regulatory requirements, operational and equipment standards and practices
Safety Objective	The functional, performance and integrity safety properties of the air navigation system, derived at the OSED level. Safety objectives describe what the air navigation system has to provide across the interface between the service provider and service user in order that the SAfety Criteria are satisfied. They provide mitigation of the pre-existing risks; and limit the risks arising from failures within the air navigation system. As objectives, they should specify what has to be achieved – how it is achieved is covered by safety requirements – from Article 2(11) of Regulation (EC) No 1035/2011
Safety Requirement	The necessary risk reduction measures identified in the risk assessment to achieve a particular safety objective. They describe the functional, performance and integrity safety properties at the system-design level as well as organisational, operational, procedural, and interoperability requirements or environmental characteristics – from Article 2(12) of Regulation (EC) No 1035/2011
Success Case	The examination of the system from the perspective of its operation under normal and abnormal conditions.
Failure Case	The examination of the system from the perspective of its operation under failure conditions.
Hazard	Any condition, event, or circumstance which could induce an accident. This covers both pre-existing aviation hazards (not caused by ATM/ANS functional systems) and new hazards introduced by the failure of the ATM/ANS functional systems.
Normal conditions	Those conditions of the operational environment the ATM/ANS functional system is expected to encounter in day-to-day operations and for which the system must always deliver full functionality and performance
Abnormal conditions	Those external changes in the operational environment that the ATM/ANS functional system may exceptionally encounter (e.g. severe WX, airport closure, etc.) under which the system may be allowed to enter a degraded

Term	Definition
	state provided that it can easily be recovered when the abnormal condition passes and the risk during the period of the degraded state is shown to be acceptable
Mitigation	Actions taken to alleviate or moderate the severity and/or the frequency of a risk
Functional model	An abstract representation of the design of the ATM/ANS functional system that is entirely independent of the design and of the eventual physical Implementation of the system. The FM describes what safety-related functions are performed and the data that is used by, and produced by, those safety functions – it does not show who or what performs the safety functions
Implementation	The realisation of design in the form of the built and tested air navigation system prior to its transfer into operational service;
Impact Modification Factors (IM)	An Impact Modification (IM) factor can be applied to the maximum tolerable failure rate to reflect whether the hazard results in for example, impact to 2 aircraft (an IM of 2).
Providence	The 'luck' barrier in the AIM barrier model [13]. Where the conflict is resolved because the two aircraft just happened to miss each other.
Crew Collision Avoidance	The measures within the airborne domain for the resolution of conflicts in the AIM barrier model [13]. These include ACAS and See & Avoid.
ATC Collision Avoidance	The measures within the ground domain for the resolution of conflicts (losses of separation) in the AIM barrier model [13]. These include, ATC expedites, avoiding action and STCA.
Tactical Conflict Management	The measures in the ground domain for the prevention of losses of separation in the AIM barrier model [13] i.e. the tactical controller's role.
Traffic Planning & Synchronisation	The measures in the ground domain for the prevention of conflicts in the AIM barrier model [13] which are part of the planner controller's role.
Demand & Capacity Balancing	The measures in the ground domain for the prevention of conflicts which include controller workload management, sector openings etc.
Airspace Design & Strategic Planning	The measures in the ground domain for the prevention of conflicts in the AIM barrier model. These measures include the design of the airspace and long-term planning of ATCO resource availability etc.
Pre-existing risks	The risks that are inherent in aviation. They are not associated with failure of the air navigation services / system - rather it is the primary purpose of air navigation services to reduce these risks wherever possible
Strategic conflicts	The event occurring when airspace design and strategic planning has failed to resolve the conflict
Pre-tactical conflicts	The event occurring when demand and capacity balancing has failed to

Term	Definition
	resolve the conflict.
Planned conflicts	The event occurring when Traffic Planning and synchronisation has failed to resolve the conflict i.e. the Planner controller's role.
Imminent infringements	The event occurring when ATC tactical conflict management has failed to resolve the conflict i.e. the tactical controller's primary role.
Imminent collisions	The event occurring from the failure of the ATC Collision Avoidance Barrier. Where actions such as STCA, ATC Expedites and Avoiding Action have failed to resolve the conflict.
Collisions	The event occurring when Crew Collision Avoidance techniques such as ACAS, See & Avoid have failed to prevent the conflict.
ATC Induced pre-tactical conflict	A conflict created by an ATC planner action.
Induced conflict	ATM provision creates new risks, due to unplanned aircraft manoeuvres or as a result of ATC actions and these are termed induced conflicts. These are mainly created in the tactical operations and so they by-pass many of the safety barriers. These conflicts can be more difficult to detect and resolve due to their unexpected nature and the time pressure that they are created under.
ATC Induced Conflict	A conflict created by an ATC tactical action.
Pilot Induced Conflict	A conflict created by a pilot action.
Achievable	That safety requirements are capable of being satisfied in a typical ATM/ANS functional system implementation, *i.e.* they do not impose unrealistic expectations on the design comprising people, procedures, hardware, software and airspace design. This includes feasibility in terms of timescale, cost, and technical development
Argument	statement or set of statements asserting a fact that can be shown to be true or false (by demonstration and evidence)
Assurance	The results of all planned and systematic actions necessary to afford adequate confidence an air navigation service or ATM/ANS functional system satisfies the SAfety Criteria – from Article 2(10) of Regulation (EC) No 1035/2011
Evidence	Information that establishes the truth (or otherwise) of an argument. Wherever possible, it should consist of proven facts – e.g., the results of a well-established process such as simulations and testing. Only where such objective information is not available should it be based on expert opinion
Integrity	The ability of a system, under all defined circumstances, to provide all the services (or functions) required by the users, with no unintended or un-commanded services (or functions). It is based on the logical completeness

Term	Definition
	and correctness, and reliability, of the ATM/ANS functional system elements in relation to user / operator requirements
Rationale	The explanation of the logical reasons or principles employed in consciously arriving at a conclusion concerning safety. Rationales usually document (1) why a particular choice of argument was made, (2) how the basis of its selection was developed, (3) why and how the particular information or assumptions were relied on, and (4) why the conclusion from the evidence is deemed credible or realistic
Risk	The combination of the overall probability, or frequency of occurrence of a harmful effect induced by a hazard and the severity of that effect – as defined in Article 2(9) of Regulation (EC) No 1035/2011;
Risk Assessment	A sub-process in the overall safety management process to determine a priori the quantitative or qualitative value of risk related to the provision of air navigation services for a specific operational environment
Safety Performance	The performance of relevant and measurable safety indicators whereby the required SAfety Criteria will be fully achieved and maintained during the operational lifecycle
Specification	The ATM system has to provide across the interface between the service provider and service user in order that the User Requirements can be satisfied – *i.e.* a specification takes a "black-box" view of the system, at the OSED level
User Requirements	User(s) in this context are the user(s) of the air navigation service(s) concerned. In general, User Requirements are what the Users want to have happen in their domain of operation. From a safety viewpoint, the User Requirements are generally the SAfety Criteria
Validation	An iterative process by which the fitness for purpose of a new system or operational concept being developed is established (from E-OCVM 3)
Verification	Satisfaction of safety requirements can be demonstrated by direct means (e.g. testing, simulations, modelling, analysis, etc.), or (where applicable) indirectly through appropriate assurance processes

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1.5.2 Others

Term	Definition
Level Block	A level or a range of levels that is blocked off to other traffic, e.g. crossers.
Open loop clearance	A clearance is an open loop clearance when it is not possible to determine the complete new trajectory from the instruction issued. A further instruction is needed to complete the information necessary to determine how the flight will resume its normal, planned navigation.

Term	Definition
Closed loop clearance	A closed loop clearance is the opposite of an open loop clearance. It allows the trajectory to be determined beyond the end of the constraint as the duration of the constraint is known.
Subject Flight	A selected flight which becomes the focus of the HMI tools at an individual controller display, or which is currently being considered for the purposes of conflict detection.
Subject Trajectory	The [generic] trajectory of the Subject Flight.
Environmental Flight	A Flight against which the Subject Flight has been checked for interactions.
Environmental Trajectory	The [generic] trajectory of an Environmental Flight.
Airspace of interest	Airspace covered by the group of sectors using the PC aid.
Eligible Sector	The sector which currently has eligibility to make tactical inputs for a particular flight.
Background Track	A radar track for a flight that is known to the system and has not been identified as of interest at a sector or sector combination. The sector will not be identified on the co-ordination sector sequence.
What-if Probing	One shot transaction only visible to the client to check conflicts "if I do that".

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220 ## 1.6 Acronyms and Terminology

Term	Definition
1P1T	*One Planner controller one Tactical controller*
2D, 3D, 4D	*Two Dimensional, Three Dimensional, Four Dimensional*
4D TM	*Four dimensional Trajectory Management*
4DTRAD	*Four Dimensional TRAjectory Data link*
A/C	*Aircraft*
ACARS	*Aircraft Communications Addressing and Reporting System*
ACAS	*Airborne Collision Avoidance System*
ACC	*Area Control Centre*
ADEP	*Aerodrome of Departure*

Term	Definition
ADES	Aerodrome of Destination
ADS-B	Automatic Dependent Surveillance-Broadcast
ADS-C	Automatic Dependent Surveillance-Contract
AIM	Accident Incident Model
AIRM	ATM Information Reference Model
AIS	Aeronautical Information Services
AMAN	Arrival MANager
ANSP	Air Navigation Service Provider
AOC	Airlines Operations Centre
AoI	Area Of Interest
ARN	ATS Route Network
ASAS	Airborne Separation Assistance/Assurance System
ASPA-S&M	Airborne SPAcing Sequencing & Merging
ATC	Air Traffic Control
ATCO	Air Traffic Controller
ATIS	Automatic Terminal Information Service
ATM	Air Traffic Management
ATN	Aeronautical Telecommunications Network
ATS	Air Traffic Services
ATSU	Air Traffic Services Unit
ATSAW	Air Traffic Situational Awareness
BGA	Business and General Aviation
CATO	Controller Assistance Tools
CCD	Continuous Climb Departure
CD	Conflict Detection

Term	Definition
CD/R	Conflict Detection and Resolution
CDM	Collaborative Decision Making
CIA	Confidentiality, Integrity, Availability
CFL	Cleared (Current) Flight Level
CNS	Communications, Navigation and Surveillance
CPDLC	Controller Pilot Data Link Communication
CTA	Controlled Time of Arrival
CTO	Controlled Time Over
CMT	Monitoring Aid
DFS	Deutsche Flugsicherung GmbH (German ANSP)
DMAN	Departure MANager
DOD	Detailed Operational Description
DSNA	Direction des Services de la Navigation Aérienne (Directorate Air Navigation Services) (French ANSP)
DSNA	French Aviation Authority
E-ATMS	European Air Traffic Management System
EC	European Commission
E-OCVM	European Operational Concept Validation Methodology
ECAC	European Civil Aviation Conference
ECS	Executive Conflict Search
EFS	Electronic Flight Strip
EPP	Extended Projected Profile
EP3	Episode 3
ERASMUS	En-Route ATM Soft Management Ultimate System (project)
ERATO	En Route Air Trafic Organizer
ETA	Estimated Time of Arrival

Term	Definition
ETFMS	Enhanced Tactical Flow Management System
ETO	Estimated Time Over
EUROCAE	EURopean Organization for Civil Aviation Equipment
FAB	Functional Airspace Block
FACTS	Future Area Control Tools Support
FASTI	First ATC Support Tools Implementation (programme)
FCSO	Failure Case Safety Objective
FDMP	Flight Data Manager Publisher
FDPS	Flight Data Processing System
FIR	Flight Information Region
FIS	Flight Information Service
FL	Flight Level
FMS	Flight Management System
FRA	Free-Route Airspace
FTS	Fast Time Simulation
GA	General Aviation
GAT	General Air Traffic
HDG	Heading
HMI	Human-Machine Interface
i4D TM	Initial 4-Dimensional (Trajectory Management)
IAS	Indicated Air Speed
IBP	Industry-Based Prototypes
ICAO	International Civil Aviation Organisation
iFACTS	Interim Future Area Control Tools Support
IFR	Instrument Flight Rules

Term	Definition
IM	*Impact Modification*
IP	*Implementation package*
IOC	*Initial Operational Capability*
IOP	*Interoperability*
iRBT	*Initial Reference Business Trajectory*
ITEC	*Interoperability Through European Collaboration*
LoA	*Letter of Agreement*
LACC	*London Area Control Centre*
MAC-ER	*Mid-Air Collision En-Route*
MET	*METeorological services*
MONA	*MONitoring Aids*
MSP	*Multi Sector Planning*
MTCD	*Medium-Term Conflict Detection*
NATS	*National Air Traffic Services (UK ANSP)*
NEXTGEN	*Next Generation Air Transportation System*
NFL	*eNtry Flight Level*
NoTT	*No Valid Flight Plan Data Available*
NSA	*National Safety Agency*
OAT	*Operational Air Traffic*
OI	*Operational Improvement*
OFA	*Operational Focus Area*
OR	*Operational Requirement*
OPA	*Operational Performance Area*
OSED	*Operational Service(s) Environmental Description*
PXX.XX.XX	*Project PXX.XX.XX.*

Term	Definition
PC	*Planning Controller*
PIR	*Project Initiation Report*
R&D	*Research and Development*
RBT	*Reference Business Trajectory*
REQ	*Requirement*
R/F	*Radio Frequency*
RNP	*Required Navigation Performance*
R/T	*Radio Telephony*
RTA	*Requested Time of Arrival*
RTS	*Real Time Simulation*
RVSM	*Reduced Vertical Separation Minimum*
SAC	*SAfety Criteria*
SAR	*Safety Assessment Report*
SESAR	*Single European Sky ATM Research Programme*
SESAR Programme	*The programme which defines the Research and Development activities and Projects for the SJU.*
SJU Work Programme	*The programme which addresses all activities of the SESAR Joint Undertaking Agency.*
SCSO	*Success Case Safety Objective*
SDPS	*Surveillance Data Processing System*
SFL	*Supplementary Flight Level*
SJU	*SESAR Joint Undertaking (Agency of the European Commission)*
SOI	*Separation of Interest*
SPR	*Safety and Performance Requirements*
SPD	*Speed*
STCA	*Short-Term Conflict Alert*

Term	Definition
SVFR	*Special Visual Flight Rules*
SYSCO	*System Supported CO-ordination*
SWIM	*System Wide Information Management*
TAWS	*Terrain Awareness and Warning System*
TC	*Tactical Controller*
TCAS	*Traffic Collision Avoidance System*
TRACT	*TRajectory Adjustment through Constraint of Time*
TCT	*Tactical Controller Tool*
TMA	*Terminal Manoeuvring Area*
TMF	*Trajectory Management Framework*
TEMSI	*Temps Significatif (French weather forecasting map)*
TFL	*Transfer Flight Level*
TOAC	*Time Of Arrival Control*
TOC	*Top Of Climb*
TOD	*Top Of Descent*
TP	*Trajectory Prediction*
TSA	*Temporary Segregated Area*
UAC	*Upper Airspace Control*
UIR	*Upper Flight Information Region*
V&V	*Validation and Verification*
VAFORIT	*Very Advanced Flight Data Processing Operational Requirement Implementation*
VDL	*VHF Digital Link*
VFR	*Visual Flight Rules*
VOI/R	*Volume of Interest/Responsibility*
VHF	*Very High Frequency*

Term	Definition
VLJ	*Very Light Jet*
WP	*Work Package*

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2 Summary of Operational Concept (from OSED)

Although the current concept includes three Separation Services for completeness, requirements for the "CD/R aid to the PC" and the "TRACT" services are not in the scope of this SPR because they have not yet reached V3 maturity. As a consequence, TRACT has been moved to a separate SPR [18] and the requirements related to the PC aid have been moved from the main body of this document to Appendix E. Therefore, the main body of this SPR document includes only the requirements for the TC aid.

A summary of operational concept for all three services, including TRACT and PC aid, has been provided for a better understanding of the concept. It should be noted however that the three tools (TRACT, PC Aid and TC Aid) in this concept can exist independently. The absence of TRACT and PC aid would/did not impact the conclusions and requirements identified in this SPR.

2.1 Description of the Concept Element

The P04.07.02 concept should be fully operational in the considered target environment namely the Four Dimensional TRAjectory Data link (4DTRAD) one. The 4DTRAD service enables the negotiation and synchronisation of trajectory data between ground and air systems through Controller Pilot Data Link Communication (CPDLC) and Automatic Dependent Surveillance-Contract (ADS-C). This includes the exchange of 4D clearances and information such as lateral, longitudinal, vertical coordinates and time or speed (including uplinked constraints specified as cleared speed / time constraints which could be issued as a part of a route clearance). P04.07.02 is expected to develop its concept around the 4DTRAD service to address non time critical operations. Table 1 provides more details on how P04.07.02 builds around the 4DTRAD concept. For more information about the 4DTRAD concept please see *OSED_4* [12] or *EUROCONTROL Initial 4D* [15] or *RTCA SC-214/EUROCAE WG-78* [16].

4DTRAD Service	P04.07.02 Services
Negotiation and synchronization of trajectory data between ground and air systems	TRACT; CD/R PC; CD PC (basically any PC service, NOT tactical/time critical operations).
Trajectory constraints embedded within the 4DTRAD route clearance	TRACT – trajectory constrains through applying Control Time Over (CTOs)

Table 1 P04.07.02 service coverage within 4DTRAD

P04.07.02 is based on a combination of the following separation services:

- TRajectory Adjustment through Constraint of Time (TRACT),
- Conflict Detection and Resolution Aid to PC (CD/R aid to PC)
- Conflict Detection and Resolution Aid to TC (CD/R aid to TC)

Any combination of these services may be rendered together. In the case where all three services are combined, they would roughly articulate with each other as follows:

- The TRACT detects potential conflicts (e.g. 25 minutes ahead) and attempts to resolve them through CTO that should be achievable though small speed changes of the relevant aircraft;
- The list of potential conflicts that have been resolved by TRACT is input into the CD/R aid to PC tool for information. This service then detects encounters and it provides the PC with the list of remaining potential encounters that should be handled by her/him and/or the TC. Using her/his aid tool, the PC elaborates solutions that s/he either implements through the Coordination process, or proposes to the TC or sends directly to the aircraft if s/he has the ability to do so;

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- The list of potential conflicts that have been resolved by the PC and TRACT are input into the CD/R aid to TC tool for information. This service then detects encounters and it provides the TC with the list of remaining potential encounters that s/he should handle. Using her/his aid tool, s/he elaborates solutions and sends them to the relevant aircraft.

265 More precisely the concept (with all three services) functions as follows:

266 Step1

267 The global service starts at the time with the input of the aircraft predicted trajectories (TP) that may
268 actually consist in different TPs associated to each provided separation service. The look-ahead
269 times of the TP are on one hand e.g. 25 minutes for TRACT and CD/R aid to PC and on the other
270 hand e.g. 8 minutes for the CD/R aid to TC. The predicted trajectories are then used by the "conflict
271 detection" functionalities of the separation services so that a list of detected potential conflicts is
272 obtained.

273 Step2

274 The first service to be triggered is TRACT. Based on the detected "potential encounters", the
275 downlinked waypoints and the downlinked min/max time interval ("reliable Requested Time of Arrival
276 – RTA interval"), the TRACT resolution functionality automatically searches for solutions to the
277 potential encounters. The encounters that are handled by TRACT are those that can be resolved
278 through a CTO on a waypoint of the a/c route which is achievable through *small* speed adjustments of
279 the conflicting a/c. In most cases TRACT will require less than about one minute delay within a
280 horizon of up to 25 minutes to solve a conflict (i.e. delta separation of up to 8 NM). It is required that
281 the conflict involves at least one equipped aircraft to be handled by the TRACT. At the P04.07.02
282 horizon it is assumed that sufficient proportion of aircraft have the CTO capability[3]. When the conflict
283 involves two i4D-equipped aircraft the delay that TRACT requires will be shared between both aircraft.

284 Step3

285 The third step involves a coordination of the CTO between ground services. Because, on one hand
286 time constraints may be sourced from a range of tools (e.g. Arrival MANager – AMAN, complexity
287 manager, TRACT, Enhanced Tactical Flow Management System - ETFMS, etc.) and might have
288 various operational purposes (e.g. sequencing at the arrival aerodrome, sequencing in en-route for
289 reduction of traffic complexity, separation management etc.) and on the other hand an aircraft can
290 handle only one CTO at the time (cf. ref [15], "4DTRAD Concept of Operations"), it is necessary to
291 ensure that at most one CTO, which should yield the maximum benefit from a network perspective, is
292 sent at the time to an aircraft.

293 Step4

294 The obtained CTOs are automatically uplinked to the concerned aircraft with no involvement of the Air
295 Traffic Controllers (ATCOs). The flight crew analyzes the implications of the ground proposed CTO
296 and will either accept or reject it. In case of a rejection the TRACT cannot guarantee that the global
297 solution it has implemented is correct. The global situation will have to be reconsidered again at next
298 cycle (one cycle lasts at least 3 minutes, to have a chance to get all pilots answer) getting the refusing
299 aircraft out of the CTO capable flights. It is anticipated that in most cases the CTO will be accepted
300 by the flight crew as it abides with the "reliable RTA interval" FMS data.
301
302 Although the ATCOs are not involved into the CTOs elaboration and application, they are informed of
303 the time constrained aircraft. The main assumption is that the TRACT solutions will be operationally
304 relevant in most cases. However it may happen that in some cases the TRACT solution is a
305 troublemaker for the ATCO who would prefer to solve the conflict differently for any reason. Once
306 again, the assumption is that these cases will be very rare. In such cases, the ATCO still has the
307 capability to implement via Radio Frequency (R/F) her/his own solution superseding the TRACT one.

---

[3] For step1, P04.07.02 assumes that up to 40% aircraft will be i4D-equipped

308 Step5

309 The list of potential encounters that have been resolved by TRACT is input into the CD/R aid to PC
310 tool. Based on this list and those detected by the "conflict detection" functionality of the CD/R aid to
311 PC tool, the PC is informed of the remaining potential conflicts that should be handled by her/him
312 and/or TC. In addition should any flight under TRACT management be disturbed by the ATCOs so
313 that it generates a conflict, then this conflict has to be solved by ATCOs. At this stage, some
314 functions may assist the PC in organizing its work related to separation management.

315 Step6

316 The PC may elaborate solutions that rely on coordination conditions for example a change of the
317 entry/exit level. This does not require any direct communication to the aircraft. The change of
318 coordination conditions will be taken into account by the TC when operationally appropriate e.g. by a
319 change of Clearance.
320
321 As the PC also assists the TC in solving conflicts, s/he may elaborate clearances/trajectory changes
322 to solve some conflicts with the assistance of the "conflict resolution aid" functionality. There are then
323 two options:

324 •   The PC applies the actions if s/he has the ability to do so and informs the TC. In other words
325   the PC initiates the negotiation of the new trajectory if s/he has the ability to do so. By
326   negotiation, we mean either sending the clearance to the a/c through voice or D/L
327   communications or starts the negotiation as described in *RTCA SC-214/EUROCAE WG-78*
328   [16] pp13.

329 •   The PC proposes the clearances/trajectory changes to the TC which may or may not apply it.

330 Step7

331 If any, the list of potential encounters that have been resolved by the PC and TRACT are input into
332 the CD/R aid to TC tool. Based on this list and those detected by the "conflict detection" functionality
333 of the CD/R aid to TC tool, the TC is informed of the remaining potential conflicts that s/he should
334 handle.
335
336 As for the PC, some functionalities may assist the TC in organizing her/his separation management
337 tasks.

338 Step8

339 With the assistance of the "conflict resolution aid" functionality of her/his CD/R aid, the TC elaborates
340 clearances/trajectory changes in order to resolve the remaining conflicts and either send the
341 clearance to the a/c through voice or D/L communications or initiate the new trajectory negotiation as
342 described in *RTCA SC-214/EUROCAE WG-78* [16] pp13.

343
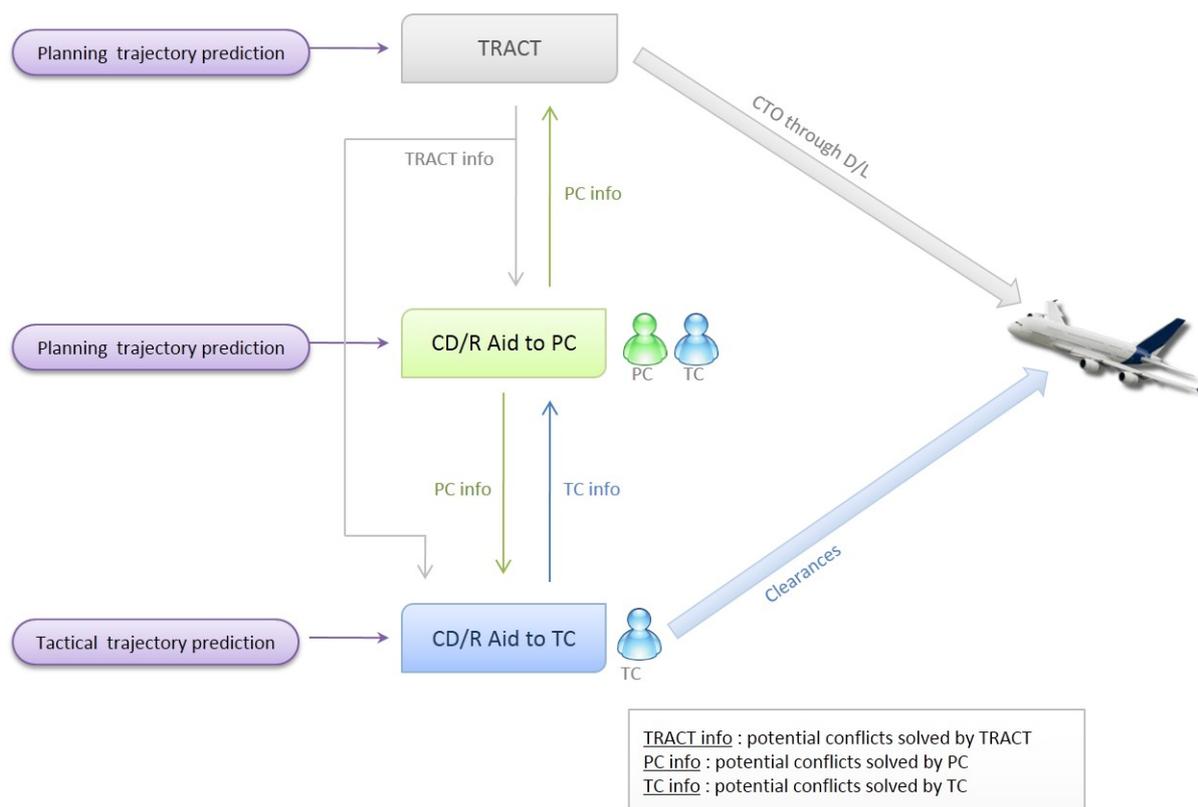
Figure 7. The P04.07.02 Operational Concept and its three services.

The three P04.07.02 services have a different look-ahead horizon, so they "naturally" constitute a sequence of services. The TRACT is supposed to first solve a set of conflicts, then the remaining conflicts are handled by the "CD/R aid to the PC", then the last and most urgent conflicts are managed by the "CD/R aid to the TC". However nothing prevents a service to provide an aid in the time horizon of another service. Typically, it may happen that the TRACT solves a conflict that has already been presented through the "CD/R air to the PC", because a constraint (e.g. another conflict involving the same aircraft) has disappeared.

It is worth mentioning that each separation service requires its own MONA (Monitoring Aids) support service because the CD&R tools and associated procedures are based on hypothesis that are reflected in the predicted trajectories, and they can only work properly if deviations of the aircraft from the planning or tactical trajectory are monitored and detected by the ATC system. It is not expected that the TRACT manages aircraft that deviated, however the two other services are able to process deviated flights and to remain helpful in such conditions.

2.2 Description of Operational Services

2.2.1 Trajectory Control by Speed Adjustment (TRACT)[4]

TRACT is based on the assumption that early resolution of conflicts could provide the potential for controllers' workload reduction. It is expected to reduce the controller's workload associated with routine monitoring and conflict detection as well as reduce the interventions of ATC in changing flight profiles to resolve potential conflicts.

TRACT is a de-conflicting service aiming at adjusting the 4D planning trajectory in order to optimise separation management for medium and/or long term conflicts (e.g. next 25 minutes conflicts). The trajectory adjustment relies, among others, on FMS generated trajectory that will facilitate more reliable information and potentially better decision aid performance.

The computed speed adjustments are translated into a Controlled Time Over (CTO) which are operated via Datalink between ground system and airborne system, with no controller intervention, although information are displayed on flights that are under TRACT "control".

It is worth mentioning that time constrains are also to be used for arrival and departure management (AMAN/DMAN) as studied in SESAR WP05.06 (for this use it is called RTA or CTA). Therefore, ground coordination will be needed in order to send the aircraft the most appropriate time constraint.

Furthermore, in order for this service to be efficient enough it is anticipated that a sufficient proportion of aircraft are equipped with i4D-capable system.

TRACT includes a monitoring service to check that:

- downlinked Extended Projected Profile (EPP) data includes the CTO as it has been uplinked;
- not i4D-equipped aircraft that are involved in a TRACT resolution are behaving as expected.

2.2.2 Conflict Detection and Resolution (CD/R)

2.2.2.1 Commonalities of CD/R services

The CD/R service may be divided into two sub-services Conflict Detection (CD) and Conflict Resolution (CR) as described below.

2.2.2.1.1 Conflict Detection (CD)

CD aid assists the controller in conflict identification and planning tasks. It provides automated early detection and filtering of potential conflicts.

The conflict detection is based on trajectories[5] with different look-ahead times, characteristics and constraints depending on the considered controller role (TC or PC). The aid may offer a temporal display of clusters of conflicting flights, clusters possibly selected by controllers in order to highlight the conflicting flights e.g. in the radar image.

2.2.2.1.2 Conflict Resolution (CR)

---

[4] Note requirements for TRACT are found in a separate SPR [18] due to the difference in maturity between the services, i.e. TRACT - V2, PC aid – V2, TC aid – V3. The main body of this document only contains requirements for the services which reached V3 maturity, i.e. only for TC aid.
[5] Depending on the tools, the trajectories considered are either the planning or the tactical ones.

393 CR aid assists the controller (TC and/or PC) in elaborating solutions to the automatically detected
394 conflicts in a context where the controllers are responsible for the separation assurance. The
395 resolution aid may consist in many types of functions, e.g.

396 • It may facilitate the identification of flexible routing/conflict free trajectories and identifies
397 aircraft constraining the resolution of a conflict or occupying a flight level requested by
398 another aircraft and/or offer a set of ranked resolutions to the En-Route controllers;

399 • On controllers demand or by conflict filtering logic in the aid, the traffic may be filtered by
400 diminishing the appearance of flights that are not "relevant" with respect to a chosen flight;

401 • Functions such as "What If" probing may analyse solutions proposed by controllers;

402 • Functions such as "What Else" functions may propose solution(s) to a detected conflict (e.g.
403 alternative trajectory or FL changes) which can be evaluated by the controller who may either
404 select (one of) them or prefer to implement one of his/her own resolution.

2.2.3 Service "CD/R Aid to the PC"[6]

2.2.3.1 Conflict Detection for PC

407 The role of the PC is twofold:

408 • to agree with neighbouring units (e.g. sectors, centres, airfields, military, etc.), sector entry
409 and exit conditions that, as far as possible, offer the airspace users efficient and expeditious
410 flight profiles through the airspace s/he is responsible for;

411 • to ensure that the workload of the Tactical Controller (or, in a MSP organization, Controller*s*)
412 s/he is responsible for, is managed so that it does not become excessive.

413 It is drawing the balance between these two responsibilities which demands the PC's problem
414 identification and resolution skills and which are expected to benefit from the provision of system
415 support in order to reduce workload and, as a result, to increase capacity.

416 Conflict Detection may aim to support the PC by identifying and classifying potential interactions
417 between flights at the various events associated with the inter-sector co-ordination process (e.g.
418 receipt of an offer, selection of a suitable sector exit level etc.) and on a cyclic basis to identify
419 whether the situation has changed significantly such that (Planning) Controller intervention is required
420 to re-evaluate and amend as necessary.

421 Trajectories may be generated to model the behaviour of each flight through and beyond the sector of
422 interest and which are manipulated to represent the various co-ordinations into and out of the sector.

423 Conflict detection may compare these sets of trajectories, one with another, to identify potential losses
424 of "planning separation" between aircraft and also pairs of aircraft whose co-ordinations, although not
425 predicted to be leading to a loss of separation, will allow aircraft to enter the sector and require some
426 action by the Tactical Controller to ensure separation.

427 Both of these ensure that the PC is able to monitor and manage the workload of the Tactical(s) in the
428 medium-term future adjusting co-ordinations, routings and sector manning as operationally
429 appropriate.

---

[6] Note requirements for PC aid are found in Appendix E due to the difference in maturity between the
services, i.e. PC aid – V2, TRACT - V2, TC aid – V3. The main body of this document only contains
requirements for the services which reached V3 maturity, i.e. only for TC aid.

2.2.3.2 Conflict Resolution for PC

Conflict resolution in Planning terms may involve the identification of alternative co-ordination conditions (level, route, profile etc.) at either the entry and/or exit boundaries of the sector so that unacceptable workload for the Tactical Controller is avoided whilst offering as expeditious a flight profile as possible to the airspace user.

The system may build upon the tools developed for the Planning CD support. For example it may allow the PC to ask "what-if" questions to the system which will respond with similarly classified interactions that are predicted to occur if the potential co-ordination plan were to be put in place.

Trajectories modelling the behaviour of the aircraft and manipulated so that they are constrained by a number of alternative co-ordination possibilities (e.g. vertically or laterally) may be built and passed to the CD process.

This may allow the PC to evaluate several alternatives, potentially in parallel, before committing to a new co-ordination agreement with the neighbouring sectors and with the Tactical(s) under his jurisdiction.

2.2.4 Service "CD/R Aid to the TC"

This service inherits from commonalities of CD/R services as described in 2.2.2.1

2.2.4.1 Conflict Detection for TC

The Conflict Detection service supports the TC in assuring separation between (pairs of) aircraft and between aircraft and restricted airspace. It may aim to support the controller by identifying and classifying potential interactions between flights that are under tactical control within the Area of Responsibility. S/he will also address remaining conflicts which have been highlighted by the PC.

The conflict detection tool TCT described in this project is based on the tactical trajectory. The tool will detect potential separation infringements between those trajectories.

Trajectories will be used to model the behaviour of each flight based on the current tactical clearance (not taking into account any strategic constraints such as standing agreements). An update of the trajectories will occur if a new clearance was issued.

Conflict Detection may compare these sets of trajectories, one with another, to identify potential losses of minimum separation between aircraft. Moreover, also aircraft which deviate from the tactical clearance should be compared to all other aircraft because their predicted trajectory may contain a high degree of uncertainty.

2.2.4.2 Conflict Resolution for TC

Conflict Resolution in tactical terms may involve the identification of different solutions, e.g. by modifying the trajectory laterally, vertically or in terms of speed adjustments. In the envisaged operational environment priority should be given to solutions which impose a minimum deviation from the RBT. Moreover, the solution should be closed loop, i.e. it should be clearly defined when and how the aircraft returns on Route Business Trajectory (RBT).

This is very important for an accurate prediction of the trajectory and the relying Decision Support Tools.

The identified "best" conflict resolution should be implemented in the most efficient manner by the controller. In case of time criticality voice is the preferred communication medium while in all other cases data link may be used.

Queue and complexity management considerations may also be taken into account by the choice of the conflict resolution if the operational situation permits.

2.2.5 Commonalities

2.2.5.1 Applicability of the Separation Services

Different traffic types and complexity induce different look-ahead time horizons for the conflict detection and resolution tasks. It is expected that the proposed solution will apply to these various situations, supporting both TC and PC, whatever the time criticality of the tasks are.

(C) TRACT is expected to provide the most benefits in situations with a predominant cruising traffic (e.g. pure UIR) when the detection of a potential conflict and an automatic resolution could occur with a very large look-ahead time horizon (e.g. 25 minutes before the potential conflict occurrence).

(B) Conflict Detection and Resolution Aid to PC is expected to support teamwork and better co-ordination process between TC and PC. In particular, the PC would have the possibility to anticipate between those conflicts that can be solved by coordination and those that require a tactical resolution (i.e. more appropriate allocation of responsibility). Also this service may be implemented as a common display, in order to support the PC-TC discussion. This is sensible when controller teams handle less time-critical situations, which typically occur in those sectors characterised by cruising traffic with some proportion of traffic in vertical transition (e.g. UIR/FIR vertical transition). In these situations conflict detection and resolution aids to PC is expected to be the most beneficial of the services. It could be provided when aircraft are close to the sector.

(A) Conflict Detection and Resolution Aid to TC is expected to be more appropriate to support TC in time-critical situations, which typically occur in those sectors characterised by cruising traffic with a significant proportion of traffic in vertical transition (e.g. FIR/TMA Interface). In these situations, short-term conflict detection and resolution aid to TC is envisioned to be the service that yields the most benefits;
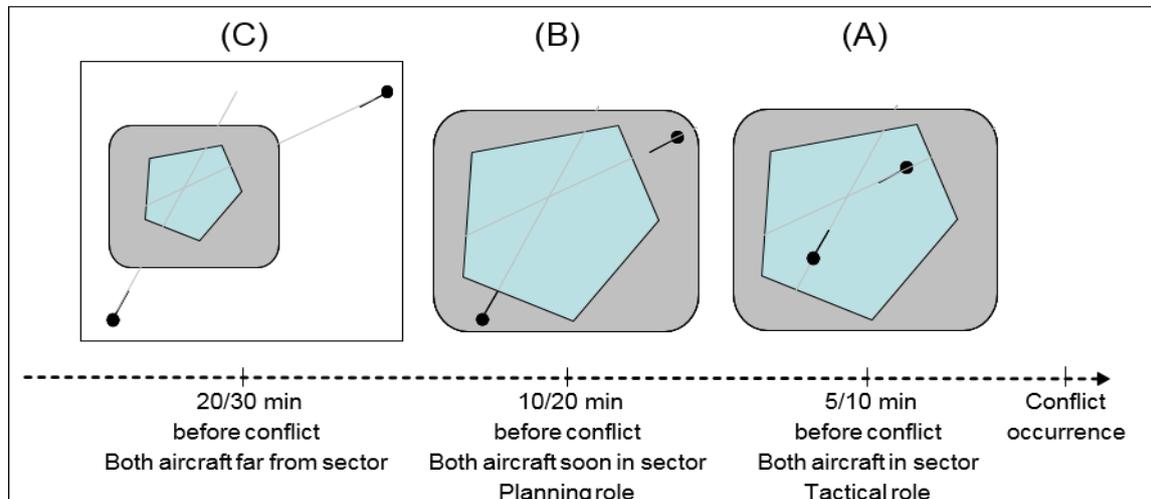
Figure 8. From early to late conflict detection and resolution.

Although each one of the considered services should yield the most benefit according to traffic types, they may be rendered in parallel for a given traffic as shown in Figure 7. In that case some operational requirements need to be satisfied in order to ensure a proper global functioning.

2.2.5.2 Service "Monitoring Aids (MONA)"

Given a separation service, MONA are essential for detection of deviations of the aircraft behaviour from the hypothesis from the predicted trajectory model used by the service. Whenever these deviations are too large, the service cannot be rendered normally and appropriate actions should be taken. Such actions are not defined yet.

For example, in the target 4DTRAD environment the separation services assume that the aircraft follow the shared 3D trajectories. Whenever this assumption is violated the trajectory prediction input to the services may not be accurate enough and it follows that the services may not be rendered properly. This may lead to safety critical situations which must be detected as early as possible so that the controller can react quickly and resolve them.

Therefore, each service should be associated to a MONA service to support detection of the aircraft deviations from the tactical (resp. planning) 3D trajectory in case of CD/R aid to TC (resp. to PC). This comprises lateral route deviation, vertical flight level and vertical rate deviations. Whenever the aircraft are under time constraints, longitudinal deviations should also be detected.

2.3 Description of Operational Environment

The scope of this version of the document is limited to build 4 of WP04.07.02. This means that it is limited to Step 1 of SESAR (ATM service level 2), with IOC between 2016 and 2018. The description of ATM service level 2 and the areas of particular relevance to WP04.07.02 are described in detail in the OSED_4 [12]. This information is not repeated here to avoid unnecessary duplication, which could lead to discrepancies as the documents are updated (both documents are working documents which should be updated as the services iterate through their lifecycle phases).

3 Requirements

This section details the Safety and Performance requirements for the TC aid service extracted from the Safety Assessment Report [17]. Traceability and a brief explanation of how the requirements were derived is also provided in Appendix A of this document.

The results and conclusions of the Safety Assessment Report [17], and more specifically the derived Safety Requirements, are valid provided that all the assumptions made during this assessment and presented in the Safety Assessment Report [17] are valid. Those assumptions are yet to be validated.

The Safety and Performance requirements presented are organised based on the operational services identified in the *OSED_4* [12], namely:

- SVC-04.07.02-SPR-CDR1.0001: Conflict Detection and Resolution (CD/R) aid to TC;

The identifiers of the requirements are set according to the rules defined in chapter 4 of the *Requirements and V&V Guidelines [2]* as follows:

<Object type>-<Project code>-<Document code>-<Reference code>.<Reference number>

Where:

- <Object type> is **REQ** for Requirement;
- <Project code> is **04.07.02;**
- <Document code> is **SPR;**
- <Reference code> represents the above mentioned operational services as follows:
    - **CDR1**: Safety and Performance Requirements for the **CD/R Aid to TC.**
- <Reference number> is a sequence number for each series of requirements as follows:
    - **1xxx** – Success Case Safety Requirements;
    - **2xxx** – Failure Case Safety Requirements;

The Requirements presented in this document were derived during the safety workshop under Task 20 and updated during T099 & T093. Some of these requirements were validated/verified during the V3 validation exercises that took place under P04.07.02. For evidence on which of the requirements were validated/verified and which were not please refer to the Safety Assessment Report [17], section 3.3.4.

Figure 9 illustrates an overview of the interaction between the safety elements. Note this SPR document only contains the Safety and Performance Requirements. For the higher level safety elements (SACs, SCSOs and FCSOs) and for a better understanding of the entire derivation process please refer to Appendix A or the Safety Assessment Report [17].
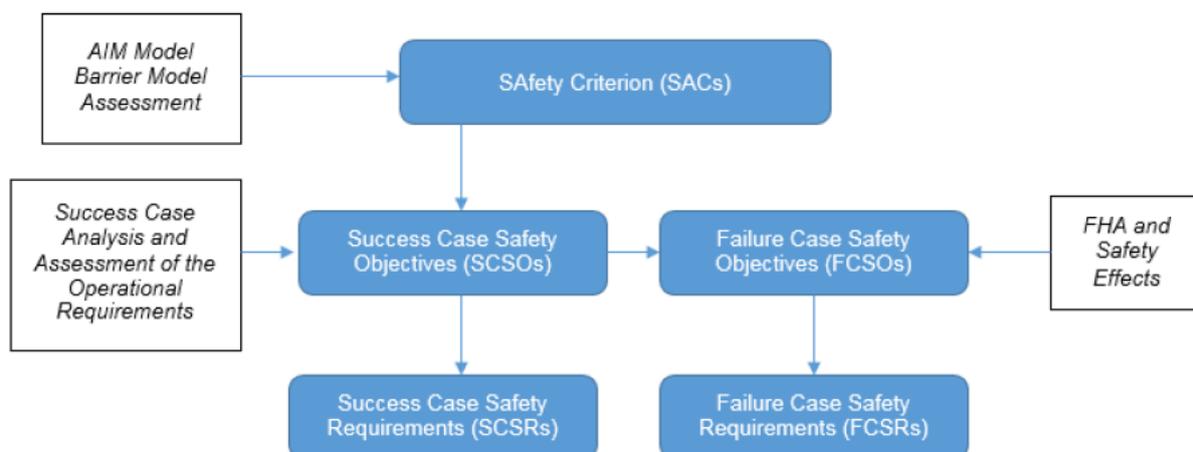
555
556
Figure 9 Overview of the Derivation Process

3.1 Conflict Detection and Resolution (CD/R) aid to TC: SVC-04.07.02-SPR-CDR1.0001

This section details the safety requirements currently derived for the Conflict Detection and Resolution aid to TC services. It is anticipated that these requirements will be updated as part of an iterative process to include quantitative figures where these are not currently available.

3.1.1 Safety and Performance Requirements

Some of the requirements presented in this section have been labelled as "functional", "operational" or "performance". Out of these some of them are the same[7] or similar[8] to some of the OSED requirements. However they have all been left in the safety requirements section as it is assumed that they were all considered to have safety impact on operations.

The list of requirements which are the same or similar with the OSED requirements for the TC aid is presented in Table 2. Note some of the requirements have been deleted to reflect deletions from the last update of the OSED [12].

SPR Requirement	Similar/Same OSED Requirement
REQ-04.07.02-SPR-CDR1.1030	REQ-04.07.02-OSED-0001.3089
REQ-04.07.02-SPR-CDR1.1080	REQ-04.07.02-OSED-0001.3094
REQ-04.07.02-SPR-CDR1.1100	REQ-04.07.02-OSED-0001.3091
REQ-04.07.02-SPR-CDR1.1200	REQ-04.07.02-OSED-0001.2005
REQ-04.07.02-SPR-CDR1.1220	REQ-04.07.02-OSED-0001.3026

---

[7] *"Same"* in this case means that both the meaning and the text of the requirement are the same with the OSED Requirement.
[8] *"Similar"* in this case means that the meaning of the requirement is the same but the text is slightly different compared to the OSED Requirement.

REQ-04.07.02-SPR-CDR1.1330	REQ-04.07.02-OSED-0001.1001
REQ-04.07.02-SPR-CDR1.1340	REQ-04.07.02-OSED-0001.2001

570 **Table 2 TC Aid OSED Duplicated Requirements with Safety Impact on Operations**

571 3.1.1.1 Success Case[9]

572 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1010
Requirement	It shall be possible for flights other than those in the sector to be recognised/made relevant in order that they are included in TC aid calculations.
Title	Recognise flights outside the sector
Status	<Verified>
Rationale	TC aid calculations will include all flights (i.e. those inside and OUTSIDE the sector) that could contribute in creating encounters in order to make sure that all the interactions are taken into account and that TC aid will not mislead the controller by missing some of the interactions.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

573
574 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3027	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3032	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2035	<Partial>
<APPLIES TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

575
576 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1030
Requirement	Where no CFL is available the tactical trajectory shall use the Entry flight level of the first controlled sector.
Title	Cleared/entry flight level
Status	<Verified>
Rationale	TC aid will have the ability to switch between using cleared and entry flight levels when calculating trajectories. A tactical trajectory requires ATC information to be operationally meaningful for tactical resolution, such as an agreed NFL or CFL.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

577
578 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3089	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3093	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED BECAUSE OF>	<Change Order>	Change reference	N/A

---

[9] May include: Performance, Functional, Operational and Safety Requirements

579
580 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1040
Requirement	The Tactical trajectory shall be updated by any clearances input into the TC Aid.
Title	Update trajectory
Status	<In Progress>
Rationale	In order to provide an up-to-date traffic picture and enhance controller's situational awareness, the TC aid calculations will be updated by any new clearances. Conversely controller's trust in the tool will be negatively affected.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

581
582 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3091	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3089	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3093	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

583
584 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1050
Requirement	The TC Aid shall compare tactical trajectories between flights within the sector to predict the horizontal and vertical separation that will be achieved between them.
Title	Compare trajectories
Status	<Verified>
Rationale	TC aid will help the controller in detecting separation infringements for both vertical and horizontal trajectories in order to reduce workload and help him in gaining situational awareness faster compared to current operations.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

585
586 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3027	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3028	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3032	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3101	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2007	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2035	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2034	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

587
588 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1060
Requirement	The TC Aid shall detect any conflicting tactical trajectories within the minimum horizontal separation thresholds.
Title	Conflicting trajectories
Status	<Verified>

Rationale	TC aid will help the controller in detecting separation infringements for horizontal trajectories in order to reduce workload and help him in gaining situational awareness faster compared to current operations.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

589

590 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3027	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2035	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED BECAUSE OF>	<Change Order>	Change reference	N/A

591

592 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1070
Requirement	The TC Aid shall display an alert to the controllers when any conflicting tactical trajectories are detected.
Title	Alert controllers
Status	<Verified>
Rationale	The TC aid will improve the controller's reaction time, compared to current operations, by displaying alerts to highlight conflicting trajectories. This would result in a faster mitigation appliance.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

593

594 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2008	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3027	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3028	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3037	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2007	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2035	<Partial>
<APPLIES TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

595

596 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1360
Requirement	ATCOs shall be able to delete/supress/hide alerts.
Title	TC supresses alerts
Status	<Verified>
Rationale	The TC aid will not negatively impact controller's situational awareness by creating clutter on the situational displays. Therefore the tactical controller should have means to supress or delete the unwanted/nuisance alerts.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

597

598 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2008	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3027	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3028	<Partial>

<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2035	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

599
600
601 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1080
Requirement	For the identification of Tactical encounters a ground speed uncertainty shall be taken into account.
Title	Solutions
Status	<In Progress>
Rationale	TC aid will make sure to catch all encounters if there is a large uncertainty in the ground speed. This avoids late alerts and unstable resolutions.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

602
603 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3094	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2008	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

604
605 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1090
Requirement	The controller shall be provided with all of the relevant information[10] needed for each encounter.
Title	Controller information
Status	<Verified>
Rationale	To prevent separation infringements, the controller will be informed about flight encounters (and all the relevant details) in order for the appropriate action to be made.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

606
607 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2008	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

608
609 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1100
Requirement	The reaction time of the controller and flight crew shall be considered for the

---

[10] Relevant information = a/c pair; in which sector the infringement occurred; beginning of infringement; CPA (Closest Point of Approach); end of infringement, etc.

For a full understanding of what the relevant information is please refer to the CATO Requirements Specification document [19].

	calculation of a tactical trajectory following a clearance.
Title	ATCO/flight crew reaction time
Status	<Verified>
Rationale	Turn time will be used for calculation of the lateral latency time (refer to Trajectory Calculation) dependant on the difference between actual track and cleared track if the aircraft moves into the direction of the cleared track.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

610

611   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3091	<Full>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

612

613   [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1110
Requirement	The TC Aid shall display the conflicting trajectories on the situation display within x number of seconds (after the detection of the conflict) to the controller.
Title	Display conflicting trajectories
Status	<In Progress>
Rationale	TC aid will be able to show the conflicting trajectories in an instant manner (usually that means 500 ms) such that the controller's reaction time will not be delayed by the display latency and the possible infringements will be dealt with faster compared to current operations.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

614

615   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3027	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3028	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3032	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3037	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2007	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2035	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

616

617   [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1120
Requirement	The TC Aid shall create a deviation trajectory if Flight Path Monitoring detects a Route deviation.
Title	Route deviation
Status	<Verified>
Rationale	The TC aid will enhance controller's situational awareness in detecting when an aircraft is not following its predicted route or when a clearance is only given to the aircraft but not entered into the system by creating a deviation trajectory. This also ensures the integrity of the resolutions proposed, including new resolutions that will take account of the deviation.
Category	<Functional>

Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

618

619 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2004	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3019	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3120	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3026	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3024	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2005	<Partial>
<APPLIES TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

620

621 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1130
Requirement	The TC Aid shall create a deviation trajectory if Flight Path Monitoring detects a Lateral deviation.
Title	Lateral deviation
Status	<Verified>
Rationale	The TC aid will enhance controller's situational awareness in detecting when an aircraft is not following its predicted route or when a clearance is only given to the aircraft but not entered into the system by creating a deviation trajectory. This also ensures the integrity of the resolutions proposed, including new resolutions that will take account of the deviation.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

622

623 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2004	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3019	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3026	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2005	<Partial>
<APPLIES TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

624

625 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1140
Requirement	The TC Aid shall create a deviation trajectory if Flight Path Monitoring detects a Vertical Rate Deviation.
Title	Vertical rate deviation
Status	<Verified>
Rationale	The TC aid will enhance controller's situational awareness in detecting when an aircraft is not following its predicted route or when a clearance is only given to the aircraft but not entered into the system by creating a deviation trajectory. This also ensures the integrity of the resolutions proposed, including new resolutions that will take account of the deviation.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

626

627 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2004	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3019	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3021	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3023	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3026	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2005	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

628
629 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1150
Requirement	The TC Aid shall create a deviation trajectory if Flight Path Monitoring detects a CFL deviation.
Title	CFL deviation
Status	<Verified>
Rationale	The TC aid will enhance controller's situational awareness in detecting when an aircraft is not following its predicted route or when a clearance is only given to the aircraft but not entered into the system by creating a deviation trajectory. This also ensures the integrity of the resolutions proposed, including new resolutions that will take account of the deviation.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

630
631 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2004	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3019	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3022	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3023	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

632
633 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1160
Requirement	The TC Aid shall create a deviation trajectory if Flight Path Monitoring detects a Speed Deviation.
Title	Speed deviation
Status	<In Progress>
Rationale	The TC aid will enhance controller's situational awareness in detecting when an aircraft is not following its predicted route or when a clearance is only given to the aircraft but not entered into the system by creating a deviation trajectory. This also ensures the integrity of the resolutions proposed, including new resolutions that will take account of the deviation.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

634
635 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2004	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3019	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2005	<Partial>

<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3007	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3026	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

636
637   [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1170
Requirement	The TC Aid shall create a deviation trajectory if Flight Path Monitoring detects that there is no valid flight plan data available.
Title	No valid flight plan data
Status	<Verified>
Rationale	The TC aid will enhance controller's situational awareness in detecting when an aircraft is not following its predicted route or when a clearance is only given to the aircraft but not entered into the system by creating a deviation trajectory.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

638
639   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2004	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3019	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3024	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.4037	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3026	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3010	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

640
641
642   [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1190
Requirement	The TC Aid shall alert the controller to any detected deviations via HMI on the radar display.
Title	HMI alert
Status	<Verified>
Rationale	Deviations from the trajectory can convert in imminent infringements therefore it is important that the TC aid will help the controller in maintaining his situational awareness in such cases and in minimising his reaction time.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

643
644   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3019	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3021	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3022	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3023	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3024	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3026	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3010	<Partial>

<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

645

646 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1200
Requirement	The TC Aid shall continuously monitor actual track data and controller clearance data.
Title	Continuous monitoring
Status	<Verified>
Rationale	TC aid will be able to provide trajectory calculations and detect trajectory compliances at all times, if the system is turned on, so it can continuously provide an enhanced situational awareness, trust and reduced workload for the controller.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

647

648 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2005	<Full>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

649

650

651 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1220
Requirement	The TC Aid shall detect deviations between controller clearance data and Mode S downlinked airborne parameters.
Title	Mode S parameters
Status	<Verified>
Rationale	Example: Cleared flight level will be compared to Mode S selected flight level in order to give the controller a chance to react early on deviations.Example: Cleared Flight level shall be compared to Mode S Selected Altitude in order to give the air traffic controller a chance to react early on deviations. The exact message set to be compared has not been finalized yet (subject to validation). Example: Cleared Flight level shall be compared to Mode S Selected Altitude in order to give the air traffic controller a chance to react early on deviations. The exact message set to be compared has not been finalized yet (subject to validation).
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

652

653 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3026	<Full>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

654

655

656

657 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1260

Requirement	When the controllers request a what-if probe for a heading or direct route the TC Aid shall display if that heading or direct route is conflict free.
Title	Direct route what-if probing
Status	<Verified>
Rationale	The TC aid will enhance the controller's situational awareness and help him in decision making by suggesting conflict free horizontal trajectories.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

658
659   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3038	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

660
661
662   [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1290
Requirement	The TC Aid shall provide what-else probing to the controllers.
Title	What-else probing
Status	<Verified>
Rationale	The TC aid will reduce controller's workload by detecting future possible encounters based on various trajectory changes made by the controller.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

663
664   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3038	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

665
666   [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1300
Requirement	The TC Aid shall compare the proposed tactical trajectory of a subject flight against the actual traffic situation when the controller requests a what-if or what-else probe.
Title	TC Aid compares trajectories
Status	<Verified>
Rationale	The TC aid will reduce controller's workload and help him in decision making by detecting, on request, future possible encounters based on various trajectory changes made by the controller.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

667
668   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3038	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

669
670
671 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1320
Requirement	When the controllers request a what-else probe the TC Aid shall display if the flight levels are conflict free or not, and if a vertical rate is necessary to achieve the level.
Title	Flight level what-else probing
Status	<Verified>
Rationale	The TC aid will reduce the controller's workload by providing conflict resolution for proposed flight levels.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

672
673 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.4009	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3038	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3106	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

674
675 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1330
Requirement	When the controllers request a what-else probe for headings or direct routes the TC Aid shall display if that headings or direct routes are conflict free.
Title	Heading/Directs what-else probing
Status	<Verified>
Rationale	The TC aid will reduce the controller's workload by providing conflict resolution for proposed headings or direct routes.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

676
677 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.4009	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3038	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3106	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

678
679 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1340
Requirement	The TC Aid shall be available at all controller workstations.
Title	TC aid availability
Status	<Verified>
Rationale	Both tactical and planner controllers will be aware of the same traffic picture in order to maintain situational awareness and to enhance planner-tactical collaboration.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

680
681   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.1001	<Full>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

682
683   [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1350
Requirement	The controllers shall have the possibility to enable and disable the TC Aid tool.
Title	Enable/Disable TC aid
Status	<Verified>
Rationale	In order to prevent situations when the tool works incorrectly, the controller will have the possibility to switch the TC aid off.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

684
685   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2001	<Full>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

686

3.1.1.2 Failure Case

688   The Failure Case Safety Requirements are written below. These include various FDPS, SDPS, FMS
689   or TC aid failures. There are no specific OSED requirements concerning these features to be used
690   for traceability, however the requirements containing data related to the features have been used
691   instead. Note that in some cases all the OSED Requirements have been considered to be relevant.

692   [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.2010
Requirement	The probability of Loss of FDPS shall be no more than 5.33E-06 per flight hour.
Title	Loss of FDPS
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

693
694   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3089	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3090	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3093	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3019	<Partial>

<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3020	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3023	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2007	<Partial>
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<APPLIES TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

695
696   [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.2020
Requirement	The probability of Loss of SDPS shall be no more than 3.33E-07 per flight hour.
Title	Loss of SDPS
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

697
698   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3007	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3112	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3090	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3019	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3020	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3023	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3026	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.4052	<Partial>
<APPLIES TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED BECAUSE OF>	<Change Order>	Change reference	N/A

699
700   [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.2030
Requirement	The probability of Loss of TC Aid shall be no more than 3.33E-07 per flight hour.
Title	Loss of TC Aid
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]

Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

701

702 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.1001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2001	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3089	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3090	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3112	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3093	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3019	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3037	<Partial>
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<APPLIES TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

703

704 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.2040
Requirement	The probability of Loss of FMS shall be no more than 5.33E-06 per flight hour.
Title	Loss of FMS
Status	<In Progress>

Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

705

706 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3090	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3112	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3021	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3022	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3024	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3028	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.4052	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3099	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3102	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3106	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

707

708 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.2050
Requirement	The probability of Delay of the FDPS shall be no more than 5.33E-06 per flight hour.
Title	Delay of FDPS
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

709

710 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3090	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3093	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3019	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3020	<Partial>
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<APPLIES TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED BECAUSE OF>	<Change Order>	Change reference	N/A

711
712   [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.2060
Requirement	The probability of Delay of the SDPS shall be no more than 3.33E-07 per flight hour.
Title	Delay of SDPS
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

713
714   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2004	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3090	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3019	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3020	<Partial>
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<APPLIES TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

715
716   [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.2070
Requirement	The probability of Delay of the TC Aid shall be no more than 3.33E-07 per flight hour.
Title	Delay of TC Aid
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

717
718   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.4052	<Partial>
<APPLIES TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

719
720   [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.2080
Requirement	The probability of Delay of the FMS shall be no more than 5.33E-06 per flight hour.
Title	Delay of FMS
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

721
722   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3089	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3090	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3112	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3011	<Partial>

<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3021	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3023	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3028	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.4052	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3099	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3106	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

723
724   [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.2090
Requirement	The probability of Corruption (undetected) of the FDPS shall be no more than 5.33E-06 per flight hour.
Title	Corruption of FDPS (undetected)
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

725
726   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3089	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3090	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3112	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3093	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3019	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3021	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3022	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2007	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3027	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3032	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3035	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3120	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3038	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.4009	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3095	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.4052	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3099	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2035	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3102	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.4041	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

727
728   [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.2100

Requirement	The probability of Corruption (undetected) of the SDPS shall be no more than 3.33E-07 per flight hour.
Title	Corruption of SDPS (undetected)
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

729

730 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3007	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3112	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3090	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3019	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3021	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3023	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3026	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.4052	<Partial>
<APPLIES TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

731

732 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.2110
Requirement	The probability of Corruption (undetected) of the TC Aid shall be no more than 3.33E-07 per flight hour.
Title	Corruption of TC Aid (undetected)
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

733

734 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0003.2017	<Partial>
<APPLIES TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

735

736 [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.2120
Requirement	The probability of Corruption (Detected) of the FDPS shall be no more than 1.00E-05 per flight hour.
Title	Corruption of FDPS (detected)
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

737

738 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3089	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3090	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3112	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3093	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3019	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3021	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3022	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3023	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3024	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.4037	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2007	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3027	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3032	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.4051	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3035	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3120	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3038	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.4009	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3095	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2035	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3102	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.4041	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

739
740   [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.2130
Requirement	The probability of Corruption (Detected) of the SDPS shall be no more than 1.00E-05 per flight hour.
Title	Corruption of SDPS (detected)
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

741
742   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3007	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3112	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3090	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3019	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3020	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3023	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.4052	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

743
744   [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.2140
Requirement	The probability of Corruption (Detected) of the TC Aid shall be no more than 1.00E-05 per flight hour.
Title	Corruption of TC Aid (detected)
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

745
746   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.1001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3089	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3090	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3091	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3112	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3007	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3093	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3008	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3019	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3026	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2007	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3027	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3038	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3101	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3102	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.4041	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3104	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2036	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3106	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A

<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

747

748   [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.2150
Requirement	The probability of Corruption (Detected) of the FMS shall be no more than 1.00E-05 per flight hour.
Title	Corruption of FMS (detected)
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

749

750   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3089	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3090	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3112	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3021	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3022	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.4052	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3099	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3102	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3106	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

751

752   [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.2160
Requirement	The probability of the Executive misunderstanding the tool shall be no more than 5.00E-06 per flight hour.
Title	Executive misunderstanding
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

753

754   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3091	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3026	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

755

756   [REQ]

Identifier	REQ-04.07.02-SPR-CDR1.2170
Requirement	The probability of the Flight Crew misunderstanding the instruction shall be no more than 5.00E-06 per flight hour.

Title	Flight Crew Misunderstanding
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

757

758   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3091	<Partial>
<APPLIES TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

759

3.2 Information Exchange Requirements (IER)

This section will be completed once all the required information from the relevant documents will be available.

4 References and Applicable Documents

4.1 Applicable Documents

[1] Template Toolbox 03.00.00
https://extranet.sesarju.eu/Programme%20Library/SESAR%20Template%20Toolbox.dot

[2] Requirements and V&V Guidelines 03.00.00
https://extranet.sesarju.eu/Programme%20Library/Requirements%20and%20VV%20Guidelines.doc

[3] Templates and Toolbox User Manual 03.00.00

https://extranet.sesarju.eu/Programme%20Library/Templates%20and%20Toolbox%20User%20Manual.doc

[4] EUROCONTROL ATM Lexicon
https://extranet.eurocontrol.int/http://atmlexicon.eurocontrol.int/en/index.php/SESAR

4.2 Reference Documents

[5] ED-78A GUIDELINES FOR APPROVAL OF THE PROVISION AND USE OF AIR TRAFFIC SERVICES SUPPORTED BY DATA COMMUNICATIONS.[11]

[6] B.4.1 Performance Framework (validation targets, influence diagrams), D41

[7] P10.01.07 Technical Architecture Document Cycle 4, D115

[8] SESAR Safety Reference Material, 16.06.01, 00.02.01

[9] SESAR Security Reference Material, D101 Level 1 (00.04.02)/Level2 (00.03.01)

[10] SESAR Environnent Reference Material, D24, 00.00.04

[11] WPB.01 Integrated Roadmap, DS14

[12] WP04.07.02, OSED_4, D28, 00.01.00

[13] AIM model, v0.2 June 2012 (Note the original assessment was conducted using V0.1 and updated as part of the offline analysis).

[14] VP356 TMA Initial Operational & SPR Requirements Step 1, D83, 00.01.01

[15] EUROCONTROL Initial 4D – 4D Trajectory Data Link (4DTRAD) Concept of Operations. December 2008.

[16] RTCA   SC-214/EUROCAE   WG-78.
http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/atc_comms_services/sc214/current_docs/version_l_m/, September 2013.

[17] WP04.07.02, Final Safety Assessment Report_4, D61, 00.03.00

[18] WP4.7.2, Preliminary Safety and Performance Requirements for TRACT_4, D60, 00.03.01

[19] WP4.07.02, Project CATO – Requirements Specification Release 6/Final for Industrial Prototype, Version 1.0

[20] SESAR 2015 Release 5, S27 Medium Term Conflict Detection (MTCD) and conformance monitor tools

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[11] *The EUROCAE ED-78A has been used as an initial guidance material. ED-78A is useful, but is not an applicable document, because it mostly addresses the V4-V5 phases, whilst the SESAR R&D programme is focussed on development (V1-V2-V3, and because of its partial compliance with safety regulatory requirements).*

799 ## Appendix A   **Safety and Performance Assessment**

800 This appendix contains an extract from the Safety Assessment Report [17]. This is to enable the
801 reader to gain an understanding of the derivation process for the SACs and SOs, thus providing a
802 better understanding of the connection between these and the safety requirements for PC and TC aid.
803 For the complete explanation please see the Safety Assessment Report [17].

804 The safety activities performed in Task 20 were performed in accordance with 16.06.01 guidance
805 material.

806 ## A.1 Safety Criteria Derivation

807 ## Introduction

808 As part of WP4.7.2 Task 20, a workshop was held to review the material that was produced for the
809 Task 8 Deliverable, and to amend to the material where necessary. The attendees to this workshop
810 are presented in Table 3 Task 20 Success Case Analysis workshop.

Name	Organisation	Role
Andrew Burrage	Helios (representing NATS)	Safety Expert and Lead for SPR Task
Sarah Broom	Think Research (Representing NATS)	P04.07.02 Validation Support and SPR Task 20 support
Karim Mehadhebi	DSNA	P16.06.01 representative (safety process expert)
Andrew Darby	NATS	Project Manager
Stephen Pember	NATS	Concept Expert
Michael Teichmann	DFS	ATC Expert
Charlie Madier	DSNA	Concept Expert

811 **Table 3 Task 20 Success Case Analysis workshop - Attendees**

812 The specific objectives of the workshop were as follows:

813 • To revisit the process and methodology behind the Safety Assessment

814 • To revisit the following for each of the 04.07.02 Concepts:

815 o Assumptions and Architecture of the concept

816 o Success Case Safety Objectives

817 o Review of Hazard Identification

818 • Identification of Abnormal Scenarios and any additional SCSOs required to mitigate against
819 these (this was performed as a post workshop activity but has still been recorded in the
820 Safety Assessment Report [17])

821 The detailed descriptions of the identified SACs make reference to events within the Accident Incident
822 Model (AIM) [13].

823 Scope

824 The initial workshop was conducted as part of Task 8 and the associated safety criteria were limited
825 to the first build of 04.07.02 (denoted Build 1) which is dedicated to separation management with ATM
826 service level 2 capabilities. As described above, a further safety workshop was conducted in the
827 second iteration (Build 2) to review the SACs in light of the concept development. As a result the
828 SACs were updated.

829 It was expected that the output of this workshop be a direct input into the validation activities so that a
830 direct measure of the safety benefits or detriments of each separation service can be established
831 during the exercises. However the validation plans were already mature before this task was
832 undertaken. It is expected that the execution of the validation plan may be amended in light of this
833 document. In the next iteration the SPR will be prepared prior to the completion of the validation plan
834 so as to act as an input to the validation activities.

835 The SACs were quantified by assessing the AIM precursors which the operational services (PC Aid,
836 TC Aid) belonging to the concept would affect, and judging the extent to which the operational
837 services could have a positive (or negative) impact upon them. The precursor impacts were then
838 aggregated to produce the final results for each SAC.

839 The updated SACs, for the PC and TC aid, and their rationale are shown in sections A.1.1X below.
840 Note for a detailed understanding of how the SACs were derived please see the Safety Assessment
841 Report [17].

842 A.1.1 TC Aid SACs

SAC #	Description	Rationale
11	There shall be 21% reduction in the number of Imminent Infringements.	Safety Criteria developed through workshop with safety and ATC experts focussing on the barriers between hazard and mid-air collision, based on list of pre-existing hazards identified. Related AIM Barrier MB5 [13]. The "What if" tool will improve the detection of conflicts which is expected to reduce the failure frequency of event MB4.1.2 - "ATCO failure to identify conflict in time". The What Else tool will improve the resolution of conflicts which is expected to reduce the failure frequency of event MB4.1.2.2 Inadequate information for conflict management. The conformance monitoring tool will improve the detection of non-adherence to clearances which is expected to reduce the failure frequency of event MB4.3 "Inadequate Pilot Response to ATC". Furthermore, CD/R for TC will improve the team working between the planner and the tactical. This will mean that for sectors where there is a limited planning function the planner will be able to provide resolution advice to the tactical. This will reduce the failure frequency of events and MB4.2.1 - "ATCO misjudgement of separation" and MB4.2.2 - "ATCO failure to act".
12	There shall be 30% reduction in the number of Tactical conflicts.	Safety Criteria developed through workshop with safety and ATC experts focussing on the barriers between hazard and mid-air collision, based on list of pre-existing hazards identified. The CD function, What if and What else all make the controller more likely to identify conflicts, and resolve them with better information about the nature of the conflict. Related aim barriers: MBX1.3.1 ATCO misjudgement of separation; MBX.1.2.3 Failed to Detect Conflict;

		MBX1.1.1 Inadequate traffic picture; MBX.1.3.1 ATCO misjudgement of separation; MBX.1.3.2 ATCO failure to act.
13	There shall be 41% reduction in the number of ATC Induced Tactical conflicts.	Safety Criteria developed through workshop with safety and ATC experts focussing on the barriers between hazard and mid-air collision, based on list of pre-existing hazards identified. Related AIM Barrier MF7.1 [13]. The "What Else?" tool will also reduce the likelihood of induced conflicts since it provides the controller with a view of all the predictable knock-on conflicts. This is expected to reduce the failure frequency of event MF7.1.4. "Conflict resolution leads to knock-on conflict".
14	There shall be 28% reduction in the number of Pilot Induced Tactical conflicts.	Safety Criteria developed through workshop with safety and ATC experts focussing on the barriers between hazard and mid-air collision, based on list of pre-existing hazards identified. Related AIM Barrier MF6.1 [13]. The conformance monitoring tool will detect pilot error since it provides support in the resolution of conflicts and will reduce the likelihood of a knock-on planned conflict. This will strengthen the barrier "BY Ground/Air Trajectory Deviation Alerting".
15	There shall be no increase in the number of Near Collisions.	Safety Criteria developed through workshop with safety and ATC experts focussing on the barriers between hazard and mid-air collision, based on list of pre-existing hazards identified. Related AIM Barrier MF4 [13]. It should be noted that there could be a safety detriment to the What Else tool if it was to overlap and potentially conflict with STCA. The result could be two tools based on different data presenting a very conflicting picture that is confusing to the controller. Provided that the safety assumption 3 (STCA and CD/R for TC are independent) this safety detriment can be discounted. There may be some safety gain from the redundancy in the alerting which is introduced by having the independent TC-Aid and STCA. However, this gain is believed to be offset by the confusion from inconsistency of alerting. This is reflected in the SAC which sets an expectation of 'no worse than today'.

843   **Table 4 Safety Criteria for TC Aid**

844 ## A.1.2 PC Aid SACs

SAC #	Description	Rationale
21	There shall be a 12% reduction in the number of ATC Induced Pre-Tactical conflicts.	Safety Criteria developed through workshop with safety and ATC experts focussing on the barriers between hazard and mid-air collision, based on list of pre-existing hazards identified. Related AIM Barrier MB9.1 [13]. The "What Else?" tool will also reduce the likelihood of misjudgement error since it provides support in the resolution of conflicts and will reduce the likelihood of a knock-on planned conflict. This is expected to reduce the failure frequency of events MF9.1.1 - "Pre-Tactical Conflict generated from other sector" and

		MF9.1.2 - "Conflict resolution leads to knock-on Pre-Tactical conflict".
22	There shall be 36% reduction in the number of Planned Tactical conflicts.	The "What If?" and "What Else?" tools provide the controller with medium term conflict detection and resolution functionality and improve the quality of planning data. These are expected to provide significant safety benefits through a reduction in the number of planned conflicts. This is expected to reduce the failure frequency of event MB9.2.2b.1 - "Failure to identify conflict or traffic peak". It is also expected that the planner controller will be able to address planning conflicts much earlier than before and prioritise planning actions. This is expected to reduce the failure frequency of event MB9.2.2b.2 "Misjudge conflict resolution".
23	There shall be 7% reduction in the number of Pilot Induced Tactical conflicts.	Safety Criteria developed through workshop with safety and ATC experts focussing on the barriers between hazard and mid-air collision, based on list of pre-existing hazards identified. Related AIM Barrier MF6.1 [13]. The monitoring aid (CMT) will detect whether exit conditions can actually be achieved based on aircraft performance. This is expected to reduce the failure frequency of crew induce conflicts; MF6.1.2.2 - "Conflict due to Lateral Deviation", MF6.1.2.3 - "Conflict due to Speed Deviation" and MF6.1.2.4 - "Conflict due to V.Rate Deviation".

Table 5 Safety Criteria for PC Aid

A.2 Success Case Safety Objectives Derivation

Introduction

Task 8 (Iteration 1)

Following the SAfety Criteria (SAC) derivation, the Task 8 workshop performed the preliminary work of the Success Case Analysis. The Success Case Analysis considered the services when working as intended, and identified the requirements that need to be placed for the services to deliver their safety benefits (as defined by the SAC). The Failure Case Analysis, performed later and discussed in section A.3, considered how the services continue to operate safely under failure conditions.

The overall objective of the Success Case Analysis workshop was to provide the Task 8 team with a foundation upon which to perform the Success Case Analysis.

This objective was broken down into the following:

- Reviewing and developing the functional blocks. The functional blocks described the services from a functional perspective, enabled the completeness of the ORs to be assessed, and provided a reference for the performance requirements to be described against. The functional blocks are available in the Safety Assessment Report [17].
- Reviewing and discussing the use cases for the services. The various possible uses of the services were explored and the boundary between the Success and Failure cases was established. The use cases also helped to confirm the completeness of the ORs. The use cases are available in the Safety Assessment Report [17].

Following the workshop the ORs were reviewed, and:

- Any missing requirements were specified to ensure the services were completely described.

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867 The SCSOs were defined, by using the foundation provided by the workshop, and then reviewed by
868 the project contributors and WP16.06.01 safety experts.

869 Task 20 (Iteration 2)

870 The results from the Task 8 analysis were reviewed as the first step of Task 20. In addition the
871 following work was undertaken:

872 • Development and assessment of the 'SPR level' model. The 'SPR level' model provides a
873   model of the system at a high level, but unlike the functional model it also includes
874   architectural details (who or what performs the functions).

875 • Development and assessment of the threads (scenarios). The threads show the interactions
876   between the various elements of the SPR level model through specific scenarios which
877   represent the way the concepts will be used in operational situations.

878 Note the 'SPR level' model and the threads are not included in this appendix. They are contained in
879 the Safety Assessment Report [17].

880 Scope

881 The output of the Task 8 workshop and the associated Success Case Analysis is limited to the first
882 build of 04.07.02 (denoted Build 1) which is dedicated to separation management with ATM service
883 level 2 capabilities. A further safety workshop would need to be convened to establish safety effects
884 beyond the scope of build 1 (during later iterations of the project).

885 This task falls within E-OCVM level V2, it should inform the V3 activities, but should not be V3 itself.
886 This means that all requirements are at the service or concept level, and independent of
887 implementation. They should not require a specific implementation. They should specify the
888 standard (accuracy, integrity, latency, etc.) to which a system must perform its functions, in order for
889 the concept to achieve its safety benefit. They should not specify what *can* be done with technology
890 available, but what *needs* to be done for the concept to work. The scope of the Task 20 activities was
891 to extend the work of Task 8 to include derivation of the safety requirements.

892 The Success Case Safety Objectives for TC and PC aid and the OSED Requirements they satisfy are
893 shown further in sections A.2.1X. For a more detailed understanding on how the Success Case
894 Safety Objectives were derived please see the Safety Assessment Report [17].

895 A.2.1 TC Aid SCSOs

SCSO #	Description	Rationale	OSED Requirement
11	The TC Aid shall indicate all relevant pairs of aircraft whose predicted (tactical or deviated) trajectories result in an infringement upon the horizontal and vertical minimum separation.	Success Case Analysis (preliminary) performed during workshop involving safety and ATC experts identified the requirements that need to be placed for the services to deliver their safety benefits when working as intended. Related AIM Barriers MB5 and MF4 [13]. This safety objective relates to the AIM Barrier Pre-Cursor MBX1.3.1 ATCO misjudgement of separation as the TC aid would automatically identify conflicts which still exist after an	REQ-04.07.02-OSED-0001.2002 REQ-04.07.02-OSED-0001.3027 REQ-04.07.02-OSED-0001.3028 REQ-04.07.02-OSED-0001.3032 REQ-04.07.02-OSED-0001.3037 REQ-04.07.02-OSED-0001.3095 REQ-04.07.02-OSED-0001.2034 REQ-04.07.02-OSED-0001.3099 REQ-04.07.02-OSED-0001.3101 REQ-04.07.02-OSED-0001.3112 REQ-04.07.02-OSED-0001.3008 REQ-04.07.02-OSED-0001.3093 REQ-04.07.02-OSED-0001.3007 REQ-04.07.02-OSED-0001.2007 REQ-04.07.02-OSED-0001.2035 REQ-04.07.02-OSED-0001.3089

		inadequate resolution is applied. It relates to MBX.1.2.3 Failed to Detect Conflict as the TC aid detects all relevant interactions within the sector therefore reducing the risk of the Tactical failing to detect conflictions. It also relates to MBX1.1.1 Inadequate traffic picture as the TC aid detects all relevant interactions within the sector therefore reducing the risk of the Tactical being unaware of any conflicts due to not having an adequate traffic awareness	REQ-04.07.02-OSED-0001.3091 REQ-04.07.02-OSED-0001.3094
12	The TC Aid shall indicate the following deviations between an aircraft's known position and predicted trajectory: 1) Route Deviation (ROUTE) 2) Vertical Deviation Rate (RATE) 3) Cleared flight level deviation (CFL) 4) Speed Deviations (SPD) 5) No valid flight plan data available (NoTT)	Success Case Analysis (preliminary) performed during workshop involving safety and ATC experts identified the requirements that need to be placed for the services to deliver their safety benefits when working as intended. Related AIM Barriers MF6.1 and MF4 [13]. This safety objective relates to the AIM Barrier Pre-Cursor MF6.1.2 Conflict due to Crew/ac Deviation due the fact the TC aid shall detect deviations from any instructions issues to the aircraft that affects the trajectory. Therefore there is a reduced risk of a conflict being created due to these deviations	REQ-04.07.02-OSED-0001.2004 REQ-04.07.02-OSED-0001.2005 REQ-04.07.02-OSED-0001.3090 REQ-04.07.02-OSED-0001.3019 REQ-04.07.02-OSED-0001.3020 REQ-04.07.02-OSED-0001.3021 REQ-04.07.02-OSED-0001.3022 REQ-04.07.02-OSED-0001.3023 REQ-04.07.02-OSED-0001.3024 REQ-04.07.02-OSED-0001.3026 REQ-04.07.02-OSED-0001.3010
13	For the subject aircraft the TC aid shall identify conflicts for any probed clearances.	Success Case Analysis (preliminary) performed during workshop involving safety and ATC experts identified the requirements that need to be placed for the services to deliver their safety benefits when working as intended. Related AIM Barrier MF7.1 [13]. This safety objective relates to the AIM Barrier MBX.1.3.1 ATCO misjudgement of separation due to the fact that the TC aid would automatically identify conflicts which still exist after an inadequate resolution is applied. It also relates to	REQ-04.07.02-OSED-0001.3038

		MBX1.1.1 Inadequate traffic picture due to the fact that the TC aid what if functionality will identify any conflictions for any probed clearances they are about to issue that they may not have been aware of due to an inadequate traffic picture. It also relates to MF7.1.1 Conflict resolution leads to knock on conflict due to the fact that the TC aid, via the what if probing would identify a new conflict created by the proposed resolution	
14	TC Aid shall support the TC to correctly prioritise and resolve conflicts indicated to the ATCO by TC aid in a timely way.	Success Case Analysis (preliminary) performed during workshop involving safety and ATC experts identified the requirements that need to be placed for the services to deliver their safety benefits when working as intended. Related AIM Barriers MB5, MF7.1, and MF4 [13]. This safety objective relates to the AIM Barrier MBX.1.3.2 ATCO failure to act. The TC aid shall display to the controller all conflictions and will indicate the severity/geometry of those interactions, therefore indicating the highest priority of tasks	REQ-04.07.02-OSED-0001.3104 REQ-04.07.02-OSED-0001.2008
15	The TC Aid shall detect Tactical encounters which would involve the subject flight for all flight levels within the sector.	This safety objective relates to the AIM Barrier MBX1.3.1 ATCO misjudgement of separation due to the fact that the TC aid shall display to the Tactical Controller the occupancy of all other levels in the sector and any potential conflictions if they were to use these levels for the subject flight, therefore reducing the risk of the tactical misjudging separation. It also relates to MF7.1.1 Conflict resolution leads to knock on conflict due to the fact that the TC Aid will help the controller by showing encounter free options before the controller decides upon a resolution thereby	REQ-04.07.02-OSED-0001.2036 REQ-04.07.02-OSED-0001.3106 REQ-04.07.02-OSED-0001.3038

		reducing the chance that they pick a resolution which leads to a knock-on conflict. It also relates to MBX1.1.1 Inadequate traffic picture due to the fact that the TC aid what- else functionality will reduce the risk of the Tactical having an inadequate traffic picture as they have a constant view of flight level occupancy in the sector with regards to the subject flight	
16	The TC Aid shall be active at all Controller Work Positions at all times.	This is a correct assumption, but will need to be validated during the simulation	REQ-04.07.02-OSED-0001.1001
17	Where accurate trajectory information is not available for a flight (e.g. an aircraft that has not yet departed) the TC Aid shall produce a tactical trajectory based upon estimated times at specific points.		REQ-04.07.02-OSED-0001.2030

896

Table 6 Success Case Safety Objectives for TC Aid

A.2.2 PC Aid SCSOs

897

SCSO #	Description	Rationale	OSED Requirement
21	The PC aid shall indicate pairs of aircraft which have planning encounters at the entry or exit sector boundary	This safety objective relates to the AIM Barrier Pre-Cursor MB10.1.1.2.1.1 Failure to identify Conflict due to the fact that PC aid identifies conflicts which the controller may otherwise have missed. It also relates to MB10.1.1.2.1.2 Misjudge Conflict Resolution due to the fact that PC aid would automatically identify conflicts which still exist after an inadequate resolution is applied.	REQ-04.07.02-OSED-0002.2012 REQ-04.07.02-OSED-0002.3047 REQ-04.07.02-OSED-0002.3058 REQ-04.07.02-OSED-0002.3087 REQ-04.07.02-OSED-0002.3051 REQ-04.07.02-OSED-0002.3059 REQ-04.07.02-OSED-0002.3119 REQ-04.07.02-OSED-0002.2013
22	The PC aid shall identify planning encounters in proposed resolutions	This safety objective relates to the AIM Barrier Pre-Cursor MB10.1.1.2.1.2 Misjudge Conflict Resolution due to the fact that The PC aid, via the what if probing would identify an inadequate resolution	REQ-04.07.02-OSED-0002.2012 REQ-04.07.02-OSED-0002.3087 REQ-04.07.02-OSED-0002.3058 REQ-04.07.02-OSED-0002.3056 REQ-04.07.02-OSED-0002.3055 REQ-04.07.02-OSED-0002.3076 REQ-04.07.02-OSED-0002.2013

		proposed by the controller. It also relates to MF7.1.1 Conflict resolution leads to knock-on conflict due to the fact The PC aid, via the what if probing would identify a new conflict created by the proposed resolution.	
23	The PC Aid shall detect planning encounters which would involve the subject flight for all sector coordination entry and exit levels	This safety objective relates to the AIM Barrier Pre-Cursor MF7.1.1 Conflict resolution leads to knock-on conflict. The PC Aid will support the controller by showing encounter free options before the controller decides upon a resolution thereby reducing the chance that they pick a resolution which leads to a knock-on conflict	REQ-04.07.02-OSED-0002.3077 REQ-04.07.02-OSED-0002.3056 REQ-04.07.02-OSED-0002.3055 REQ-04.07.02-OSED-0002.3049 REQ-04.07.02-OSED-0002.2012
24	The PC aid shall monitor aircraft's achievability to meet entry and exit coordination	This safety objective relates to the AIM Barrier Pre-Cursor MB10.2.2 Inadequate planner-upstream coordination. The tool helps to identify situations where the aircrew are deviating vertically and therefore may create a new conflict/workload issue in the next sector. Therefore the controller is more likely to provide adequate upstream coordination.	REQ-04.07.02-OSED-0002.2014
25	The PC aid shall coordinate entry and exit conditions without the necessity of controller intervention	This safety objective relates to the AIM Barrier Pre-Cursor MB10.1.1.2 Inadequate planning task due to the fact that automating some coordination reduces workload for controller, in very high workload situations this gives the controller more time to perform their task, and they are therefore less likely to make errors in judgement. It also relates to MB10.1.1.1.2.2 Incorrect planning data. This could actually have a negative impact due to the fact that some coordinations are not handled by the controller, therefore they may not be as aware of the situation and therefore may have reduced situational awareness.	REQ-04.07.02-OSED-0002.2016 REQ-04.07.02-OSED-0002.3060
26	The PC Aid shall enable the application of constraints to the	This safety objective relates to the AIM Barrier Pre-Cursor MB10.1.1.1.2.1 No planning information. The controller can input constraints to the system, therefore	REQ-04.07.02-OSED-0002.4016

	coordination trajectory	this improves the information available and displayed by other existing tools, which means they are less likely to mislead the controller. It also enables the new tools to perform more accurate trajectory prediction, which may help the controller to identify encounters.	
27	The PC Aid shall detect deviations from each flights entry and exit conditions	This safety objective relates to the AIM Barrier Pre-Cursor MB10.1.2.1 Inadequate planner-exec coordination due to the fact that The tool identifies a situation where the planner has instructed the tactical to implement a resolution and the tactical has failed to do so. It also relates to MB10.1.1.1.2.2 Incorrect planning data due to the fact that the tool allows the resolution to be entered into the system so that it can be used by other tools, thus improving the data available to other tools.	REQ-04.07.02-OSED-0002.2053
28	The PC Aid shall indicate the predicted trajectories of a subject aircraft and any aircraft which may be interacting with it	This safety objective relates to the AIM Barrier Pre-Cursor MB10.1.1.1.2.2 Incorrect planning data. The tool is providing details of the trajectory of relevant aircraft to the controller, which means they are less likely to have an inaccurate picture of the situation.	REQ-04.07.02-OSED-0002.3052 REQ-04.07.02-OSED-0002.3055 REQ-04.07.02-OSED-0002.2011
29	The PC Aid should identify aircraft which are between the subject aircraft's current flight level and proposed exit flight level when a controller is assessing an exit flight level	This safety objective relates to the AIM Barrier Pre-Cursor MB7.1.2.3.A Potential conflict due to bad instructions given to pilot. The tool will help reduce the chance of the PC coordinating an exit level which requires the tactical to make many clearances to achieve. Since this is likely to reduce the number of clearances the tactical makes, it must reduce the chance of the tactical giving a bad clearance	REQ-04.07.02-OSED-0002.3109 REQ-04.07.02-OSED-0002.3055 REQ-04.07.02-OSED-0002.3110 REQ-04.07.02-OSED-0002.2038
210	The PC Aid shall improve communication	This safety objective relates to the AIM Barrier Pre-Cursor MB10.2.2 Inadequate planner-upstream	REQ-04.07.02-OSED-0002.3044 REQ-04.07.02-OSED-0002.3043

	between controllers	coordination. The tools allow precise communication between sectors therefore reduces the risk of inadequate upstream coordination. It also relates to MB10.1.2.1 Inadequate planner-exec coordination due to the fact the tool will allow more precise communication and sharing of information between controllers.		
211	The PC aid tool shall be active at all CWPs at all times		REQ-04.07.02-OSED-0002.2010 REQ-04.07.02-OSED-0002.1002	
212	The PC Aid shall identify planning encounters against a flight for every MTCD probe where the flight is blocking a level/s and/or likely to perform unusual manoeuvres	Correct assumption, but needs to be validated.	REQ-04.07.02-OSED-0002.3047	

898   **Table 7 Success Case Safety Objectives for PC Aid**

899   ## A.3 Failure Case Safety Objectives Derivation

900   ## Introduction

901   The objective of the Failure Case Analysis workshop was to derive failure case safety requirements
902   for the 04.07.02 Separation Task in En-Route Trajectory Based Environment project. This workshop
903   was held over three days examining each service for a day. Note this appendix only contains the
904   results for the TC and PC aid tools, namely for only two of the three days.

905   The workshop objectives were as follows:

906   •   Derive a complete set of logical requirements (requirements which define the logical way in
907   which each functional block within the service would operate, these are more detailed than
908   the SCSOs, but less detailed than the V3 ORs);

909   •   To identify all potential hazard causes associated with the system;

910   •   To identify hazard effects on operations (including the aircraft);

911   •   To assess the severity of hazard effect(s).

912   The participants of the Failure Case Analysis workshop are presented in Table 8 below.

Name	Organisation	Role
Andrew Burrage	Helios (representing NATS)	Safety Expert and Lead for SPR Task
Sarah Broom	Think Research (Representing NATS)	P04.07.02 Validation Support and SPR Task 20 support
Stephen Pember	NATS	Concept Expert
Michael Teichmann	DFS	ATC Expert
Pascal Deketelaere	DSNA	Concept Expert

913
Table 8 Task 20 Failure Case Workshop - Attendees

914
915   The Failure Case Safety Objectives derived during the workshop are shown further in sections
916   A.3.1X. For a more detailed understanding of the Failure Case Safety Objectives derivation process
917   please see the Safety Assessment Report [17].

918   ## A.3.1 TC Aid FCSOs

FCSO #	Description	Rationale
11	The frequency of the tool misleading the controller into missing a tactical conflict shall be no greater than 4E-6 per flight hour	A Functional Hazard Assessment was conducted to identify all potential hazards; requirements were identified based on the necessary functionality and performance in the case of internal failures to maintain the risk/likelihood of an effect at an acceptable level. This requirement is taken from CD/R aid to TC Hz#1, allocated severity MAC-SC3 (loss of separation).
12	The frequency of the tool presenting nuisance alerts to the controller which increase workload, potentially leading to a missed tactical conflict shall be no greater than 8E-5 per flight hour	A Functional Hazard Assessment was conducted to identify all potential hazards; requirements were identified based on the necessary functionality and performance in the case of internal failures to maintain the risk/likelihood of an effect at an acceptable level. This requirement is taken from CD/R aid to TC Hz#2, allocated severity MAC-SC3 (loss of separation).
13	The frequency of the tool presenting nuisance resolution proposals leading to a missed tactical conflict shall be no greater than 4E-4 per flight hour	A Functional Hazard Assessment was conducted to identify all potential hazards; requirements were identified based on the necessary functionality and performance in the case of internal failures to maintain the risk/likelihood of an effect at an acceptable level. This requirement is taken from CD/R aid to TC Hz#3, allocated severity MAC-SC3 (loss of separation).
14	The frequency of the tool suffering a detected failure	A Functional Hazard Assessment was conducted to identify all potential hazards; requirements were

		resulting in increased workload for the controller, potentially leading to a missed encounter, or unnecessary action shall be no greater than 8E-5 per flight hour	identified based on the necessary functionality and performance in the case of internal failures to maintain the risk/likelihood of an effect at an acceptable level. This requirement is taken from CD/R aid to TC Hz#3, allocated severity MAC-SC3 (loss of separation).
	15	The frequency of the controller misunderstanding/misinterpreting the tool potentially leading to making a bad tactical decision shall be no greater than 4E-5 per flight hour	A Functional Hazard Assessment was conducted to identify all potential hazards; requirements were identified based on the necessary functionality and performance in the case of internal failures to maintain the risk/likelihood of an effect at an acceptable level. This requirement is taken from CD/R aid to TC Hz#3, allocated severity MAC-SC3 (loss of separation).

919
Table 9 Failure Case Safety Objectives for TC aid

920   A.3.2 PC Aid FCSOs

FCSO #	Description	Rationale
21	The frequency of the tool misleading the controller such that he fails to take appropriate action for a pre-tactical encounter shall be no more than 2E-4 per flight hour	A Functional Hazard Assessment was conducted to identify all potential hazards; requirements were identified based on the necessary functionality and performance in the case of internal failures to maintain the risk/likelihood of an effect at an acceptable level. This requirement is taken from CD/R aid to PC Hz#1, allocated severity MAC-SC4 (tactical conflict).
22	The frequency of the tool misleading the controller such that he takes unnecessary action for a pre-tactical encounter shall be no more than 4E-3 per flight hour	A Functional Hazard Assessment was conducted to identify all potential hazards; requirements were identified based on the necessary functionality and performance in the case of internal failures to maintain the risk/likelihood of an effect at an acceptable level. This requirement is taken from CD/R aid to PC Hz#2, allocated severity MAC-SC4 (tactical conflict).
23	The frequency of the tool automatically coordinating flights inappropriately, resulting in an induced tactical or pre-tactical encounter shall be no more 2E-4 per flight hour	A Functional Hazard Assessment was conducted to identify all potential hazards; requirements were identified based on the necessary functionality and performance in the case of internal failures to maintain the risk/likelihood of an effect at an acceptable level. This requirement is taken from CD/R aid to PC Hz#3, allocated severity MAC-SC4 (tactical conflict).
24	The frequency of the tool suffers a detected failure resulting in increased workload for the controller, potentially leading to a missed encounter, or unnecessary action shall be no more 2E-3 per flight hour	A Functional Hazard Assessment was conducted to identify all potential hazards; requirements were identified based on the necessary functionality and performance in the case of internal failures to maintain the risk/likelihood of an effect at an acceptable level. This requirement is taken from CD/R aid to PC Hz#3, allocated severity MAC-SC4 (tactical conflict).

| 25 | The frequency of the controller misunderstanding/misinterpreting the tool potentially leading to making a bad planning decision shall be no more 2E-3 per flight hour | A Functional Hazard Assessment was conducted to identify all potential hazards; requirements were identified based on the necessary functionality and performance in the case of internal failures to maintain the risk/likelihood of an effect at an acceptable level. This requirement is taken from CD/R aid to PC Hz#3, allocated severity MAC-SC4 (tactical conflict). |

921   **Table 10 Failure Case Safety Objectives for PC aid**

A.4 Traceability Tables

923 This section contains the traceability tables which show the relationship between the safety
924 requirements and their corresponding high level safety elements, namely SACs, SCSOs and FCSOs.
925 For a better understanding of the traceability tables an overview of the derivation process explained in
926 the sections above is shown in Figure 10.
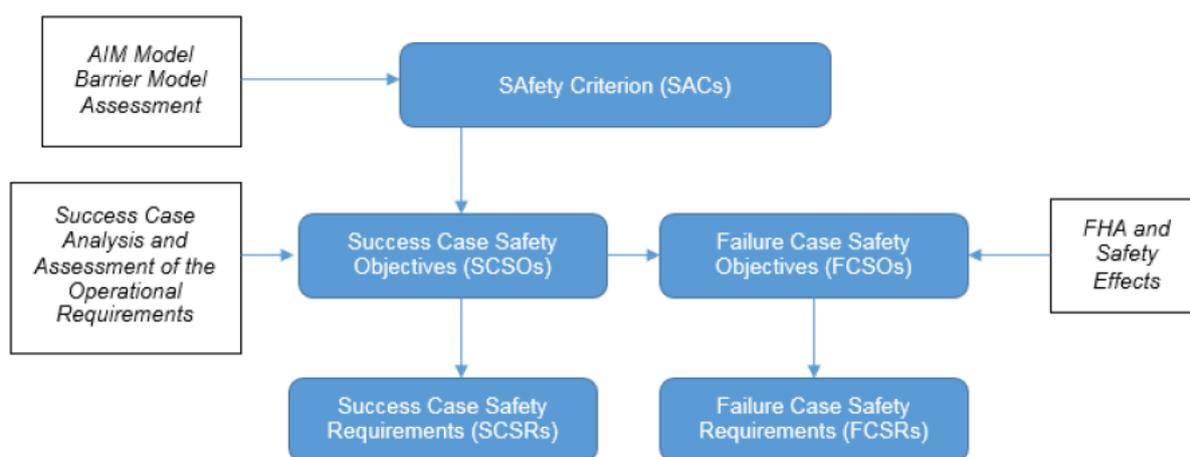
927

928   **Figure 10 Appendix A - Overview of the Derivation Process**

A.4.1 Success Case Safety Requirements

930 The SCSRs were defined based on the assessment of the SPR level model and threads, and the
931 SCSOs. These were then reviewed by safety experts and concept experts. The SRs are not
932 repeated in this annex, as they are the subject of section 3.1.1.1 and Appendix E and this would result
933 in unnecessary duplication. The threads and the SPR level model are shown in the Safety
934 Assessment Report [17].

935 Table 11 and Table 12 show the traceability of the Success Case Safety Requirements for the TC and
936 PC aid. As can be seen in the tables each Success Case Safety Requirement trace back to a specific
937 Success Case Safety Objective which traces back to a specific Safety Criteria. Each Safety
938 Requirement satisfies also a number of OSED Operational Requirements which are shown in the
939 Trace Tables in Sections 3.1.1.1 of this document and in the Safety Assessment Report [17].

TC Aid

Safety Criteria	Success Case Safety Objective	Success Case Safety Requirement ID
SAC 11	SCSO 11	*REQ-04.07.02-SPR-CDR1.1010* ~~*REQ 04.07.02 SPR CDR1.1020*~~

		REQ-04.07.02-SPR-CDR1.1030 REQ-04.07.02-SPR-CDR1.1040 REQ-04.07.02-SPR-CDR1.1050 REQ-04.07.02-SPR-CDR1.1060 REQ-04.07.02-SPR-CDR1.1070 REQ-04.07.02-SPR-CDR1.1080 REQ-04.07.02-SPR-CDR1.1090 REQ-04.07.02-SPR-CDR1.1100 REQ-04.07.02-SPR-CDR1.1110
	SCSO 12	REQ-04.07.02-SPR-CDR1.1120 REQ-04.07.02-SPR-CDR1.1130 REQ-04.07.02-SPR-CDR1.1140 REQ-04.07.02-SPR-CDR1.1150 REQ-04.07.02-SPR-CDR1.1160 REQ-04.07.02-SPR-CDR1.1170 ~~REQ 04.07.02 SPR CDR1.1180~~ REQ-04.07.02-SPR-CDR1.1190 REQ-04.07.02-SPR-CDR1.1200 ~~REQ 04.07.02 SPR CDR1.1210~~ REQ-04.07.02-SPR-CDR1.1220
	SCSO 13	~~REQ 04.07.02 SPR CDR1.1230~~ ~~REQ 04.07.02 SPR CDR1.1250~~ REQ-04.07.02-SPR-CDR1.1260
	SCSO 14	~~REQ 04.07.02 SPR CDR1.1270~~ ~~REQ 04.07.02 SPR CDR1.1280~~ REQ-04.07.02-SPR-CDR1.1360
	SCSO 15	REQ-04.07.02-SPR-CDR1.1290 REQ-04.07.02-SPR-CDR1.1300 REQ-04.07.02-SPR-CDR1.1320 REQ-04.07.02-SPR-CDR1.1330
	SCSO 16	REQ-04.07.02-SPR-CDR1.1340 REQ-04.07.02-SPR-CDR1.1350
SAC 12	SCSO 11	REQ-04.07.02-SPR-CDR1.1010 ~~REQ 04.07.02 SPR CDR1.1020~~ REQ-04.07.02-SPR-CDR1.1030 REQ-04.07.02-SPR-CDR1.1040 REQ-04.07.02-SPR-CDR1.1050 REQ-04.07.02-SPR-CDR1.1060 REQ-04.07.02-SPR-CDR1.1070 REQ-04.07.02-SPR-CDR1.1080 REQ-04.07.02-SPR-CDR1.1090 REQ-04.07.02-SPR-CDR1.1100 REQ-04.07.02-SPR-CDR1.1110
	SCSO 12	REQ-04.07.02-SPR-CDR1.1120 REQ-04.07.02-SPR-CDR1.1130 REQ-04.07.02-SPR-CDR1.1140 REQ-04.07.02-SPR-CDR1.1150

		REQ-04.07.02-SPR-CDR1.1160 REQ-04.07.02-SPR-CDR1.1170 ~~REQ 04.07.02 SPR CDR1.1180~~ REQ-04.07.02-SPR-CDR1.1190 REQ-04.07.02-SPR-CDR1.1200 ~~REQ 04.07.02 SPR CDR1.1210~~ REQ-04.07.02-SPR-CDR1.1220
	SCSO 13	~~REQ 04.07.02 SPR CDR1.1230~~ ~~REQ 04.07.02 SPR CDR1.1250~~ REQ-04.07.02-SPR-CDR1.1260
	SCSO 14	~~REQ 04.07.02 SPR CDR1.1270~~ ~~REQ 04.07.02 SPR CDR1.1280~~ REQ-04.07.02-SPR-CDR1.1360
	SCSO 15	REQ-04.07.02-SPR-CDR1.1290 REQ-04.07.02-SPR-CDR1.1300 REQ-04.07.02-SPR-CDR1.1320 REQ-04.07.02-SPR-CDR1.1330
	SCSO 16	REQ-04.07.02-SPR-CDR1.1340 REQ-04.07.02-SPR-CDR1.1350
SAC 13	SCSO 13	~~REQ 04.07.02 SPR CDR1.1230~~ ~~REQ 04.07.02 SPR CDR1.1250~~ REQ-04.07.02-SPR-CDR1.1260
	SCSO 15	REQ-04.07.02-SPR-CDR1.1290 REQ-04.07.02-SPR-CDR1.1300 REQ-04.07.02-SPR-CDR1.1320 REQ-04.07.02-SPR-CDR1.1330
	SCSO 16	REQ-04.07.02-SPR-CDR1.1340 REQ-04.07.02-SPR-CDR1.1350
SAC 14	SCSO 12	REQ-04.07.02-SPR-CDR1.1120 REQ-04.07.02-SPR-CDR1.1130 REQ-04.07.02-SPR-CDR1.1140 REQ-04.07.02-SPR-CDR1.1150 REQ-04.07.02-SPR-CDR1.1160 REQ-04.07.02-SPR-CDR1.1170 ~~REQ 04.07.02 SPR CDR1.1180~~ REQ-04.07.02-SPR-CDR1.1190 REQ-04.07.02-SPR-CDR1.1200 ~~REQ 04.07.02 SPR CDR1.1210~~ REQ-04.07.02-SPR-CDR1.1220
	SCSO 16	REQ-04.07.02-SPR-CDR1.1340 REQ-04.07.02-SPR-CDR1.1350
SAC 15	SCSO 16	REQ-04.07.02-SPR-CDR1.1340 REQ-04.07.02-SPR-CDR1.1350

941 **Table 11 Traceability - Success Case Safety Requirements - TC Aid**
942

943 ## PC Aid

Safety Criteria	Applying to Success Case Safety Objective	Success Case Safety Requirement ID
SAC 21	SCSO 21	*REQ-04.07.02-SPR-CDR2.1030* *REQ-04.07.02-SPR-CDR2.1050* *REQ-04.07.02-SPR-CDR2.1440* *REQ-04.07.02-SPR-CDR2.1450* *REQ-04.07.02-SPR-CDR2.1460* *REQ-04.07.02-SPR-CDR2.1480* *REQ-04.07.02-SPR-CDR2.1490* *REQ-04.07.02-SPR-CDR2.1500* *REQ-04.07.02-SPR-CDR2.1510* *REQ-04.07.02-SPR-CDR2.1520*
	SCSO 22	*REQ-04.07.02-SPR-CDR2.1010* *REQ-04.07.02-SPR-CDR2.1020* *REQ-04.07.02-SPR-CDR2.1060* *REQ-04.07.02-SPR-CDR2.1070* *REQ-04.07.02-SPR-CDR2.1080* *REQ-04.07.02-SPR-CDR2.1090* *REQ-04.07.02-SPR-CDR2.1100* *REQ-04.07.02-SPR-CDR2.1500* *REQ-04.07.02-SPR-CDR2.1510* *REQ-04.07.02-SPR-CDR2.1520* *REQ-04.07.02-SPR-CDR2.1530*
	SCSO 23	*REQ-04.07.02-SPR-CDR2.1110* *REQ-04.07.02-SPR-CDR2.1120* *REQ-04.07.02-SPR-CDR2.1460* *REQ-04.07.02-SPR-CDR2.1480* *REQ-04.07.02-SPR-CDR2.1490* *REQ-04.07.02-SPR-CDR2.1500* *REQ-04.07.02-SPR-CDR2.1510* *REQ-04.07.02-SPR-CDR2.1520*
	SCSO 24	*REQ-04.07.02-SPR-CDR2.1130*
	SCSO 25	*REQ-04.07.02-SPR-CDR2.1140* *REQ-04.07.02-SPR-CDR2.1150* *REQ-04.07.02-SPR-CDR2.1160* *REQ-04.07.02-SPR-CDR2.1170* *REQ-04.07.02-SPR-CDR2.1180* *REQ-04.07.02-SPR-CDR2.1190* *REQ-04.07.02-SPR-CDR2.1200* *REQ-04.07.02-SPR-CDR2.1210*
	SCSO 26	*REQ-04.07.02-SPR-CDR2.1220* *REQ-04.07.02-SPR-CDR2.1230*

	SCSO 27	REQ-04.07.02-SPR-CDR2.1240 REQ-04.07.02-SPR-CDR2.1250
	SCSO 28	REQ-04.07.02-SPR-CDR2.1260 REQ-04.07.02-SPR-CDR2.1270 REQ-04.07.02-SPR-CDR2.1280 REQ-04.07.02-SPR-CDR2.1300 REQ-04.07.02-SPR-CDR2.1310 REQ-04.07.02-SPR-CDR2.1320 REQ-04.07.02-SPR-CDR2.1330 REQ-04.07.02-SPR-CDR2.1470
	SCSO 29	REQ-04.07.02-SPR-CDR2.1340 REQ-04.07.02-SPR-CDR2.1350
	SCSO 210	REQ-04.07.02-SPR-CDR2.1360 REQ-04.07.02-SPR-CDR2.1380 REQ-04.07.02-SPR-CDR2.1390
	SCSO 211	REQ-04.07.02-SPR-CDR2.1400 REQ-04.07.02-SPR-CDR2.1410
	SCSO 212	REQ-04.07.02-SPR-CDR2.1420 REQ-04.07.02-SPR-CDR2.1430
SAC 22	SCSO 24	REQ-04.07.02-SPR-CDR2.1130
	SCSO 25	REQ-04.07.02-SPR-CDR2.1140 REQ-04.07.02-SPR-CDR2.1150 REQ-04.07.02-SPR-CDR2.1160 REQ-04.07.02-SPR-CDR2.1170 REQ-04.07.02-SPR-CDR2.1180 REQ-04.07.02-SPR-CDR2.1190 REQ-04.07.02-SPR-CDR2.1200 REQ-04.07.02-SPR-CDR2.1210
	SCSO 26	REQ-04.07.02-SPR-CDR2.1220 REQ-04.07.02-SPR-CDR2.1230
	SCSO 27	REQ-04.07.02-SPR-CDR2.1240 REQ-04.07.02-SPR-CDR2.1250
	SCSO 28	REQ-04.07.02-SPR-CDR2.1260 REQ-04.07.02-SPR-CDR2.1270 REQ-04.07.02-SPR-CDR2.1280 REQ-04.07.02-SPR-CDR2.1300 REQ-04.07.02-SPR-CDR2.1310 REQ-04.07.02-SPR-CDR2.1320 REQ-04.07.02-SPR-CDR2.1330
	SCSO 29	REQ-04.07.02-SPR-CDR2.1340 REQ-04.07.02-SPR-CDR2.1350

	SCSO 210	*REQ-04.07.02-SPR-CDR2.1360* *REQ-04.07.02-SPR-CDR2.1380* *REQ-04.07.02-SPR-CDR2.1390*
	SCSO 211	*REQ-04.07.02-SPR-CDR2.1400* *REQ-04.07.02-SPR-CDR2.1410*
SAC 23	SCSO 24	*REQ-04.07.02-SPR-CDR2.1130*
	SCSO 25	*REQ-04.07.02-SPR-CDR2.1140* *REQ-04.07.02-SPR-CDR2.1150* *REQ-04.07.02-SPR-CDR2.1160* *REQ-04.07.02-SPR-CDR2.1170* *REQ-04.07.02-SPR-CDR2.1180* *REQ-04.07.02-SPR-CDR2.1190* *REQ-04.07.02-SPR-CDR2.1200* *REQ-04.07.02-SPR-CDR2.1210*
	SCSO 27	*REQ-04.07.02-SPR-CDR2.1240* *REQ-04.07.02-SPR-CDR2.1250*

944   **Table 12 Traceability - Success Case Safety Requirements - PC Aid**

945 ## A.4.2 Failure Case Safety Requirements

946 The FCSOs were derived following the functional hazard assessment which took place during the
947 three days workshop mentioned in section A.3. For a more detailed understanding of the functional
948 hazard assessment process please see the Safety Assessment Report [17].

949 Table 13 and Table 14 show the traceability of the Failure Case Safety Requirements for the TC and
950 PC aid. As can be seen in the tables each Failure Case Safety Requirement trace back to a specific
951 Failure Case Safety Objective. Each Safety Requirement satisfies also a number of OSED
952 Operational Requirements which are shown in the Trace Tables in Section 3.1.1.2 and Appendix E of
953 this document.

954 ## TC Aid

Failure Case Safety Objective	Failure Case Safety Requirement
FSCO 11	REQ-04.07.02-SPR-CDR1.2020 REQ-04.07.02-SPR-CDR1.2030 REQ-04.07.02-SPR-CDR1.2060 REQ-04.07.02-SPR-CDR1.2070 REQ-04.07.02-SPR-CDR1.2110
FCSO 12	REQ-04.07.02-SPR-CDR1.2010 REQ-04.07.02-SPR-CDR1.2020 REQ-04.07.02-SPR-CDR1.2030 REQ-04.07.02-SPR-CDR1.2040 REQ-04.07.02-SPR-CDR1.2050 REQ-04.07.02-SPR-CDR1.2060 REQ-04.07.02-SPR-CDR1.2070 REQ-04.07.02-SPR-CDR1.2080 REQ-04.07.02-SPR-CDR1.2090

	REQ-04.07.02-SPR-CDR1.2100 REQ-04.07.02-SPR-CDR1.2110 REQ-04.07.02-SPR-CDR1.2120
FCSO 13	REQ-04.07.02-SPR-CDR1.2030 REQ-04.07.02-SPR-CDR1.2100 REQ-04.07.02-SPR-CDR1.2110
FCSO 14	REQ-04.07.02-SPR-CDR1.2120 REQ-04.07.02-SPR-CDR1.2130 REQ-04.07.02-SPR-CDR1.2140 REQ-04.07.02-SPR-CDR1.2150
FCSO 15	REQ-04.07.02-SPR-CDR1.2160 REQ-04.07.02-SPR-CDR1.2170

955
956

Table 13 Traceability - Failure Case Safety Requirements - TC Aid

957 ## PC Aid

Failure Case Safety Objective	Failure Case Safety Requirement
FCSO 21	REQ-04.07.02-SPR-CDR2.2010 REQ-04.07.02-SPR-CDR2.2020 REQ-04.07.02-SPR-CDR2.2040 REQ-04.07.02-SPR-CDR2.2050 REQ-04.07.02-SPR-CDR2.2070 REQ-04.07.02-SPR-CDR2.2090 REQ-04.07.02-SPR-CDR2.2100 REQ-04.07.02-SPR-CDR2.2110 REQ-04.07.02-SPR-CDR2.2120 REQ-04.07.02-SPR-CDR2.2140 REQ-04.07.02-SPR-CDR2.2150 REQ-04.07.02-SPR-CDR2.2220
FCSO 22	REQ-04.07.02-SPR-CDR2.2060 REQ-04.07.02-SPR-CDR2.2090 REQ-04.07.02-SPR-CDR2.2100 REQ-04.07.02-SPR-CDR2.2110 REQ-04.07.02-SPR-CDR2.2120 REQ-04.07.02-SPR-CDR2.2140 REQ-04.07.02-SPR-CDR2.2150 REQ-04.07.02-SPR-CDR2.2220
FCSO 23	REQ-04.07.02-SPR-CDR2.2030 REQ-04.07.02-SPR-CDR2.2040 REQ-04.07.02-SPR-CDR2.2080 REQ-04.07.02-SPR-CDR2.2090 REQ-04.07.02-SPR-CDR2.2130
FCSO 24	REQ-04.07.02-SPR-CDR2.2010 REQ-04.07.02-SPR-CDR2.2110 REQ-04.07.02-SPR-CDR2.2120 REQ-04.07.02-SPR-CDR2.2140

	REQ-04.07.02-SPR-CDR2.2160 REQ-04.07.02-SPR-CDR2.2170 REQ-04.07.02-SPR-CDR2.2180 REQ-04.07.02-SPR-CDR2.2190 REQ-04.07.02-SPR-CDR2.2200
FCSO 25	REQ-04.07.02-SPR-CDR2.2010 REQ-04.07.02-SPR-CDR2.2210 REQ-04.07.02-SPR-CDR2.2220 REQ-04.07.02-SPR-CDR2.2230 REQ-04.07.02-SPR-CDR2.2240 REQ-04.07.02-SPR-CDR2.2250 REQ-04.07.02-SPR-CDR2.2260

958   Table 14 Traceability - Failure Case Safety Requirements - PC Aid

959 ## Appendix B   Task 20 – Review Safety Workshop

960 The main objectives of this two day workshop were to:

961 • Review and update already exiting safety requirements (changes for clarity or even
962 suppressions/merging);
963 • Manage unaddressed comments left from outside reviewers;
964 • Integrate past validation exercises' results in the safety material (through reviewing which
965 of the existing requirements were and which were not validated/verified or through
966 creating new safety requirements if needed).

967 Attendees at the workshop:

Name	Organisation	Role
	NATS	
	Think Research (representing NATS)	
	NATS	
	DSNA	
	DSNA	
	DSNA	
	DFS	
	DFS	

968 ## B.1 Main Results

969 ## B.1.1 Suppressed Requirements

TC Aid		
Requirement	**Action**	**Comment**
REQ-04.07.02-SPR-CDR1.1240 [SR-118]; The TC Aid shall compare the proposed tactical tentative or speculative trajectory of a subject flight against the actual traffic situation at the time of the probe.	Suppressed	Duplication of REQ-04.07.02-SPR-CDR1.1300 [SR-1114]. The TC Aid shall compare the proposed tactical trajectory of a subject flight against the actual traffic situation when the controller requests a what-if or what-else probe. Speculative trajectory = What-else probe trajectory Tentative trajectory = What-if probe trajectory

Requirement	Action	Comment
REQ-04.07.02-SPR-CDR1.1310 [SR-1131]; The TC Aid shall provide what-else probing on the request of a controller for a subject aircraft.	Suppressed	Already contained in *REQ-04.07.02-SPR-CDR1.1300 [SR-1114]*. The TC Aid shall compare the proposed tactical trajectory of a subject flight against the actual traffic situation when the controller requests a what-if or what-else probe.

PC Aid		
Requirement	**Action**	**Comment**
REQ-04.07.02-SPR-CDR2.1040 [SR-213]; The PC Aid shall display planning interactions to allow the planner to prioritise actions based on the severity of the interactions.	Suppressed	Part of it contained in *REQ-04.07.02-SPR-CDR2.1020 [SR-212]*. The PC Aid shall continuously display any planning encounters that are being monitored within the sector. *Planning encounters = planning interactions* *A new requirement has been created to express to need of the planner to prioritise the displayed encounters. See 0.*
REQ-04.07.02-SPR-CDR2.1290 [SR-2128]; When the Planner interrogates a coordination offer via what-if or what-else probe, the coordination trajectory of that subject flight will be displayed on the radar screen and the trajectories of any environmental flights that form an encounter with the subject flight.	Suppressed	Already contained in *REQ-04.07.02-SPR-CDR2.1300 [SR-2129]*. On interrogation of a coordination offer via what-if or what-else probe, the coordination trajectories of the subject flight and any environmental flights that form an encounter with the subject flight shall be displayed within x number of seconds.
REQ-04.07.02-SPR-CDR2.1370 [SR-2139]; The Planner shall be able to point out planning encounters of interest to his executive.	Suppressed	Already contained in *REQ-04.07.02-SPR-CDR2.1380 [SR-2132]*. The time between which the planner points out encounters of tactical interest to the tactical workstation display shall be x number of seconds.

TRACT		
Requirement	**Action**	**Comment**
REQ-04.07.02-SPR-TRA3.1090 [SR-319]; TRACT shall not attempt to solve a confliction where two aircraft trajectories are head on.	Suppressed	Already contained in *REQ-04.07.02-SPR-TRA3.1100 [SR-3110]*. TRACT shall not attempt to solve a confliction where convergences or divergences between a pair of aircraft are of a small angle. *Head-on trajectories are considered to be small angle divergences.*
REQ-04.07.02-SPR-TRA3.1210 [SR-3121];	Suppressed	Already contained in *REQ-04.07.02-SPR-TRA3.1200 [SR-3120]*.

The flight crew shall have the ability to accept the CTO if they deem it to be acceptable.		The flight crew shall have the ability to accept or reject the CTO.
REQ-04.07.02-SPR-TRA3.1280 [SR-3129]; Any flights that are performing unusual or abnormal manoeuvres (e.g. supersonic flight) shall not be considered as eligible by TRACT.	Suppressed	Questionable. Any aircraft for which the behaviour can be predicted could be managed by TRACT. Remove for the moment and analyse it again in the next iteration.

970 B.1.2 Additional Requirements

971 Two additional safety requirements were found during the workshop.

Tool	New Requirement	Rationale	Comments
PC Aid	REQ-04.07.02-SPR-CDR2.1440; SR-2144 The planner shall be able to distinguish which of the displayed encounters are pertinent through selective filtering functionality.	The controllers will have the possibility to filter their encounters in order to be able to distinguish the ones which are of interest and to avoid misunderstanding of the traffic picture and loss of situational awareness caused by a crowded display.	This requirement was introduced based on the results gathered from VP-500 and as a result of supressing REQ-04.07.02-SPR-CDR2.1040 [SR-213];
TC/PC Aid	ATCOs shall be able to delete/supress/hide alerts.	The TC/PC aid will not negatively impact controller's situational awareness by creating clutter on the situational displays. Therefore the controllers should have means to supress or delete the unwanted/nuisance alerts.	DFS implemented this feature for TC Aid and it has been agreed this should be captured as a requirement as well.

972 There were discussions about defining a new safety requirement which would establish the
973 relationship between TC Aid and STCA due to the overlap the two tools would have during operations
974 (in the 0-2 min prior to the conflict time range). However this has not been defined yet because the
975 interactions between the two tools was not tested until now. This will be tested when the TC Aid will
976 be fully developed therefore a requirement defining the relationship between TC Aid and STCA
977 should be considered prior to that.

978 B.1.3 Changes in existing SPRs

979 Changes for clarity of the requirements have been made during this workshop as well. These meant
980 rewording of some of the requirements or providing explanations for some of the terms contained in
981 their text (e.g. *Increase in severity = the distance between the two a/c involved in the conflict*
982 *diminishes faster than usual; one or both the a/c deviate from their trajectories such that the time until*
983 *the conflict diminishes faster; or any other sudden change in the time/distance until the conflict*).

984 It is to be noted that the meaning of all the requirements that have clarification changes remained the
985 same therefore these changes did not have any impact on the concept as a whole.

986 To maintain the neutral impact on the concept, it has been considered that SPRs which are the same
987 or similar with the OSED requirements will not be changed (even if they needed to be) without, in the
988 same time, making the corresponding change in the OSED as well. As a consequence these
989 requirements were left unchanged during this workshop..

Appendix C   Security risk assessment

The security risk assessment performed in Task 20 activities were performed in accordance with 16.06.02 guidance material.

In the sections that follow is a description of the Initial Security Assessment Process that was followed and the subsequent output.

Note the Security risk assessment covers all three operational services, including TRACT.

No progress was made on the Security Risk Assessment under this iteration mainly due to the unavailability of resource and time. It is recommended that a full Security Risk Assessment needs to be completed for this project.

C.1 Scope

The scope of the P04.07.02 concept considered in this task is limited to the areas that are part of the ATM change. The boundaries will be inputs to the P04.07.02 concepts, for example the services are reliant on data from FDPS and Surveillance, the input of this data is a primary asset, but the generation of this data is not.

C.2 Objectives

The ultimate goal of performing a security risk assessment is to provide input towards the building of the ATM security case. This will, at the top level, make the claim that the OFA is secure. The case will be a set of sub-claims and provide evidence to justify that these sub-claims are true. This work provides identification of the assets which need securing in order for P04.07.02 services to operate.

The two specific objectives for this phase of the assessment are:

1) Generation of performance requirements for the SPR of P04.07.02, with regard to the security needs of the services. This is at a concept/operational level only, with no regard to specifics of system/implementation concerns.

2) Input to the system projects via P16.6.2. The transversal is concerned with gathering the complete security needs of the concept projects in order that the system projects specify suitable solutions (technical) to meet all SESAR concept security needs.

The Security Risk Assessment Workshop was conducted by WebEx and took place on 11th March 2014.

C.3 Security Risk Assessment Process

C.3.1 Overview
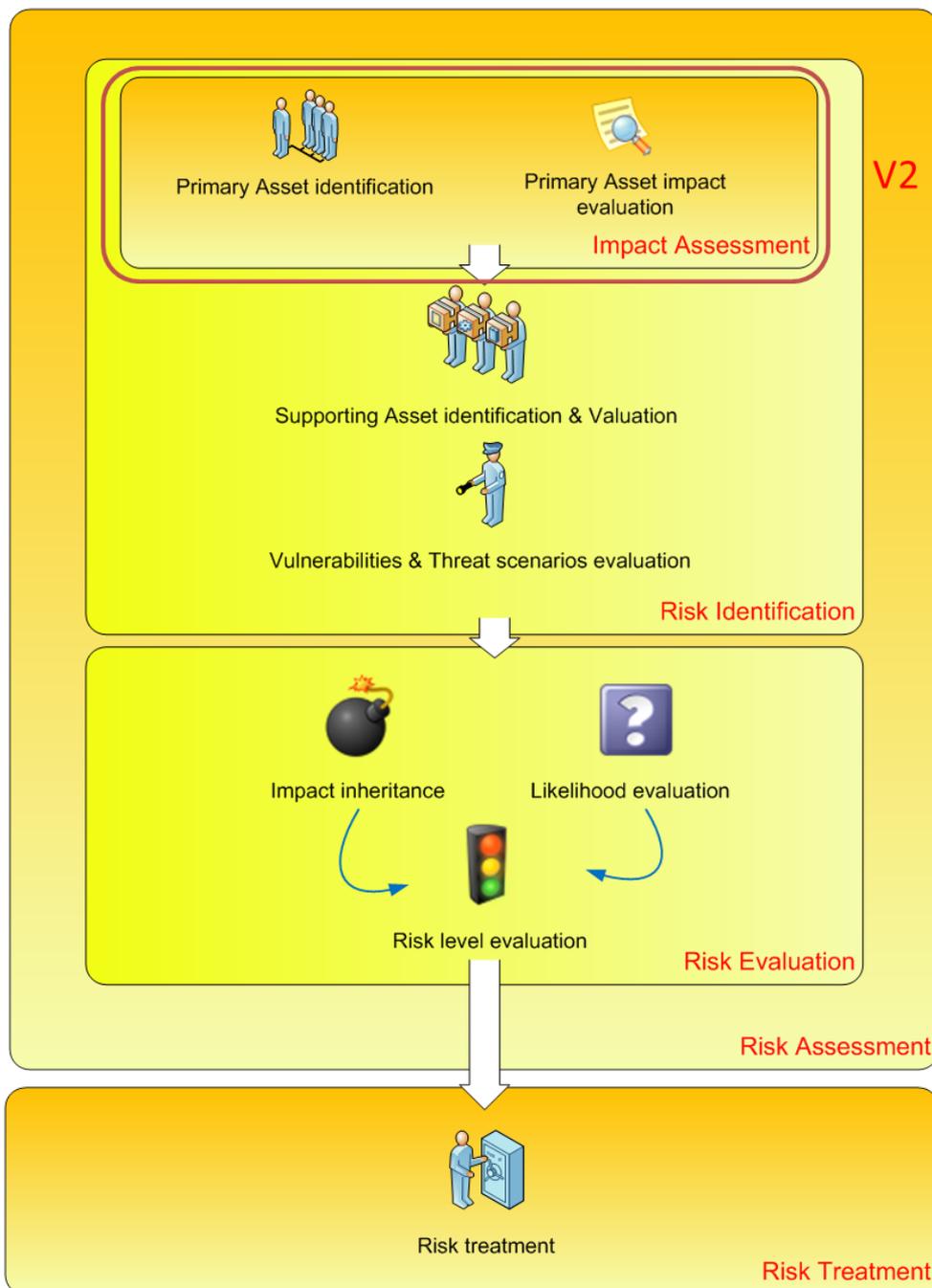
The essence of the security risk assessment is to:

1. Identify the intangible assets (e.g. information, services),
2. The impact of these being compromised,
3. The assets which support the primary assets (people, processes, equipment, etc.),
4. The vulnerabilities of the supporting assets and scenarios under which they could be attacked,

1026   5.   Evaluation of these threats (generating a set of risks), and finally
1027   6.   Development of options for treating these risks (generation of security controls).
1028   We are only concerned with 1 and 2. In this context step 1 should be relatively simple and not take
1029   much time. Step 2 is where the majority of the work is expected.

C.3.2 Primary Asset Identification

1031   Primary assets are the intangible activities, information and services which are of value to the project
1032   and which the project wants to protect. A successful attack on the system could ultimately impair the
1033   primary assets and this would have an impact on the ATM system. Any attack which would have an
1034   impact on the concept would have to do so via affecting a primary asset, therefore the primary assets
1035   should cover all aspects on the concept which are required for delivery of the services.

1036   Services an OFA may consider as primary assets include:

1037   •   Services whose loss or degradation make it impossible to carry out the mission of the project
1038   •   Services that contain secret processes or processes involving proprietary technology
1039   •   Services that, if modified, can greatly affect the accomplishment of the project's mission
1040   •   Services that are necessary for the project to comply with contractual, legal or regulatory
1041   Requirements

1042   Information an OFA may consider as primary assets include:

1043   •   Vital information for the exercise of the project's mission or business
1044   •   Personal information, as can be defined specifically in the sense of the national laws regarding
1045   privacy
1046   •   Strategic information required for achieving objectives determined by the strategic orientations
1047   •   High-cost information whose gathering, storage, processing and transmission require a long time
1048   and/or involve a high acquisition cost

1049   The Primary Assets that were identified during the Security Risk Assessment process are as follows:

ID	Primary Asset	Description	Rationale
PA#1	Trajectory prediction function	Data from FDPS and surveillance will be imported and provide a key input to the services.	If this asset was compromised, there would be an impact on performance of the service.
PA#2	Conflict detection function	Any potential interactions between aircraft are detected by comparison of trajectories and highlighted to the controller	If this asset was compromised, there would be an impact on the performance of the service.
PA#3	Conflict Resolution function	An ATCO is able to assess the outcome of any decision made to resolve a conflict between aircraft (before they commit to it)and also display other possible resolutions	If this asset was compromised, there would be an impact on the ATCO's ability to resolve conflicts quickly and efficiently as they have to therefore increasing their workload, especially when in busy traffic. This would decrease the performance of the service

PA#4	TRACT Resolution Data	TRACT issues CTOs to eligible aircraft in order that they either reduce or increase speed to arrive at a point at a particular time to avoid confliction with another aircraft(s)	If this asset was compromised, there would be an impact on the performance of the service.
PA#5	Aircraft Downlink Data e.g. ETA Min/Max	Note: ref OSED 3.2.1, applicable to all services not just TRACT	If this data was compromised there is the potential to create spurious deviation alerts to the ATCO and therefore greatly increased their workload until the ATCO realises what is happening
PA#6	Aircraft performance Model	TP uses aircraft performance model data to increase the accuracy of the trajectories and therefore the conflict detection	If this is compromised the TP function would be compromised
PA#7	Surveillance Data	TP uses surveillance data in order to increase the trajectory accuracy and therefore the conflict detection	If this is compromised the TP function would be compromised
PA#8	Flight Data (including RBT, Flight Plan, aircraft type)	TP uses Flight Data in order to increase the trajectory accuracy and therefore the conflict detection	If this is compromised the TP function would be compromised
PA#9	MET Data	TP uses MET data in order to increase the trajectory accuracy and therefore the conflict detection	If this is compromised the TP function would be compromised
PA#10	Clearance Data	TP uses clearance data in order to increase the trajectory accuracy and therefore the conflict detection	If this is compromised the TP function would be compromised
PA#11	AOC Data	TP uses AOC data in order to increase the trajectory accuracy and therefore the conflict detection	If this is compromised the TP function would be compromised
PA#12	Conformance Monitoring	If an aircraft is not conforming to a clearance	If this is compromised the performance of the service

	Function	(whether it be a Tactical Clearance, Coordination Constraint or TRACT resolution) then the system will alert the ATCO to this and any resultant interactions	is reduced as the ATCO is not aware of aircraft that are not following their clearances and the risk of loss of separation is increased
PA#13	Operational Adaptation Data	TP uses Operational Adaptation data in order to increase the trajectory accuracy and therefore the conflict detection	If this is compromised the TP function would be compromised

C.3.3 Primary Asset Impact Evaluation

Once the Primary Assets have been identified, the next stage is to identify the asset impacts. Assets form the targets of security attacks, and the identification of possible impacts is concerned with evaluating the harm resulting from each asset being compromised by an attack. For each primary asset the Project must identify the required level of Confidentiality, Integrity, and Availability (CIA) required. To obtain this evaluation, the project must evaluate the impact when the Confidentiality, Integrity, and Availability for each of its primary assets when it is compromised.

The process is done by defining scenarios under which the primary assets could be compromised by an attack. Below are the scenarios that were identified during the Security Risk Assessment Workshop:

Primary Asset	Parameter	Scenario ID	Description
PA#1: Trajectory prediction function	Confidentiality	PA1.C.1	An attacker gains access (read-only) to the trajectory data import function. This could potentially cause a regulatory infraction as some of the more detailed flight plan data is not publically available.
PA#1: Trajectory prediction function	Integrity	PA1.I.1	An attacker is able to modify the trajectory prediction algorithm and the event is undetected. In the worst case this means that TC aid is now misleading the controller into providing clearances which are in conflict. In the worst case the controller is busy, and has become used to the tool such that he trusts it. This means that the only safety left is: STCA (safety nets) Surveillance data provided to the controller TCAS See and Avoid Providence. This means there could be no effective ATC (if the controller is too busy to utilise the surveillance data).
PA#1: Trajectory prediction function	Integrity	PA1.I.2	As PA1.I.1, except that the attack is detected. This will mean that the impacts are on capacity rather than personnel, as ATC will respond by

Primary Asset	Parameter	Scenario ID	Description
			disabling the tools, which would reduce capacity. In the worst case this could happen at the peak of traffic, which means it would have the same impact as PA1.A.1
PA#1: Trajectory prediction function	Integrity	PA1.I.3	Single trajectory affected. The controller is likely to identify the discrepancy, and given the safety barriers left, and accident is unlikely. In the worst case though the controller trusts the tool and follows it.
PA#1: Trajectory prediction function	Availability	PA1.A.1	An attacker is able to disable the TP function. Worst case scenario, it is taken down at the peak traffic. Still have safety nets as above. Worst case scenario is MAC, but it is less likely than in integrity scenario.
PA#2: Conflict detection function	Confidentiality	PA2.C.1	An attacker gains access to the conflict detection function, meaning that they can gain knowledge about how the MTCD operates etc. and pass this information on.
PA#2: Conflict detection function	Integrity	PA2.I.1	A person is able to modify the conflict detection algorithm and it is undetected. The system may now not be detecting actual conflicts, or mislead the controller into thinking there is a confliction where is there not one. In the worst case this could lead to a MAC, although the controller is still supported by: STCA (safety nets) Surveillance data provided to the controller TCAS See and Avoid Providence. This means there could be no effective ATC (if the controller is too busy to utilise the surveillance data).
PA#2: Conflict detection	Integrity	PA2.I.2	As above, except that the intrusion is detected. This would mean that ATC will respond by disabling the tools and therefore there would be a

Primary Asset	Parameter	Scenario ID	Description
function			reduction in capacity. In the worst case it could happen in peak traffic, which could lead to a potential MAC (very unlikely given the remaining barriers).
PA#2: Conflict detection function	Availability	PA2.A.1	An attacker is able to disable the conflict detection function, this would have the same impact as PA1.A.1
PA#3: Conflict Resolution function	Confidentiality	PA3.C.1	An attacker gains access to the conflict resolution function, meaning that they can gain knowledge about this functionality and use the information and pass it on or use it to their own advantage.
PA#3: Conflict Resolution function	Integrity	PA3.I.1	An attacker spoofs the resolution data that is shown to the controller as a result of a what-if or what-else probe and the intrusion is not detected. This could mislead the controller into making an unsafe clearance therefore increasing the risk of an incident. In some ways this is worse than the TP or CD being compromised, as the potential false resolution would be closer to a potential accident than a missed conflict, however if the CD function is still working accurately then it would be mitigated. Additionally The controller is still supported by: STCA (safety nets) Surveillance data provided to the controller TCAS See and Avoid Providence. In the worst case the controller would trust the information and cause knock-on conflicts and a potential MAC.
PA#3: Conflict Resolution function	Integrity	PA3.I.2	As above, except that the intrusion is detected. Assuming that ATC responded by disabling conflict resolution functions only disabling conflict resolution, this would mean that: TRACT would not be functioning.

Primary Asset	Parameter	Scenario ID	Description
			Integrated coordination would not be functioning. What if and what else probes would not be functioning. In the worst case the controllers would be used to these functions and would struggle without them leading to significantly reduced capacity, even though the tools would still be helping to identify conflicts. It could happen during peak traffic load, leading to a potential missed conflict resolution and accident.
PA#3: Conflict Resolution function	Availability	PA3.A.1	A person disables the conflict resolution function such that it is not available to controllers. As the system (controllers) would have come to rely on this function, the performance would be degraded when controllers are forced to revert to manual conflict resolution. This scenario has the same impact as detected integrity intrusion.
PA#4: TRACT Resolution Data	Confidentiality	PA4.C.1	An attacker gains access to the TRACT Resolution data and how this is sent to the aircraft, meaning that they can gain knowledge about this functionality and use the information and pass it on or use it to their own advantage.
PA#4: TRACT Resolution Data	Integrity	PA4.I.1	An attacker spoofs the CTO data sent to an aircraft from TRACT and it is undetected. In the worst case scenario this could be used to cause tactical conflicts, which means that the TRACT system is no longer fit for purpose or able performing. This could result in the entire TRACT system being inoperable if a significant number of CTOs are compromised Assumption: ATCO is still supported by conflict detection and resolution tools.
PA#4: TRACT Resolution Data	Integrity	PA4.I.2	An attacker spoofs the CTO, but it is detected. This would have the same impact as the availability scenario below.

Primary Asset	Parameter	Scenario ID	Description
PA#4: TRACT Resolution Data	Availability	PA4.A.1	An attacker disables the ability to produce and send TRACT resolution data to the aircraft, therefore this means no CTOs are available to aircraft and the TRACT functionality is not available to the ATCOs. However, assumption is that the conflict detection and resolution tools are still available to the ATCOs.
PA#5: Aircraft Downlink Data e.g. ETA Min/Max	Confidentiality	PA5.C.1	An attacker gains access to Aircraft Downlinked Data so …….
PA#5: Aircraft Downlink Data e.g. ETA Min/Max	Integrity	PA5.I.1	An attacker spoofs the Aircraft Downlink data so incorrect Mode S readings are displayed to the controller. This has the potential to create spurious deviation alerts to the ATCO and therefore greatly increased their workload until the ATCO realises what is happening. Assumption the ATCO is still supported by conflict detection and resolution tools (will assume this for this assessment).
PA#5: Aircraft Downlink Data e.g. ETA Min/Max	Integrity	PA5.I.2	Spoofing aircraft data undetected which has the potential to create spurious deviation alerts to the ATCO and therefore will greatly increase their workload. Assumption that the ATCO is still supported by conflict detection and resolution tools.
PA#5: Aircraft Downlink Data e.g. ETA Min/Max	Availability	PA5.A.1	An attacker disables the ability to download aircraft downlinked parameters therefore this will have an impact on the conformance monitoring functionality and related deviation trajectories. The controller will not be aware if the aircraft is not complying with clearances (just CFL??), and therefore this could cause conflictions between aircraft.
PA#6: Aircraft performance Model	Confidentiality	PA6.C.1	An attacker gains access to the Aircraft Performance Model data

Primary Asset	Parameter	Scenario ID	Description
PA#6: Aircraft performance Model	Integrity	PA6.I.1	An attacker spoofs the aircraft performance data meaning that the TP function is compromised and this goes undetected by the controller. This has the potential to create false interactions or not detect true interactions between aircraft. There would potentially be a number of spurious alerts. Controller workload is increased. In the worst case this could lead to a MAC, although the controller is still supported by: STCA (safety nets) Surveillance data provided to the controller TCAS See and Avoid Providence. This means there could be no effective ATC (if the controller is too busy to utilise the surveillance data).
PA#6: Aircraft performance Model	Integrity	PA6.I.2	An attacker spoof the aircraft performance data meaning that the TP function is compromised. This has the potential to create false interactions or not detect true interactions between aircraft. There would potentially be a number of spurious alerts. However, the ATCO detects that there is a problem and therefore does not use the TP functionality until the issue has been resolved. This would have the impact of having to restrict the number of aircraft in the sector as the controller has to resort to fall back methods of controlling and therefore cannot handle the same amount of aircraft
PA#6: Aircraft performance Model	Availability	PA6.A.1	An attacker disables the aircraft performance model meaning a complete loss of TP and associated MTCD. In the worst case this could lead to a MAC, although the controller is still supported by: STCA (safety nets)

Primary Asset	Parameter	Scenario ID	Description
			Surveillance data provided to the controller TCAS See and Avoid Providence. This means there could be no effective ATC (if the controller is too busy to utilise the surveillance data), however as soon as the controller is aware that there is no TP and associated MTCD they shall revert to fallback controlling techniques - this is likely to mean that the flow rates will be restricted within the sector until the issue has been resolved
PA#7: Surveillance Data	Confidentiality	PA7.C.1	An attacker gains access to surveillance data
PA#7: Surveillance Data	Integrity	PA7.I.1	An attacker is able to compromise the surveillance data, and is undetected by the ATCO. This could be spoofing aircraft, or it could be hacking in and injecting false data. This could at a worst case also result in missing aircraft, fictitious aircraft or aircraft in the wrong position. This would also mean that TP and associated MTCD cannot be relied upon and will be inaccurate. STCA is not a mitigation and neither is the radar display, therefore is a major safety issue.
PA#7: Surveillance Data	Integrity	PA7.I.2	An attacker is able to compromise the surveillance data which is detected by the ATCO. In this scenario the ATCO is no longer able to rely on any of the support tools or the radar display to perform their controlling tasks. This would mean that the controller has to revert to Procedural control until the issue has been resolved which would have severe capacity issues (also many controller may have no Procedural Control Training)
PA#7: Surveillance Data	Availability	PA7.A.1	An attacker is able to disable the surveillance data. The controller is no longer able to carry not with the air traffic task in hand unless they revert to procedural control, but would only be supported by: TCAS

Primary Asset	Parameter	Scenario ID	Description
			See and Avoid Providence.
PA#8: Flight Data (including RBT, Flight Plan, aircraft type)	Confidentiality	PA8.C.1	An attacker gains access to flight data.
PA#8: Flight Data (including RBT, Flight Plan, aircraft type)	Integrity	PA8.I.1	An attacker is able to compromise flight data, for example spoofing the flight data meaning that the TP function is compromised. This has the potential to create false interactions or not detect true interactions between aircraft. Controller workload is increased, as they have undetected this spoofing. This means there could be no effective ATC (if the controller is too busy to utilise the surveillance data). In the worst case this could lead to a MAC, although the controller is still supported by: STCA (safety nets) Surveillance data provided to the controller TCAS See and Avoid Providence.
PA#8: Flight Data (including RBT, Flight Plan, aircraft type)	Integrity	PA8.I.2	An attacker is able to compromise flight data, for example spoofing the flight data meaning that the TP function is compromised. This has the potential to create false interactions or not detect true interactions between aircraft. The ATCO detects that this is happening, and no longer uses the services. This would have the impact of having to restrict the number of aircraft in the sector as the controller has to resort to fall back methods of controlling and therefore cannot handle the same amount of aircraft

Primary Asset	Parameter	Scenario ID	Description
PA#8: Flight Data (including RBT, Flight Plan, aircraft type)	Availability	PA8.A.1	An attacker is able to disable the flight data meaning a complete loss of TP and associated MTCD. In the worst case this could lead to a MAC, although the controller is still supported by: STCA (safety nets) Surveillance data provided to the controller TCAS See and Avoid Providence. This means there could be no effective ATC (if the controller is too busy to utilise the surveillance data).
PA#9: MET Data	Confidentiality	PA9.C.1	An attacker gain access to met data
PA#9: MET Data	Integrity	PA9.I.1	The integrity of the MET data provided is compromised. The data is credible, but is being deliberately manipulated to cause issues.
PA#9: MET Data	Availability	PA9.A.1	An attacker is able to disable the MET data from reaching the services. This would have the effect of an increased number of deviation alerts and a reduction in TP accuracy.
PA#10: Clearance Data	Confidentiality	PA10.C.1	An attacker gain access to clearance data
PA#10: Clearance Data	Integrity	PA10.I.1	An attacker is able to compromise clearance data, and is undetected by the ATCO. This would have an impact of meaning that TP is not accurate and would also create numerous spurious deviation alerts. This means there could be no effective ATC (if the controller is too busy to utilise the surveillance data). In the worst case this could lead to a MAC, although the controller is still supported by:

Primary Asset	Parameter	Scenario ID	Description
			STCA (safety nets) Surveillance data provided to the controller TCAS See and Avoid Providence.
PA#10: Clearance Data	Integrity	PA10.I.2	An attacker is able to compromise clearance data and this is detected by the ATCO. The controller would have to stop using the services as they cannot rely on the clearances that they are entering into the system are accurate. They would have to revert to fallback methods of controlling until the issue was resolved. This would severely restrict the flow rates of aircraft through the sector.
PA#10: Clearance Data	Availability	PA10.A.1	An attacker is able to disable clearance data meaning a complete loss of TP and associated MTCD. In the worst case this could lead to a MAC, although the controller is still supported by: STCA (safety nets) Surveillance data provided to the controller TCAS See and Avoid Providence. This means there could be no effective ATC (if the controller is too busy to utilise the surveillance data).
PA#11: AOC Data	Confidentiality	PA11.C.1	An attacker gain access to AOC Data which may be used to their advantage.
PA#11: AOC Data	Integrity	PA11.I.1	An attacker compromises the AOC Data and the ATCO does not detect this. This has the potential impact of making the TP less accurate and therefore will influence the MTCD output. However, the TP will still be

Primary Asset	Parameter	Scenario ID	Description
			using the BADA model so the inaccuracies will be due to difference between how airlines operate, which in most cases, may only be small.
PA#11: AOC Data	Integrity	PA11.I.2	An attacker compromises the AOC Data and the ATCO detects this. Therefore he cannot make use of the TP functionality and the associated MTCD. He therefore must resort to using fallback methods of controlling until the issues has been resolved. This will have the impact of severely restricting the sector flow for a time until the issue has been resolved.
PA#11: AOC Data	Availability	PA11.A.1	An attacker disables all AOC Data. This will have the impact of making the TP less accurate and therefore also influence the MTCD. However, the TP will still be using the BADA model so the inaccuracies will be due to difference between how airlines operate, which in most cases, may only be small.
PA#12: Conformance Monitoring Function	Confidentiality	PA12.C.1	An attacker gain access to conformance monitoring functionality data
PA#12: Conformance Monitoring Function	Integrity	PA12.I.1	An Attacker is able to compromise Conformance monitoring data, and the ATCO does not detect this. Therefore the ATCO may not be alerted to aircraft that are not complying with their clearances (be it a Tactical Clearance, Coordination Constraint or a TRACT CTO) which could potentially lead to a loss of separation, or worst case MAC. Alternatively, an aircraft could be displaying non-conformance when actually it is conforming. This could lead to an increase in workload for the controller as they have to confirm clearances with the aircraft.
PA#12: Conformance Monitoring Function	Integrity	PA12.I.2	An attacker is able to compromise Conformance monitoring data and the ATCO detects this. He therefore must resort to using fallback methods of controlling until the issues has been resolved. This will have the impact of severely restricting the sector flow for a time until the issue has been

Primary Asset	Parameter	Scenario ID	Description
			resolved.
PA#12: Conformance Monitoring Function	Availability	PA12.A.1	An attacker is able to disable conformance monitoring functionality. Therefore the ATCO has no indication if the aircraft is deviating from their clearances (be it a Tactical clearance, Coordination Constraint or a TRACT CTO). This could potentially lead to a loss of separation; however, it is assumed that they would still be supported by TP and MTCD.
PA#13: Operational Adaptation Data	Confidentiality	PA13.C.1	An attacker gains access to Operational Adaptation Data
PA#13: Operational Adaptation Data	Integrity	PA13.I.1	An attacker is able to compromise operational adaptation data e.g. sector Volume of Interest (VOI)/Volume of Responsibility (VOR) and is undetected by the ATCO. This has the potential impact of aircraft not showing the correct jurisdiction states and therefore affects the eligibility of TP generation and therefore conflict detection. Genuine Interactions may not be shown to the controller, or false interactions are generated which may increase the controller's workload, increasing the risk of a loss of separation.
PA#13: Operational Adaptation Data	Integrity	PA13.I.2	An attacker is able to compromise operational adaptation data and is detected by the ATCO. He therefore must resort to using fallback methods of controlling until the issues has been resolved. This will have the impact of severely restricting the sector flow for a time until the issue has been resolved.
PA#13: Operational Adaptation Data	Availability	PA13.A.1	An attacker is able to disable operational adaptation data so therefore the controller will have to resort to using fallback methods of controlling as the TP data and associated TP will be compromised. This will have an impact of severely restricting the sector flow for a time until the issue has

Primary Asset	Parameter	Scenario ID	Description
			been resolved

The table below presents the impact assessment classification matrix. It provides standard severities for each area in which the operational concept could be impacted.

	5	4	3	2	1
IMPACT AREAS	Catastrophic	Critical	Severe	Minor	No impact / NA
IA1:PERSONNEL	Fatalities	Multiple Severe injuries	Severe injuries	Minor injuries	No injuries
IA2:CAPACITY	Loss of 60%- 100% capacity	Loss of 60%-30% capacity	Loss of 30%-10% capacity	Loss of up to 10% capacity	No capacity loss
IA3:PERFORMANCE	Major quality abuse that makes multiple major systems inoperable	Major quality abuse that makes major system inoperable	Severe quality abuse that makes systems partially inoperable	Minor system quality abuse	No quality abuse
IA4:ECONOMIC	Bankruptcy or loss of all income	Serious loss of income	Large loss of income	Minor loss of income	No effect
IA5:BRANDING	Government & international attention	National attention	Complaints and local attention	Minor complaints	No impact
IA6:REGULATORY	Multiple major regulatory infractions	Major regulatory infraction	Multiple minor regulatory infractions	Minor regulatory infraction	No impact
IA7:ENVIRONMENT	Widespread or catastrophic impact on environment	Severe pollution with long term impact on environment	Severe pollution with noticeable impact on environment	Short Term impact on environment	Insignificant

The impact of compromising the primary assets is considered against this table for each of:
- **Confidentiality:** Degree to which a service ensures that data is only accessible to those authorised to have access e.g. controllers, ANSPs and air crew.
- **Integrity:** Degree to which the information within the service is as designed (in particular that it is not modified by any external force).
- **Availability:** Degree to which the services are operational and accessible when required for use.

The results of the impact assessment are shown in the following table:

ID	Primary Asset	CIA	IA1 - Personnel	IA2 - Capacity	IA3 - Performance	IA4 - Economic	IA5 - Branding	IA6 - Regulatory	IA7 - Environment	Scenario	Overall Impact	Maximum Impact
PA#1	Trajectory prediction function	C	1	1	1	3	2	1	1	PA1.C.1	1	3
		I	3	2	1	1	4	1	1	PA1.I.1	3	4
			2	4	1	2	4	1	2	PA1.I.2	3	4
			2	1	1	1	1	1	1	PA1.I.3	1	2
		A	2	4	1	2	4	1	2	PA1.A.1	3	4
PA#2	Conflict detection function	C	1	1	1	3	2	1	1	PA2.C.1	1	3
		I	3	2	1	1	4	1	1	PA2.I.1	3	4
			2	4	1	2	4	1	2	PA2.I.2	3	4
		A	2	4	1	2	4	1	2	PA2.A.1	3	4
PA#3	Conflict Resolution Function	C	1	1	1	3	2	1	1	PA3.C.1	1	3
		I	3	2	1	1	4	1	1	PA3.I.1	3	4
			2	4	1	2	4	1	2	PA3.I.2	3	4
		A	2	4	1	2	4	1	2	PA3.A.1	3	4
PA#4	TRACT Resolution Data	C	1	1	1	3	2	1	1	PA4.C.1	1	3
		I	2	2	1	1	3	1	1	PA4.I.1	2	3
			1	2	1	1	3	1	1	PA4.I.2	2	3
		A	1	2	1	1	3	1	1	PA4.A.1	1	3
PA#5	Aircraft Downlink Data e.g. ETA Min/Max	C	1	1	1	1	1	1	1	PA5.C.1	1	1
		I	1	2	1	1	2	1	1	PA5.I.1	1	2
			1	1	1	1	1	1	1	PA5.I.2	1	1
		A								PA5.A.1		0
PA#6	Aircraft performance Model	C	1	1	1	3	2	1	1	PA6.C.1	1	3
		I	2	2	2	2	2	1	1	PA6.I.1	4	2
			1	3	1	2	2	1	1	PA6.I.2	2	3
		A	1	3	1	2	2	1	1	PA6.A.1	2	3
PA#7	Surveillance data	C								PA7.C.1		0
		I	4	5	1	3	5	1	2	PA7.I.1	5	5
			4	5	1	4	4	2	2	PA7.I.2	4	5
		A	5	5	1	4	5	2	2	PA7.A.1	5	5
PA#8	Flight Data (including	C								PA8.C.1		0
		I	5	4	1	2	4	1	2	PA8.I.1	4	5

ID	Primary Asset	CIA	IA1 - Personnel	IA2 - Capacity	IA3 - Performance	IA4 - Economic	IA5 - Branding	IA6 - Regulatory	IA7 - Environment	Scenario	Overall Impact	Maximum Impact
	RBT, Flight Plan, aircraft type)		1	3	1	2	2	1	1	PA8.I.2	2	3
		A	5	4	1	2	4	1	2	PA8.A.1	4	5
PA#9	Met Data	C	1	1	1	1	1	1	1	PA9.C.1	1	1
		I	1	2	1	1	2	1	1	PA9.I.1	2	2
		A	1	2	1	1	2	1	1	PA9.A.1	1	2
PA#10	Clearance Data	C								PA10.C.1		0
		I	5	4	1	2	4	1	2	PA10.I.1	4	5
			1	4	1	2	2	1	1	PA10.I.2	3	4
		A	5	4	1	2	4	1	2	PA10.A.1	4	5
PA#11	AOC Data	C								PA11.C.1		0
		I	1	2	1	1	2	1	1	PA11.I.1	1	2
			1	4	1	2	2	1	1	PA11.I.2	3	4
		A	1	2	1	1	2	1	1	PA11.A.1	1	2
PA#12	Conformance Monitoring Function	C								PA12.C.1		0
		I	5	4	0	2	4	1	2	PA12.I.1	4	5
			1	4	1	2	2	1	1	PA12.I.2	3	4
		A	1	1	0	1	1	1	1	PA12.A.1	1	1
PA#13	Operational Adaptation Data	C								PA13.C.1		0
		I	4	4	0	2	4	1	2	PA13.I.1	3	4
			1	4	1	2	2	1	1	PA13.I.2	3	4
		A	1	2	0	1	1	1	1	PA13.A.1	1	2

Appendix D   Environment impact assessment

Note the environment impact assessment covers all three operational services, including TRACT.

An initial consideration of the three services has concluded that for the CD/R aid to PC and CD/R aid to TC services since they do not alter the way in which aircraft are controlled it would be expected that they would only alter the way in which the controllers obtain information. Therefore they are believed to have a neutral environmental impact. Furthermore, P16.06.03 has conducted an initial sweep of all OFAs to identify those areas which have an impact on environment. In this sweep OFA 3.3.1 and 3.3.3, which P04.07.02 relates to, were not considered to have an environmental impact.

However, TRACT does alter the way in which aircraft are controlled in the en-route phase of flight. The nature of the speed adjustments means that this will have an environmental impact. An initial analysis by NATS of the concepts of 'en-route holding' may be an indication of the impact of TRACT. En-route holding seeks to eliminate standard stack holding by slowing aircraft for extended periods of time in the en-route phase and so could be considered to be an extended version of TRACT. This analysis found that given a 4-5% speed change in the en-route phase, there was an ~1% increase in fuel burn for the period which it was applied (for en-route holding it was envisioned that this could be of the order of hours). The only dependency is if the aircraft would need to change level to maintain that speed (i.e. if it's already flying close to stall speed or maximum Mach).

Appendix E   Conflict Detection and Resolution (CD/R) aid to PC: SVC-04.07.02-SPR-CDR2.002[12]

This section details the Safety and Performance requirements for the PC aid service extracted from the Safety Assessment Report [17]. Traceability and a brief explanation of how the requirements were derived is also provided in Appendix A of this document.

The results and conclusions of the Safety Assessment Report [17], and more specifically the derived Safety Requirements, are valid provided that all the assumptions made during this assessment and presented in the Safety Assessment Report [17] are valid. Those assumptions are yet to be validated.

The Safety and Performance requirements presented are organised based on the operational services identified in the *OSED_4* [12], namely:

- SVC-04.07.02-SPR-CDR2.0002: Conflict Detection and Resolution (CD/R) aid to PC.

The identifiers of the requirements are set according to the rules defined in chapter 4 of the *Requirements and V&V Guidelines [2]* as follows:

<Object type>-<Project code>-<Document code>-<Reference code>.<Reference number>

Where:

- <Object type> is **REQ** for Requirement;
- <Project code> is **04.07.02;**
- <Document code> is **SPR;**
- <Reference code> represents the above mentioned operational services as follows:
  - **CDR2**: Safety and Performance Requirements for the **CD/R Aid to PC;**
- <Reference number> is a sequence number for each series of requirements as follows:
  - **1xxx** – Success Case Safety Requirements;
  - **2xxx** – Failure Case Safety Requirements;

The Requirements presented in this document were derived during the safety workshop under Task 20 and updated during T099 & T093. Some of these requirements were validated/verified during the V2/V3 validation exercises that took place under P04.07.02 and P04.03. For evidence on which of the requirements were validated/verified and which were not please refer to the Safety Assessment Report [17], section 3.3.4.

Figure 9 illustrates an overview of the interaction between the safety elements. Note this SPR document only contains the Safety and Performance Requirements. For the higher level safety elements (SACs, SCSOs and FCSOs) and for a better understanding of the entire derivation process please refer to Appendix A or the Safety Assessment Report [17].

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[12] Note this section was moved from the main body of the document into this Appendix due to the fact that the CD/R Aid to PC concept did not reach V3 maturity.

Figure 11 Overview of the Derivation Process

B

C

D

E

E.1 Safety and Performance Requirements

Some of the requirements presented in this section have been labelled as "functional", "operational" or "performance". Out of these some of them are the same[7] or similar[8] to some of the OSED requirements. However, they have all been left in the safety requirements section since they were all considered to have a safety impact on operations.

The list of requirements which are the same or similar with the OSED requirements for the PC aid is presented in Table 15.

Safety Requirement	Similar/Same OSED Requirement
REQ-04.07.02-SPR-CDR2.1120	REQ-04.07.02-OSED-0002.3056
REQ-04.07.02-SPR-CDR2.1140	REQ-04.07.02-OSED-0002.2016
REQ-04.07.02-SPR-CDR2.1220	REQ-04.07.02-OSED-0002.4016

Table 15 PC Aid OSED Duplicated Requirements with Safety Impact on Operations

Note this section also refers to the results gathered from VP-798 which took place under P04.03. Note also there was no VALR for VP-798 at the time this SPR was produced. All the requirements were extracted from the key results presented in a Webex (attendees are presented in section 3.2.3.4 of the SAR [17]) on the 2nd June 2016. VP-798 input in this SPR is represented by the following requirements:

SPR Requirement
REQ-04.07.02-SPR-CDR2.1460
REQ-04.07.02-SPR-CDR2.1470
REQ-04.07.02-SPR-CDR2.1480
REQ-04.07.02-SPR-CDR2.1490
REQ-04.07.02-SPR-CDR2.1500
REQ-04.07.02-SPR-CDR2.1510
REQ-04.07.02-SPR-CDR2.1520
REQ-04.07.02-SPR-CDR2.1530

Table 16 Requirements from VP-798

For more information on how these requirements were derived please see section 3.2.3 of the Safety Assessment Report [17].

E.1.1 [13]Success Case

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1010
Requirement	The PC Aid shall continuously monitor any planning encounters within the AOR.
Title	Monitor Coordination Encounters
Status	<In Progress>
Rationale	If the process is not continuous infringements will remain undetected and may grow in severity, or alerts may cause undue workload if not current.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3047	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3087	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1020
Requirement	The PC Aid shall continuously display any planning encounters that are being monitored within the AOR.
Title	Display Coordination Encounters

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[13] May include: Performance, Functional and Safety Requirements

Status	<In Progress>
Rationale	If the displaying process is not continuous possible infringements will remain undetected and the controller will not benefit from a reduced workload.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3047	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3087	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3051	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3059	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3056	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3057	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2012	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1440
Requirement	The planner shall be able to distinguish which of the displayed encounters are pertinent through selective filtering functionality.
Title	Distinguish between requirements
Status	<In Progress>
Rationale	The controllers will have the possibility to filter their encounters in order to be able to distinguish the ones which are of interest and to avoid misunderstanding of the traffic picture and loss of situational awareness caused by a crowded display.
Category	<Operational>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2012	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3047	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3052	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2038	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4048	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3058	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3059	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1450
Requirement	ATCOs shall be able to delete/supress/hide alerts.
Title	PC supresses alerts
Status	<In Progress>

Rationale	The PC aid will not negatively impact controller's situational awareness by creating clutter on the situational displays. Therefore the planner controller should have means to supress or delete the unwanted/nuisance alerts.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3059	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2012	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3047	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3052	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2038	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4048	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3058	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1030
Requirement	The PC Aid shall make the controller aware to any planning encounters that are being monitored if they increase in severity[14].
Title	PC Aid alert
Status	<In Progress>
Rationale	The PC aid will improve the controller's reaction time to higher severity coordination encounters compared to current operations which would result in a faster mitigation appliance. Conversely high severity infringements will be passed to the tactical controller.
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3047	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3087	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3051	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3059	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2012	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3058	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3119	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

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[14] Increase in severity = the distance between the two a/c involved in the conflict diminishes faster than usual; one or both the a/c deviate from their trajectories such that the time until the conflict diminishes faster; or any other sudden change in the time/distance until the conflict.

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1050
Requirement	If a flight is involved in a planning encounter with more than one environmental flights these encounters shall be displayed as individual pairs[15].
Title	Individual pairs display
Status	<In Progress>
Rationale	Displaying the encounters as individual pairs will help the controller to understand the situation better hence he will maintain & retain situational awareness quickly as opposed to displaying the encounters all together, which may not be easy to assimilate or understand.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3047	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3087	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3051	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3059	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2012	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2038	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3119	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1060
Requirement	The PC Aid shall indicate any what-if encounters on the situation display and PC Aid tool displays when the Planner probes an alternative coordinated level, heading or direct route (i.e. a 'what-if' probe).
Title	Display planning encounters
Status	<In Progress>
Rationale	To assist the controller in decision making the PC aid would identify and display via the 'what if' function an inadequate proposed resolution and the possible new conflicts created by it.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2015	<Partial>

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[15] Individual Pairs = If a/c A was involved in a conflict with a/c B and C, two individual encounters were displayed on the HMI, i.e.:

1. a/c A with a/c B; and

2. a/c A with a/c C.

<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3057	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4014	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2012	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3087	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3056	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3055	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3076	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2013	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1070
Requirement	The what-if encounters display shall be removed from the situation display and tools when the controller stops the 'what-if' probe, and the clearance shall not be committed to the system.
Title	Cessation of the 'what-if' probe
Status	<In Progress>
Rationale	In order to remove temporary data that may be misleading, the 'what-if' tool will only be used as a theoretical tool which will give the controller an image on what could happen if various clearances were to be given.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3056	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3058	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4055	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3055	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3076	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2013	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1080
Requirement	The planner shall be able to commit the alternative coordination to the system by a specific action.
Title	Alternative clearance
Status	<In Progress>
Rationale	The planner will have the ability to confirm through a specific HMI action the probed coordination as a replacement "alternative coordination" to the current coordination. This "alternative coordination" can then be offered to the (possibly alternative) receiving sector and will ensure that the workload level will remain low or will even decrease.
Category	<Operational>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3049	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A

<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1090
Requirement	The revised coordination shall be indicated to the upstream planner and upstream Executive.
Title	Revised coordination
Status	<In Progress>
Rationale	The HMI will warn the upstream planner/executive controllers about a revised coordination in order to maintain their situational awareness and increase their speed of reaction.
Category	<Operational>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3054	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3049	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3044	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1100
Requirement	The PC aid shall display the severity and geometry of each encounter that is displayed to the planner.
Title	Severity and geometry
Status	<In Progress>
Rationale	The PC aid will enhance the planner's situational awareness and will help in assessing the severity of the encounters.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3077	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2012	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3087	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3058	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3056	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3055	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3076	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3052	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1110
Requirement	When a subject flight is selected, the PC Aid shall display to the planner any potential speculative encounters at all sector coordination entry and exit

	levels.
Title	Subject flight selection
Status	<In Progress>
Rationale	For a more accurate conflict resolution and to decrease the planner's workload, the PC aid will use the 'what-else' function to detect and display any encounters.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3077	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3056	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3076	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3055	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3058	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3049	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3045	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3046	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2012	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2015	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1120
Requirement	All potential what-else encounters at every sector entry and exit flight level shall be displayed in elevation view to the Planner controller.
Title	Elevation view
Status	<In Progress>
Rationale	For a more accurate conflict detection and to decrease the planner's workload, the PC aid will use the 'what-else' function to detect and display in elevation view any encounters.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3056	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3058	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1130
Requirement	The PC Aid shall alert the Planner controller if the system predicts the flight will not achieve coordinated exit flight level.
Title	Coordinated flight level not achieved
Status	<In Progress>
Rationale	The PC aid will monitor the conformance of the aircraft with the coordinated exit flight levels and will highlight the non-compliant ones to increase the planner's situational awareness and speed of reaction.

Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2014	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4018	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3053	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4017	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1140
Requirement	The PC Aid shall automatically coordinate flights into the sector without reference to the planner controller when the coordination passes the MTCD check.
Title	Automatically coordinate flight levels
Status	<In Progress>
Rationale	The PC aid will decrease the planner's workload and will coordinate flights automatically when the proposed flight levels pass the check of other tools from the system.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2016	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4019	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3060	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4023	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1150
Requirement	Where the coordination fails the MTCD check, the PC Aid shall refer the coordination offer to the Planner controller for manual assessment.
Title	MTCD check fails
Status	<In Progress>
Rationale	The PC aid will decrease the planner's workload but not by creating unresolved tactical conflicts.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2016	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3060	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4019	<Partial>

<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4023	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1160
Requirement	The PC Aid shall automatically set the exit flight level for a flight without reference to the planner controller when the corresponding flight level passes the MTCD check.
Title	PC automatic flight level
Status	<In Progress>
Rationale	The PC aid will decrease the planner's workload and will coordinate exit flight levels automatically when the proposed flight levels pass the check of other tools from the system.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4021	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4022	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2016	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3060	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4020	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1170
Requirement	The PC Aid shall alert the planner to coordinate an exit flight level in the instances that the system does not do this automatically, or cannot find a suitable XFL.
Title	Coordinate an exit flight level
Status	<In Progress>
Rationale	In order to keep the controller aware of the current situation, the PC aid tool will highlight when a suitable exit flight level has not been assigned or selected.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4023	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4022	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4021	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3060	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2016	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1180

Requirement	It shall be possible for the Planner to override any automatic coordination decision by the system.
Title	Planner override
Status	<In Progress>
Rationale	The safety of the system is ultimately the responsibility of the controller hence he will be the one to decide if a coordination decision of the system is suitable or not.
Category	<Operational>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2016	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4020	<Partial>
<APPLIES TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1190
Requirement	It shall be possible for the Planner to withdraw a coordination offer that has been made to the Downstream sector if this coordination is no longer relevant to that Downstream Sector.
Title	Coordination offer
Status	<In Progress>
Rationale	The planner will be able to withdraw any coordination offer if that specific coordination offer will create hazardous situations to the downstream sector or if it has been agreed with the downstream sector to be withdrawn.
Category	<Operational>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3044	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3049	<Partial>
<APPLIES TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED BECAUSE OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1200
Requirement	The PC Aid shall alert the planner to any coordination that have been rejected or revised by the downstream sector.
Title	Rejected coordination
Status	<In Progress>
Rationale	In order to keep the planner aware of the current situation and prevent him in creating infringements in the downstream sectors, the PC aid tool will provide an alert about any coordination that have not been accepted by the downstream sector.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3044	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1210
Requirement	Any rejected coordination (by the planner) shall be removed from the PC Aid consideration.
Title	Remove rejected coordination
Status	<In Progress>
Rationale	If a proposed coordination has been rejected it is more than likely that the situation will not change hence the PC aid will lose time in which it can help the planner solving other issues by insisting with the same coordination offer.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4023	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1220
Requirement	The planner shall be able to apply coordination constraints to the coordination trajectory to a flight as either a heading, speed or direct route instruction.
Title	Coordination constraints
Status	<In Progress>
Rationale	The planner will save the PC aid from unnecessary coordination attempts that will be rejected by other sectors from various reasons (LoA or other constraints).
Category	<Operational>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4016	<Full>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1230
Requirement	The coordination trajectory and any TP and MTCD outputs shall be updated by the committal of coordination constraints done by the planner controller.
Title	TP and MTCD updates
Status	<In Progress>
Rationale	To avoid future hazards the other tools in the system will be updated with the coordination constraints from the PC aid.
Category	<Functional>

Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4016	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1240
Requirement	The PC Aid shall alert the controller if the flight is deviating from the applied coordination constraints.
Title	Deviating from the flight level constraint
Status	<In Progress>
Rationale	The PC aid will monitor the conformance of the aircraft with the applied flight level coordination constraint and will highlight the non-compliant ones to increase the planner's situational awareness.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4017	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3053	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1250
Requirement	The deviation alerts associated with coordination constraints shall be triggered at times/events appropriate to the controller role.
Title	Spurious alerts
Status	<In Progress>
Rationale	Spurious alerts will be avoided.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4017	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3053	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1260
Requirement	The PC Aid shall produce a coordination trajectory for every flight of interest to the sector as soon as the flight is recognised to the sector.
Title	Automatic coordination trajectory
Status	<In Progress>
Rationale	In order to not increase controller's workload, the PC aid will automatically

	compute coordination trajectories for every flight recognised to the sector.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4054	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4055	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4056	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1270
Requirement	The FDPS shall alert the ATCO that there is a new coordination offer for the sector via the PC Aid.
Title	Coordination offer
Status	<In Progress>
Rationale	The PC aid will help maintaining or even increasing the controller's situational awareness.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2015	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1280
Requirement	The FDPS alert about the new coordination offer shall remain displayed until the Planner has taken some action to interrogate the new coordination offer.
Title	Coordination offer displayed
Status	<In Progress>
Rationale	The PC aid will make the controller aware of the new coordination offers and will make sure the controller takes action to address it.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2015	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1300
Requirement	On interrogation of a coordination offer via what-if or what-else probe, the coordination trajectories of the subject flight and any environmental flights that

	form an encounter with the subject flight shall be displayed within x number of seconds.
Title	Interrogation of a coordination offer
Status	<In Progress>
Rationale	The PC aid will use the 'what-if' or 'what-else' function to test and display (usually within 500 ms) the coordination offers in order to make the controller aware of the possible encounters generated by it.
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3056	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3055	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3052	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2011	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1310
Requirement	On cessation of the interrogation probe of the subject flight the coordination trajectories of that flight and any interacting environmental flights shall disappear.
Title	Cessation of the interrogation
Status	<In Progress>
Rationale	The PC aid will not create controller confusion and will make it clear when an interrogation has stopped.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3076	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3077	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3119	<Partial>
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<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1320
Requirement	The Planner shall be able to reject a flight from the upstream sector if he decides that the coordination offer is unsuitable and/or unsafe for the traffic situation at that time.
Title	Reject flight
Status	<In Progress>
Rationale	The planner will decide if receiving a certain flight will negatively impact the overall safety of the current traffic situation in his area of interest.
Category	<Operational>
Validation Method	<Real Time Simulation>

Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4023	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1330
Requirement	The Planner shall be able to revise the flight level of any coordination offer.
Title	Revise flight levels
Status	<In Progress>
Rationale	The planner will be able to change receiving flight's flight levels to be more suitable and/or safe for the traffic situation at the time.
Category	<Operational>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4023	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1340
Requirement	When the Planner probes a potential Exit flight level via the What-if or What-else, the PC Aid shall display to the Planner all other flights (context flights) that are between the entry level and proposed exit flight level along the subject flight's trajectory.
Title	Probing exit flight levels
Status	<In Progress>
Rationale	For a more accurate possible conflict detection and to decrease the planner's workload, the PC aid will highlight the context flights to the planner controller.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2038	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3109	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3110	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1350
Requirement	Context encounters shall be distinguishable to the controllers from planning encounters.

Title	Context flights
Status	<In Progress>
Rationale	By making the context flights distinguishable from the coordination flights the PC aid will avoid misleading the controllers do any possible wrong clearances.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3110	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2038	<Partial>
<APPLIES TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1360
Requirement	The planner shall be able to accept a flight via the PC aid which shall inform all relevant parties i.e. upstream planner and upstream executive.
Title	Accept flights via PC aid
Status	<In Progress>
Rationale	PC aid will relieve the controller of informing the upstream sector about an accepted coordination in order to help on reducing workload.
Category	<Operational>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3044	<Partial>
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<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED BECAUSE OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1380
Requirement	The time between which the planner points out encounters of tactical interest to the tactical workstation display shall be x number of seconds.
Title	Coordination point-out
Status	<In Progress>
Rationale	The planner and the executive controllers will be able to coordinate between each other in order to be able to have a common understanding of the traffic picture at all times.

The information on the HMI will be updated in a fast manner (usually 500 ms) in order to avoid delays which might lead the controllers to make errors. |
Category	<Performance>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3054	<Partial>

<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3044	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3043	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1390
Requirement	The Executive and Planner shall be able to independently remove the coordination point out from their respective work positions.
Title	Executive and planner
Status	<In Progress>
Rationale	The controllers will have the possibility to independently remove already solved data, or of no interest, from their HMI in order to avoid crowded displays which will cause misunderstanding of the traffic picture and loss of situational awareness.
Category	<Operational>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3054	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.1002	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1400
Requirement	The PC Aid shall be available continuously at all controller work positions, regardless of role assigned at that workstation.
Title	All working positions
Status	<In Progress>
Rationale	Controllers will be able to access PC aid information in order to be able to have a common understanding of the traffic picture at all times.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3054	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.1002	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1410
Requirement	The controller shall have the ability to select or de-select the PC aid display.
Title	PC aid selection/de-selection
Status	<In Progress>
Rationale	The controller will be able to access the PC aid functionality as required.
Category	<Functional>

Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3054	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.1002	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1420
Requirement	The PC Aid shall highlight those flights that are Holding within the sector against every MTCD probe.
Title	Holding flights
Status	<In Progress>
Rationale	By always highlighting holding flights, the planner's situational awareness will be enhanced.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3047	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1430
Requirement	The PC Aid shall highlight any unusual/unexpected flights operating within the sector against every MTCD probe.
Title	Unusual flights
Status	<In Progress>
Rationale	To maintain safety into the sector, flights with unusual/unexpected behaviour (supersonic, special flights, etc.) will be highlighted to the controller.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3047	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

E.1.2 Failure Case

All the OSED Requirements that contain FDPS, SDPS, FMS or PC aid data have been mentioned in the traceability tables for the Failure Case Safety Requirements respectively. Note that in some cases all the OSED Requirements have been considered to be relevant.

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2010
Requirement	The probability of loss of FDPS shall be no more than 9.52E-06 per flight hour.
Title	Loss of FDPS
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3045	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3046	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3076	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3077	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4054	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4055	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4056	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3047	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3049	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3052	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2038	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3109	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4045	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3110	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3053	<Partial>
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<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED BECAUSE OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2020
Requirement	The probability of loss of SDPS shall be no more than 9.52E-06 per flight hour.
Title	Loss of SDPS
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3045	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3046	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3076	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3077	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4054	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4056	<Partial>

<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3047	<Partial>
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<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2030
Requirement	The probability of loss of Upstream PC Aid shall be no more than 1.33E-05 per flight hour.
Title	Loss of Upstream PC Aid
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.1002	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3076	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3077	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3119	<Partial>
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<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2040
Requirement	The probability of loss of PC Aid shall be no more than 9.52E-06 per flight hour.
Title	Loss of PC Aid
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

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[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2050
Requirement	The probability of loss of Downstream PC Aid shall be no more than 9.52E-06 per flight hour.
Title	Loss of Downstream PC Aid
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

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[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2060
Requirement	The probability of delay of the FDPS shall be no more than 9.52E-06 per flight hour.
Title	Delay of FDPS
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2070
Requirement	The probability of delay of the SDPS shall be no more than 9.52E-06 per flight hour.
Title	Delay of SDPS
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2080
Requirement	The probability of delay of the Upstream PC Aid shall be no more than 1.33E-05 per flight hour.
Title	Delay of Upstream PC Aid
Status	<In Progress>

Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2090
Requirement	The probability of delay of the PC Aid shall be no more than 9.52E-06 per flight hour.
Title	Delay of PC Aid
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2100
Requirement	The probability of delay of the Downstream PC Aid shall be no more than 9.52E-06 per flight hour.
Title	Delay of Downstream PC Aid
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2110
Requirement	The probability of corruption (undetected) of the FDPS shall be no more than 9.52E-06 per flight hour.
Title	Corruption of FDPS (undetected)
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2120
Requirement	The probability of corruption (undetected) of the SDPS shall be no more than 9.52E-06 per flight hour.
Title	Corruption of SDPS (undetected)
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>

Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2130
Requirement	The probability of corruption (undetected) of the Upstream PC Aid shall be no more than 1.33E-05 per flight hour.
Title	Corruption of Upstream PC Aid (undetected)
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2140
Requirement	The probability of corruption (undetected) of the PC Aid shall be no more than 9.52E-06 per flight hour.
Title	Corruption of PC Aid (undetected)
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2150
Requirement	The probability of corruption (undetected) of the Downstream PC Aid shall be no more than 9.52E-06 per flight hour.
Title	Corruption of Downstream PC Aid (undetected)
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3042	<Partial>
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<APPLIES TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED BECAUSE OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2160
Requirement	The probability of corruption (detected) of the FDPS shall be no more than 1.54E-04 per flight hour.
Title	Corruption of FDPS (detected)
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3047	<Partial>
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<APPLIES TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2170
Requirement	The probability of corruption (detected) of the SDPS shall be no more than 1.54E-04 per flight hour.
Title	Corruption of SDPS (detected)
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2180
Requirement	The probability of corruption (detected) of the Upstream PC Aid shall be no more than 1.54E-04 per flight hour.
Title	Corruption of Upstream PC Aid (detected)
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2012	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3119	<Partial>
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Relationship	Linked Element Type	Identifier	Compliance
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<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED BECAUSE OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2190
Requirement	The probability of corruption (detected) of the PC Aid shall be no more than 1.54E-04 per flight hour.
Title	Corruption of PC Aid (detected)
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<APPLIES TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2200
Requirement	The probability of corruption (detected) of the Downstream PC Aid shall be no more than 1.54E-04 per flight hour.
Title	Corruption of Downstream PC Aid (detected)
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<APPLIES TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2210
Requirement	The probability of the Upstream Planner misunderstanding the tool shall be no more than 1.43E-04 per flight hour.
Title	Upstream Planner misunderstanding
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3057	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4014	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4015	<Partial>
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<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2220
Requirement	The probability of the Planner misunderstanding the tool shall be no more than 9.52E-06 per flight hour.
Title	Planner misunderstanding
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3051	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4048	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3054	<Partial>
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3057	<Partial>
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<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2230
Requirement	The probability of the Downstream Planner misunderstanding the tool shall be no more than 1.43E-04 per flight hour.
Title	Downstream Planner misunderstanding
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4048	<Partial>
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<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2240
Requirement	The probability of the Upstream Executive misunderstanding the tool shall be no more than 1.43E-04 per flight hour.
Title	Upstream Executive misunderstanding
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4018	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3060	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2250
Requirement	The probability of the Executive misunderstanding the tool shall be no more than 1.43E-04 per flight hour.
Title	Executive misunderstanding
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3051	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3043	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4048	<Partial>

<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3054	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3055	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3056	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3057	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4014	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4017	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3059	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4018	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3060	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.2260
Requirement	The probability of the Downstream Executive misunderstanding the tool shall be no more than 1.43E-04 per flight hour.
Title	Downstream Executive misunderstanding
Status	<In Progress>
Rationale	See sections A.3, A.4 or the SAR [17]
Category	<Safety>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3051	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3043	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4048	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3054	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3055	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3056	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3057	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4014	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4017	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3059	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4018	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3060	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

E.1.3 Requirements from VP-798

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1460
Requirement	The conflict detection function shall compute at its defined look ahead time, whatever the CWP display setting or configuration.
Title	Computes at look ahead time
Status	<In Progress>
Rationale	The aim is to ensure a permanent computation / automatic detection whatever the HMI configuration of the CWP (especially regarding the display settings). Thus, the system is still able to trigger an (critical) alert.

	For example, if the ATCO reduces the time horizon of the MTCD to 10min (from the HMI, i.e. reducing the timeline of the agenda), the MTCD capability of detection will not be impacted as it will still be able to detect conflicts at a 15 min (for example) time horizon and it will still be able to integrate the conflict information in a different part of the CWP HMI such as in label or flight leg.
Category	\<Functional>
Validation Method	\<Real Time Simulation>
Verification Method	\<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
\<SATISFIES>	\<ATMS Requirement>	REQ-04.07.02-OSED-0002.3047	\<Partial>
\<SATISFIES>	\<ATMS Requirement>	REQ-04.07.02-OSED-0002.2012	\<Partial>
\<SATISFIES>	\<ATMS Requirement>	REQ-04.07.02-OSED-0002.2013	\<Partial>
\<APPLIES TO>	\<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
\<APPLIES_TO>	\<Operational Focus Area>	OFA03.03.01	N/A
\<CHANGED_BECAUSE_OF>	\<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1470
Requirement	The conflict detection's Trajectory Prediction function shall take into account accurate flight data (such as aircraft speed).
Title	TP accurate flight data
Status	\<In Progress>
Rationale	False and missed detections due to TP inaccuracy (e.g. inaccurate SPD data) need to be avoided, especially when the time horizon is close to the current time.
Category	\<Functional>
Validation Method	\<Real Time Simulation>
Verification Method	\<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
\<SATISFIES>	\<ATMS Requirement>	REQ-04.07.02-OSED-0002.3045	\<Partial>
\<APPLIES TO>	\<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
\<APPLIES_TO>	\<Operational Focus Area>	OFA03.03.01	N/A
\<CHANGED BECAUSE OF>	\<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1480
Requirement	The conflict detection's upper bounds of the look ahead time shall be at least 15 minutes.
Title	Conflict Detection upper bounds
Status	\<In Progress>
Rationale	In the reference scenario (i.e. without MTCD) the PC is working at a look ahead time at or above 15 minutes. Thus, the MTCD shall do the same; otherwise its added-value will be very limited. A look ahead time lower than 10 minutes is starting to be too close to the "tactical" horizon of the conflict detection (i.e. the TCT based on aircraft attitude is starting to be more relevant than the MTCD based on planned trajectory).
Category	\<Functional>
Validation Method	\<Real Time Simulation>
Verification Method	\<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2011	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1490
Requirement	The conflict detection's lower bounds of the look ahead time shall be consistent with the upper bounds of the TCT look ahead time.
Title	Conflict Detection lower bounds
Status	<In Progress>
Rationale	Clutter due to displaying the same conflicts by two separate tools needs to be avoided. Otherwise this can create loss of situational awareness. Also, the MTCD's operational performance of detecting conflicts might start to be less relevant or accurate compared to the one proposed by a Tactical Controller Tool (i.e. the TCT based on aircraft attitude is starting to be more relevant instead of the MTCD based on planned trajectory).
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.2011	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1500
Requirement	The conflict notification filters shall reflect individual sector adaptations.
Title	Conflict notification filters
Status	<In Progress>
Rationale	Conflicts under / over filtering will be avoided in order to prevent missing conflicts or a loss of situational awareness.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.4012	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1510
Requirement	The conflict detection function shall inform the controller about each potential loss of separation within the AOR & AOI, involving at least one distributed flight.

Title	Conflict Detection mid-term conflict encounters
Status	<In Progress>
Rationale	Specific conflict cases where the conflict's location is too close to a sector boundary and where a coordination may be required to manage these conflicts are included by this requirement.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3044	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1520
Requirement	The HMI shall classify data blocks by priority and/or severity order.
Title	HMI classifies data blocks
Status	<In Progress>
Rationale	The conflict detection tool will enhance the controller's situational awareness and will help the controller in assessing the severity of each encounter.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3052	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR2.1530
Requirement	The system (MTCD and its HMI) shall support the ATCO to mentally represent the geometry of a conflict.
Title	Mental representation of conflicts
Status	<In Progress>
Rationale	The controller's situational awareness and decision making will be enhanced by the tool through helping the controller to mentally represent the conflict geometry.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0002.3052	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR2.0002	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

Appendix F   Deleted Requirements – TC Aid

The following requirements have been deleted in accordance with the last OSED [12] update. They represent SPR requirements which are similar or the same with the OSED requirements that have been deleted from the OSED.

[REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1020
Requirement	The TC Aid shall produce a Tactical trajectory for a flight when track data and either a cleared flight level or entry flight level is available for a flight.
Title	Tactical trajectory
Status	<Deleted>
Rationale	A tactical trajectory requires ATC information to be operationally meaningful for tactical resolution, such as an agreed NFL or CFL.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3089	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3093	<Partial>
<APPLIES TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1180
Requirement	The calculated trajectory shall be a Tactical Trajectory if valid flight plan data is available and if no deviation, as detected by Flight Path Monitoring occurred. Otherwise it is referred to as a deviation trajectory.
Title	Tactical and deviation trajectories
Status	<Verified>
Rationale	The difference between tactical and deviation trajectories will be clear.
Category	<Operational>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2033	<Full>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED BECAUSE OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1270
Requirement	The TC Aid shall discard an encounter between a pair of aircraft if vertical or horizontal separation is not infringed anymore.
Title	Discard encounter
Status	<Verified>
Rationale	The TC aid will not mislead the controller by displaying already solved encounters as encounters that are not solved in order to avoid unnecessary

	actions which will distract the controller from the actual traffic picture.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2008	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1280
Requirement	If two aircraft are involved with more than one encounter with each other the TC Aid shall only display the first encounter.
Title	First encounter
Status	<Verified>
Rationale	Since it is assumed that the secondary encounter may disappear as soon as the first encounter has been solved, the TC aid will only display the first encounter to avoid visual clutter and make it easy for the controller to distinguish information. It is assumed that secondary encounters will disappear as soon as the first encounter has been solved.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2008	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1210
Requirement	The TC Aid shall detect if a deviation no longer exists and remove the display of the alert to the controller.
Title	Remove deviation tag
Status	<Verified>
Rationale	The TC aid will not mislead the controller by keeping already solved deviations on the situational display thus creating false alerts.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2005	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3019	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.2004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3021	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3022	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3023	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3024	<Partial>

<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3026	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3010	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1230
Requirement	The TC Aid shall provide what-if probing to the controllers.
Title	What-if probing
Status	<Verified>
Rationale	The TC aid will enhance the controller's situational awareness by helping in detecting separation infringements using the "what-if" function of the tool.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3038	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

[REQ]

Identifier	REQ-04.07.02-SPR-CDR1.1250
Requirement	When the controllers request a what-if probe for a flight level the TC Aid shall display if the flight level is conflict free or not, and if a vertical rate is necessary to achieve a level.
Title	Flight level what-if probing
Status	<Verified>
Rationale	The TC aid will enhance the controller's situational awareness and help him in decision making by suggesting conflict free vertical trajectories.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Analysis>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.07.02-OSED-0001.3040	<Partial>
<APPLIES_TO>	<Service>	SVC-04.07.02-SPR-CDR1.0001	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA03.03.01	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A

-END OF DOCUMENT-